FARMER-LED SOIL CONSERVATION INITIATIVE IN A DEVELOPING COUNTRY SETTING : THE CASE OF THE CLAVERIA LAND CARE ASSOCIATION IN CLAVERIA, MISAMIS ORIENTAL, PHILIPPINES

By

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ABSTRACT

FARMER-LED SOIL CONSERVATION INITIATIVE IN A DEVELOPING COUNTRY SETTING : THE CASE OF THE CLAVERIA LAND CARE ASSOCIATION IN CLAVERIA, MISAMIS ORIENTAL, PHILIPPINES

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In the middle of 1996, a group of 20 farmers in Claveria, Misamis Oriental, formed an organization called the Claveria Land Care Association (CLCA) under the support and patronage of the International Centre for Research on Agroforestry (ICRAF). The objective of the organization was to promote the use of contour plowing through a farmer-to-farmer approach. By the year 2000, the CLCA had members in 105 *sitios* while the absolute number of adopters of contour plowing has almost doubled from the previous number of adopters. The CLCA is credited for the phenomenal rise in farmers that have switched to contour plowing in Claveria.

This study investigates the CLCA phenomenon by: (1) documenting the events leading to farmer awareness of soil erosion problems in Claveria and the options available to combat them; (2) documenting its evolution from a low-key farmer organization to a high-profile promoter of soil conservation; (3) determining the characteristics and activities of the CLCA sub-chapters that made significant influence on adoption of contour plowing; (4) determining the characteristics of the farmers who perceive themselves as members of the CLCA; (5) determining the parcel and farmer characteristics that influence adoption; and (6) identify the future challenges that the CLCA *sitio*-based organizations face.

Using primary data collected from a survey of 274 randomly-selected farmers from 45 *sitios* in the municipality of Claveria, a probit analysis was done to determine the statistical association between perception of membership, and the farmers' socio-economic characteristics, ties with the community and participation in community activities. The probit analysis was also utilized to test the statistical relationship between adoption of contour plowing, and the variables farmers' socioeconomic traits, parcel characteristics and perception of membership. The results indicate that attendance in cross-visits and *sitio* meetings, and those that lived close to Claveria are more likely to perceive themselves as members of the CLCA. Further, number of parcels tilled by the farmer, attendance in training and *sitio* meetings, slope of the parcel tilled, and the area of the parcel have a significant statistical association with contour farming adoption.

The study also found that the CLCA lacks self-sufficiency in funds generation and needs to lock down on the membership selection criteria and benefits in order to sustain its activities in the future. The CLCA's mechanism for participatory governance and democratic selection of its leaders is well in place.

The results and insights gained from the findings of this research paper are relevant for policy makers and development project designers in creating programs and schemes aimed at catching the "elusive" adopters of technology -- traditional farmers from the developing countries.

In memory of my brother Teddy and our father Guillermo. I miss you both

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1.1 Problem Statement

Soil degradation is a chronic problem throughout the world, especially in developing countries. Although technology is available to fully address the threat of soil degradation, farmer adoption of soil conservation technology has been limited due to various factors, ranging from their inability to invest in conservation innovation to inadequate institutional structures for facilitating information flow and insecurity of property rights (Lal, 1990; Place and Hazell, 1993). This is a challenge, as well as a problem, for policy makers in government and development groups since soil erosion and loss of soil fertility continue to threaten the viability and productivity of agricultural land. Ironically, it is the farmer -- widely regarded as one of the main perpetrators of soil degradation, but whose livelihood depends on the productivity of the land -- who stands to lose everything in the end, should the problem remain unsolved.

Unless ways are found to reduce agricultural-induced soil degradation, pressure on the natural environment will continue to grow as a result of siltation, run-off and, in the absence of inexpensive productivity enhancing methods, the conversion of forested land into agricultural land. The pressure on the natural environment is likely to continue as food security remains one of the most important objectives of modern time (Fujisaka and Garrity, 1988; Pimentel, 1995; Pimentel, 1998). It is imperative, therefore, that a solution be found and implemented in order to arrest the continuous degradation of land.

New methods of agricultural production that merge production and inter-

generational sustainability objectives -- commonly referred to in the development field as sustainable farming -- can sustain the production potential of land. However, the impact of development programs geared toward this objective will remain limited unless these technologies are widely adopted by resource poor farmers throughout the developing world.

This study analyzes a farmer-led initiative in a low-income nation -- the Philippines -- that has successfully accelerated farmer adoption of contour plowing, an effective but relatively simple technology for soil conservation. Recognizing that the dynamics of adoption are complex, this research also explores the determinants of adoption and test how the interplay of these forces (economic, institutions and socio-demographics) influence adoption by poor farmers.

1.2 Background

There is ample evidence that shows that the adoption rate for soil conservation innovations among poor farmers has been low in a number of communities in developing nations, despite the active promotion of these innovations by policy makers, government and international organizations. In many cases, non-adoption is attributed to the perceived conflict between production and conservation. Some farmers view conservation as too costly, relative to its short term benefits, while others find the returns on conservation adoption as too uncertain (Lovejoy and Parent, 1982; Pampel and van Es, 1977; Nowak, 1987). Both situations have discouraged farmers from adopting conservation farming, especially in developing countries where the majority of the farmers

live under conditions of extreme poverty (Spears, 1983).

Soil degradation, however, remains one of the most pressing environmental problems in the world -- particularly in the humid tropics (Pimentel, 1998; El-Swaify, 1993). Furthermore, development specialists, policy makers and members of the scientific community agree that the most serious threat to soil quality is man's intervention (Lal, 1990), particularly by way of agricultural production activities. Studies further show that soil fertility has been declining steadily, primarily as a result of continuous harvesting of trees for trade and fuel wood consumption and the conversion of forest land to agricultural use. This has weakened nature's ability to protect itself from natural phenomena like wind and heavy rains, especially in the upland areas which are more susceptible to erosion.

Because adoption of a technology is a complex process, understanding the factors that impact on farmer adoption is an important area for research. Mainstream economics assume that rationality dictates the action of an economic agent and, hence, is the primary force in explaining behavior. Economic rationality suggests that an economic agent is led into action by his desire to maximize economic returns while minimizing costs. With this in mind, we would expect that conservation technologies would be readily embraced by farmers, since their use assures the fertility of the land and continuous production in the future. Being aware of the economic value of fertile soils, farmers should be open to adopting soil conservation technologies.

However, empirical evidence suggests that farmer adoption of conservation technologies is not simply about monetary costs and profits (Nkonya *et al*, 1997; Feather,

1982; Swinton, 2000) . Rather, additional factors such as the farmers' values, perceptions and the inter-agent relationships that are not captured in mainstream economic theories are starting to be recognized as significant contributors to farmers' conservation adoption decision.

Traditionally, the farmer's decision equation is explained by market-related variables such as goods' prices and input costs. However, a growing body of evidence suggests that farmer adoption of conservation technology is often influenced by an individual's sentiment of civic action, and is the product of social interaction with other members of the community. As this research will demonstrate, factors such as the farmers' social characteristics and farmers' relationship with their social environment are as relevant variables in understanding the process of adoption of conservation technologies, as are economic considerations.

There is growing evidence that farmers in low-income societies do not base their decisions solely on the profitability or purely self-serving motives. Culture and societal norms have a strong influence on a farmer's value system which in turn influence his actions. Values are important because they shape an agent's behavior to relegate profit and personal gains to the role of minor decision variables, especially for farmers from the developing nations whose communities are still characterized by strong traditional norms. Because economics, social, and environmental factors all play a role in farmers' adoption decision, it is difficult to generalize regarding which factors are most important in shaping farmers' decision to adopt or not adopt in a given community. This suggests that the case study approach is required to analyze farmers' adoption behavior. Through case study

analysis, it is possible to isolate specific qualitative factors that potentially explain farmers' decision-making behavior, including aspects of the social environment that directly relates to his adoption or non-adoption decisions.

This case study was conducted in the municipality of Claveria in the Misamis Oriental province in southern Philippines. Claveria was chosen as the research site at the request of the International Centre for Research on Agroforestry (ICRAF), which recently became involved in promoting soil conservation through community-based farmer groups. ICRAF has been experimenting with agroforestry systems in upland communities since the late 1980s. In 1996, a group of farmers who participated in one of ICRAF's training sessions on contour plowing, established a farmer-led soil conservation effort which had evolved into a farmer association known as the Claveria Land Care Association (CLCA). ICRAF helped establish the CLCA in order to assist them to disseminate information about contour plowing and the use of buffer crops.

The CLCA has caught the attention of development agencies and the local government because it is considered to be one of the most successful farmer-led soil conservation initiatives in the region of Mindanao. The CLCA model is being studied and emulated by other provinces in Mindanao and plans are in the pipeline for its replication on a regional level, prior to expanding it nationally.

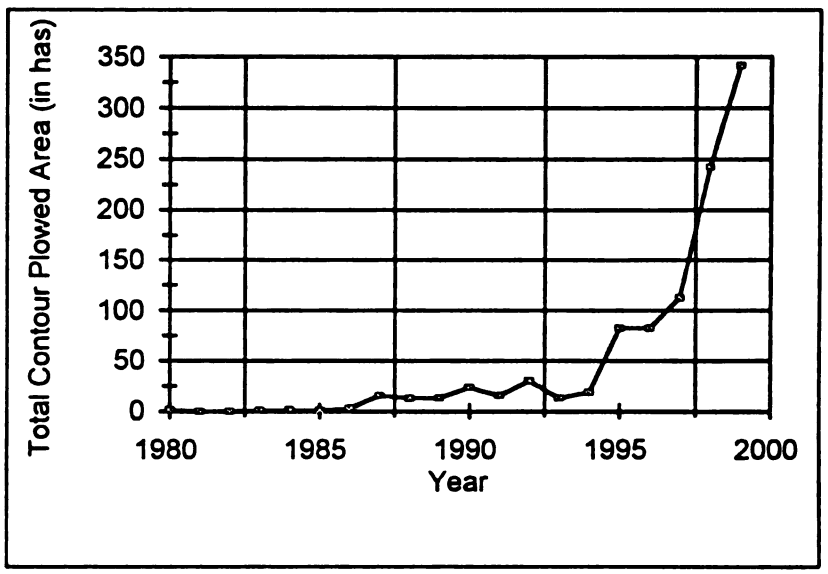
Given its success in promoting soil conservation among resource (and investment) -- poor farmers, the CLCA merits careful scrutiny in order to identify its unique qualities, document what it has done to achieve its goals, and to determine how conditions that have made the CLCA's conservation movement successful can be replicated in other areas. The

lessons to be learned from the CLCA experience will be useful to both government and non-government agencies in planning future grassroots programs and in determining the role that they can play to enhance soil conservation initiatives.

1.3 Research Issues

As a result of information dissemination and extension activities conducted in Claveria by the International Rice Research Institute (IRRI) and ICRAF for the past two decades, farmers' awareness of soil erosion and adoption of soil conservation technologies increased dramatically, as shown in Figure 1. Furthermore, ICRAF's

Figure 1 - Total Area Contour Plowed, 1980-1999, Claveria, Philippines



Source: ICRAF, 2000.

research efforts, which have quantified the economic benefits of soil conservation (*i.e.*, higher land productivity and additional income from the trees and crops planted on the buffer strips) have demonstrated that soil conservation is a sound investment for farmers.

Existing literature, suggests that farmer adoption of conservation technologies is typically low due to several factors including the relative high investment costs for the technology, insecure land tenure (Sajise and Ganapin, 1991; Agustin and Nortcliff, 1994), high information costs (Fujisaka and Garrity, 1989; Pakpahan, 1992), and the risk averseness of low-income farmers. However, although these studies explain why farmers do not adopt soil conservation technologies, they seldom address the issue of how the constraints could be eliminated through inexpensive pro-active and farmer-led projects that can be undertaken to promote their adoption.

In this context, the experience of Claveria is ground breaking because a growing number of Claverian farmers are adopting contour farming, despite the presence of the same factors that have slowed adoption of conservation technologies in many developing countries. The Claveria experience suggests that farmer-based groups can minimize the constraints that have a limited farmer adoption of conservation farming elsewhere.

This study focuses on four main research questions. The first question is: what are the reasons behind farmers' willingness to be considered a member of the CLCA? To do so requires investigating the following questions:

1. What are the socio-economic profiles of the farmer who perceive themselves as members of the CLCA?

2. What benefits can the farmer-members obtain from being a part of the CLCA?

Are these benefits exclusive or can non-members avail also gain access to these benefits?

3. What role do social relationships, bonding and kernels of commonality play in creating a sense of belonging among members of the CLCA?

The second question: why do farmers adopt a conservation technology? Breaking this query down, this study will investigate the following questions:

1. What are the economic costs and benefits that the farmers face, should they choose to adopt the recommended soil conservation practices?

2. What is the role of access to information in the farmers' decision to adopt?

3. What factors determine the farmers' motivation for adoption? What role do social relationships and bonding -- components of social capital creation -- play in the farmers' decision to adopt contour plowing?

Third, this study poses the question: what role do the CLCA sub-chapter (*sitio*) associations play in influencing the farmers' decision to adopt conservation technologies? In relation to this, the following key questions are investigated:

1. What role do the CLCA activities play in promoting adoption?

2. What are the characteristics and activities of CLCA sub-chapters that have been instrumental in eliminating traditional constraints (*i.e.* costs of adoption) that farmers have faced in adopting conservation farming?

Finally, this study also aims to answer the question: how sustainable are the CLCA organizations? In order to answer this question, the following key questions must be investigated:

1. How are CLCA leaders selected and sub-chapters members recruited and will

these mechanisms assure the organizations a reliable supply of leaders and members?

2. Given ICRAF's significant level of involvement in supporting the operations and activities of the sub-chapters, how will these organizations continue with their activities should ICRAF pull out of Claveria?

3. What would likely happen to the CLCA sub-chapter after most of the farmers in the community have adopted the recommended soil conservation practices?

1.4 Research Objectives

The objective of this study is to determine how an organization such as the CLCA can: (1) reduce the traditional constraints to adoption of soil conservation technologies by low-income and marginal farmers in a developing country environment; (2) sustain its farmer-based conservation initiatives in the future in terms of leaders, members and resources.

Achieving these objective requires six steps. First, the adoption rate in Claveria is documented historically, focusing mostly on the events that started and promoted the farmers' awareness of the soil erosion as a problem, and technologies available to them. Second, utilizing secondary data and key informant interviews, document the evolution of the Claveria Land Care sub-chapters to their present status in order to gain insights to the conditions that contributed to their present development. Third, using the same set of information, identify the characteristics and activities of these organizations that have made positive impact on the adoption rate for contour plowing in the communities. Four,

determine the characteristics of farmers who are members[1] of a CLCA sub-chapter, compared to non-members. Five, determine the parcel and farmer characteristics of that have influenced adoption of contour plowing Finally, drawing on these results, assess the challenges that the CLCA will face in sustaining itself as a viable organization in the future.

Answers to these questions are necessary to determine if it is desirable to replicate the CLCA model in other regions, and if so, ascertain what are the possible ways to strengthen these organizations by way of government policy support and non-government organizations intervention. In relation to the second reason, the answers to the above questions will help to identify the conditions to consider in mapping strategies for enticing resource and investment poor farmers to adopt soil conservation technologies.

1.5 Organization of the Study

This research study is composed of seven chapters. Chapter 1 identifies the research issue related to farmer adoption of conservation technologies and notes the specific research questions and objectives that are addressed in this study.

Chapter 2 reviews the existing theories and past empirical studies that have

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[1]As will be explained in the subsequent discussions regarding membership in the CLCA, perception of membership was used as the representation of true membership in the organization. This was a strategy in order to capture the essence of membership in a group -- willingness to bear the costs of membership, anticipation of benefits from membership, and individual objectives that are in synch with the group's objectives -- for use in later analysis. This became necessary as the majority of the CLCA members did not go through any membership screening, nor are many of these paper members aware of their association with the CLCA.

focused on the issues of organization formation and sustainability, participatory development, traditional factors that affect adoption of soil conservation, and the role of social capital in technology adoption.

Chapters 3 discusses the historical, economic, and political background of Claveria; documents the history of the soil conservation movement in Claveria and the evolution of the CLCA; discusses in detail the evolution of the CLCA from a small farmers' soil conservation group into a high profile farmer-based organization in Claveria; and, describes the conservation technologies that the CLCA promotes.

Chapter 4 describes the data collection methods used in this study; discusses the results of the cross-tabular analyses which test the influence of farmers' socio-economic characteristics and their participation in community activities on the perception of membership in the CLCA; and, discusses the cross-tabular results regarding the influence of farmers' socio-economic traits, parcel characteristics, and perception of membership on the adoption of contour plowing.

Chapter 5 discusses the theory behind the probit and the logit models -- the most widely used qualitative response models -- and how they are used in empirical studies; discusses the results of the probit analysis to determine the effect of the farmers' socio-economic characteristics, and participation in community and CLCA activities, on the probability that the farmers will perceive themselves as members of CLCA; discusses the effects of the farmers' socio-economic traits, participation in community and CLCA activities, parcel characteristics, and perception of membership in the CLCA on the probability that the farmers will adopt contour plowing.

Chapter 6 describes the CLCA's financial ability, membership recruitment, and selection of leaders, and presents a discussion of the CLCA's ability to sustain its activities in the future.

Finally, Chapter 7 summarizes and synthesizes the results and findings of the study by: reviewing the soil conservation initiatives in Claveria and the evolution of the CLCA; discussing the strengths and weaknesses of the CLCA in relation to its sustainability; and, discussing the role of the CLCA in the promotion of contour plowing. This chapter also outlines this study's recommendations on areas for further research.

Chapter 2
Review of Related Literature

This research examines three issues. First, why do farmers associate themselves with the CLCA (*i.e.*, what characteristics are associated with membership)? Second, why do farmers adopt soil erosion technologies (*i.e.*, what factors affect the rate of adoption)? Third, what role does social capital play in farmers' perception of membership in the CLCA and adopt soil conservation technologies?

Thus, the literature review centers on three themes, namely: (1) theories on organizational formation; (2) empirical studies that identify factors that affect the adoption of innovation by low income farmers (including group formation); and (3) theoretical and empirical assessment of the role of social capital in organizational dynamics and farmer adoption of conservation initiatives. In addition, this section presents an overview of the soil conservation technologies -- contour plowing, contour strips with natural vegetative strips (NVS),[2] hedgerows,[3] or trees -- that are being promoted in Claveria.

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[2]NVS is the term for grass that grows naturally on contour strips. The NVS system was "discovered" by local farmers. After observing its success reducing soil erosion, ICRAF added and NVS to its package of technologies and promoted it to farmers.

[3]In this study, hedgerows study refer to pineapples, leguminous trees, shrubs, cash crops and other non-timber or non-fruit trees planted on the contour strips. Technically, the hedgerow systems use plants on the buffer strips to control soil erosion as opposed to rock terraces.

2.1 The Nature of an Organization

North (1990) defines an organization as a group of individuals bound by a common purpose by which objectives are to be achieved. On the other hand, Schmid (unpublished) defines it as some boundary of people with shared institutions and mutual recognition of opportunity sets. Davis and Weckler (1996) describe an organization as any collection of people and activities that were formed for a specific purpose or mission, which they identify as the reason for establishing the organization. Uphoff (1993) distinguishes an organization from an institution by defining an organization as "structures of recognized and accepted role," whereas institutions are "complexes of norms and behaviors that persist over time by serving collectively valued purposes."

Robison and Siles (1998) define an organization through its functions and purpose. According to them, an organization exists to meet the needs of the members and, by circumstance, also the needs of the non-members that are affected by its activities. They suggest that while individuals join an organization to meet four needs categories -- economic (survival and physical needs), social (social interaction and sense of belonging), validation (the need to know that one matters), and information (to understand our environment). Organizations, according to them, vary with respect to their emphasis on a particular need.

An organization presupposes membership. Barnard (1938) argues that an organization must have a membership of at least two individuals, and requires a conscious coordination of activities. Kaufman's (1964) defines coordination as "...ordering the direction, volume, and timing of activities, goods, and services so that the functioning of

one element in a system at least does not prevent or negate or hamper the functioning of other elements, and at best facilitates and assists, the functioning of others." To achieve this order within the organization, internal institutions are needed to determine the costs and benefits within an organization, and decide on the distribution of costs and benefits (Pakpahan, 1992).

Robison and Siles (1998) emphasize the central role that membership plays in an organization. It is the membership that distinguishes one organization from another and it is the membership requirements that express the organization's purpose. They distinguish between two types of organization--based on whether the organization is exclusive or inclusive. An exclusive membership requires a trait based on birth or adoption. Such organizations are closed to individuals lacking the inherited traits. An inclusive organization allows for membership of individuals who can and are willing to develop or acquire the required traits.

2.1.1 Rationale behind group formation and collective action

We begin the discussion in this section by asking, "what is the objective of individuals in seeking a collective formation?" Olson's (1965) view is that agents organize a group to pursue the provision of a good which would not have been otherwise provided because of the high cost of providing the first unit of the good, and the great difficulty in excluding non-payers from using or consuming the good. Through collective action, the provision of a desired good is assured through cost-sharing.

Similary, Truman (1951) hypothesizes that organizations arise as a result of

individuals' shared feelings of deprivation and frustration. This implies that individuals form an organization to produce a good--one that will end the deprivation and disappointments -- which members of the group can consume or share with non-members. However, Truman does not specify the mechanism by which the good could be produced.

While these authors argue that a collective good is produced in response to members' desire for enjoyment of this good (either individually or together as a collective unit), other scholars describe the production of collective goods as the incentive for membership -- which are either derived from the interaction of the organization with its environment or from the interaction of the individual members with each other. For instance, Ostrom, Schroeder and Wynne (1993) argue that incentives are not merely tangible rewards and penalties, but rather the perceived outcomes that are likely to result from particular actions taken within a set of rules in a specific physical and social context. The motivation for pursuing these incentives within the group is based on internal values, shared cultural values and perceptions of consequences of actions by individual agents.

Frank (1988), Morrison (1971) and, Schmidt and Soroko (1997) believe that emotional response can take the place of selected material benefits. Emotional response, as an incentive for membership in a group, pertains to the individual members' feeling of goodwill for being a part of the group. To this Milgrom and Roberts (1992) add that although the wants and needs of individual human beings that comprise an economic organization are not necessarily material in nature, the efficiency of the organization is measured in terms of how these needs and wants are satisfied.

Finally, the empirical findings of Macapagal and Nayal (1994) point to personal,

family and broad community welfare as the primary reasons for the rural poor's decision to join an organization. Among rural people, personal ties are especially strong determinants of an individual's decision to join an organization.

2.1.2 Organization and participatory development

The notion of participatory development was conceived during the early 1970s, as a result of the observed failures of top-down rural projects initiated by development agencies. Although various definitions of participatory development exist, the Institute of Primary Health Care and Canada Asia Partnership defines participatory development as a "...continuous process of stakeholders to testaments, investments, and community progress enhancement, responsibilities, working voluntarily and collectively towards the goal of sustainable development" (Institute of Primary Health Care and Canada Asia Partnership, 1994). On a functional level, Pelayo (1994) adds that participatory development also entailed sharing of costs and risks among the stakeholders, which in turn lead to sustainable development.

What is the relationship between participatory development and organizations? Reyes (1992) contends that true participatory development has to work through an organizational structure which facilitates collective action. According to Reyes, building an organization is critical in the participatory development process. While Pelayo's (1994) conclusion are similar to Reyes', he adds that an organization serves as the forum for individuals' expression of sentiments and the avenue for action.

In the past, development and government agencies have often used the outside-

expert approach to implement their programs, relegating the rural poor -- the subject of development and primary stakeholder in the development process -- to passive recipients of financial assistance or technology. Proponents of participatory development projects argue that the outside expert development paradigm is inapplicable to the conditions of underdeveloped countries (Macapagal and Nayal, 1994), and that a lot resources have been spent on programs that have had minimal impact on the attainment of the development objectives of the funding agencies. In response, scholars and project managers began to re-assess the top-down approach and explore the idea of including the target recipients in the formulation of programs that would benefit them.

Considerable empirical evidence supports the participatory approach. For instance, Uphoff, Cohen and Goldsmith (1979) find that popular participation has been a key factor that explains the success of guerilla movements in the developing world. Morss and Gow(1981) report that in rural development projects, the target recipients realize greater benefits when decisions are made democratically and when the rural folks invest in the project. Similarly, Reyes (Unpublished), who studied a health resource distribution program in Benguet, Philippines, concludes that the rural people in that community acquire a sense of responsibility and self-confidence, if they have a personal stake in the community health programs. She attributes this to the fact that community participation in the creation and implementation of the project transforms the role of the community members from passive recipients of development efforts into active stakeholders. She concludes that the poor, remote, and unserved communities can, in fact, attain sustainable development through their own initiative, if given the ability and opportunity to respond

to their problems.

2.1.3 Organizational and Individual Goals

Litterer (1969), in his analysis of organizational systems, argues that an organization's survival depended on its ability to continually balance accomplishing its objectives, while satisfying the needs of its members. According to him, organization goals are served by the acts of its members and it is through the commitment and investment of its members that an organization attains success in achieving its goals. Litterer adds that if the members do not find the objectives of the organization sufficiently attractive or not compatible to their individual agenda, the existence of the organization will be compromised and may in the end lead to its weakening and eventual disbandment.

Similar to Litterer's observation, Selznick (1957) argues for an alignment of the individual members' and the organization's objectives. He proposes that should there be a disparity between the objectives of the organization and that of its members, then either the organization must alter its objectives, or influence the objectives and values of the members to make them consistent with the organization's objectives. However, accomplishing either of these two proposals, requires that the organization possess an institution within the organization that can effect such changes, either by way of top-down change or through participatory decision making.

In examining a framework through which development projects can be effectively

implemented, Oakley and Marsden (1984) argues for the formation of local groups [4] as the fundamental method of soliciting community participation for an externally-created project. He believes that the inter-relationships developed between the members of the group are a key point in group solidarity. Group solidarity, he contends, is one of the key bases for the group's development which translates into the community's continuous participation in the project.

2.2 Factors that affect the farmers' adoption of technological innovation

According to Nkonya *et al.* (1997), the relative importance of factors affecting technology adoption differs across countries because of natural resources, cultural, political and socioeconomic difference. This supports the observation of Heisey and Mwangi (1997), who also contend that in Malawi, the factors influencing adoption depend on location of the community.

Both these studies suggest the difficulty in identifying *a priori* specific factors and variables to model the adoption behavior for farmers in general, given the complexity of the interaction of environmental and sociological conditions and other variables which are primary determinants of farmers' adoption decision behavior. This is particularly true in developing countries where traditional and cultural institutions are more dominant factors in the decision equation -- in contrast to developed countries where self-interest and pure economic profit are the driving motives for technology adoption.

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[4]Oakley made a distinction between local groups and communities. He referred to communities as groups of individuals with different agenda and objectives in contrast to local groups, who are individuals who share a common agenda and objectives.

Feder *et al.* (1985), who reviews empirical studies pertaining to technology adoption of farmers in developing countries, reports that the major determinants of agricultural technology adoption identified by these studies are farm size, human capital, labor availability, off-farm income sources, tenure, supply constraints and prices of agricultural outputs and inputs. He also notes the importance of government extension agents in the promotion of technology adoption among small farmers. These findings are consistent with Keregero *et al*'s (1992) findings regarding farmer adoption in Tanzania, and the conclusions of Heisey and Mwangi (1993) on the role of extension services in Eastern Africa on technology adoption.

Nkonya *et al.* (1997), who also tests some of the variables mentioned in Feder *et al.*'s (1985) research, finds that farmers' education and the number of extension visits significantly affect farmers' adoption of hybrid maize and intensity of fertilizer use in northern Tanzania. They also conclude that farm size is positively correlated with access to information and the opportunity to experiment, which in turn affect hybrid maize adoption.

Sinden and King (1990), drawing on an adoption model developed by Ervin and Ervin (1982), proposes a three-stage adoption process to analyze the factors associated with farmer adoption of soil conservation practices. The first stage involves identifying the farmer's perception of his land's condition. The second stage involves the farmer's recognition and choice -- from several problems presented to him -- of the problem worth solving. Finally, the last stage involves the formation of the decision and the creation of a plan of action to solve the chosen problem. These authors found that various personal and

land-related factors influenced the farmers' perception of land condition. Further, they conclude that personal and economic factors affect the recognition of the problem, and that institutional (*e.g.* access to information) and economic factors are significant variables in the farmers' decision to adopt soil conservation measures.

Cary and Wilkinson (1997), who also used the Sinden and King model (1990) in their empirical study, find that five general factors affect the conservation behavior of rural Australian landholders: (1) recognition of the problem; (2) a perception that an available solution is technically feasible; (3)a perception that the technical solution is profitable; (4) psychological motivations to act; and (5) the scale of the farm business operation. Their results show that farmers' perception of long-term profit is a significant predictor of use of a conservation practice, especially for the decision to plant trees. However, environmental orientation -- which uses membership in the Australian Landcare [5] as a proxy -- is found to be non-significant predictor of the decision to plant deep-rooted pasture grass and trees. Thus, they conclude that a pro-environmental attitude does not necessarily translate into a pro-environment behavior, unless economic or other benefits re-enforce the conservation behavior.

Feather's (1982) theory of behavior argues that positive or negative valences[6]

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[5]The Australian Landcare groups are voluntary organizations composed of people from different professions and walks of life who are concerned about protecting the Australian land, sand dunes, bodies of water, public reserve and other open space (Campbell, 1994). Unlike the CLCA, the Australian Landcare groups are highly sophisticated and organizationally developed.

[6]Valence refers to the resulting feeling or emotion arising from the recognition of the consequence of some action.

arising from the farmers' psychological environment related to the conservation decision affect farmers' adoption decisions. He reasons that a conservation decision is based on the potential utility derived from the activity, assuming that conservation induces a positive valence for farmers.

Lynne *et al.* (1988) develops a framework, based on Feather's model, and combines it with Rokeach's (1973) and Fishbein's (1975) theories on the fundamental human values that dictate behavior. In their study, Lynne and his co-authors use logit analysis and behavioral theory to determine the statistical significance of attitudinal and beliefs variables (*e.g.*, willingness to take responsibility, belief in one's ability) in the adoption of conservation practices. They conclude that strong attitudes that favor conservation raises the level of farmers' conservation effort. Although economic incentives are effort-getters, the degree of responsiveness will be enhanced by the strength of the farmers' conservation-related attitudes.

An empirical study by Blase (1960) in western Iowa is one of the earliest studies that concludes that need for immediate income, perception of soil erosion as a problem, characteristics of sample farms, and access to credit to finance conservation measures, positively affect the adoption of technologies that reduce soil loss. Blase's results suggest that risks to current income and consumption play an important role in the decision to adopt a conservation technology.

Ervin and Ervin (1982), in their study on the use of soil conservation practices by farmers in Monroe County in Missouri, argue that farmers' decision-making follows a three sequence process: recognition of the existence of the erosion problem, assessment of

the problem, and choice of the course of action. Ervin and Ervin further reason that each level in the decision-making process is affected by four categories of factors: personal, physical, institutional, and economic factors. In their analysis, they conclude that education, perception of the degree of the erosion problem, and cost-sharing variables (*e.g.* subsidy) are significantly and positively associated with farmer adoption of soil conservation practices.

The Feder and O' Mara (1981) study is significant because it represents pioneering research in the use of information as a factor in inducing adoption. They argue that knowledge accumulated by farmers reduces the uncertainty they face, thereby inducing them to adopt a relatively "risky" new technology. Thus, they conclude that information is the key to adoption, although they do not address the issue of costs of acquiring information that makes information gathering a risky task by itself.

The role of information in technology adoption is further explored in the study by Feder and Slade (1986) that analyzes the role of active information accumulation in the diffusion of a new technology in India. They differentiate active information gathering -- which entail costs -- from passive information collection in order to analyze the factors affecting farmers' decision regarding information acquisition itself, and relate this to the impact of the information-collection decision of the farmers on adoption of conservation technology. Using data from India, they conclude that information has a positive impact on adoption, in addition to size of farm, convenient access to information, and better endowments of human capital. They conclude that larger farmers are more likely to invest in information acquisition than lower-income ones, and that farmers who have a higher

endowment of human capital (*i.e.* years of school) are more likely to adopt earlier than those with less human capital. Feder and Slade predict that given the same conditions, a greater initial stock of information will build on more knowledge acquisition in the future. Using the same arguments that can be found in the study by Feder and Mara's (1981), Feder and Slade conclude that greater information will also result in a heightened inclination for farmers to adopt new technologies.

2.3 Social Capital and Farmers' Organization and Conservation Initiatives

While the concept of "social capital" has been growing in popularity, its meaning is by scholars across disciplines. A key issue is how can social capital as a concept be applied in explaining behavior and products of behavior. In the context of this study, the relevant questions posed are "what is the role that social capital play in explaining behavior within an organization," and "what role does social capital play in influencing the decision of the farmer to adopt a conservation technology?"

2.3.1 What is Social Capital?

The first reference to social capital has been traced back to Adam Smith in the following words:

> *" Every man feels his own pleasures and his own pains more sensibly than those of other people. After himself, the members of his own family, those who usually live in the same house with him, his parents, his children, his brothers and sisters, are naturally the objects of his warmest affections."* (quoted in Robison, Myers and Siles (2000)).

Robison, Myers and Siles (2000), in describing the factors affecting the terms of

trade for farmiands, refer to Smith's unwitting reference to social capital and define social capital as an agent or stakeholder's sympathy or sense of obligation for another agent or stakeholder. Robison (1996) refers to social capital as the potential influence of relationships, and has used theoretical models to operationalize this definition in economics.

The Social Capital Group of the World Bank highlights three perspectives on social capital (Grootaert, 1998). The first perspective -- referred to as the communitarian view -- describes social capital in the context of local level organizations (*e.g.*, the associations, civic groups) which cultivate the norms of reciprocity and trust that facilitate mutually beneficial collective action. The second perspective stresses the importance of vertical as well as horizontal associations between groups and emphasizes the importance of bridging ties to cross social divides. The third perspective -- referred to as the institutional view -- highlights the role of social and political environment in addition to the community networks espoused by the second view.

Fukuyama (1999) defines social capital as an "instantiated informal norm that promotes cooperation between two or more individuals." He describes social capital norms as ranging from one constituting reciprocity between two friends to elaborate articulated doctrines of religion. Social capital, according to Fukuyama, leads to cooperation in groups and is associated with honesty, commitment, reliable performance of duty and reciprocity.

Woolcock and Narayan (1999) argue that the prevailing definition of social capital, as described above, implies that social capital is inherently good and that it always

has a positive effect on the community. Furthermore, they argue that this definition assumes homogeneity in communities, which the existing empirical literature suggest is an erroneous assumption. Fukuyama (1999) argues that social capital can lead to undesirable results such as hate groups, inbred bureaucracies, and even corruption. Olson (1982) attributes Britain long-term economic decline to the long-term build-up of entrenched interest groups -- a product of social capital -- in that country.

2.3.2 The Role Social Capital Plays in an Organization

The relationship between social capital and the organization is manifested through the membership of the organization. Portes (1998), in his definition of social capital[7], alludes to the idea that social capital and an organization -- albeit not necessarily a formal organization -- go hand-in-hand because an organization is a group of actors (with a common purpose and activity) who in essence utilize social capital to secure benefits from other actors. Robison and Siles (1998), however, directly link social capital and organization by graphically and analytically illustrating how social capital -- within the membership of the organization -- determines the stability of relationships among the members. They point to membership density as one of the determinants of the level of social capital in an organization. They also argue that the quality of relationship between the organization's members determines the organization's ability to meet its members' needs.

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[7]According to Portes (1998), "social capital stands for the ability of actors to secure benefits by virtue of membership in social networks or other social structures."

Organizations, in order to function, must be able to coordinate their activities. Coordination between members of an organization requires rules of action and collective decision making (Schmid and Soroko, 1997). These rules of action are institutions which Uphoff (1993) describes as "complexes of norms and behavior that persist over time by serving collectively valued purposes." Their functions are to facilitate action within the members to achieve the organizational goal and to eliminate free riding in the organization.

However, the cost of enforcement of the rules on behavior within the organization depends on the level of social capital among the members (Fukuyama, 1999). An individual member chooses to remain a member upon the presumption that at least one of his or her needs is being met by the organization. However, a person who free rides places the burden and cost of his membership on other members. Therefore, enforcement of the membership requirements becomes necessary. We can characterize low-cost enforcement as characteristic of an organization with a high degree of cooperation among members, while an organization with high-cost enforcement is characterized by free-riding and opportunistic members. Robison and Siles (1998) argue that the level of social capital plays a critical role in determining cooperation or conflict in an organization. Cooperation can be described as resulting from the presence of social capital within the actors in the organization (Fukuyama, 1999). Frank (1988) adds that in the absence of selective incentives, an emotional response is needed to eliminate the free rider problem. Thus, social capital determines the degree of cooperation and adherence to the membership requirements by the members of the organization, thereby minimizing the possibility of

free riding by some members.

2.3.3 The Role of Social Capital in Conservation Initiatives

The common pool characteristic of soil[8] is the starting point from which the literature on social capital and its role in soil conservation adoption begins. We note that by its nature, a common property resource (such as soil) is subject to over-use as a result of the high cost of screening out individuals who take advantage of its use without paying for its cost and management. For this reason the management of soil -- its conservation and protection -- can not be achieved without the involvement and commitment of all potential users. In his address to the UN Conference on Environment and Development, United Nations Secretary General Maurice Strong (1992) stated that resource management -- the foundation of successful sustainable development policy -- can not be made without the full support of the community and the participation of ordinary people at the local level.

Strong's pronouncements summarizes what most empirical and theoretical studies have concluded -- that resources such as soil can not be managed efficiently without the cooperation of members of the community. For instance, Tobisson and Rudqvist (1992) argue that social relationships and trust form the basis for rules for common property management. They allude to pre-existing social capital as networks and norms of

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[8]Soil as a resource has both low-exclusion cost and common pool characteristics. It is a low-exclusion cost resource in the sense that any addition to its production capacity can be enjoyed almost exclusively by the tiller of the land. However, it is also a common pool resource because the fertile topsoil can washed down by wind or rain to adjoining farms.

reciprocity. Similarly, Poverty Net[9] (2001) cites the importance of community organizations in preserving the environment by acting as a collective force against natural resource degradation, and thereby providing information and political power for environmental protection. As evidence, they cite Egan's study (1996) in Ecuador's Amazon which concludes that it is the ability of the indigenous groups to form linkages with one another that creates the political force needed to rally support to preserve the Amazon.

A direct association between social capital and conservation initiative is tested by Lynne *et al.* (1986) in their study linking attitudes and farmer conservation behavior in three counties in the Florida "panhandle." They report that farmers who have strong environmental views and beneficence are more likely to be conservation adopters. According to them, this emphasizes the importance of farmer's attitude toward conservation relative to profitability objectives. This study supports the findings of Forster and Stem (1980) who contend that farmers place significant value on their perceived role as "stewards of soil." The findings also indicate that sympathy for others, and connection with the rest of the community,[10] can result in conservation activities.

Swinton (2000) tests the association between social capital and the adoption of either of two soil conservation methods -- fallow and vertical furrows -- in his study of farmers in a community in the Peruvian Altiplano ("high plain"). Using Putnam *et al.*

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[9]Poverty Net is a World Bank website that provides information and other resources on poverty alleviation.

[10]The literature refers to sympathy and personal attachment to the community as sources of social capital.

(1993) and Grootaert's (1999) example, Swinton uses membership in local organizations as the indicator of social capital and reports that membership is positively associated with the adoption of a conservation technology. Although Swinton suggests more research is needed to validate his results, he reports that the statistical results are encouraging.

2.4 Summary

The existing literature helps provide the basis for the hypothesis in this study. Theory on organization indicates that individuals form an organization for the purpose of securing the provision of a good which may not have been provided otherwise because of cost or other constraints to its production. In addition, the development literature suggests that organizations serve as a medium for participation in the community. Applying this in the case of the CLCA, the good is agricultural land that is productive and protected from erosion. The organization also acts as the manifestation of civic duty connected with soil preservation, and becomes the voice of farmers who believe in conservation.

The CLCA is a unique group because despite its lack of organizational sophistication, it has seemingly transcended this constraint and has achieved its objectives. As the springboard in understanding the phenomenon that is the CLCA, this study refers back to the fundamentals in organizational theory. The literature says that in order for an organization to function well, there has to be institutions within the organization that synchronizes the organization's and the members' goals. Theoretically, this study begins the analysis by with the assumption that there is a harmony between the farmers and the CLCA goals. The farmers wish to have a productive land -- for food security -- which is

what the CLCA also pursues as a civic duty and legacy to the future generation.

Looking deeper, however, there are other aspects of organization that traditional organizational theories have not explained fully. One of these is the presence and pursuit of social capital within the context of interaction between the members of an organization. The literature defines social capital as a bond or a relationship that drives an agent to act that is beneficial to another agent. There is theoretical evidence that attest that social capital can reduce the cost of monitoring and determines the stability of relationship within the organization.

The literature also indicated that farmers' decision to adopt a conservation technology is a result of a complex interaction of the farmers' individual socio-economic characteristics, parcel characteristics, farmers' relationship with the community, and profit considerations. The farmers' access to information was also found to be a very important determinant of adoption. And lastly, there is evidence also that point to traditional and cultural institutions as significant factors in the farmers' decision equation.

The literature indicates that social capital analysis is relevant in studying the conservation adoption behavior of farmers. Although the empirical evidence point to variables such as the farmers' socio-economic characteristics, information and physical characteristics of the land tilled as the common determinants of conservation adoption by farmers, there is a growing evidence that cultural and social capital impact the decision of farmers to use conservation methods. This study will investigate if social capital is also relevant in understanding and explaining the success of the CLCA, and the dramatic rise in adoption of contour plowing in Claveria.

Chapter 3
The Evolution of the Claveria Land Care Association

This chapter characterizes the municipality of Claveria, documents the history of soil conservation in the area and the evolution of the CLCA. The chapter also describes the soil conservation technologies that the CLCA has promoted in the municipality.

3.1 The municipality of Claveria

Claveria is one of the 24 municipalities in Misamis Oriental province, Region X.[11] It is located 42 kilometers northeast of Cagayan de Oro City – the provincial capital – and is bounded by the provinces of Agusan del Norte and Bukidnon on the east, Bukidnon on the south, and several coastal municipalities in Misamis Oriental on the north and west. (See Figure 3.1 - Map of the Philippines).

3.1.1 Early History

Claveria was originally named *Ticala* -- the native word for "wonder"-- by a group of Magahats[12] who had settled in the area at the turn of the century. The name *Ticala* was later changed to "Claveria" by a Spanish Jesuit Missionary and curate of Jasaan[13] named Fr. Juan Yras, in memory of Don Narciso de Claveria, one of the most

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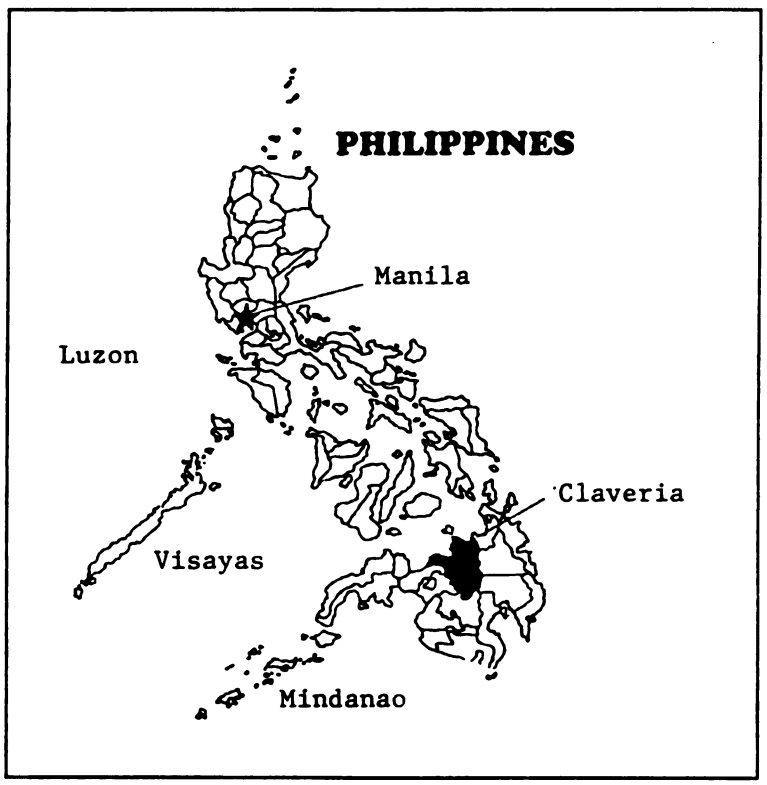
[11]The provinces in the Philippines are grouped into 13 administrative regions. However, local governance only extends to the provincial level.

[12]Magahat are indigenous people who inhabited the area during pre-modern times.

[13]Jasaan is an adjoining municipality west of Claveria.

popular Spanish governor-generals of the Philippines during the Spanish colonial time (1565-1898). However, Claveria did not attain the status of a municipality until 1950, when President Elpidio Quirino issued Executive Order No. 334 granting Claveria municipality status.

Figure 2 - Location of Claveria on the Philippine Map



Source: ICRAF, 2000

3.1.2 Demographic Characteristics

Claveria – the third most populated municipality in Misamis Oriental -- has a

population of approximately 44,682[14] (8,468 households). During the 1990s, the municipality's population increased at a rate of 4.2 percent per year. However, Claveria has the lowest population density in the province with 61 persons per square kilometer. The municipality's population distribution in its 24 *baranggays*, based on 1998 population data, is presented in Table 3.1.

Income and demographic data from the Claveria Municipal Planning Office (1998) estimates the average size of a typical Claverian household at 5.3 persons. Sixty-three percent of the total households earns a yearly income of less than P30,000 (equivalent to $600[15]) and twenty-six percent has an income higher than P30,000 but less than P54,000 ($1,080). Given the projected poverty threshold for rural dwellers in Misamis Oriental is roughly P62, 500 ($1,252) per year (CMPO, 1999), close to 90 percent of households in Claveria are below the poverty line.

3.1.3 Agro-climactic environment

Situated on the average, 600 to 1000 meters above sea level with a total land area of 82, 475 hectares, Claveria is the largest municipality (area wise) in the province. Sixty-eight percent of Claveria's land area is steep mountains and rolling hills, with the highest peak reaching 2,500 meters above sea level (Mt. Kimangkil). Thirty-three percent of

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[14]This figure is based on the 1998 projection made by Claveria's Municipal Planning Office (CMPO). All socio-demographic data from the CMPO are based on reports from the Philippine National Census and Statistics Office.

[15]The exchange rate used in this study is $1 = ₱50.

Table 3.1- Population and Household Distribution by *baranggay*, Claveria, Philippines, 1998

Baranggay	Population[a]		Households	
	Number	Percent	Number	Percent
Poblacion	8,130	18.2	1,519	17.9
Ane-i	6,021	13.5	1,141	13.5
Hinaplanan	2,570	5.8	482	5.7
Mat-i	1,577	3.5	364	4.3
Malagana	1,946	4.4	282	3.3
Patrocinio	3,013	6.7	589	7.0
Lanise	2,465	5.5	476	5.6
Aposkahoy	1,951	4.4	343	4.0
Bulahan	952	2.1	206	2.4
Cabacungan	1,015	2.3	179	2.1
Gumaod	1,065	2.4	192	2.3
Kalawitan	516	1.2	97	1.1
Luna	1,294	2.9	239	2.8
Madaguing	759	1.7	151	1.8
Minalwang	3,518	7.9	649	7.7
Panampawan	620	1.4	109	1.3
Parmbugas	595	1.3	124	1.5
Pelaez	764	1.7	152	1.8
Plaridel	908	2.0	201	2.4
Punong	440	1.0	84	1.0
Rizal	804	1.8	160	1.9
Sta. Cruz	1,473	3.3	289	3.4
Tamboboan	1,541	3.4	295	3.5
Tipolohon	747	1.7	147	1.7
Total	44,682	100.0	8,468	100.0

Source: Municipal Planning Office, 1998.

[a]1998 estimated population was based on the 1990 and 1995 National Census reports

Claveria's land area has a slope of 50 percent or higher. Table 3.2 summarizes the topographical characteristics of Claveria.

Table 3.2 - Topography of land by slope, Claveria, Philippines, 1998.

Description	Slope (percent)	Area	
		In hectares	Percent
Flat to low slope	0-3	2,723	3.3
Medium slope	3.1-18	23,357	28.3
Steep slope	18.1-30	15,266	18.51
Very steep slope	>30	41,130	49.9
Total		82, 475	100.0

Source: Municipal Agriculture Office, 1999

In general, Claveria's soils are well drained with moderate depth and are of various textures. A large percentage of the municipality's soil has a low ph, low available phosphorous, low to moderate organic matter content and low exchangeable potassium.

Claveria experiences two types of climate, depending on the *baranggays'* elevation. The highly-elevated eastern section of Claveria experiences heavy rainfall five out of the twelve months of the year. This area has no dry season and has the most rainfall during the months of November to January and July to August.

The municipality's western section has a relatively mild climate, compared to the eastern part. This area's dry season is from November to April, while its relatively mild wet season occurs between the months of May and October.

From 1997-1999, Claveria's annual rainfall averaged 3,208 mm, with the heaviest rainfall registering in the eastern part of the municipality between the months of December and January. During the same period, the average number of rainy days was 271 days.

3.1.4 Agricultural Economy of Claveria

Seventy-nine percent of the households in Claveria are engaged in some type of farm activity. Nine percent of its labor force is made up of salaried wage earners who are employed by the municipal government, the public school system and private establishments. Six percent of the labor force is comprised of seasonal part-time laborers, employed by other farmers at harvest. The remaining six percent is made up of self-employed (micro enterprises) and overseas contract workers.

Approximately 40 percent (30,130 hectares) of Claveria's total land area is classified as agricultural. However, data from the municipal office show that only 20 percent (6,026 hectares) is currently farmed due to widespread absentee landownership and government ownership of tracts of land for its reforestation program.

The primary crop grown in Claveria is corn, followed by cassava, tomato, coffee and rice. In addition, some areas are planted with a variety of crops such as sweet potato, pepper, bananas, onions, beans and other rootcrops. More than one-half of the agricultural land is used for corn production. Fifteen percent of the total planted area is devoted to cassava production, 10 percent to tomatoes and seven percent to rice and coffee. A total of 88 hectares are devoted to fruit tree crops such as mangoes, marang,

jackfruit, and lanzones. (Table 3.3)

Table 3.3 - Crops Planted According to Land area, Claveria, Philippines, 1998.

Crops Planted	Area Planted (has.)	Percent of	
		Agricultural Area	Total Land Area
Corn	3,070	51.0	3.72
Cassava	926	15.4	1.12
Tomato	615	10.2	0.75
Coffee	473	7.9	0.57
Rice[a]	472	7.8	0.57
Others	468	7.7	0.57
Total	6,024	100	7.30

Source: Municipal Agriculture Office, 1999.
[a] Both irrigated and non-irrigated fields

Claveria has large rivers and lakes with potential to support fresh fish production. Estimates from the municipal office place Claveria's annual fish harvest to be around 1,000 kilograms. However, because its fishing industry remains small, the municipality is dependent on neighboring coastal municipalities such as Jasaan, Villanueva, Balingasag and Cagayan de Oro City for its supply of fish. In the effort to develop Claveria's fishing industry, the municipal government established the Inland Fisheries Development Council in 1995, to study possible policies, plans, and programs to promote fish production.

3.1.5 Infrastructure and Communication

Claveria has a total road network of 438.5 kilometers (274.1 miles). However, only four percent of the road network is paved with either concrete or asphalt, while 18 percent is unpaved but filled with gravel. The remaining 78 percent (344 kilometers or 215 miles) is earth filled and unpassable during the rainy season. Residents reported that roads are acutely lacking in Claveria. People living in the remote *baranggays* must either carry their crops on their heads or on horseback for sale in the market. Because the trip takes a long time, residents in these villages complained that the local officials have neglected their need for farm-to-market roads.

For villages that have roads, the primary modes of transportation are public utility jeepneys and modified motorcyles called *habal-habal* which can be rented. However, in most cases, the residents still need to walk at least one-half kilometer to reach the roads that these vehicles service. Following a heavy rain, many roads become unpassable, requiring the residents to walk to their destination.

Only one *baranggay* -- the *poblacion* or the municipal center -- is served by the water district. The remaining 23 *baranggays* rely on springs and wells for water supply. The majority of the households in Claveria carry water into their homes and store it in containers. The municipal office reports that only one-half of the population living in Claveria has access to a safe and adequate supply of potable water.

Modern forms of communication are very limited in Claveria. While residents have access to a 16-line radio transmitted telephone facilities, very few households can afford

phone services. Even the *baranggay* [16] council offices do not have a budget for telephone services. Thus, the *baranggay* councils and most of the business establishments in the municipality use two-way VHF radio transceivers.

The Misamis Oriental II Electric Service Cooperative Inc. supplies the power requirements of Claveria. Only 16 of the total 24 *baranggays* have access to electricity. Only 3,020 households (36 percent) have access to electric power.

3.1.6 Government Units

The municipality of Claveria is governed by a municipal board which is composed of the mayor, vice-mayor and seven council members. The board liaises with the *baranggay* leaders through the chairman of the Association of *Baranggay* Captains (ABC).

The municipality is broken down into 24 *baranggays*, each headed by a *baranggay* captain, seven *baranggay* council members known locally as *kagawads*, a youth group chairperson, and a *baranggay* secretary and treasurer. Except for the *baranggay* secretary and treasurer, all of the *baranggay* officials are elected by the residents of the *baranggays*.

Each of the *kagawads* is in charge of one to three *sitios* (village) or *puroks* that comprise the *baranggays*. There are seven to thirteen *sitios* in each *baranggay*, depending on the *baranggay*'s area and total population. The boundaries of each *sitio*

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[16]Traditionally, the word *baranggay* refers to a group of small villages (*sitios*). In terms of Philippine modern governance, it is local government sub-unit directly under the municipal government. Claveria has 24 *baranggays*.

(and hence the *baranggays*) are determined by proximity to a central *sitio* and the history[17] of the area.

The municipality receives its budget from the provincial government, based on the tax revenues generated by the municipality. However, each *baranggay* receives an automatic appropriation of ₱50,000 per year from the provincial government, as mandated by the Philippines' local government code. It is from this fund that projects and equipment for the *sitios* are financed according to the discretion of the *baranggay* board.

3.2 Soil conservation initiative in Claveria: A Historical Overview

There exists no written documentation of soil conservation initiatives in Claveria, prior to the efforts initiated by the Philippine Department of Agriculture and the International Rice Research Institute (IRRI) in 1987. However, anecdotal data indicate that some farmers used terracing and contour plowing before IRRI started its program. Typically, according to the farmers who were interviewed for this study, farmers who came from other islands (particularly those from the Visayan islands) and who used these technologies before migrating to Claveria, continued to use them on their new land.

3.2.1 Early Conservation Promotion Efforts

According to Mercado *et al* (1999), contour hedgerows planted to pruned leguminous trees were first promoted by the Department of Agriculture in the early 1980s

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[17]For example, one *sitio* used to be the estate of a landed family who had since sold or rented out most of the land to the farmers or other landowners.

under the *Sloping Agricultural Land Technology* (SALT) project. This initiative was designed to help the farmers in Claveria arrest soil erosion, provide organic fertilizer to the companion annual food crops, supply fodder for ruminants, and restore water quality in the watersheds.

The early 1980s were turbulent times for the residents of Claveria. During those years, several areas in Claveria were considered insurgents "hot spots"-- referring to the proliferation of armed anti-government activities by the New People's Army, especially in remote *baranggays*. Consequently, the residents were constantly moving to avoid being in the cross-fire between the rebels and the government soldiers. During those times, hence, it was virtually impossible for the government to implement its extension and conservation projects. It was not until the mid-1980s, when the government operatives gained ground in driving the rebels away out of Claveria, that the peace and order environment in the municipality improved sufficiently to foster additional extension and conservation initiatives.

3.2.2 IRRI's farmer to farmer Training Program

Hafner (1996) reported that in 1987, IRRI began a farmer-to-farmer training program in Claveria that promoted contour hedgerows system. This project was initiated in 1985 as part of the upland rice cropping program that IRRI undertook in collaboration with the Department of Agriculture Regional Office in Northern Mindanao. Based on interviews with farmers, Hafner concluded that this was the first structured initiative to promote soil conservation in the municipality and which raised the farmers' general

awareness of contour farming in Claveria.[18]

Under the farmer-to-farmer training program, IRRI selected six farmers for training (in the province of Cebu) on how to create contour hedgerows including how to use an A-frame to establish contour lines, construct earth bunds by double plowing with animal draft, strengthen bunds, and form ditches using shovels, and how to plant hedgerows composed of single row of grasses (Hafner, 1996).

Fujisaka (1993) reported that between 1987 to 1989, six farmers in turn, trained 175 farmers in seven farmer-to-farmer training sessions. During this period, the DA worked closely with IRRI, especially in the selection of the farmer-participants.

While IRRI's training approach was lecture-based, it also incorporated farmers' testimonials regarding their positive experience with contour hedgerows and hands-on farmer training. By 1989, over 200 farmers had been trained (Fujisaka, 1993) and by 1990, 71 farmers had established hedgerows, 64 of whom had adopted the method after observing their neighbor-farmers (Hafner, 1996). Fujisaka (1993) estimated that 71 to 80 farmers had adopted the technology by late 1992.[19]

3.2.3 ICRAF's Program

The International Centre for Research on Agroforestry (ICRAF) became involved in farm-research in Claveria soon after the collaborative program between ICRAF and

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[18]Key informant interviews conducted as part of this study support Hafner's findings.

[19]Hafner (1996) noted, however, that there were contradicting accounts of the number of adopters because different researchers used different definitions of "adoption."

Philippine Council for Agriculture and Natural Resource Research and Development (PCARRD) was forged in 1993 (ICRAF, 1997). In partnership with the Misamis Oriental State College in Agriculture Technology (MOSCAT), ICRAF launched research activities to develop conservation farming practices that were suited to small-scale farmers who cultivated sloping lands. In effect, this initiative took over IRRI's experiment station and on-farm research program on contour hedgerows, which was winding down in Claveria.

From 1993 to1996, ICRAF primarily conducted research. However, as the farmers became increasingly aware of the on-going research on contour hedgerows and in response to requests from these farmers, ICRAF became increasingly involved in training and information dissemination on soil conservation technologies. In 1996, ICRAF identified a low-cost alternative to hedgerows -- natural vegetative strips (NVS) -- and established an extension team to promote this. Garrity *et al* (1998) reported that this team was created to formulate strategies to effectively diffuse NVS technology to a large number of interested farmers and to develop linkages with public sector research and extension institutions.

The ICRAF extension team--formally known as the Contour Hedgerow Extension Team (CHET) -- was composed of an NVS farmer-adoptor, a DA extension agent, and an ICRAF technicican. The CHET adopted Chamber's (1989) idea of "triangulation"[20] as a

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[20]Chambers defined triangulation as "...seeking multiple perspectives through different methods, analysts, entities sampled, locations, points in a distribution, sources of information, and/or disciplinary perspectives, leading to cross-checking, successive approximation and/or appreciation of ranges of variance." Once the "triangulation model" was institutionalized, ICRAF and the Federated CLCA officers began an aggressive information and recruitment campaign.

guiding principle, in order to avoid extensionists' bias and to maximize knowledge within the extension team (Mercado, 1998). The members of the CHET were conceptualized to be on equal authority so as to allow information to flow linearly from the researcher (ICRAF and farmer) via extensionist (DA and farmer) to the target farmers. ICRAF funded the compensation for the ICRAF personnel and the farmer-volunteer, while the Municipal Agricultural Office shouldered the DA technician's salary and operating expenses.

An interview with a former CHET member[21] indicated that the team's activities initially targeted individual households in the *baranggays* in order to promote the new technology and conducted demonstrations on contour farming and agro-forestry. However, this approach proved to be too time consuming to be practical. Subsequently, each team was assigned to concentrate on a particular area. Eventually, the DA representative dropped out and only the ICRAF technician and the partner farmers continued to participate in the information campaign.

Mercado, *et al.* (1998) reported that farmers' interest in soil conservation technology grew at a faster rate than ICRAF had anticipated. After a short period of time, training requests from farmers increased at such a high rate that CHET shifted from individual training to group training and added training on the theory and practice of soil conservation. While encouraging the CHET-trained farmers to share the information and knowledge that they had gained with other farmers, CHET also conducted more group sessions with approximately 20-25 invited participants per session.

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[21]Mr. Nicanor Paday, who is currently one of ICRAF's Land Care coordinators.

At one of these training sessions in 1996, 20 farmers proposed the idea of creating a farmer self-help organization to unite and assist farmers to learn how to use soil conservation technologies. Thus, the principles that guide what is now known as the Claveria Land Care Association -- self-help, voluntary, self-governing, and focused on the problem solving within the community -- grew out of ICRAF's early experiences in promoting soil conservation technologies and farmers' desire to promote their use.

3.3. History of the CLCA

The Claveria Land Care Association (CLCA) was established in 1996 by a group of 20 farmer leader-participants who of a two-day training seminar that was facilitated by the CHET and sponsored by ICFRAF. While the organization's formation was spontaneous, it was not entirely farmer initiated. Anecdotal information from key informant interviews[22] indicated that after a training session, one of ICRAF's facilitators casually suggested to the farmers that information sharing among farmers in the community would be best served by an organization that was committed to promoting the contour hedgerow system. The farmers were quick to respond and with the assistance and encouragement of ICRAF personnel, 25 farmers formed an organization which they named the CLCA,[23] and elected an executive board consisting of the president, the vice-

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[22]This finding was based on interviews with Mr. Agustin Mercado, ICRAF-Claveria Research Coordinator and Mr. Nicanor Paday, another ICRAF personnel.

[23]Farmers adopted the word "Landcare" from the name written on the ICRAF vehicle used to provide transportation for farmers to the field during field visits and hands-on training (Mercado *et al.*, 1998).

president, treasurer, auditor, public relations officer and secretary.

3.3.1 Initial Conceptualization of the CLCA

The CLCA Federation was originally conceptualized by its founding members as a municipality-wide farmers organization that would have sub-units in the *baranggays* in order to attract more members. Upon the advise of ICRAF, it was registered with the Philippine Securities Exchange Commission (PSEC) in 1996 as a non-profit farmers' organization, with the objective of promoting environmental conservation to help its members in improving productivity. The CLCA leaders explained that CLCA's registration with the PSEC gave CLCA the legal identity required to apply for financial assistance from government and non-government institutions.

The *baranggay*-based CLCA (referred to as chapters) was established because the leaders of the Federated CLCA acknowledged that CLCA chapters in the *baranggays* had better chances of attracting members since farmers in each *baranggay* were well known to each other. The plan was to have the *baranggay*-level CLCA's disseminate the information to the individual *sitios* about both soil conservation and the organization itself. This paradigm represented a modified version of the CHET approach with farmers taking the lead but relying on ICRAF for technical and logistics support.

A few months after the establishment of the first CLCA chapter in 1996, the Federation officers, with the help of ICRAF and the chapter officers, started to establish the first *sitio*-based CLCA known as sub-chapters. The rationale for the creation of the sub-chapters was the same for the CLCA chapters -- to promote the CLCA and

disseminate information on soil conservation to the farmers and their households in the villages.

3.3.2 Evolution of the CLCA

The partnership between ICRAF and CLCA grew as ICRAF assisted the organization in many aspects of training, recruitment and administration. In addition to conducting training sessions in the *sitios* and *baranggays*, ICRAF arranged cross-visits[24] between the *baranggays* to enable the farmers to observe first hand how to establish contour hedgerow and agroforestry technologies, and to convince potential adopters of the ease and "profitability" of their use. Both ICRAF and CLCA officials also used cross-visits to recruit members and gather support for the organization. Typically, right after one of these training sessions, farmers decided to organize a new CLCA chapter or sub-chapter.

Efforts to establish new CLCA chapters and sub-chapters became a priority as the CLCA sought to attract more attention to its conservation movement and solicit support from the local governments. The CLCA officers campaigned vigorously among *baranggay* and municipal leaders, as well as among the residents.

Initially, local government officials in Claveria were suspicious of the motivation behind ICRAF's efforts to promote soil conservation. Some thought that Mr. Agustin

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[24]A cross-visit is another name for a farm-demonstration activity where farmers from one area go on a field trip to interact and observe farmers in another area that has successful conservation adoption. In many cases, a cross-visit is informative as well as a social activity.

Mercado -- the ICRAF-Claveria coordinator -- was using the CLCA to pursue the mayoralty seat in Claveria. To allay these fears, ICRAF solicited the support of these officials -- specifically the *baranggay* captains, members of the municipal council and the president of the Association of Baranggay Captains in Claveria -- by involving them in meetings and selected activities of the organization. When the local officials witnessed first hand what the organization was attempting to accomplish, support for the CLCA followed. With the involvement of the local government units (LGU's), the "triangulation" of what would be the Landcare movement was completed.

3.3.3 Management and Partnerships in the CLCA

The local government, through the *baranggays'* discretionary budget allotment for their Human and Ecological Security (HES),[25] provides limited financial support for CLCA's activities -- particularly for constructing seedling nurseries and for activities that the CLCA engages in with *sitio* officials.

At this point, the CHET model was virtually abandoned in favor of a sectoral partnership between the CLCA, ICRAF and the *baranggay* government. This was to become a modification of the "triangulation model" wherein an alliance between the three

[25]The HES budget is 20 percent of the total development funds of the baranggay. Currently, the municipal government of Claveria has an annual budget of P50,000 ($1,000) for each *baranggay*

groups of stakeholders was forged.[26] Through the *baranggay* leadership, the Federated CLCA and ICRAF jointly promoted the formation of *baranggay*-level CLCA. Each chapter had its own set of leaders[27] who were independent of each other but were jointly monitored by the Federated CLCA leadership and the *baranggay* captain. At the chapter level, the three ICRAF personnel who are designated to assist the CLCA served as advisers to the chapters, especially in training and livelihood[28] programs.

The smallest management unit of CLCA is the *sitio*-based sub-chapter. Following the hierarchy[29] the sub-chapters comprised the chapters. The sub-chapters, in turn, are made up of farmer-members living in the *sitio*. Similar to the chapters, the sub-chapters are independent from each other and in practice enjoy autonomy from the Federated CLCA. The participation of ICRAF had the greatest impact at the sub-chapter level,

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[26]The idea was for each of the groups to assist each other to promote soil conservation. The CLCA became the channel of technical information about contour, ICRAF provided the information through its research activities, and the local government units were being tapped for the promotion of the CLCA and for financial assistance.

[27]Interview with the CLCA Federation president, Mr. Marcelino Patindol, indicates that majority of the CLCA chapter officers are elected from the officers of the sub-chapters that comprise the chapter. However, there are cases when the *baranggay* council appoints the chapter officers from among the sub-chapter leaders in cases where the sub-chapter officers are still incomplete or in the process of election themselves

[28]"Livelihood" programs referred to projects that gave out assistance and training on backyard enterprises. These were intended to supplement farm income.

[29]The Federated CLCA is the municipal-wide organization which has chapters as members. The chapters, in turn, have sub-chapters as members while the sub-chapters are composed of farmer-members. Chapter officers attend the Federated CLCA gatherings while the sub-chapter officers participate in chapter activities. Community activities, which occur at the *sitio* level. Farmer-members of the sub-chapters participate in each of the sub-chapter activities.

primarily because of the smaller size of the group and the higher degree of familiarity of the stakeholders with each other. However, based on the interviews with the CLCA leaders on all levels. Logistic support for the *baranggay* government was weakest at the sub-chapter level.

3.3.4 Leadership and Membership in the CLCA

Data collected from ICRAF and from interviews with CLCA chapter leaders, show that the CLCA has (as of February 2000) 16 chapters (*baranggay*-level), 105 sub-chapters (*sitio*-level), and approximately 800 farmers in its membership base. Table 3.4 shows the distribution of the CLCA organizations in each *baranggay*. This indicated that the CLCA's rules and criteria for leadership and membership selection varied among the chapters and sub-chapters, although ICRAF had tried to guide the organizations toward a common ground.

Table 3.4 - Distribution of Sub-chapters by *Baranggay* in Claveria, Philippines, 2000

Baranggay	CLCA Chapter?	Number	
		Sitios	Sub-chapters
Ane-i	Yes	8	8
Aposkahoy	No	9	0
Bulahan	No	7	0
Cabacungan	Yes	6	5
Gumaod	Yes	6	6
Hinaplanan	Yes	8	8
Kalawitan	Yes	3	3

Table 3.4 - Cont'd

Lanise	Yes	10	10
Luna	Yes	4	4
Madaguing	Yes	7	7
Malagana	No	6	0
Mat-i	Yes	11	11
Minalwang	No	6	0
Panampawan	Yes	3	0
Parmbugas	No	4	0
Patrocenio	Yes	11	11
Pelaez	No	6	0
Plaridel	No	7	7
Poblacion	Yes	8	8
Punong	Yes	4	4
Rizal	Yes	6	6
Sta. Cruz	Yes	5	2
Tamboboan	Yes	5	5
Tipolohon	No	3	0
Total	16 with chapters	153 *sitios*	105 with sub-chapters

Source: Municipal Planning Office, 1999.

3.3.4.1 Selection of the Chapter and Sub-chapter Leaders

Key informant interviews with the leaders of the 16 chapters and 41 sub-chapters identified significant variability in the way that chapter and sub-chapter leaders were selected. First, selection of leaders on the on both chapter and sub-chapter levels was mostly done through popular election but the appointment of leaders by the ***baranggay***

leadership -- either by direct appointment by the *baranggay* captain, or by the electoral choice of the *baranggay* council members -- was more likely at the chapter level. Six chapters and nine sub-chapters reported that their leaders were appointed by the *baranggay* council compared to 10 chapters and 32 sub-chapters that indicated that they held elections to select their leaders.

Second, there were two cases when chapters were formed after the establishment of the *baranggay* sub-chapters. In these instances, the chapter leaders were elected by the sub-chapter leaders. The latter was, according to the chapter and sub-chapter leaders interviewed, the preferred situation, even if appointment of the chapter leaders by the *baranggay* council was acceptable to the Federated CLCA, as well as the rest of the constituency of the organization.

The way that the sub-chapter leaders were selected also varied between the sub-chapters. In eight sub-chapters, the officers were the concurrent *sitio* officers. This often created confusion among community residents, as most thought that the CLCA was a program of the *baranggay* leadership that was being implemented in the *sitios*. Key informants interviewed in these *sitios* reported that a majority of the residents in their community did not regard the CLCA as an organization, but rather, as a program akin to an extension program with ICRAF personnel serving as the extension agents.

Even in the 37 *sitios* where the CLCA sub-chapter officers were not *sitio* officers, the community generally considered the CLCA as an organization that was attached to the *sitio* government. Residents generally regarded the CLCA officers and the *sitio* leaders as one group with the *sitio* officials as the leaders. In almost all of the sub-chapters

interviewed, the *sitio* residents observed that the CLCA sub-chapter president sought the approval from the *sitio* leader before the CLCA planned and engaged an activity. This perception was reinforced because rather than holding separate meetings, the CLCA held their meetings as part of the regular *sitio* meetings, with the *sitio* head presiding over the meeting.

However, there were ideal cases where the *sitio* government and the CLCA were viewed by the community as two independent but associated groups working to promote of soil conservation. Eight of the CLCA sub-chapters had well-defined objectives and clear set of rules on membership, regular monthly meetings separate from the *sitio* meetings, and regular organization activities[30] such as fund-raisers and weekly *pahinas*. In these instances, the residents generally perceived the CLCA sub-chapters as active and well-organized farmer groups with exclusive membership.

However, in all of the of the 45 sub-chapters and 16 chapters studied, the CLCA was generally viewed as a group created by ICRAF and supported by local government units, rather than as a farmer-led entity. Furthermore, interviews with the sub-chapter leaders indicated that they generally perceived the CLCA to be ICRAF-led. This perception was due to the active participation and involvement of ICRAF's Landcare staff in establishing CLCA chapters and sub-chapters in the *baranggays* and *sitios*.

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[30]Key informant sub-chapter and *baranggay* leaders, and ICRAF personnel, observed that the identity of the CLCA sub-chapters emanate from the *baranggay* council. This had occurred because the *baranggay* council, through its promotion and association with the CLCA, inadvertently shaped the image of the CLCA organizations to the community as a new government institution specifically created to promote soil conservation, although this was not the original intent.

3.3.4.2 Farmer Membership

The Federated CLCA president, who was one of the key informants interviewed for this study, insisted that farmer members were selected according to whether or not the prospective member had adopted contour farming, or was planning to adopt it in the near future. In addition, membership in the CLCA supposedly required prospective members a one time payment of ₱15 ($0.3) for dues and to fill out a personal data sheet.

However, as with the selection of officers in the CLCA chapters and sub-chapters, individual farmer's membership selection (or assignment in a number of cases) also varied from *sitio* to *sitio*, due to the absence of enforceable uniform rules of membership.[31] As a result, in 31 sub-chapters, the leaders used their discretion in establishing membership policies, while in nine cases, the existing members set these rules.

For example, eleven sub-chapters extended automatic membership to farmers who had attended at least one meeting or one activity. In18 *sitios*, all residents living in the *sitio* were automatic members. In only eight sub-chapters had members joined on their own volition and understood the responsibilities of membership. In the remaining six sub-chapters, members joined in response to the invitation from *baranggay* officials. In this last case, membership is likewise automatic for those who were invited.

It must be noted that the automatic membership in the CLCA renders any analysis and conclusion regarding the farmers' membership in the CLCA invalid unless the

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[31]According to the Federated CLCA, individual membership in the sub-chapter requires a member's personal data sheet form and make a one time payment of ₱15 ($0.3) to the Federation. However, only approximately 10 percent of total farmer-members have actually fulfilled these requirements.

definition of membership is re-defined. Since membership in a group -- in the real sense of the word -- presupposes an individual's desire to be part of the said group and his willingness to pay for the costs of membership, it follows that for the CLCA, the true members are those who regard themselves as part of the organization and its activities. This will be discussed further in the cross-tabular and probit analyses in the Chapters 4 and 5.

3.4 The Conservation Technologies that CLCA promotes

Traditionally, farmers plow their fields using an oxen to cut furrows that run down the slope of the field. This practice results in severe soil erosion, due to heavy rainfall during the growing season. Three types of soil conservation technologies have been promoted in Claveria -- contour plowing, natural vegetative strips, and hedgerows.

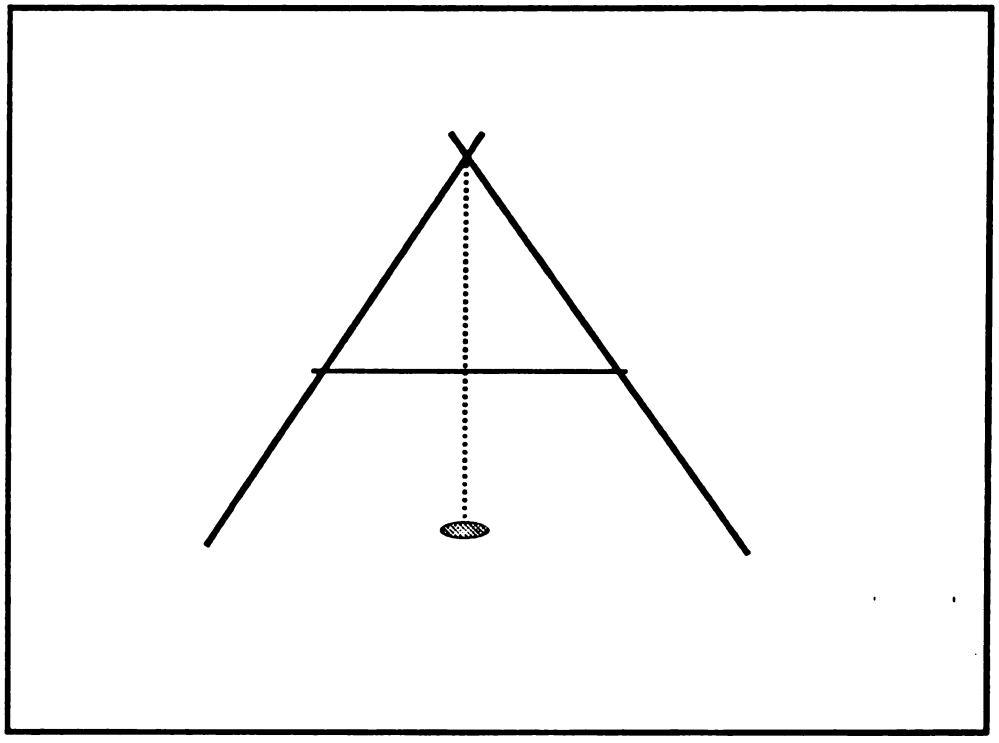
3.4.1 The Basic Technology – Contour Plowing

Contour plowing involves plowing the field so that the furrows are perpendicular to the slope of the hill or mountain. Before plowing, farmers must establish contour lines in the field using either an A-frame or by the "cow's back method."

The A-frame (a tripod) is made of wood or bamboo stick nailed or tied together in the shape of the letter "A" with a string and stone dangling from the top of the frame. The string is 10-20 centimeters long the stone must be heavy enough to prevent it from swinging. The A-frame is held where the string passes exactly at the midpoint mark on the cross bar of the frame and where both of frame's legs touch the ground (Figure 3.). This

position, which indicates the ideal contour location, is marked by driving a stake into the ground at the left leg of the frame. By pivoting on the right leg of the frame, the A-frame is moved to determine the next contour position, using the same procedure described earlier. This level-finding process is repeated until the stakes have been laid out on a single line across the entire field.

Figure 3. - The A-Frame Used in Marking the Contour Line



The first contour line is established across the middle of the slope -- halfway between the top and the bottom of the field. If the slope is 25 percent, the succeeding contour lines are established five to seven meters above or below. This distance will create

a vertical interval of one to two meters between each contour line.

After laying out all of the contour lines, the field is ready for contour plowing. To plow following the contour lines, a farm animal must be used, since a tractor can not be maneuvered well to make soft turns of the contour line.

Recently, ICRAF developed a simpler method for contouring fields. Referred to as the "cow's back method," it is a less precise but a less expensive method of establishing contour. Using the top of the cow's back as a guide, the farmer estimates the curve of the slope of the land by peering through the cow's back to follow the contour of the land. Farmers prefer this method because it is simpler and easier to employ -- compared to the A-frame.

3.5 Complementary Conservation Technologies

To level the contoured area, farmers must either plant hedgerows on the contour strips or create rock walls to catch the soil that runs down the slope when rain falls or strong wind blows. Gradually, the contoured land will form step-like terraces which the farmer can till with minimal risk of erosion.

The complementary technology that this study refers to is the system used to create terraces. Some farmers use rock walls -- as in the case in the northern areas in the island of Luzon -- to catch the soil. However, in Claveria, the farmers prefer contour hedgerow systems over rocks for economic reasons. Contour hedgerow systems are excellent barriers against erosion, and also provide extra income for farmers, building materials, or feed for farm animals. The choice of complementary technology as used in

this study, therefore, refers to the type of hedgerow that farmer-adopters prefer to use on the contour strips they establish.

3.5.1 Contour Hedgerow Systems

To plant leguminous tree hedgerows or fodder grasses on the contour lines, the farmer must plow two rows along the contour lines-- marked with sticks --to make two to three feet wide contour strips. Once planted, the contour plants block the water running down the slope of the fields during rains, and catch the soil that erodes from the higher areas. By the second season, natural terraces would be discernible and the land gradually flattening between the contour lines. With continuous contour plowing, the land in between the contour lines will be completely flat in six to nine seasons, depending on the steepness of the parcel's slope.

Garrity (1995) reports that the contour hedgerow system is the main conservation farming practice prescribed for open-field cultivation systems in Southeast Asia, especially the practice of planting of leguminous trees on the contour strips. Data from the International Board for Soil Research and Management (IBSRAM) indicated that hedgerow systems can reduce annual soil loss by 70 to 99 percent (Sajjapongse and Syers, 1995). Garrity estimates that in Claveria, hedgerows reduce erosion by 50-90 percent.

However, despite increased yields of annual crops grown between hedgerows of leguminous trees, farmer adoption of these systems is low, due to competition between the hedgerow perennials and the crops, inadequate phosphorous cycled to the crop in pruning, and the additional labor needed to prune the hedgerow crops (Garrity, *et al.*, 1999).

Among these three factors, labor was cited as the biggest constraint for hedgerow adoption. ICRAF (1996) found that farmers' labor investment to prune their leguminous-tree hedgerows averaged 31 days per hectare, which increased the total labor cost for upland rice and corn farmers by 64 and 90 percent, respectively.

For this reason, ICRAF has been developing alternatives for the leguminous-tree hedgerows that would be effective in arresting soil erosion but would not entail as much cost. Currently, ICRAF recommends that farmers plant crops such as pineapples or fruit trees in the strips of contoured land, instead of leguminous trees.

Natural Vegetative Strips (NVS) are an inexpensive type of contour hedgerow system. To establish NVS, the farmer, after laying out the contour lines, simply leave unplowed 50 centimeters of land space on both sides of the contour lines. Eventually, grass and wild herbs grow in these areas and create a natural vegetative barrier against soil movement in the way as do contour hedgerow crops.

Fujisaka *et al.* (1994) found that farmers who regarded soil erosion as a problem were more interested in natural vegetative barrier techniques than hedgerow systems because they required less labor. NVS required significantly less pruning and maintenance than fodder grasses or tree hedgerows, and competed less for nutrients with the farmers' annual crops than introduced species (Ramiaramanana, 1993). Research has demonstrated that NVS were as effective in minimizing soil loss as hedgerows (Agus, 1993), and did not cause greater weed problems for the annual crops (Moody,1992). Furthermore, establishing NVS required virtually no labor investment.

However, NVS does not enhance the nutrient mix of the planted annual crops, as

do leguminous trees. Thus, farmers using NVS must apply fertilizer to maintain soil fertility. To address this disadvantage, ICRAF recommends that farmers prune their NVS from time to time and place the cut grass below the contour strips. The grass serves as organic fertilizer for the planted annual crops.

3.6 Summary

Claveria is one of the 24 municipalities in Misamis Oriental, Philippines. It's economy is traditional agriculture based with 79 percent of its households engaged in a some type of farm activity. However, only 20 percent Claveria's agricultural land is actually used for production. The rest is idle from absentee landownership or under the government's reforestation program.

The municipality is low income with most of its residents earning below the poverty level. Due to the steepness of its topography, Claveria is highly susceptible to erosion, especially during the rainy season, making income opportunities for its residents significantly limited.

The soil conservation initiative in Claveria had started even before the 1980s when the Department of Agriculture initiated the SALT program. Emigrating farmers from other islands brought with them knowledge on terracing and contour plowing that they had learned from their home islands.

In 1985, the International Rice Research Institute (IRRI) collaborated with the DA to initiate farmer-to-farmer training on contour hedgerow systems under IRRI's upland rice cropping program. This was to be the first structured initiative to promote soil

conservation in Claveria and raise the general awareness on contour farming in the municipality.

In early to mid-1990s, the International Centre for Research on Agroforestry (ICRAF) began farm research in Claveria and soon after established a partnership with the Misamis Oriental State College in Agriculture and Technology (MOSCAT) to develop conservation farming practices for small-scale farmers who cultivated sloping land. In 1996, ICRAF established the extension team called the Contour Hedgerow Extension Team (CHET) to promote contour farming and agroforestry and to disseminate information regarding conservation technology use by targeting individual households in the *baranggays*. CHET, however, could not keep up with the demand for its services and ICRAF sought an alternative to this extension program.

The breakthrough in soil conservation promotion came in 1996 when a group of 20 farmers who were participants in an ICRAF-sponsored training on erosion, banded together to create a farmer self-help organization to unite and assist farmers to learn how to use soil conservation technologies. This group later on became the Claveria Land Care Association (CLCA) and has been instrumental in the promotion and propagation of erosion control practices in Claveria.

The CLCA became one of three partners in the modified version of Chamber's "triangulation" model. The other two were the local government units (LGUs) -- composed of the *baranggay* and municipal officials -- that provided financial and logistical assistance, and ICRAF, which provided the technical expertise.

The CLCA is composed of three levels of administrative units: the Federation, the

chapters (16), and the sub-chapters (105). The Federated CLCA is the umbrella organization under which the chapters and the sub-chapters belong. The chapter is *baranggay*-based while the sub-chapter is *sitio*-based. Although the CLCA units share common objectives and perform similar community and conservation activities, their membership and leadership institutions vary. In general however, membership in the CLCA is automatic which led this study to re-define membership as perception of membership. Perception of membership carries with it the recognition of the duties of a member and entitlement to benefits and incentives for members.

It was also found that among the CLCA groups, the level of support from the different *barahggay* LGUs was found to be highly variable and depends mostly on the LGU's discretion. As such, it can be concluded that the institutional support for the programs and activities of the CLCA is still in the primary stage of development.

The CLCA promotes contour plowing (the base technology) and the use of either of three complementary terracing alternatives. These three are natural vegetative strips (NVS), leguminous-tree hedgerow systems, and cash crops such as pineapples or fruit trees.

Chapter 4
Characteristics of CLCA Members and Adopters of Contour Plowing

Key objectives of this study are to determine what factors are associated with the farmers' perceived membership in the CLCA and their decision to adopt contour plowing. To address these objectives, a two-step approach to data analysis is used. First, a cross-tabular analysis is done to assess the significance of the relationship between membership/adoption, and categoric variables hypothesized to be associated with farmers' membership/adoption decisions. Second, the farmers' status as members and their decision to adopt (or not adopt) contour plowing (the basic conservation technology) in their parcels is analyzed using a probit model.

This chapter is composed of three sections: (1) description of the data collection methods and the type of data collected; (2) discussion of the characteristics of the farmers that are associated with the farmers' (perceived) membership in the CLCA; and, (3)discussion of the characteristics which are significantly associated with adoption of contour plowing, including the farmers' socio-economic characteristics, the social institutions that the farmers live under, and the physical characteristics of the parcels that the farmers till.

This chapter discusses the results of the cross-tabular analysis that was carried out to evaluate the probabilities of significant relationships between: (1) the CLCA membership status of the farmers (farmers considering themselves members or not members); (2) the farmers' adoption of contour plowing (adoptor, non-adoptor); and (3) with categorical variables (*i.e.*, socio-economic status, access to information, and sense of

community). Tables are generated to show the number of cases in each of the cross-tabulated categories and to derive the probability that the resulting distribution would have occurred, if no relationship existed. From these results, profiles of the CLCA members and adoptors of contour plowing are drawn.

4.1. Data Collection Methods

Data for this study were collected through key informant interviews and a survey of farmers (Table 4.1).

Table 4.1 - Data Collection Structure, Claveria, Philippines, 2000

Type of Instrument	Level	Sample Size
Leader Interview	Federation	1
Leader Interview	Chapters	15 of a total of 17
Leader Interview	Sub-chapters	3 per chapter (Total = 45)
Individual Interviews	Farmers	6 per sub-chapter, plus 4 additional farmers (Total = 274)

Key informant interviews were conducted at three levels--with the leaders of the CLCA Federation, leaders of 15 chapters and leaders of 45 sub-chapters. The sample of 274 farmers, which was selected from among the farmers living in 45 *sitio*-locations which had sub-chapters, included approximately the same number of adopters and non-adopters

of contour plowing.

4.1.1 The Federation

The CLCA Federation is the umbrella organization that manages all of the CLCA sub-units in Claveria. The Federation leadership interacts with the local government officials and plans with ICRAF the activities of the chapters and sub-chapters. The Federation is also the governing body that decides on the requirements for membership, and incentives.

The CLCA Federation leader was interviewed to obtain information regarding the history, development and objectives of the Federation. The Federation, the first CLCA organization established, originally included the founding members who were the farmers who had participated in the ICRAF-sponsored training in 1996 that started the CLCA.

From the rapid appraisal, which was conducted during the early stages of the fieldwork, it was discovered that the president of the Federation, Mr. Marcelino Patindol,[32] was the only person among the current roster of Federation officers who had been with the organization from its inception. In addition, only Mr. Patindol had been consistently involved in the CLCA's activities and its development. The rest of the officers (the vice-president, secretary and auditor) were part-time managers because of their distance from the ICRAF office, which served as the headquarters for the

[32]Although the Federation has a complete set of officers, only Mr. Patindol was interviewed because he was the only officer who has been active in the Federation activities, and hence, was the only person in the Federation leadership that was in a position to talk about the topics of the interview.

Federation. Mr. Patindol's background as a *baranggay* captain (in *baranggay* Sta. Cruz in 1996 before running and losing for municipal council office) made him uniquely qualified to comment on the relationship between the CLCA and local government units.

To obtain the information needed, the interview with Mr. Patindol was structured (with a questionnaire), but open questions were included to allow him to interject his ideas and insights on the topics covered during the interview. The Federation questionnaire focused on seven topics: (1) the events that lead to the establishment of the CLCA; (2) objectives and functions of the CLCA Federation; (3) membership policies and requirements; (4) responsibilities of the chapters and sub-chapters; (5) resources of the Federation; (6) institutional linkages, ; and (7) problems and plans of the Federation. Results of these interviews were reported in Section 3.3 in Chapter 3.

4.1.2 The Chapters

From the interview with the president of the CLCA Federation, it was determined that the chapters and the sub-chapters -- although part of the Federation -- are autonomous CLCA organizations. Thus, in order to understand the connections between all the units of the CLCA, it was necessary to also interview the leaders of the chapter and the sub-chapters. The objectives of these interviews were to determine the parallel development of the sub-units, focusing on their history, development, objectives, institutional linkages.

Fifteen of the 17 chapters were targeted for the key informant interviews.[33] A uniform questionnaire was developed for all of the chapter interviews. The questionnaire focused on nine topics : 1) the events that lead to the establishment of the chapter; 2) objectives and functions of the chapter; 3) membership policies and requirements; 4) responsibilities of the sub-chapters to the chapter; 5) responsibilities of the chapter to the Federation and to the *baranggay* leadership; 6) selection process and qualities of the chapter leaders; 7) resources available to the chapter; 8) institutional linkages; and 9) problems and future plans.

In addition, baseline information was collected on the characteristics of the *baranggay* in which each chapter was located and, upon the request of ICRAF, questions were added to assess the leaders' sentiment regarding the suggestion that penalties be imposed on farmers for non-adoption of contour plowing. Results of these interviews were for ICRAF's use and were not reported in the text of this study.

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[33]The choice of chapters (and the *baranggays)* to exclude was based on the two considerations. First, *baranggay* Panampawan, was excluded because it was a dormant chapter. Except for the president, all of the chapter officers in this *baranggay* had resigned because of time constraints, and there have been no chapter activities since the time of its establishment. The president had also expressed his desire to leave so he can tend to his farm and his other commitments. Second, *baranggay* Poblacion, was excluded list of chapters for interview because it was an outlier in terms of infrastructure, proximity to the municipal officials, institutional linkages (the *baranggay* captain is the mother of the governor of Misamis Oriental), and access to resources. *Baranggay* Poblacion is the center of the municipality and is more urban than the other *baranggays*. Thus, since this chapter was not representative of the existing conditions that other chapters faced, the insights and information obtained from interviewing its leaders would refer to its unique situation.

4.1.3 The Sub-chapters

The sub-chapters are the *sitio*-based CLCA organizations, through which the services, activities and programs of the CLCA offers are channeled. Sub-chapters form the membership base of the chapters in the same way that the chapters are the members of the Federation. Thus, the key informant interviews with the sub-chapter leaders focused on obtaining the information needed to assess the specific characteristics of the sub-chapters that had an impact on the delivery of information and other services to the community, social capital formation between the organization and the farmers, and the link between the CLCA and the farmer's decision to adopt. Forty-five of the *sitio* sub-chapters were targeted[34] for key informant interviews. The key questions focused on nine topics: (1) the events that lead to the establishment of the sub-chapter; (2) objectives and functions of the sub-chapter; (3) membership policies and requirements; (4) responsibilities of the farmer-members to the sub-chapter; (5) responsibilities of the sub-chapter to the Federation and to the *baranggay* leadership; (6) selection process and qualities of the sub-chapter leaders; (7) resources available to the sub-chapter; (8) institutional linkages; and (9) problems and future plans.

In addition baseline information were collected on the characteristics of the *sitio* in which the sub-chapter was located and questions were added to assess to the leaders' sentiment regarding the suggestion that penalties be imposed on farmers for non-adoption of contour plowing. The results of these interviews were not reported directly in this study

[34]The sub-chapters were chosen by randomly selecting three *sitios* (from where these sub-chapters were based) from each of the 15 *baranggays* included in the study. There are a total of 105 (as of 1999) sub-chapters in Claveria.

but were used by ICRAF internally.

4.1.4 Farmers

The farmer survey was conducted to collect data to identify the socio-economic, environmental and institutional factors associated with farmers' adoption of soil conservation technologies, and factors associated with membership in the CLCA sub-chapter.

The sample of 274 small farmers was distributed across the 45 *sitios* in which leader interviews were conducted. From each *baranggay*, three *sitios* were randomly selected using a random numbers table. In each *sitio*, a list of the all the farmers were obtained from the *sitio* secretary and divided into adopters and non-adopters of contour plowing. Using a random numbers table, three adopters and three non-adopters were selected as respondents for each *sitio*.

The farmer questionnaire collected data that are hypothesized to be associated with farmers' perceived membership in the CLCA and adoption of contour plowing. Each of the sections in the questionnaire and all the data collected in each section are shown in Table 4.2.

Table 4.2 - Questionnaire Sections and Data Collected, Claveria, Philippines, 2000

Section	Data collected	Measurement
Household Characteristics	Age Gender Education Number of children Non-farm income	years male or female years of school number pesos
Land use and Farm Production	Number of parcels owned Area of each parcel Years used Tenure for each parcel Slope Soil quality Adoption Crops Production	number hectares number choose from list degrees of inclination scale for soil fertility with or without technology choose from list kilograms
Credit	Amount of loan Reason for loan Collateral Months to repay Late payment penalty	pesos choose from list choose from list number choose from list
Use of Conservation Technology	Advantages and disadvantages of each technology Labor requirement to contour plow Year NVS was established Kinds of trees planted Reasons for adoption or non-adoption of technology	choose from list labor days number choose from list choose from list
Technology Information Sources and Assessment	Source of info on contour plowing, NVS, planting trees, A-frame, cow's back method, and the CLCA	choose from list
Participation in the CLCA	Frequency of participation (in 1999) in CLCA training, cross-visits, *pahina*, and *sitio* meetings Reason for joining or <u>not</u> joining CLCA Benefits of membership Responsibilities of a member Compliance with CLCA requirements	number choose from list choose from list choose from list yes or no
Problems with Adoption of Conservation Technology	Problems with contour plowing, NVS, trees Ways CLCA can help solve these problems	choose from list choose from list

Table 4.3 - Cont'd

Qualities of CLCA leaders	Most important qualities of CLCA leaders Most important qualities of leaders in general Problems of the CLCA Ways the CLCA can be strengthened	choose from list choose from list choose from list choose from list
Penalties for non-conservation	Agree or disagree with penalties Reasons for choice	yes or no choose from list

4.2 Characteristics of farmers who considered themselves as CLCA members

The objective of this section is to highlight the characteristics of farmers that are significantly associated with their perception of membership in the CLCA. "Perception" of membership was used in the analysis, since the majority of the members on the roster of the CLCA did not go through a formal membership screening process. In the course of the key informant interviews, it was discovered that most of the CLCA "members" were automatically included in the roster simply because they lived in a *sitio* in Claveria or were associated with the CLCA officers or LGU officials. Many of the farmers who were interviewed did not even know they were part of the CLCA until they were informed prior to the interview. As such, it was more accurate to depict the "true" members of CLCA as those who did not object to being a member of the CLCA and who were willing to participate in the CLCA activities such as meetings and *pahinas*. Using this criterion, the sample included 113 farmers who considered themselves as non-members and 161 who regarded themselves as members. The categoric variables hypothesized to be associated with the perceived membership are grouped into three categories: socio-economic

characteristics, participation in the CLCA activities and social capital. Since chi-square analysis requires categoric data, in some cases continuous variables have been converted to categoric variables. Table 4.3 lists the category and type of variable included in the analysis.

Table 4.3 - Variables Expected to be Associated with Perception of Membership in the CLCA, Claveria, Philippines, 2000

Variable	Type of Variable[a]	Hypothesis
Age of farmer	continuous	Younger farmers are more likely to perceive themselves a member of a conservation oriented organization because they have access to more information and interaction with the members.
Gender	categoric	Men are more likely to perceive themselves as members of the CLCA because women have additional responsibilities in the household and do not have time to socialize.
Civil status	categoric	Single farmers are more likely to perceive themselves as members of the CLCA because they have more free time than the married farmers, and can interact with the other members of the organization more freely.
Years of School	continuous	Farmers who have more years in school are more likely to perceive themselves as members of the CLCA because years of education makes farmers more open to civic duties, and interaction with other people.
Frequency of attendance in training	continuous	Farmers who have more participation in training in the village are more likely to feel part of the CLCA because they are more likely to have better information about the CLCA and more interaction with the members during the training and feel they are members of the organization.
Frequency of attendance in cross-visits[b]	continuous	Farmers who have more participation in cross-visits are more likely to regard themselves as members of the CLCA because they are more likely to have more interaction with the current members during the cross-visits, and feel that they are part of the organization.
Frequency of attendance in *pahina*[c]	continuous	Farmers who have more participation in *pahina* are more likely to regard themselves as members of the CLCA because are more likely to interact with the members and feel that they belong in the organization.

Table 4.3 - Cont'd

Frequency of attendance in *sitio* meetings	continuous	Farmers who have attended more *sitio* meetings are more likely to regard themselves as members of the CLCA because these are the members of the community who would share the civic objectives of the organization.
Total non-farm income	continuous	Farmers who have more non-farm income are more likely to perceive themselves as members of the CLCA because they have are more able to afford the costs of being a member.
Total number of parcels	continuous	Farmers who have more parcels are more likely to perceive themselves as members of the CLCA because they are more likely to take advantage of the free seedlings and information on controlling erosion.
Previous residence	categorical	Farmers who have lived closer to Claveria in the past are more likely to perceive themselves as members of the CLCA because they know more likely to know more members of the CLCA. and feel part of the organization.

[a] Continuous variable converted to a categoric variable for this analysis. For the probit analysis in the next chapter, the continuous variables were used instead of categoric.
[b] Cross-visits are exposure trips for farmers to observe other farms that have adopted contour plowing
[c] Local term for community work-sharing.

4.2.1 Socio-economic characteristics

Seven socio-economic traits were cross-tabulated with perception of membership: age, gender, civil status, years in school, off farm-income, residence before Claveria, and number of parcels owned (Table 4.4). The chi-square test (at 10 percent confidence level) indicated only the variable "residence before Claveria" was statistically significant. All the other variables had very low chi-square statistic as shown in Tables 4.4 - 4.10. To be statistically significant at the 10 percent level, the chi-square computed value must be greater than the $\chi^2_{0.1}$ value.

From the results of the cross-tabular analysis, we conclude that the farmer-members of the CLCA are mostly from the province of Misamis Oriental. This is not surprising as it is likely that Misamis Oriental natives who have settled in Claveria were easier to attract to join a rural association that aimed to promote and care for their native area. These farmers were more likely to join the CLCA (i.e., consider themselves as members of the organization), which anecdotal data indicates is due to a sense of loyalty and attachment to the family living in the area, and to their heritage.

Table 4.4 - Descriptive statistics for the continuous variables, Claveria, Philippines, 2000

Variable	Minimum Value	Maximum Value	Mean	Standard Deviation
Age of Farmer	21	76	44	11.7
Years in School	0	23	7	3
Frequency of training	0	10	0.4	1.1
Frequency of cross-visits	0	3	0.3	0.6
Frequency of pahina	0	43	5	6.7
Frequency of *sitio* meetings	0	46	4	5.5
Total Non-farm Income (₱ per annum)	0	54000	4133	8744.8
Area of parcel	0.22	14	1.7	1.5
Number of parcels owned	1	4	1	0.5

Table 4.5 - Age and Perception of Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Age of Farmer	≤ 30	10.6%	15.5%	13.5%
	between 30 and 50 yrs old	54.9%	54.0%	54.4%
	≥ 50	34.5%	30.4%	32.1%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 1.537 d.f. = 2 $\chi^2_{0.1} = 4.60$

Table 4.6 - Gender and Perception of Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Gender	Female	15.9 %	17.4%	16.8%
	Male	84.1%	82.6%	83.2%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.102 d.f. = 1 $\chi^2_{0.1} = 2.70$

Table 4.7 - Civil Status and Perceived Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Civil Stat	Single	5.3 %	4.3%	4.7%
	Married	94.7%	95.7%	83.2%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.557 d.f. = 2 $\chi^2_{0.1} = 4.60$

Table 4.8 - Education and Perception of Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 112)	Members (N = 158)	
Education	Elem	66.4%	64.0%	65%
	Secondary	23.9%	23.6%	23.7%
	College	8.8%	10.6%	9.9%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.693 d.f. = 3 $\chi^2_{0.1} = 6.25$

Table 4.9 - Non-farm income and Perception of Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Non-farm Income	None	65.5%	62.7%	63.9%
	≤ ₱ 5,000	13.3%	13.0%	13.1%
	≥ ₱ 5,000	21.2%	24.2%	23.0%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.339 d.f. = 2 $\chi^2_{0.1} = 4.60$

Table 4.10 - Place of Origin and Perception of Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 160)	
Previous Residence	Native of Misamis Oriental	82.3 %	90.1%	86.9%
	Visayan region	17.7%	9.3%	12.8%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 4.815 d.f. = 2 $\chi^2_{0.1} = 4.60$

Table 4.11 - Parcels Owned and Perceived Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 112)	Members (N = 160)	
Number of Parcels	1	72.3%	66.2%	68.8%
	2	18.75%	25.6%	22.7%
	≥ 3	8.9%	8.1%	8.4%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 2.976 d.f. = 5 $\chi^2_{0.1} = 9.24$

To verify the result of the chi-square test, a two-tailed t-test for comparing sample means was performed on two variables -- age and years of school -- as these two socio-economic characteristics were consistently cited in the literature as determinants of farmer adoption of a new technology. The results confirmed the chi-square test results. The computed t-value (0.094) for the mean age of the farmers who considered themselves members and non-members was lower than the critical value of 1.960 (272 degrees of freedom) at the five percent confidence interval. Similarly, the t-value of the mean number of years in school for those who regarded themselves as members and those who did not consider themselves as members was 0.59, which again was lower than 1.960. Therefore, it is very likely that the difference between the mean age and education of the farmers who perceived themselves as CLCA members and those who did not, is not statistically significant.

4.2.2 Participation in the CLCA Activities

Two variables that measured farmers' participation in CLCA activities were cross-tabulated with perceived membership: participation in training and cross-visits. The chi-square test (at the 10 percent confidence level) indicates that the amount of training and participation in cross-visits are statistically associated with the perception of membership in the CLCA, as shown in Tables 4.12 and 4.13.

Table 4.12 - Participation in Training Sessions and Perceived Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Participation in training	None	92.0 %	75.2%	82.1%
	At least 1 time	8.0%	24.8%	17.9%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 12.883 d.f. = 1 $\chi^2_{0.01} = 6.64$

Table 4.13 - Participation in Cross-visits and Perceived Membership in the CLCA, Claveria, Philippines, 2000

Characteristic		Perceived member of CLCA?		Row Average
		Not Member (N = 113)	Members (N = 161)	
Participation in cross-visits	None	91.2%	72.0%	79.9%
	At least 1 time	8.8%	28.0%	20.1%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 15.099 d.f. = 1 $\chi^2_{0.01} = 6.64$

Nearly 25 percent of the farmers who considered themselves as CLCA members have received training in soil conservation[35] compared to only eight percent of those who did not, even if membership was not a prerequisite for participating in training. Anecdotal data and key informants point to the fact that farmers who did not regard themselves as members of the CLCA were reluctant to participate in training sessions in the villages because they believed that only members of the organization could participate. Even when assured that these sessions were open to anyone, some farmers either felt that it was shameful -- *nakakahiya* sentiment -- to participate in someone else's group activity, or suspicious that they would be recruited to join the CLCA if they participated in the training. However, the latter reason was not entirely without basis as key informants revealed that sometimes farmers who participated in these sessions were actively recruited

[35]Soil conservation training includes practical training in the use of the A-frame, contour plowing and tree seedling preparation, and lectures on suitable trees that can be used as hedgerow plants.

to contour and join the CLCA by the members and officers of the organization.

While one would expect that those who regarded themselves as members would be more likely to participate in training activities, it is striking that such a low number of these individuals have participated in at least one training session. One complaint that farmers and leaders raised during interviews was the limited number of opportunities for livelihood training in the communities. From the interviews, it became clear that rather than investing their time in participating in soil conservation training, some farmers would prefer to learn more about income-generating methods.

Similar results were obtained when the relationship between perceived membership and cross-visits was evaluated. Only 28 percent of the members interviewed had participated in cross-visits. Although this percentage was larger than the 8.8 percent participation by non-members, the number was still low -- given that cross-visits represented an educational and socialization opportunity that were available to farmers free of charge. Group interviews, conducted to find out why the participation rate was so low, indicated many farmers felt that the opportunity cost of cross-visits was higher than their perceived benefits. Cross-visits were often viewed as too time consuming, especially during the land preparation time of the season.

4.2.3 Representations of Community Relationships

The variables that measured an attachment to the community were cross-tabulated with perceived membership: participation in *sitio* meetings and *pahina* (scheduled community work). Attendance in *sitio* meetings and *pahina* reflect the farmers' sense of

connection with the rest of the community -- commonly referred to as "kernels of commonality" in the social capital literature -- which give rise to what is termed as "bonding" social capital. Farmers' participation in *sitio* meetings and *pahina* build solidarity which manifests itself in joining the CLCA -- an organization that is viewed favorably in the community.

The chi-square test indicates that participation in *sitio* meetings was statistically associated (at the 10 percent level of confidence) with perceived CLCA membership (Table 4.14). Eighty-seven percent of these farmers had attended at least one *sitio* meeting in 1999. In contrast, only 47 percent of those farmers who did not regard themselves as CLCA members had attended at least one *sitio* meeting. These results indicate that farmers who have a stronger connection with the rest of the community are more likely to consider themselves as members of the CLCA than those who are less connected. This supports what the CLCA leaders and the local government officials interviewed for this study have said, that the farmers who participate in community activities are easier to recruit to join

Table 4.14 - Attendance in *Sitio* Meetings and Perceived Membership in the CLCA, Claveria, Philippines, 2000

Characteristics		Perceived member of CLCA?		Row of Average
		Not Member (N = 113)	Members (N = 161)	
Attendance in Meetings	None	54.0 %	13.0%	29.9%
	At least 1 time	46.0%	87.0%	70.1%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 53.065 d.f. = 1 $\chi^2_{0.01} = 6.64$

the CLCA than those who are not active in community gatherings and activities.

This association between perceived membership and participation in *sitio* meetings may be related to the farmers' strong cultural pre-disposition to be associated with the rest of the community. The local word for this cultural sentiment is *pakikisama.*[36] In most cases, the *sitio* meetings are attended by local government officials -- especially the baranggay kagawad -- who actively promote the CLCA. Out of respect for these local officials' standing in the community and out of the *pakikisama*, farmers who are asked to join the CLCA almost never decline the invitation, although they may not necessarily follow through with adoption of contour plowing.

From the key informant and group interviews, the author found that since most of the members regarded the CLCA as a part of the local government, they also perceived the *sitio* meetings as CLCA meetings. Hence, farmers who regarded themselves as CLCA members considered attending the *sitio* meetings as part of their responsibilities as CLCA member. This was true even in *sitios* that held two separate meetings-- one for the *sitio* and one for the CLCA.

The chi-square analysis also showed a statistically significant relationship (five percent confidence interval) between "participation in *pahina*" and perceived membership in the CLCA (Table 4. 15). Close to 88 percent of the farmers who regarded themselves as CLCA members had attended at least one *pahina* in 1999, compared to 51

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[36]*Pakikisama*, literally translated, means "to be one with the group." This is a Filipino cultural trait where a person engages in an action to be part of the group.' In some literature, *pakikisama* can be referred to as a cultural capital -- a form of social capital that is rooted in a person's cultural upbringing.

percent of those who had not. Farmer-"members" cited attendance in both CLCA's and *sitio*-sponsored *pahinas* (community or group work) as one of their responsibilities as a CLCA member -- despite the fact that members are only required to help out in the CLCA-sponsored *pahinas*. This further suggests that farmers who have a strong sense of bonding with the rest of the community are more likely to join the CLCA than those who are not as attached. However, the significance of this statistical association still has to be tested in the probit analysis in the next chapter before any conclusion on the importance of social relations and decision to join a group can be drawn.

Table 4.15 - Participation in *Pahina* and Perceived Membership in CLCA, Claveria, Philippines, 2000

		Perceived member of CLCA?		Row of Average
		Not Member (N = 113)	Members (N = 161)	
Participation in *Pahina*	None	48.7 %	12.4%	27.4%
	At least once a year	51.3%	87.6%	72.6%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 43.890 d.f. = 1 $\chi^2_{0.01} = 6.64$

4.3 Characteristics of the Adopters of Contour Plowing

This section identifies the characteristics of farmers that are significantly associated with adoption of contour plowing. The sample consists of 165 non-adopters and 108 adopters. The list of variables is presented in Table 4.16. In addition to socio-economic characteristics and the farmers' relationship with the rest of the community, three variables

are included that characterize the farmers field namely, the parcels' fertility and slope, and the tenurial arrangement. For those farmers that tilled several parcels, a single parcel was selected at random for inclusion in the analysis.

4.3.1 Socio-economic characteristics

Five socio-economic characteristics were tabulated with adoption: age, years in school, off farm-income, residence before Claveria, and number of parcels tilled. At the 10 percent level of confidence, the chi-square test indicated that none of these traits were significantly associated with adoption of contour plowing. All of these variables registered very low chi-square statistics, as shown in Tables 4.17 - 4.21.

Thus, the results of the cross-tabular analysis fail to prove significant relationships between these socio-economic indicators and adoption of contour plowing. This suggests that the farmer-adopters in Claveria are influenced by external factors in their decision to adopt contour plowing.

Table 4.16 - Variables Expected to be Associated with Adoption of Contour Plowing

Variable	Type of Variable[a]	Hypothesis
Age of farmer	continuous	Younger farmers are more likely to adopt contour plowing because they are more likely to experiment with new methods than older farmers.
Civil status	categoric	Married farmers are more likely to adopt contour plowing because they think of the next generation more than single farmers.
Years of School	continuous	Farmers who have more years in school are more likely to adopt contour plowing because they more likely to have more information about the problems of erosion and the benefits of contour plowing.

Table 4.16 - Cont'd

Frequency of attendance in training	continuous	Farmers who have more participation in training in the village are more likely to adopt contour plowing because they are more knowledgeable about the benefits of contour plowing and the ways set up the contour.
Frequency of attendance in cross-visits[b]	continuous	Farmers who have more participation in cross-visits are more likely to adopt contour plowing because they have witnessed the benefits of contour plowing from other farmers.
Frequency of attendance in *pahina*[c]	continuous	Farmers who have more participation in *pahina* are more likely to adopt contour plowing because they have more interaction with farmers who contour plow, and have more access to seeds for the contour strips.
Frequency of attendance in *sitio* meetings	continuous	Farmers who have attended more *sitio* meetings are more likely to adopt contour plowing because of they are more likely to have more interaction with other farmers who contour plow.
Total non-farm income	continuous	Farmers who have more household non-farm income are more likely to contour plow because they have income to compensate for the decline in area for production as a result of establishing contour strips.
Total number of parcels	continuous	Farmers who have less number of parcels are more likely to contour plow because they would tend to protect their farm more from erosion since they have no other source of income.
Size of parcel	continuous	Farmers who till larger parcels are more likely to contour plow because the ratio of area for lost for production and total area of parcel would be less.
Previous residence	categorical	Farmers who have lived closer to Claveria in the past are more like to contour plow because they have more attachment to their land.
Membership in the CLCA	categorical	Farmers who are members of the CLCA are more likely to contour plow because they have more access to information and seedlings.
Soil fertility	categorical	Farmers whose parcel are less fertile are more likely to contour plow to let the soil regain its fertility.
Slope of parcel	categorical	Farmers whose parcels are steeper in slope are more likely to contour plow to prevent erosion of their parcels' topsoil.
Tenure	categorical	Farmers who have secure rights on their farm are more likely to contour plow because they are more secure that they will get the return on their investments.

[a] Continuous variable converted to a categoric variable

Table 4.17 - Age and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Age of Farmer	< 30	12.1%	15.7%	13.6%
	between 30 and 50 yrs old	55.8%	51.9%	54.2%
	> 50	32.1%	32.4%	32.2%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.816 d.f. = 1 $\chi 20.1 = 2.70$

Table 4.18 - Level of Education and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 163)	Yes (N = 106)	
Education	Elem	65.0%	66.6%	66.2%
	Secondary	25.2%	21.6%	23.8%
	College	9.8%	10.4%	10.0%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.608 d.f. = 3 $\chi 20.1 = 6.25$

Table 4.19 - Non-farm Income and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 165)	Yes (N = 108)	
Non-farm Income	None	65.5%	61.1%	63.7%
	< ₱ 5,000	11.5%	15.7%	13.2%
	> ₱ 5,000	23.0%	23.1%	23.1%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 1.077 d.f. = 2 $\chi 20.1 = 4.60$

Table 4.20 - Parcel Tilled and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 163)	Yes (N = 108)	
Number of Parcels	1	68.1%	69.4%	68.6%
	2	25.8%	18.5%	22.9%
	> 3	6.1%	12.0%	8.5%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 4.175 d.f. = 2 $\chi 20.1 = 4.60$

Table 4.21 - Provincial origin and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 165)	Yes (N = 107)	
Previous Residence	Native of Misamis Oriental	88.5 %	85.0%	87.1%
	Visayan region	11.5%	15.0%	12.5%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 2.216 d.f. = 2 $\chi 20.1 = 4.60$

To verify the results of the chi-square test, a two-tailed t-test for two variables -- age and years of school -- was done to compare these two variables' sample means. The results supported the chi-square test results: At 10 percent level of confidence, the computed t-value of 0.752 for the mean age of adopters and non-adopters was lower than the critical value of 1.960 (272 degrees of freedom). Similarly, the mean number of years in school for adopters and non-adopters registered a t-value of 0.588, which was lower than 1.960.

4.3.2 Impact of CLCA on Adoption of Contour Plowing

Three CLCA-related variables were cross-tabulated with adoption: perceived membership in the CLCA, frequency of attendance in training, and frequency of participation in cross-visits. The chi-square test (10 percent confidence level) indicated that all three variables were statistically associated with adoption of contour plowing. The

results are shown in Tables 4.22 - 4.24.

Table 4.22 - Perceived Membership in the CLCA and Adoption, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 165)	Yes (N = 108)	
Member of CLCA?	No	46.1 %	34.3%	41.4%
	Yes	53.9%	65.7%	58.6%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 3.747 d.f. = 1 $\chi 20.1 = 2.70$

Table 4.23 - Participation in Training and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Participation in training	None	89.1 %	71.3%	82.1%
	At least 1 time	10.9%	28.7%	17.9%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 14.035 d.f. = 1 $\chi 20.01 = 6.63$

Table 4.24 - Participation in Cross-visits and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Participation in cross-visits	None	84.2%	74.1%	80.2%
	At least 1 time	15.8%	25.9%	19.8%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 4.253 d.f. = 1 $\chi 20.05 = 3.84$

Close to 66 percent of adopters considered themselves to be members of the CLCA, compared to 34 percent who did not. On the other hand, 54 percent of non-adopters perceived themselves as members of the CLCA, compared to 46 percent of the farmers who regarded themselves as non-members. The noticeable difference in the ratios indicate the significant association between perceived membership and adoption. Farmer-"members" are more likely to adopt than non-members because of several factors including higher interaction with other farmers who have adopted, better access to information about conservation technology, and access to seedlings and other conservation materials.

The chi-square test results also indicate a negative association between the frequency of attendance in training and adoption. This is inconsistent with other empirical studies that show a positive relationship between training (more training indicates greater information access) and technology adoption. However, while these results are unexpected, key informant interviews revealed that information sharing among farmers

reduced the need for attendance in the formal training sessions -- which possibly explains the negative relationship between attendance in training and the farmers' decision to adopt. This supports the reports by CLCA leaders, as well as the ICRAF Land Care extension personnel, that information about contour plowing is primarily disseminated through word of mouth. It can be deduced from the findings of this study that the information gathered from training sessions is efficiently disseminated to non-attendees through informal channels.

A significant statistical relationship (albeit a positive one) is also obtained between frequency of cross-visits and adoption. The positive and significant association between these two variables support ICRAF's findings that that demonstrations -- which is the principle behind cross-visits -- enhance information exchange between farmers especially on topics such as contour plowing. Cross-visits allow for hands on experience and informative testimonials on the benefits from contour plowing, which encourages farmers to adopt it.

4.3.3 Some Indicators of the Presence of Social Capital

The three social capital indicators -- membership in other organization (aside from the CLCA) in the community, attendance in *sitio* meetings, and participation in ***pahina*** – are cross-tabulated with adoption. The chi-square tests indicate that there is no significant association (at 10 percent confidence level) between these variables and adoption of contour plowing (Tables 4.25 - 4.27).

Table 4.25 - Membership in organizations aside from CLCA and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		Yes (N = 160)	Yes (N = 106)	
Member of another organization	No	72.5%	65.1%	69.5%
	At least 1 time	27.5%	34.9%	30.5%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 1.651 d.f. = 1 $\chi 20.1 = 2.70$

Table 4.26 - Participation in *Pahina* and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 165)	Yes (N = 108)	
Frequency of *Pahina*	None	27.9 %	26.9%	27.5%
	At least 1 time	72.1%	73.1%	72.5%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 0.35 d.f. = 1 $\chi 20.1 = 2.70$

Table 4.27 - Participation in *Sitio* meetings and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Participation in Meetings	None	32.7 %	25.9%	30.0%
	At least 1 time	67.3%	74.1%	70.0%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 1.437 d.f. = 1 $\chi 20.1 = 2.70$

The results indicate that, although culturally the farmers of Claveria are pre-disposed to community work (as manifested in *pahina*) and strong social and community ties, they do not view adoption as a manifestation of these ties. Although one could argue that prevention of soil erosion affects the whole community, anecdotal data indicates that adoption of contour plowing is considered an individual decision by the farmer that affects only his family and himself. The farmers consider the benefit of good soil to be higher income for himself and a good future for his children. Interviews with the farmer leaders suggest that although many regarded adoption as good for the community, it is hardly a consideration in the individual farmer's decision to adopt contour plowing. At the most, some farmers agree to "experiment" with contour plowing out of reverence for baranggay officials or even ICRAF personnel who are held in high esteem in the community.

4.3.4 Tenure

The chi-square test supports the prevailing theory that tenure status has a

significant relationship with a farmer's decision to adopt. As shown in Table 4.28, 41 percent of the adopters of contour plowing are farmers who are tilling their farm under the Comprehensive Agrarian Reform Program, compared to 27 percent of the farmers who have not adopted. Interestingly, the percentage of land-owners with titles and who are also adopters are close to identical with owners who are non-adopters (20.4 and 20.0 percent respectively).

Key informants reveal that farmers who have government-issued land rights are farmer-beneficiaries of the Comprehensive Agrarian Reform Program (CARP). Under the program, the right of the farmer to the land is secure and binding, which means that the risk of improving the land and then it being taken away later on is virtually non-existent. However, since the farmers are not full owners of the land, they believe that investing on the land and adopting conservation technology (which is encouraged by the government) improve their chance of being titled-owners under the CARP. This explains why non-owners but CARP beneficiaries are more likely to adopt than full-fledge owners with titles.

Table 4.28 - Tenure and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row Average
		No (N = 165)	Yes (N = 108)	
Tenure	owner with title	20.0%	20.4%	20.1%
	gov't issued rights	27.3%	40.7%	32.6%
	leaseholder	27.3%	21.3%	24.9%
	caretaker	25.5%	17.6%	22.3%
	All	100.0%	100.0%	100

Chi-Sq. Computed Value = 6.378 d.f. = 3 $\chi 20.1 = 6.25$

4.3.5 Parcel Characteristics

Three parcel characteristics-- soil quality, parcel size and slope -- are cross-tabulated with adoption. The chi-square test (10 percent confidence level) indicate that level of soil fertility (based on the farmers' assessment) and parcel size are not statistically associated with adoption of contour plowing (Table 4.29 and 4.30). However, at the same confidence level, the chi-square test shows that slope is significantly associated statistically with adoption (Table 4.31).

Table 4.29 - Soil Fertility and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Soil Fertility Level	Not fertile	28.5%	29.6%	28.9%
	Somewhat fertile	47.9%	53.7%	50.2%
	Fertile	23.6%	16.7%	20.9%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 1.99 d.f. = 2 $\chi 20.1 = 4.60$

Table 4.30 - Size of Parcel and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 165)	Yes (N = 108)	
Size of Parcel (ha)	<1	23.0%	19.4%	21.6%
	36892	59.4%	54.6%	57.5%
	>2	17.6%	25.9%	20.9%
	All	100.0%	100.0%	100.0%

Chi-Sq. Computed Value = 2.826 d.f. = 2 $\chi 20.1 = 4.60$

Table 4.31 - Parcel Slope and Adoption of Contour Plowing, Claveria, Philippines, 2000

		Adopted Contour Plowing?		Row of Average
		No (N = 164)	Yes (N = 108)	
Slope of parcel	< 10 degrees	6.7%	0.0%	4.0%
	10 < slope < 20 degrees	72.0%	69.4%	71.0%
	20 < slope < 30 degrees	14.6%	27.8%	19.9%
	> 30 degrees	6.7%	2.8%	5.1%
	All	100.0%	100.0%	100

Chi-Sq. Computed Value = 14.921 d.f. = 3 $\chi 20.01 = 11.34$

The non-significance of the association between soil fertility and adoption is attributed to the farmers' use of fertilizers to compensate for the loss in soil nutrients arising from erosion. As such, farmers who consider their land to be infertile are not necessarily more inclined to adopt contour plowing than farmers who till more fertile parcels. Although, according to the key informants, farmers prefer to contour plow a parcel with a bigger area than a smaller parcel, the cross-tabular results indicate a non-significant association between the variables parcel size and adoption. For the variable "parcel slope," however, there is a significant statistical association with adoption of contour plowing -- which is consistent with the notion that steeper slopes increase the incidence of erosion. Thus, farmers who till steeply sloped parcels are more likely to adopt contour plowing to prevent the erosion of the topsoil.

4.4 Summary

The results indicate that farmers who perceive themselves as members of the CLCA are those originally from Misamis Oriental and who probably have known the other farmers in Claveria for a long time. They also tend to have a strong attachment to their community and are active participants in community-related work.

The cross-tabular results also show that farmers who regarded themselves as CLCA members are more likely to participate in training sessions and cross-visits than non-members, the reason being that these two activities are viewed as "exclusive" to CLCA members, even if in reality they are not. However, even with the statistically significant association between perceived membership and attendance in training and cross-visits, "members' " participation in these two activities is low.

There are no socio-economic characteristic that pre-dispose farmers to adopt contour plowing. Instead, the results indicate that perceived membership in the CLCA, greater access to information and parcel characteristics, significantly impact farmer adoption. Perceived membership in the CLCA allows farmers to freely (without "hiya" or shame) interact with adopters who share their positive experience with adoption. Likewise, as "members" of the CLCA, the farmers gain access to information about conservation technologies, and seedlings for trees and crops that they can plant on the contour strips. Not surprisingly, attendance in cross-visits -- a source of information on the problem of erosion and methods of conservation adoption -- also had a significant effect on adoption since this an activity that members can participate in.

The results also indicate that parcel characteristics -- particularly, tenure and slope

of the parcel -- significantly influence farmers' adoption of contour plowing. Security of tenure frees the farmers from any apprehension that any investment they make on the land will be taken away later on. Farmers who are beneficiaries of the government's agrarian reform program are more likely to adopt because they believe that investing in the land they till strengthens their application for titled ownership under the CARP. Similarly, farmers who till parcels with steeper slopes are more likely to adopt to prevent the soil in their parcel from eroding.

Chapter 5
Qualitative Response Modeling of the Farmers' Perceived Membership in the CLCA and to Adopt Soil Conservation Technologies

The results presented in Chapter 4 identify several variables associated with the perceived membership and adoption of contour plowing. In this chapter, the probit analysis is used to confirm the cross-tabular results in Chapter 4.

The nature of the research problems in this study (determinants of perception of membership in the CLCA and adoption of conservation practice) requires the use of qualitative response (QR) models, as opposed to linear regression models. In the QR models, the dependent variable is a discrete outcome that renders the conventional regression methods inappropriate because regression coefficients misrepresent the marginal effects of changes in discrete outcomes. Qualitative response models can specify a relationship between the independent variables and the discrete dependent variables in the same essence as regression models. Using one of the two most widely used QR models, -- the probit model -- this study analyzes what variables are statistically associated with the farmers' perception of themselves as members of the CLCA, and with the farmers' decision to adopt contour plowing. The choice of the probit model -- as opposed to the logit model, the other most commonly used QR model -- is a matter of convenience as both probit and logit models arrive at the same conclusion. A discussion on the theory behind these two QR models and the rationale of why probit was used in this study, is presented in the next section.

5.1 The Theory Behind the Probit and Logit Models

The approach taken by QR is in the general framework of probability models specified as follows:

$$\text{Prob (event j occurs)} = \text{Prob}\ (\ Y = j\ )$$

The literature groups probability models into two broad categories, namely, binomial and multinomial, depending on whether the outcome is a choice between two alternatives or more than two discrete choices. From the theoretical point of view, the multinomial cases are extensions of the binomial models.

In discrete choice theory, two of the most widely used probability models are the logit and the probit models. These two models produce predictions that are consistent with the general framework of probability models specified above. For a given regressor vector, we would expect

$$\lim_{\beta' \mathbf{x} \to +\infty} \text{Prob}\ (Y = 1) = 1$$

and

$$\lim_{\beta' \mathbf{x} \to -\infty} \text{Prob}\ (Y = 1) = 0$$

where β reflects the impact of $\mathbf{x}$ on the probability, and $\beta'\mathbf{x} = \beta 0 + \beta 1 x 1 + ... + \beta k x k$

If a normal probability distribution is used, then we have the probit model of the form:

$$\text{Prob}\ (Y = 1) = \int_{-\infty}^{\beta' \mathbf{x}} \varphi\ (t)\ dt$$

$$= \varphi(\beta'x)$$

Many economists, however, use the logistic distribution (shown below) instead of the normal distribution, purely for mathematical convenience.

$$\text{Prob}(Y = 1) = \frac{e^{\beta'x}}{1 + e^{\beta'x}}$$

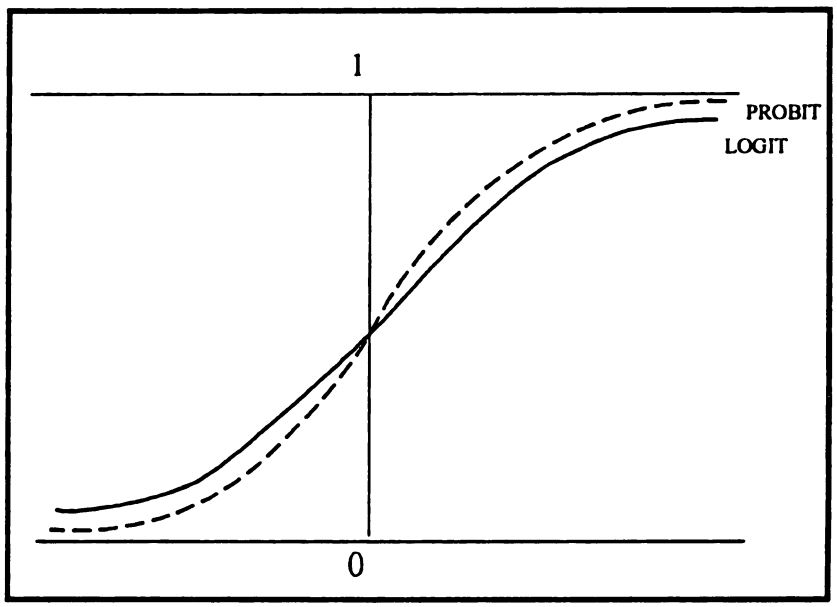
$$= \Lambda(\beta'x)$$

The restriction on φ and Λ taking on values strictly between 0 and 1 for all real numbers ensures that the estimated response probabilities are strictly between 0 and 1 for all values of the parameters and x_k.

The probit and logit models bear similar statistical results because the logistic distribution is similar to the standard normal cumulative distribution, except in the tail. The logistic distribution has a slightly flatter tail than the standard normal distribution, as shown in Figure 5.1.

This suggests that the probit curve approaches the axes more quickly than the logistic curve. However, the use of either one will result in the same statistical conclusion, even if the underlying assumptions regarding the distribution of the cases and the error term differ. Probit is more commonly used in economics because economists generally

Figure 4 - Graph of Probit and Logit Probability Models



Source: Gujarati, 1995

favor the normality assumption of this model. The assumption of normality makes specification problems associated with statistical analysis easier to analyze and interpret than with the standard logistic distribution (Wooldridge, 2000). However, since the logit model is more readily available in computer software programs, it is preferred by many researchers (Gujarati, 1995). The choice between the two, in most cases, is a matter of mathematical convenience. Greene (1997) reports that for intermediate values of $\beta'\mathbf{x}$ (between -1.2 and +1.2 for example), the two distributions tend to give similar probabilities. However, the logistic distribution gives a larger probabilities to $y = 0$ when $\beta'\mathbf{x}$ is very small and smaller probabilities when $\beta'\mathbf{x}$ is very large, than the normal

distribution. For large samples, we can expect extremely similar predictions. The probit and logit models generally arrive at the same conclusion, but their coefficients differ in magnitude due to the difference in the basic assumption about the distribution of cases. The choice of one over the other is often based on arbitrary preference or computational convenience rather than on theoretical grounds. For the purpose of this study, the probit model is used to analyze the binary choices of membership in the CLCA, and of adoption of contour plowing.

5.1.1 Maximum Likelihood Estimation

Both of these models uses the maximum likelihood estimation (MLE)[37] of the link function (*i.e.*, the probability distribution function) for the dependent variable in contrast to conventional regression model's use of least squares estimation of the dependent variable. For the probit model, the link function used is the inverse of the standard normal cumulative distribution function, and for the logit model, the link function used is the natural log of odds-ratio.

The principle behind the MLE is explained by Wackerly, *et. al* (1996) through an illustration. Suppose a box contains three balls which are either all red, all white, or a combination of the two colors. A random sampling of two balls would yield either all red or all white, or one red and one white. The probability of obtaining two red balls (without

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[37]Due to the non-linear nature of the of the maximization problem, there is no formula for maximum likelihood estimates. However, the general theory of (conditional) MLE for random samples suggests that the MLE is consistent, asymptotically normal and efficient under general conditions (Wooldridge, 2000).

knowing how many of the three balls are red) from a sample of two could either be 1/3 (if there are two red balls and one white) or 1 (if all the balls are red). If we ask what the maximum probability is that our sample would be two red balls, then it would be 1. This simplified example illustrates a method for finding an estimator that can be used in different cases. The technique of selecting estimated values of parameters that maximize the likelihood[38] of the observed sample is the MLE.

To obtain the MLE conditional on the explanatory variables, we assume a random sample size n and the density of y_i given x_i as:

$$f(y| x_i ; \beta) = [G(x_i \beta)]^y [1-G(x_i \beta)]^{1-y}, \quad y = 0, 1$$

where y is the dependent variable and x_i is the vector of explanatory variables.

The MLE involves the estimation of the unknown parameter such that the probability of observing the given y's is as high as possible. The object of the MLE method is to find the maximum of the likelihood function.

From the above, we can see that if y = 1, then the equation is reduced to $G(x_i \beta)$. When y = 0, then we get $[1 - G(x_i \beta)]$. The log-likelihood function for observation *i* is a function of the parameters, and the data (x_i , y) and is obtained by taking the log of the density function of y, expressed as:

$$l_i (\beta) = y_i \log [G(x_i \beta)] + (1 - y_i) \log [1 - G(x_i \beta)].$$

---

[38]Referred to in statistics as the joint probability function or joint density function and has the general form: $L (y_1, y_2,....y_n | \theta_1, \theta_2....\theta_k)$.

Since G(·) is strictly between zero and one, l_i (β) is well-defined for all values of β. The log-likelihood for sample size N is derived by summing up the log of the density function l_i (β) across all observations. The MLE of β – denoted by **β** – maximizes the said log-likelihood function. In the probit model, G(·) is assumed to be of the standard normal cdf form, thereby making **β** the probit estimator. On the other hand, the logit model, G(·) is of the logistical distribution form which makes **β** the logit estimator.

5.1.2 Interpreting the Probit and Logit Estimators

In the linear regression (LR) model, the coefficient β of a regressor measures the unit effect of the regressand for a unit change in the value of the regressor. Since the probit and logit models deal with the probability of some binary event (0, 1) occurring, the interpretation of the slope coefficient β is not as straightforward as those obtained from LR.

In the Linear Probability Model (LPM), the slope coefficient directly measures the change in the probability of an event occurring resulting from a unit change in the magnitude of the regressor. However, for the probit and logit models, the rate of change in the probability of an event occurring is not measured by the β coefficient, but instead is measured by $\beta_i \varphi (Z_i)$ where $\varphi (\cdot)$ is the density function, and where $Z_i = \beta_1 + \beta_2 X_{2i} + ... + \beta_3 X_{3i}$ is the regression model used in the analysis.

The coefficients generated in probit and logit analysis are not interpreted the same way as the β coefficients are interpreted in the OLS model. The βs in the probit and logit estimates are not measures of the rate of the partial effects of each x_i on the response

probability. Instead, the probit coefficients indicate the effect of a change in the independent variable based on either the inverse of the standard normal CDF (for the probit model), or the logistic distribution (for the logit model). However, the sign of both the probit and logit coefficients indicate the direction of the change in the response probability for the change in each x_i and are expected to be the same direction for both models.

5.1.3 Computing for the Marginal Effects in the Probit and Logit models

In both the probit and logit models, the coefficients -- being a non-linear regression -- are not the marginal effects that conventional linear regression estimates. (Greene,1997). Consider the probability model as specified below:

$$E[y \mid \mathbf{x}] = 0[1 - F(\beta'\mathbf{x})] + 1[F(\beta'\mathbf{x})]$$

$$= F(\beta'\mathbf{x})$$

Computing for the marginal changes, we obtain the following expression:

$$\frac{\partial E[y \mid \mathbf{x}]}{\partial \mathbf{x}} = \left[\frac{d F(\beta'\mathbf{x})}{d(\beta'\mathbf{x})} \right] \beta$$

$$= f(\beta'\mathbf{x})\,\beta$$

where $f(\cdot)$ is the density function that corresponds to the cumulative distribution $F(\cdot)$. For the normal distribution, the cumulative distribution is

$$\frac{\partial E[y \mid \mathbf{x}]}{\partial \mathbf{x}} = \varphi(\beta'\mathbf{x})\,\beta$$

where $\varphi(t)$ is the standard normal density. For the logistic distribution, the marginal effect is expressed as

$$\frac{\partial E[y \mid \mathbf{x}]}{\partial \mathbf{x}} = \Lambda(\beta'\mathbf{x})\,[\,1 - \Lambda(\beta'\mathbf{x})\,]\,\beta$$

For computing marginal effects, Greene (1997) recommends that the expressions be evaluated at the sample means of the data or evaluate the marginal effects at every observation and use the sample average of the individual marginal effects.

5.2 The Farmers's Perception of Membership in the CLCA

This section presents the statistical model used to identify the factors associated with the farmers' perception of membership in the CLCA and discusses the empirical results. The probit model was used to determine the relationship between the perception of membership in the CLCA (the dichotomous response variables (0=not member, 1=member)) and the independent variables. The perception of membership was used as the proxy for the decision to become a member since more than one-half of the members in the CLCA roster were automatic members, by virtue of residence in the *sitios*. Perception of membership (or non-membership) signifies a farmer's non-objection to being

regarded as a member of the CLCA and willingness to undertake the basic costs of membership such as attendance in the CLCA meetings and participation in *pahinas.*

The probit estimators were also calculated using the principles explained in the section on marginal effects. One tailed t-tests on the computed probit estimators was utilized to determine significance of statistical relationship between the explanatory variables and the response variable.

5.2.1 Empirical Model

The empirical model for the farmer's perception of membership in the CLCA is as follows:

MCLCA = f (age, gender, cvilstat, yrs_sch, freqtrai, freqcros, freqpahi, freqmeet, tot_nfy, tot_par, rec_resi)

where MCLCA = perceived membership in the CLCA[a]
age = age of the farmer[b]
gender = gender of farmer[a]
yrs_sch = years in formal school[b]
freqtrai = frequency of participation in training in 1999[b]
freqcros = frequency of participation in a cross-visit in 1999[b]
freqpahi = frequency of participation in *pahina* in 1999[b]
freqmeet = frequency of attendance in a *sitio* meeting in 1999[b]
tot_nfy = average non-farm income in a year[b]
tot_parc = total number of parcels owned[b]
rec_resi[c] = farmer's residence before Claveria[a]

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[a] categorical data
[b] continuous data
[c] The farmer's residence before Claveria was a scale variable with 0 = native of Misamis Oriental (including Claveria), 1 = from other parts of Mindanao, 2 = from the Visayan region, and 3 = from the Luzon region.

5.2.2 Key Results - Characteristics of the CLCA members

Forty-one percent of the farmers surveyed perceived themselves as members of the CLCA. The results of the membership model estimation are presented in Table 5.1. One-tailed t-tests were used to test the significance of the estimated coefficients since the direction of the relationship was also hypothesized. As mentioned, the probit-estimated coefficients do not indicate the change in the probability of membership given a one-unit change in the corresponding independent variable. Instead, the probit coefficients show the effect of a change in an independent variable on the inverse of the standard probability distribution. However, the signs of the coefficients are consistent with the direction of the change. The relative impact of the change in an independent variable on the probability of membership was calculated by taking the derivative of the probit function, as shown in column 3 in Table 5.1 (*i.e.*, Dprobit coefficient).

At the ten percent level of confidence, the frequency of attendance in cross-visits, frequency of attendance in *sitio* meetings, and residence before living in Claveria, were significantly associated with perceived membership in the CLCA. At the same significance level, the results indicate that age, gender, education, non-farm income, parcels tilled, and attendance in training and *pahina* were not significant factors in perceived membership in the CLCA. The model correctly predicted the farmer's perceived membership in the CLCA 67 percent of the total cases.

Table 5.1 - Results of the Probit and Dprobit Estimation of the Membership Model

Variable	Probit Coefficient	Dprobit Coefficient (%)*	z	P - value
Age of farmer	0.0072	0.3	0.96	0.399
Gender of farmer	0.2427	8.8	1.08	0.281
Civil status of farmer	0.0636	2.3	0.21	0.832
Years of formal school attended	0.0234	0.8	0.82	0.409
Frequency of attendance in training sessions	0.1321	4.8	0.89	0.375
Frequency of attendance in cross-visits	0.3655	13.2	1.97	**0.049
Frequency of attendance in *pahinas*	0.0237	0.8	1.02	0.308
Frequency of attendance in *sitio* meetings	0.1709	6.2	4.88	**0
Total Non-farm income	0	0	0.16	0.873
Total number of parcels	0.0226	0.8	0.3	0.764
Residence prior to living in Claveria	-0.244	-8.8	-1.93	**0.054

N = 274
Predicted probability of perceived membership = 0.67
*Significant at the 10 percent level of significance if P-value < 0.1
**Results indicate the variable is significantly associated with perceived membership in the CLCA

As expected, the farmers who attend more cross-visits were more likely to regard himself or herself a member of the CLCA. Attendance in a cross-visit is an opportunity for a farmer to be acquainted with other farmers who were members of the organization. Through this interaction, bonding between the farmers is established which possibly translates into a sense of belonging into the group. It also gave the farmer more information about the CLCA in a more intimate manner, which enhances their sense of belonging with the organization. Statistically, the results indicate that attendance in cross-

visits increased the probability of perceived membership by 13 percent.

Farmers who attended *sitio* meetings were also more likely to perceive themselves as members of the organization because these meetings provided information about the CLCA, and they acquainted the farmer with the organization's activities and members. This knowledge about the organization and its activities, and the bonding with the other farmers, makes it easier for a farmer to regard himself or herself as part of this group. The result also indicated that attendance in the meeting increased the probability of perceived membership by six percent.

The farmer's previous residence before settling in Claveria had a negative impact on perceived membership in the CLCA. The farther the farmer had lived previously from Claveria, the less likely he was to voluntarily associate himself with the CLCA. This is probably because farmers from other areas were less likely to know the farmer-members of the organization and, therefore, less likely to have a strong attachment to the local community. The results indicate that the previous residence variable affects the probability that a farmer would perceive himself or herself a member of the CLCA by nine percent.

These significant statistical association between perceived membership in the CLCA, and the frequency of cross-visits, frequency of attendance in *sitio* meetings, and residence prior to living in Claveria, are consistent with the results of the cross-tabular analysis in Chapter 4. However, the probit result in this chapter is inconsistent with the cross-tabular result that reflect a significant statistical association between perceived membership and frequency of attendance in *pahina*. The discrepancy lies in the effects of the other independent variables included in the probit model (that were not included in the

cross-tabular analysis in Chapter 4) on perception of membership that was not taken into account when the cross-tabular analysis was done. Further investigation revealed that the attendance in *pahina* has a high correlation with *sitio* meetings attendance. In the cross-tabular analysis on perceived membership and attendance in *pahina*, the effect of *sitio* meetings was ignored which exaggerated the effect of *pahina* attendance on perceived membership. As such, the frequency of *pahina* attendance registered a significant statistical association when it was likely to be reflecting the impact of *sitio* meetings on perceived membership.

5.3 The Farmer's Decision to Adopt Contour Plowing

This section presents the statistical model used to identify factors associated with the farmers' decision to adopt contour plowing and discuss the empirical results.

The probit model was utilized to test the relationship between the dichotomous response variable "adoption" (0=not adopt, 1= adopt) of contour plowing and the independent variables. The Dprobit was estimated and used to determine the change in the probability of adoption of contour as a result of a change in the independent variables. The one-tailed t-test was used to determine the significance of the statistical relationship between the independent variables and the farmers' decision to contour plow.

5.3.1 The Empirical Model - Adoption of Contour Plowing

The empirical model for the farmer's decision to adopt contour plowing is:

DC = f (age, cvilstat, yrs_sch, tot_par, freqtrai, freqcros, freqpahi, freqmeet, memberlc, squa_rec, tot_nfy, slope, rec_tenu, parcelar)

where DC = decision to adopt or not adopt [a]
age = age of the farmer [b]
cvilstat = civil status [a]
yrs_sch = years in formal school [b]
tot_parc = total number of parcels owned [b]
freqtrai = frequency of participation in training in 1999 [b]
freqcros = frequency of participation in a cross-visit in 1999 [b]
freqpahi = frequency of participation in *pahina* in 1999 [b]
freqmeet = frequency of attendance in a *sitio* meeting in 1999 [b]
memberlc = perceived membership in CLCA [a]
squa_rec = soil fertility [a]
tot_nfy = average non-farm income in a year [b]
slope = slope of randomly chosen parcel [a]
rec_tenu = tenure for the parcel [a]
parcelar = area of parcel in hectares [b]

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[a] categorical data
[b] continuous data

5.3.2 Key Results - Adoption of Contour Plowing

The results of the contour plowing adoption model estimation are presented in Tables 5.2. Since the direction of the relationships were hypothesized, the one-tailed t-test was used to test the significance of the estimated coefficients. Forty percent of the farmers surveyed were adopters of contour plowing. The results indicate that perceived membership in the CLCA is not a significant determinant of adoption of contour plowing (at the 10 percent confidence level). In contrast, five variables -- total parcel tilled,

frequency of attendance in training, frequency of attendance in *sitio* meetings, slope of the parcel, and the parcel area -- were significantly associated with the probability of farmer's adoption of contour plowing. The model correctly predicted farmers adopting contour plowing 39 percent of the time.

Table 5.2 - Results of the Probit Estimation of the Contour Plowing Adoption Model

Variable	Probit Coefficient	Marginal Effect (%)	z	P-value
Age	-0.0084	-0.3	-1.15	0.252
Civil status of farmer	-0.0419	-1.6	-0.15	0.879
Years of formal school attended	0.0129	0.5	0.46	0.647
Total number of parcels	-0.1543	-5.9	-1.97	**0.049
Frequency of attendance in training sessions	0.1625	6.2	1.74	**0.081
Frequency of attendance in cross-visits	0.1452	5.6	0.96	0.335
Frequency of attendance in *pahinas*	-0.0235	-0.9	-1.38	0.168
Frequency of attendance in *sitio* meetings	0.0352	1.4	1.77	**0.077
Perceived membership in the CLCA[a]	0.1607	6.1	0.88	0.377
Quality of soil in parcel	-0.0564	-2.2	-0.75	0.452
Total Non-farm income	0	0	0.33	0.744
Slope of parcel	0.1379	5.2	1.99	**0.047
Tenure	-0.1044	-4	-1.29	0.197
Area of parcel tilled	0.1043	4	1.78	**0.074
constant	-0.1175	-	-0.186	0.853

N = 272
Predicted probability of adoption = 0.39
[a]The marginal effects coefficient for dummy variables measures the discrete change from 0 to 1
*Significant at the 10 percent level of significance if P-value < 0.1
**Results indicate the variable is significantly associated with adoption of contour plowing

As expected, the significance of the impact of training was consistent with the hypothesis that farmers with more training are more likely to adopt contour plowing The results showed that training increased the probability of adoption by six percent. As training provided more opportunity for the farmer to learn how to contour plow, a farmer who had attended more training sessions is more likely to be aware and convinced of the long term benefits of contour plowing than a farmer who had attended fewer training sessions.

The results also supports the hypothesis that attendance in *sitio* meetings has a positive effect on adoption of contour plowing. They indicate that attendance in these meetings boosted the probability of adoption by 1.3 percent. These meetings -- which is often a social activity for the farmers -- serve as a forum for the advocates of soil conservation in the community to convince other farmers to adopt conservation, and are venues for information exchange regarding conservation. Once more, the role of information is highlighted in influencing farmers to adopt a conservation technology.

However, the *sitios* meetings are not only avenues for greater access to information, but also as a way for farmers to either establish a relationship or enhance an existing relationship with respected people in the community. The key informant interviews indicated that it is easier to convince farmers to try contour plowing if the *baranggay* captain or someone in the community who is held in high esteem, suggests it to the farmer. This suggests that the adoption of contour plowing is a way for some farmers to create social capital either with a specific individual or with the community itself, by using adoption as the means to connect with other farmers, leaders, or extension agents.

This social capital created between the farmers and the community is borne of *hiya* or the Filipino sentiment of self-image. However, further investigation is needed to verify this since it is equally possible that the farmers who are pre-disposed to conservation are also pre-disposed to participating in civic activities such as town meetings.

The statistical results also reflect a positive association between the slope of the parcel and adoption of contour plowing. The implication of this result is straightforward: the steeper the slope of the parcel, the more likely the farmer will adopt contour plowing to counteract the parcel's vulnerability to erosion. The slope variable increased the probability of adoption by five percent.

In addition, the size of the parcel affected adoption of contour plowing by four percent. Key informants indicated that one of their main concerns about contour plowing is that establishing the contour strips would take area away from production. Thus, farmers who tilled larger parcels are more likely to adopt contour plowing because the impact of the decline in area resulting from the establishment of contour strips was less than for those who till larger parcels of land.

On the other hand, farmers who farmed more parcels of land were less likely to adopt contour plowing than those who farmed fewer parcels. Farming fewer parcels increased the probability of adoption by seven percent. While this result did not agree with the hypothesis that the number of parcels and adoption were positively related, in retrospect, this result may be due to the possibility that farmers who farmed fewer parcels are more concerned about the decline in productivity (due to erosion) because they are more dependent on fewer parcels.

The probit analysis results are somewhat different from the results presented in Chapter 4. The cross-tabular analysis results indicate that perceived membership in the CLCA, frequency of attendance in training and cross-visits, tenure status, and slope of the parcel all have significant statistical association with adoption of contour plowing. The probit analysis also shows that attendance in training and the slope of the parcel are significantly associated with adoption of contour plowing. However, the results do not reflect a statistical association between adoption and attendance in cross-visits, nor with tenure status such as what the cross-tabular analysis results show in Chapter 4. In addition, the probit analysis also found the farmers' total number of parcels tilled, area of parcels, tilled, and the frequency of attendance in *sitio* meetings, are all statistically associated with adoption of contour plowing, all of which were found non-significant in the cross-tabular analysis.

This occurrence is likely due to the statistical correlation between the variable attendance in cross-visits and attendance in training sessions, and between tenure and the total number of parcels. Frequency of attendance in training sessions is statistically associated with adoption. The correlation between cross-visits and training sessions masked the non-significance of cross-visits in the cross-tabular analysis but was revealed in the probit analysis. This is also true for tenure which was found to be significant in the cross-tabular results in contrast to the probit analysis which found this variable to be not statistically associated with adoption of contour plowing. The statistical correlation between tenure and total number of parcels -- a variable which the probit results indicate to be statistically associated with adoption -- exaggerated the impact of tenure on

adoption as reflected in the cross-tabular analysis.

The discrepancy in the probit and cross-tabular analyses results also underscore the importance of the interaction of the independent variables. It is not uncommon for the partial effect of an independent variable with respect to the dependent variable to depend on the magnitude of the effect of another independent variable in the model (Wooldridge, 2000). This is known as the interaction effect and is estimated by taking the first-order derivative of the regression equation with respect to an independent variable. If the coefficients of the other independent variables are not equal to zero, then there is an interaction effect between some of the independent variables. The interaction effect is not captured in cross-tabular analysis but is demonstrated in the probit results. This is due to the fact that the probit model measures the effects of different variables that are interacting with each other on adoption, whereas the cross-tabular model examines the effect of each individual variable on adoption without accounting for the interaction among the independent variables.

5.5 Summary

This chapter discussed the principles behind the probit model which were used to analyze the statistical relationship between socio-economic, institutional and the parcel variables, and the farmers' perception of membership in the CLCA,[39] adoption of the

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[39]Since a significant number of the farmers were automatic members of the CLCA, "membership" was not an accurate representation of the farmer's decision to gain membership in the organization. Perceived membership was used in this study to indicate a farmer's non-objection to be considered a member of the CLCA, and his willingness to attend some of its activities.

basic technology, and their choice of complementary technology after they have adopted contour plowing.

The probit analyses indicated that the frequency of participation in cross-visits and the number of times a farmer attends *sitio* meetings were significantly associated with the farmer's perception of membership in the CLCA. Further, the individual farmer's familiarity with the other residents of Claveria and his personal attachment to the municipality (represented by the variable "residence prior to Claveria") were found to be statistically related also with his perception of being a member of the organization.

The statistical results also indicated that total number of parcels tilled by the farmer, area of the parcels tilled, frequency of attendance in training on conservation and town meetings, and the slope of the parcel tilled, were significantly associated with the adoption of contour plowing. These results suggest that information and the farmers' relationship with the other members of the community are important variables in farmer adoption of contour plowing in Claveria. The total number of parcels tilled discouraged adoption for the reason that it gave the farmers the short term production and consumption security which dimmed the attractiveness of the long term benefits derived from the prevention of erosion. On the other hand, a larger-size parcel was more likely to be contour plowed because it lessened the impact of the decline in the area for planting as a result of the establishment of the contour lines.

Training sessions gave the farmers access to information that highlighted the merits of conservation technology and how to use it efficiently. It is reasonable to conclude, therefore, that the number of times a farmer attends training sessions increases his stock of

knowledge on contour plowing which in turn lessens the uncertainties associated with its use.

Town meetings are also fora for the promotion of contour plowing. Aside from the discussion of the community's activities, government and ICRAF extension agents attend these meetings to talk about conservation programs. The information and the farmers' personal connection with the community officials and extension agents may well explain the significant statistical association between the attendance in town meetings and the probability of adoption of contour plowing. However, the link between town meetings and contour plowing needs to be studied further. It is likely that the those who attend town meetings are pre-disposed to conservation, which explains the statistical results. Further investigation is needed to clarify this issue.

The parcel's slope -- which indicated the vulnerability of the parcel's soil to erosion-- was also significantly associated with the probability that a farmer would decide to contour plow. A steeper slope implies more vulnerability to erosion and hence, a farmer who owns a steeply sloped parcel is more likely to be open to the idea of contour plowing his land.

Chapter 6
How sustainable is the CLCA?

This chapter assesses the likelihood that the CLCA sub-chapters will be able to continue their operation in the future. The analysis will center on the institutions that these organizations have established to sustain and expand their membership base and organizational activities -- focusing on four crucial determinants of an organization's continued operation, namely funds generation, membership, mechanism for membership participation, and the supply of leaders and managers.

6.1 Funding for the CLCA Operations

A key issue is whether or not the current and future sources of funds for the CLCA sub-chapter activities will be adequate to sustain the organizations. A CLCA sub-chapter's basic budget is estimated[40] to be ₱2,440 ($50) a year. According to the leaders, the farmers often make do with the resources they have by asking for in-kind or cash donations from members. For instance, to provide refreshments for the meetings, some members have previously donated extra corn from their harvest. The community also helps by donating whatever it can to support the nursery or by providing some office supplies.

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[40]The breakdown is as follows:

Refreshments for meetings	₱ 720 ($15)
Maintenance of the nursery	₱ 500 ($10)
Office supplies	₱ 250 ($5)
Transportation to attend Federation monthly meetings	₱ 250 ($5)
Refreshments for *pahina*	₱ 720 ($15)
Total	₱ 2,440 ($50)

The basic question this study poses is whether or not sub-chapters have the ability to financially support their operations without relying on donations to meet their current objectives. Among the sub-chapters that are financially able to sustain their operations, what are key characteristics of these sub-chapters? The data for this section are derived from the key informant interviews of sub-chapter leaders from the 45 sub-chapters selected for analysis in this study.

6.1.1 Present and Future sources

Present sources of funding for the sub-chapters are membership dues[41] (which vary in frequency of collection), voluntary contribution from members, *baranggay* allocation, contribution from the *sitio* officers and other fund-raising activities. Table 6.1 shows the sub-chapter payment rate for the P5 Federation dues, and Table 6.2 shows how many of the sub-chapters have their own membership dues.

Table 6.1 - CLCA Sub-Chapter Payment Rate for the Federation Dues, Claveria, Philippines, 2000.

Degree of Fee Payment	Sub-Chapter Distribution	
	Number	Percent
No one has paid	12	27
Half of the members paid	15	33
More than half have paid	18	40
Total	45	100

[41]The membership dues referred here pertain to the annual fee paid to the sub-chapter. This is in addition to the one-time P5 fee paid to the Federation for its emergency assistance fund.

Table 6.2 - CLCA Distribution of the Sub-Chapters that Collect Membership Dues, Claveria, Philippines, 2000.

Existence of Membership Fee	Sub-Chapter Distribution	
	Number	Percent
With Fee	10	22
Without Fee	35	78
Total	45	100

These data show that over three-fourths of the CLCA sub-chapters sampled do not collect a membership fee, which could serve as a source of funding for their activities. The interviews with chapter leaders revealed that the primary reason was because the leaders feared that a membership fee would be too burdensome for poor farmers thereby discouraging them from joining the CLCA. The leaders also commented that it was difficult to extract financial commitment from poor farmers without the promise of financial assistance in the future.

How do the sub-chapters generate funds for their activities? Table 6.3 shows that most of the sub-chapters rely on voluntary contributions from members and officers, as their primary source of funds. These contributions are made during activities when the hat is passed around to pay for refreshments. In most cases, the officers shoulder these costs.

Only three of the 45 sub-chapters have regular fund-raising activities which the organization could draw on to pay for refreshments at meetings, social functions, *pahina*, repairs for the *purok* house[42] small loans and other expenses. Interview with leaders of

[42]A place where the members hold their meetings or just to chat with each other.

these three sub-chapters indicated that these sub-chapters generated from ₱300 to ₱2,500 ($6 to $50) per year from these fund-raisers.

Table 6.3 - Sources of Funds for the Sub-Chapters, CLCA, Claveria, Philippines, 2000.

Sources of Funds	Sub-Chapter Distribution	
	Number	Percent
No funds	5	11
Members fees	10	22
Voluntary contributions	23	51
Local government	4	9
Fund raising activities	3	7
Total	45	100

Although the local government (LGU) has resources available to support activities that sustain the environment, it has not yet made a full commitment to financially support the CLCA sub-chapters. Interviews with *baranggay* officials, as well as *sitio* leaders, indicated that the local government allocates funds to environmental projects, as required under the budget code.[43] However, since the definition of an environmental project is vague, the local government can allocate these funds to anything that has to do with environment or re-forestation. In most cases, the different *baranggay* councils opt to allocate their money to build or repair the nurseries for tree seedlings or to purchase seedlings and plastic bags for seedlings for the *sitios*. Since the CLCA is not a government

[43]The Budget Code requires that *baranggay* councils allocate 20 percent of its total budget for HES. Under the HES, each *sitio* stands to receive ₱1,000 ($25) to ₱2,000 ($50) per year for environmental and health projects.

unit, the sub-chapters are not legally entitled to funds for their own projects. However, through collaboration and a strong relationship with the *sitio* governments, a few CLCA sub-chapters have managed to secure a minimal share in the budget allocation for their *sitios*. These leaders reported that they received a few hundred pesos a year from the LGU's, mostly to purchase supplies for the nurseries.

6.1.2 Self-sufficiency in funding

In order for the CLCA organizations to persist in achieving its operation and expand in the future, each sub-chapter must be able to secure a regular source of funds. The data gathered indicate that since each sub-chapters generally do not impose a membership fee of its own, the sub-chapter leaders and a few members take on the financial burden of sustaining the sub-chapter. However, since they too are low-income farmers, their ability to continue doing this is very limited.

The local government -- which in the "triangulation" idea is supposed to provide the financial support for the CLCA organizations -- provides sporadic funding to the sub-chapters. This is not to imply that the LGU's do not recognize the importance of the sub-chapters. On the contrary, from the interviews with the LGU officials, the importance and prominence of the CLCA is growing. Rather, there is insufficient money in the municipal government budget to guarantee a fixed allocation of funds for the sub-chapters. Interviews with the *baranggay* and *sitio* officers indicate that currently, the LGU budget is even insufficient to pay for repairs in the *baranggay* halls or the *purok* house, and to purchase equipment (*e.g.*, two-way radios) and basic supplies. Often, the local leaders rely on *pahina* and donations to bridge the funding gap. In some cases, the *baranggay*

officials have had to re-align their budget to pay for some of the basic needs of the *baranggay*.

The only realistic financing option for the sub-chapters is for them to generate money for the organization through creative fund-raising strategies. The potential for this is promising. Interviews with the sub-chapter leaders of the three *sitios* that engage in fund-raising projects said that they have raised money for their sub-chapters to pay for social activities and to purchase supplies. Although these sub-chapters still receive personal and voluntary donations both from members, ICRAF staff, and local government officials, the sub-chapter leaders say that their self-sufficiency attracted donations from other sectors. In addition, the fund-raising projects that they implement help boost membership rapport and solidarity, which in turn attract more members to join the organization.

A key issue for the future is whether or not CLCA sub-chapters that have relied on voluntary contributions and some financial assistance from the local government, will be able to sustain their activities with only funds from these sources. It is highly unlikely that these donors and benefactors can be the base of the sub-chapters' financial source. If the sub-chapters were to rely on donations as a funding source, then they must constantly tap new sources of voluntary contribution, or potentially face a situation of "donor fatigue." However, the chances of identifying new sources of contribution is remote, since *sitios* are made up of peasant farmers who, in most cases, have very few, if any, financial resources to spare.

Can the sub-chapters rely on the LGU financial support? As the interviews indicated, the LGU's simply do not have the financial ability to extend its already limited

resources to support the sub-chapters. Since it is unlikely that the financial situation of the local government will improve in the near future, the local government can hardly be relied on as a the regular source of funds for the sub-chapters' operations and activities.

6.2 Assessment of the Institutions Needed to Sustain the CLCA sub-chapters

This section examines three CLCA sub-chapter activities to determine if they are sufficient to sustain the organizations. To attain their objectives and continued independent existence in the future, sub-chapters must recruit members, encourage participation, and recruit leaders.

6.2.1 Membership Selection

An organization is only as strong as its membership base. The success of the CLCA hinges upon the cooperation and cohesion of its farmer-members. In order to achieve this, it is important that the sub-chapters continue to attain the basic purpose of membership, and that the members' achieve their individual objectives, as well as their collective goals.

The individual objectives of members was assessed by looking at the kinds of members that the CLCA sub-chapters have, as indicated by the way they were recruited into the organization. From the sample of 45 sub-chapters, information about how members were recruited, was collected to determine why the members joined the CLCA. Table 6.4 shows that the CLCA sub-chapters have no clear criteria for recruiting and screening members. This poses a potential problem, since a sub-chapter could accept

members who seek access to its frail resources with minimal commitment to the goals of the organization.

Table 6.4 - Methods of Recruitment Among the CLCA Sub-Chapters, Claveria, Philippines, 2000.

Recruitment Method	Sub-Chapter Distribution	
	Number	Percent
Automatic membership	31	69
By invitation by CLCA members or officers	8	18
By invitation by local government officials	6	13
Total	45	100

Thirty-one of the 45 sub-chapters (69 percent) gave automatic membership to either all residents in the community, participants in a sub-chapter activity, to individuals who were a personal acquaintance of a member, or of an LGU official. In all of these cases, the process of membership was virtually costless, although the cost of being a member of good standing was relegated to those who paid the P5 Federation membership fee.

The absence of a clear institution for membership fostered a sentiment of indifference in most of the CLCA sub-chapters in the sample. This is evidenced by the low compliance of the members with their responsibilities (see Table 6.5). The sub-chapter leaders reported that approximately only 10 percent (on the average) of the members actually had complied with the contour plowing adoption requirement and paid the

Table 6.5 - Recognized Members' Responsibilities Among CLCA Sub-Chapters, Claveria, Philippines, 2000

Members' Responsibilities	Distribution of Sub-chapters that consider these as member responsibilities		Approximate Compliance rate (%)
	Number (N=45)	%	
Must contour plow his or her farm	11	24	10
Participate in *pahina*, meetings and other activities	45	100	20
Share with other farmers information on conservation technologies	8	18	no estimate
Recruit new members	2	4	no estimate
Payment of Membership dues	2	4	10

Federation membership fee. Approximately 20 percent of the members in the various sub-chapters actively participated in *pahina,* meetings and other activities. While the leaders do not have a clear idea as to the number of members who actually share information on conservation technology with other farmers and recruit members for the organization, they contend that members informally share information they learn with other farmers through casual conversations among friends and neighbors.

Without a commitment from members to participate in helping the organization achieve its objectives, it is very probable that the sub-chapters will be unable to continue their activities in the coming years. In the short run, the consequence of the lack of commitment from the members places a heavier burden on the sub-chapter leaders, as they strive to carry the organization's agenda on their own. In the long run, this situation is not sustainable as the sub-chapter leaders -- who are resource-poor farmers as well -- can

not be expected to continue to shoulder the cost of keeping the organizations together without some return on their time and personal resources. Thus, it is likely that the leaders will withdraw their commitment to the organization once the long-term cost of their commitment exceeds the gain from heading the organization.

Members' compliance to their responsibilities would likely improve, if there were clear and exclusive benefits they could derive from the costs of their membership. However, currently, the benefits of membership are ambiguous. As shown in Table 6.6, by the sub-chapters leaders' own admission, the prospect of future access to financial resources to fund-livelihood assistance projects -- as a benefit of farmers' membership in the CLCA – was something uncertain but they believed could be realized in the future.

Table 6.6 - CLCA Leaders' Perceived Benefits of Membership, Claveria, Philippines, 2000

Membership Benefits	Sub-chapter distribution	
	Number (N=45)	Percent
Access to information	10	22
Access to funds and livelihood assistance	32	71
Access to free seedlings	36	80
Opportunities for social interaction	11	24

In addition, the sub-chapter leaders concede that none of the benefits listed above were available exclusively to CLCA members. Rather, any member of the community could have access to these "benefits." This situation muddled the distinction between members

and non-members, which in turn lessens the members' full commitment to the CLCA sub-chapters.

In summary, the fact that CLCA membership requirements were weak and often vague, the future ability of the CLCA sub-chapters to function as strong organizations is in doubt. To strengthen CLCA sub-chapters, there needs to be clear, binding and enforceable membership rules and policies, which in turn must be backed by exclusive benefits to membership in order to create an incentive for members to actively support the sub-chapters' programmatic agenda. .

6.2.2 Institutions for Participation in the Organization

Participation in an organization provides feedback to the leadership, so it can ascertain whether or not the organization and its members are in synch with respect to their objectives and direction. It is through participatory governance that an organization's managers learn about the issues and problems within the group, and for the group to agree to support the solutions to address these issues.

In this study, the indicators of opportunities for participation in the organization are sub-chapter leaders' answer the questions: (1) are general assembly meetings held regularly; (2) who in the organization decide on what activities the sub-chapter should carry out; (3) and who decides what training the organization would seek. The results are shown on Tables 6.7 and 6.8.

Table 6.7 - Regularity of Sub-chapter Assembly Meetings, Claveria, Philippines, 2000

When are meetings held?	Distribution Among Sub-Chapters	
	Number (N=44)	Percent
No meetings	9	20
Meetings are held regularly	26	59
Meetings only when needed	9	20

Table 6.8 - Decision-makers Who Plan the Activities for the CLCA, Claveria, Philippines, 2000

Decision maker	Distribution Among the Sub-Chapters	
	Number (N=45)	Percent
Assembly	17	37
Sub-chapter officers	8	18
Outside Stakeholders	12	27
No activities done	8	18

More than one-half of the sub-chapter leaders included in the study indicated that they held regular meetings, while nine of the 45 reported that their sub-chapters met only when it was necessary. As to be expected, the total number of sub-chapters that were active was similar to the number of the sub-chapters that met at least on a "per need" basis. All of the eight sub-chapters that indicated they did not have any activity, also said that they had never met as an organization, except when the organization was formed. According to them, any information (*e.g.*, seedling availability or livelihood opportunities)

that needed to be passed on to their members was done by word of mouth or through *sitio* leaders.

The relationship between participation and "activeness" of an organization is not directly established in the data presented, since the sample is too small to make any statistical inference. It is possible that organizations that meet regularly are still "inactive." However, it is more likely that organizations that do not meet are not active, as meetings are necessary to plan a group activity. Both theory and empirical studies support the idea that member participation is crucial for an organization to survive. This participation can not be generated and harnessed without a meeting of the minds where ideas can be exchanged and commitment made.

From the interviews, the leaders do recognize the importance of participation in organizational management. As shown in Table 6.8, 17 (of the 37 sub-chapters that had engaged in activities) sub-chapters engage in activities that are decided by their assembly, while only eight reported that their activities have been chosen by the leaders. The author's observation is that farmers in Claveria -- like other farmers in the Philippines -- possess a democratic mind set that fosters participation in governance.

6.2.3 Supply of Leaders and Managers

The other side the organizational sustainability equation -- cooperative members being on one side -- is the selection of leaders to manage the organization. Conventional wisdom dictates that the most efficient way of recruiting officers for an independent and voluntary organization is through a democratic election. This selection method fosters cooperation among members, which in turn minimizes the cost of team building. Popular

election also demonstrates the independence and sovereignty of the organization, which thereby solidifies its identity as an organization. Both of these components are very important in the continuity of the organization's existence and expansion in the future, as the objectives of the members and the organization undergo natural changes.

6.2.4 The Institution of Popular Election

This section examines the mechanism that the CLCA sub-chapters use to select their leaders and managers. Are these leaders selected by popular election, and if not, is the current selection process as effective (if not more effective) than the elective process?

Table 6.9 shows that on average, more than one-half of the sub-chapters included in this study (41 sub-chapters) elected their officers, while the rest have officers that had been appointed by the *baranggay* or *sitio* officers, or chosen by ICRAF staff.

Table 6.9 - Distribution of method of recruitment for the sub-chapter leaders, Claveria, Philippines, 2000 (N=41)

	Elected	Appointed by LGU	Selected by ICRAF	Total
President	21 (51%)	9 (22%)	11 (27%)	41 (100%)
VP	22 (54%)	8 (20%)	11 (27%)	41 (100%)
Secretary	21 (51%)	8 (20%)	12 (29%)	41 (100%)
Treasurer	21 (51%)	9 (22%)	10 (24%)	41 (100%)
PRO	20 (49%)	9 (22%)	10 (24%)	41 (100%)
Average	21 (51%)	9 (22%)	11 (24%)	41 (100%)

The data show election was the most common method for the selecting sub-chapters officers. However, about one-half of the remaining sub-chapters were split

between their officers being appointed by LGU officers or by ICRAF staff. This would not necessarily be a disadvantage if the sub-chapters were attached organizations of a larger group, whose leaders enjoyed popular mandate. However, the CLCA sub-chapters' effectiveness in disseminating the conservation movement in Claveria lies in its sovereignty and participatory nature. To attract farmers to use a new conservation method entails convincing them that CLCA's drive to promote adoption of conservation technologies is for the benefit of their community and not part of a hidden agenda. The farmers' past experience with outsiders and politicians have made them suspicious of the intentions of groups associated with outsiders, such as ICRAF and LGU's.[44] As such, the leaders of the sub-chapters must enjoy the mandate of the members, not only to gain the members' support, but also to maintain its image of independence and self-management. To achieve this, a sub-chapter must select their leaders through an (popular) elective process.

6.2.5 The LGU's and ICRAF's Role in the Selection of Sub-Chapter Leaders

The data clearly show that the LGU's and ICRAF play a significant role in the selection of some, if not most, of the sub-chapter leaders. Interviews with the LGU and ICRAF staff provided contrasting reasons behind their participation in sub-chapter leaders selection. The LGU's revealed that they appointed the sub-chapter leaders to make sure that these leaders were reliable people who had the the support of the *baranggay* council. On the other hand, ICRAF said that their participation in the selection of leaders was one time, and they only appointed the sub-chapter leaders to facilitate the speedy establishment

[44]This was revealed in the interviews with some farmer leaders who have expressed their suspicions that organizations like ICRAF and politicians are using the CLCA to advance their agenda which have little to do with the farmers' welfare.

of the CLCA sub-chapters in the *sitios*. However, all the officers chosen by ICRAF have remained in office long after the sub-chapters were established. Subsequent to their appointment, no election had been held to give these chosen officers a popular mandate. Data gathered from interviews with some sub-chapter members revealed that the reason behind this was that the members felt that the officers were doing a good job and that if ICRAF had chosen these people, then the *baranggay* council members would support them.

When asked if it was difficult to lead the sub-chapters as appointed officials, the leaders answered that it was hard to be a leader unless the person was someone who had *sitio* or *baranggay* leadership experience. Furthermore, they reported that it was difficult to obtain support from members who could argue that they did not participate in the selection process. At the same time, the *baranggay* or *sitio* officers likely feel that the appointed leader was beholden to them and, hence, would not regard his leadership on equal footing with theirs. Thus, the support that *baranggay* leaders give an appointed CLCA leader would not be due to a feeling of partnership, but out of patronage. In such a situation, the organization ceases to be an independently functioning entity. Rather, its objectives and existence become intertwined with issues and objectives other than its own.

6.3 Summary

This sustainability of the CLCA sub-chapters is determined by its ability to generate funds for its activities, maintain mechanisms for membership recruitment and membership participation, and recruitment new leaders.

Most of the sub-chapters rely on voluntary contributions from members and officers for funds. Presently, the local government units -- which were initially envisioned to financially support the CLCA activities -- can not provide the funds that the sub-chapters need to carry out their activities, due to lack of funds. Since most of the sub-chapters do not impose a sub-chapter membership fee on top of the mandatory P5 contribution to the Federated CLCA emergency fund, the limited financial resources of the sub-chapters will be drained in the future unless they engage in fund-raising activities.

The data indicate that most of the CLCA sub-chapters grant automatic membership to all residents of their *sitios*, and they do not offer clear and exclusive benefits to their members. This has resulted in the members' low commitment to the sub-chapters' objectives and activities.

The majority of the active sub-chapters practice participatory decision-making in choosing the sub-chapter activities. For most sub-chapters, the forum for participation is the regular sub-chapter meetings. The key informant interviews also revealed that the farmer-members are inclined toward participatory governance.

About one-half of the sub-chapters have officers who are elected, while the other half is split between their officers being appointed by *baranggay* officers or by ICRAF staff. Elected officers enjoy the mandate of the members, which place them above any suspicion that they are advancing the agenda of outsiders, such as local government units, or ICRAF. In the future, sub-chapter leaders must be selected through an elective process, if CLCA and sub-chapter leaders are to be perceived by the community as independent of outside groups' influence and as promoting it's own objectives.

Chapter 7
Summary and Policy Implications, and Recommendations for Further Research

7.1 Summary and Policy Implications

Despite the presence of constraints to farmer adoption common in developing countries, -- such as high initial investment costs with low short run returns and limited access to information -- the number of farmers who adopted soil conservation technologies in Claveria, Misamis Oriental, has risen dramatically since 1996. ICRAF credits this success to the farmer organization, Claveria Land Care Association (CLCA), which ICRAF has been working with since it was established in 1996 to promote contour plowing in Claveria.

Most empirical studies of adoption in rural communities have focused on profitability as the main criteria for a farmer's decision whether to adopt or not adopt conservation practices. Few studies have investigated the impact of farmer organizations on low-income farmers' decision to adopt conservation technologies and their role in promoting adoption of conservation practices. The success of the Claveria Land Care Association provides the opportunity to investigate the relationship between farmers' collective initiative and adoption of conservation technologies.

The objectives of this study are to determine how an organization like the CLCA can minimize the constraints faced by low-income farmers in adopting soil conservation technologies, and how farmer-led soil conservation initiatives can be sustained in the future. This is done by: (1) documenting the events that started and promoted the farmers'

awareness of the soil erosion problem and the technologies available to them; (2) investigating how the CLCA sub-chapters evolved from a small farmer group committed to promoting erosion control technologies, to a high-profile organization that has become synonymous with soil conservation technology adoption; (3) identifying the characteristics and activities of the CLCA sub-chapters that have made significant impact on the adoption rate of contour plowing in the *sitios*; (4) determining what the characteristics are of the farmers who perceive themselves as members of the CLCA compared to those who do not; (5) determining the farmer and parcel characteristics that influence adoption; and, (6) identifying the challenges that the CLCA *sitio*-based organizations face in the future.

Data analyzed in this study was obtained through interviews of leaders of the CLCA Federation, leaders of 15 (of the 17) chapters, and leaders of 45 randomly selected sub-chapters (from the 15 chapters). In addition, data were collected through a survey of 274 farmer-respondents. In each of the 45 sub-chapters, a random sample of three contour-plowing adopters and three non-adopters were selected

7.1.1 The CLCA and the Soil Conservation Initiatives in Claveria

The conservation initiative in Claveria began in the 1980s under the SALT program of the Department of Agriculture. However, many farmers in Claveria had some prior knowledge of soil conservation practices, especially those who emigrated to Claveria from various areas in the Philippines where terracing and contour plowing had been promoted.

Structured programs for soil conservation training and information dissemination

began in 1985, when IRRI initiated the seven-year farmer-to-farmer training on contour hedgerows under it's upland rice program. After the IRRI project ended in 1992, ICRAF, -- in partnership with the Philippine Council for Agriculture and Natural Resource Research and Development (PCARRD) and later with the Misamis Oriental State College in Agriculture and Technology (MOSCAT) -- launched research activities to develop conservation farming practices in upland areas such as Claveria. In 1996, ICRAF launched its own soil conservation extension programs by establishing the Contour Hedgerow Extension Team (CHET) to promote contour farming and agro-forestry, and to disseminate information on soil conservation technologies.

CHETs were composed of a farmer-adopter, a Department of Agriculture extension agent, and an ICRAF technician who targeted individual farmers -- teaching them about conservation methods, particularly about contour plowing and natural vegetative strips (NVS). Although this initiative proved to be effective adoption-wise, it soon became apparent that the CHET strategy was too time consuming and could not meet the growing demand for training. In time, the DA extension worker was recalled by the Department, leaving the ICRAF technician and the partner farmer to continue the soil conservation promotion campaign. Eventually, as the time commitment became too much for the farmer involved, ICRAF replaced the individual farmer sessions with group sessions with approximately 20-25 invited participants.

In 1996, after one of these group training sessions on contour plowing and other soil conservation methods, a group of participants banded together (with encouragement and assistance from ICRAF) and formed a farmer self-help organization to unite and assist

farmers on learning how to use and promote soil conservation technologies. This organization, initially composed of 20 members, became what is now known as the CLCA.

Data from ICRAF show a dramatic rise in the number of parcels that have been contour plowed since the CLCA was established -- increasing from approximately 75 hectares in 1996 to more than 300 hectares in 1999. Although ICRAF provided significant technical and logistics assistance and guidance, the local government units, farmer leaders and ICRAF credit the CLCA's farmer to farmer information drive to promote of soil conservation awareness, training, community and demonstration activities for the increase in interest in the adoption of soil conservation methods in Claveria.

7.1.2 Membership by Default?

From the time of its inception, the membership in the CLCA has been structured on paper, but informal in practice. The organization membership policies, as reflected in its by-laws, require that only farmers who have contoured their land, filled out the membership form and paid the one-time ₱ 5 CLCA Federation dues can be members of the CLCA. In addition, the individual CLCA sub-chapters -- which are the CLCA organizations that actually recruit individual farmer members -- have other discretionary requirements such as sub-chapter membership dues and attendance in the sub-chapter activities.

A closer look at the membership of the CLCA revealed that the membership criteria were loosely enforced. Thirty-one of the 45 sub-chapters reported that farmers in

their areas were granted automatic membership in the CLCA based on: (1) residence; (2) a one-time attendance in a meeting or *pahina*; or (3) by personal reference by a member or LGU official. However, in most instances, many of these farmers were not aware that their participation in *pahina* gave them automatic membership, or that some were recommended by an LGU to be included in the roster of members in the CLCA. This explains why many of the farmers interviewed for this study could not recall if they were CLCA members or not.

Given this scenario, this study re-defines membership to mean that the farmer perceived himself to be a member of the CLCA, instead of actually going through the process of applying for membership. Farmers who consider themselves to be a member of the CLCA are willing to be identified with the organization and more than likely, share the objectives of the CLCA. In addition, the farmers' perception of membership is most probably based on the fact that the farmers have either participated in the organization's meetings and *pahina* sessions, paid the membership dues, filled out the membership form, or fulfilled other requirements that the sub-chapters have laid out. Most likely, farmers who have not been involved at all in the CLCA activities do not regard themselves as members of the organization. In this case, perception of membership is a better indicator of CLCA membership than whether or not an individual's name is on the roster of a sub-chapter.

Using the probit method, this study found that attendance in the CLCA cross-visits and *sitio* meetings are the most significant determinants of perceived CLCA membership. Cross-visits provide farmers a first hand look at the activities of the CLCA and the

opportunity for interaction with the members of the organization -- hence, contributing immensely to the farmer's perception that he or she is part of the group. In the same manner, *sitio* meetings provides the opportunity for a farmer to interact with the CLCA members who more than likely are active members of the community also. The *sitio* meetings also give the farmers the chance to hear about the activities and benefits of membership in the organization and to ask questions about the CLCA, which inadvertently increases his or her awareness about the organization. Awareness and knowledge about the organization increase the farmer's familiarity with the organization's activities and the personalities within the organization. Although the biggest contributor to the perception of membership is interaction and familiarity with the members and leaders of the CLCA, knowledge about the organization solidifies this perception.

The statistical results also show that farmers who lived close to Claveria before settling in the municipality are more likely to perceive themselves as a member of the organization than those who had lived in other provinces prior to settling there. This demonstrates the importance of social relationships in organization membership and group formation. Farmers who have previously lived in Claveria are more likely to have a personal relationship with the members of the CLCA either by friendship or familial ties. It is then not difficult for these farmers to associate themselves and be comfortable being referred (even informally) to as a member of the CLCA since they have ties with the organization through their personal association with the some of the members. This level of comfort increases as the farmers know more CLCA members which is likely if they have lived longer in Claveria. Further, the strength of the bonds of these relationships is

naturally partly determined by the length of time that a farmer has lived in the municipality. As such, it is easy to understand that the personal relationships between the farmers and the farmer-members of the CLCA -- as represented by residence prior to living in Claveria -- is an important variable in determining a perception of association and membership in the CLCA.

For the most part, the probit results are consistent with the chi-square analysis findings which indicated that the frequency of attendance in cross-visits, *sitio* meetings and *pahina* and residence prior to living in Claveria are statistically associated with the farmers' perception of membership in the CLCA. The probit analysis, however, found attendance in *pahina* as not statistically associated with perceived membership. The discrepancy is likely due to the statistical correlation between the explanatory variables attendance in *pahina* and in *sitio* meetings. Since the attendance in *sitio* meetings is statistically associated with the farmers' perception of membership, the effect of *pahina* attendance on perception of membership was exaggerated in the chi-square analysis results.

7.1.3 The Adopters of Contour Plowing

The results of the probit analysis at the ten percent level of confidence point to a significant positive statistical relationship between the probability of adoption of contour plowing and physical characteristics of the parcel tilled (slope and area of the parcel), information access, and personal ties forged between farmers in the community. The results also indicate a significant negative relationship between adoption and the number of

parcels tilled by the farmer. Formally, this study found a significant positive statistical association between adoption of contour plowing and frequency of attendance in training sessions on soil conservation, frequency of attendance in *sitio* meetings, slope of the parcel being tilled and the area of the parcel tilled by the farmers.

We can surmise from the results that farmers who own more parcels of land are less likely to adopt contour because the urgency of rescuing a parcel from erosion is diminished with the possibility of farming other parcels. Since land is the indicator of wealth for farmers in the Philippines, the finding of this study illustrates the role of wealth and the farmer's total productive potential, in the decision to conserve soil. Almost all of the farmers who were interviewed for this study demonstrated awareness of the long term benefits of conservation. The core value of conservation to the small farmers is that conservation lessens the threat to their households' consumption. The urgency of action to prevent the threat to consumption is mitigated by the farmer's larger production frontier brought about by more parcels. In a similar vein, farmers who till more parcels can distribute production among the parcels which lessens the pressure on the productive capacity of the soil for each parcel. This situation diminishes (for the farmer) the urgency of soil conservation measures for any one parcel tilled by a farmer.

Interestingly, this study found that the size of the parcel a farmer tills has a positive statistical association with adoption of contour plowing. The response of the farmers to the question regarding what the primary disadvantage of contour plowing is sheds light on the reason behind this finding. According to the farmers, the reduction of the area available for planting is the major reason why other farmers -- even if they have a

strong civic awareness -- refuse to contour plow their parcel. This cost associated with contour plowing is greater if the relative size of the parcel of the land is considered. Farmers who till smaller parcels would be less inclined to contour plow than those with larger parcels to till, because the relative size of the area they have to allot for the contour lines and the hedgerows is greater than those who have larger parcels.

An interesting footnote to both of the findings regarding the relationship between the number of parcel tilled and parcel area, and adoption of contour plowing, is that the significance of association does not extend to the (sum) total of the area of *all* the parcels that a farmer tills. This implies that the individual characteristics of the parcels are important considerations in the decision to adopt a soil-conserving farming methods, and these can outweigh the effect of total parcel area to consumption risks faced by the farmers' households.

This study also found that farmers who have had more opportunities to observe the benefits of contour plowing during cross visits, are more likely to adopt the technology than those who have less chances. Further, farmers can effectively access the information on contour plowing as well as interact with adopters during the *sitio* meetings, leading to their adoption of contour plowing.

Information access is an important variable in adoption. This study found that farmers who attend more training sessions on conservation practices are statistically more likely to adopt contour plowing. The implication is that the level of information that a farmer obtains reduces the misconceptions about contour plowing, which in turn leads to adoption of the technology. Likewise, the more information about contour plowing and

other conservation technologies a farmer has, the more likely he will know how to adapt the technology to suit his parcel's specific conditions.

However, the role of training sessions in Claveria in the farmers' adoption of contour plowing goes beyond supply and access to information. The training sessions -- as observed during the actual sessions -- are both structured and informal thereby facilitating information exchange, camaraderie and social bonding among the participants and leaders of the training sessions. Given this setting, the training sessions also facilitate social capital formation between farmers and leaders that gradually lead to the non-users of contour plowing method agreeing to consider contour plowing their land. It was observed that the training sessions are an excellent opportunity for proponents of soil conservation methods to prod farmers who initially are indecisive whether to contour plow or not, to at least experiment with contour plowing. The more training sessions a non-adopter farmer attends, the greater the likelihood that he will be interacting with the people that promote the use of contour plowing. This continuous interaction between the farmer and the promoters of soil conservation methods leads to greater familiarity and bonding, resulting in trust and sympathy. It is very likely that the farmer who has bonded with soil conservation adopters will be less resistant to the idea of contour plowing since he has the testimonial of his farmer friends whom he trusts.

This is a similar explanation for the significant statistical association between the farmers' attendance in *sitio* meetings and adoption of contour plowing. The *sitio* meetings, like the training sessions and cross-visits, serve a dual purpose of information dissemination and social interaction. Often, the *sitio* leaders are heavily involved in the

activities of the CLCA and hence the organization is readily represented and promoted in the meetings. The *sitio* meetings are also fora for which the village elders, LGU officials and ICRAF personnel can interact with the farmers in the community. This interaction often leads to personal relationships that foster bonding. In time, as the farmers continue to attend the *sitio* meetings, the bonds become stronger and tighter. The proponents of the social capital theory teaches us that bonding is one of the pillars of social capital formation. With sufficient positive social interaction from attending the *sitio* meetings, the bond between the attendees will be enough to generate trust and desire to establish goodwill. Given such a scenario, the farmers will be more willing to at least experiment with contour plowing for the reason that the other farmers -- with whom they have become friends -- who have contour plowed their land, attest to the technology's usefulness, and serve as a reminder of every farmer's role as stewards of the land. Add to this, the natural clout of village elders and LGU officials -- arising from *hiya* and *pakikisama*, the Filipinos sense of shame and one-ness with the group, respectively -- in the community, and the suggestion of adoption attains a much stronger impact on the farmers.

Parcel characteristics also have strong statistical association with adoption. The farmers' awareness of the benefits from contour plowing and the farmers' recognition of the vulnerability of their parcels to erosion, are both manifested in the positive association between steep slopes and adoption of contour plowing. The results indicate that steeper-sloped parcels are more likely to be contour plowed than those that are less steep. This is consistent with the response of the farmers in the survey that indicates that farmers

recognize that contour plowing can arrest the erosion of fertile soil from their parcels. This also shows the farmers' recognition of the importance of conservation initiatives and their adoption -- despite the costs -- if the parcel characteristics makes the soil of the parcel susceptible to erosion.

It must be noted however, that the chi-square analysis results are not consistent with the probit results. The chi-square analysis indicate a significant statistical association between adoption of contour plowing and the independent variables perception of membership in the CLCA, attendance in training and cross-visits, tenure status, and slope of the randomly selected parcel tilled by the farmers. Among these variables, only attendance in training and slope of the parcel tilled by the farmer came out statistically associated with adoption of contour plowing in the probit analysis. The difference in these two results, are likely to be due mainly to the interaction effect between the independent variables in the adoption model that were not captured in the chi-square analysis.

7.1.4 Is the CLCA Dispensable?

Clearly, this study found that the CLCA provides valuable service to the municipality of Claveria. The organization, through the training sessions and cross-visits, provides farmers an inexpensive access to information on conservation technologies. The CLCA's activities serve as venues for farmer-to-farmer interaction and community participation which is potentially useful in mobilizing the community to undertake community projects through *pahina* and other community-organized activities.

Equally important is that the CLCA, through its strong presence in the community,

is an important promoter of conservation among farmers. Through the town meetings, informal exchanges between farmers belonging to the CLCA and the other members of the community, the CLCA has effectively heightened the municipality's awareness of the threats of erosion, and the urgency of action to address this problem.

But the question remains: are these functions exclusive to the CLCA? Can government or any other organization replicate the CLCA's functions and services more efficiently? The answers will determine if the CLCA should receive support from the local government and agencies and larger non-government agencies such as ICRAF -- which to this day, remains the most consistent supporter of the organization.

The regional office of the Department of Agriculture provides extension service to the province of Misamis Oriental, but mostly in production technology and institutional support relating to farm production. The Department of Environment and Natural Resource through its field office, provides limited extension service to farmers -- although its function is broad and it does not have the mandate and resources to regularly conduct training and demonstration sessions in the municipalities. In addition, none of these government agencies can reach the farmers on a personal level as well as the CLCA. Rather, farmers, who run the CLCA, are the most effective deliverers of the message of soil conservation and erosion control.

The effectiveness of participatory approach -- the members of the community are participants in the planning and implementation of community programs and not merely passive recipients -- is well documented and evidence of its superiority over the "outside expert" approach in developing country settings is abundant. However, in the past, this

method has not been readily acceptable to funding agencies for several reasons. First, it requires a leap of faith that the community has expertise that the "outside experts" do not have -- something that some agencies do not readily accept. Second, the participatory approach takes the control of a development plan from the "outside experts" and puts it in the hands of the community and its leaders. In this situation, the accountability for the money that finances the community initiatives is diluted and hard to track. Thirdly, the participatory approach can be expensive and time consuming because it requires continuous community consultation and joint planning.

The positive attitude of the local government officials in Claveria towards the CLCA signifies that they recognize the value of this approach and are willing to embrace it. Unfortunately, the local government has limited resources available to initiate and sustain the CLCA's programs. Thus, given that soil erosion is a threat to the viability of agriculture in Claveria, the local community has taken on the initiative and shouldered the cost.

ICRAF played the role of initiator, when it recruited farmers and extension agents to join its own technicians to promote and teach about contour plowing. The farmers responded and created the CLCA to actively involve the community in soil conservation. By doing so, conservation became a movement in Claveria, which is gradually spreading to the most remote *baranggays* in the municipality.

Participation in the CLCA has now become the mark of civic duty. Farmers and other residents in the community -- from the *sitios* to the *poblacion* or town center -- recognize the term "landcare" as synonymous with contour plowing -- the backbone of

farmers' erosion control. By having a farmers' organization that carries the task of conservation as its objective, the responsibility of erosion control and soil conservation has institutionally been given to the community.

How the CLCA was able to achieve such success can be attributed to several factors. First, using its image as a respected international organization and its relationship with the provincial and municipal government units, ICRAF has created a social capital base for the CLCA to draw on to secure assistance from both the government and non-government sectors. ICRAF has also provided limited resources and technical assistance, which the CLCA in turn passes on to the farmers in the community.

Second, the leaders of the CLCA are unique in terms of their commitment of time and their own resources. Foremost among the CLCA leaders is the president of the Federation, Mr. Marcelino Patindol, who is a former *baranggay* captain and farmer, and who -- because of his former office in government -- is a recognizable figure in Claveria. His dynamic personality and his ability to devote time and energy in visiting the *sitios* and *baranggays* are more than the average farmer can spare. These visits link the CLCA movement with the community and encourages *sitio* leaders and other farmers to participate and promote training and cross-visits.

Finally, the sub-chapter leaders -- the consistent direct link of the organization with the farmers in the *sitio* -- are also critical in the efficacy of the CLCA. While Mr. Patindol's presence is a boost in the promotion of the conservation movement and the presence of the CLCA in the community, the sub-chapter leaders bring the farmers together and, in the end, they are the leaders that the farmers listen to and interact with.

Many of these sub-chapter leaders are exceptional in their commitment to spread the sentiment of soil conservation to the community. After working on their land, it is not uncommon to observe the sub-chapter leaders going house-to-house to invite the residents to attend a training on conservation technologies, or to participate in a *pahina* devoted to bag seedlings for distribution. Thus, the time and voluntary effort that the sub-chapter leaders commit to the CLCA is the backbone of the achievements of the CLCA.

7.1.5 Is the CLCA Experience Replicable?

Many factors contribute to the success of an organization, some of which are unique and are beyond the scope of this study. However, in the case of the CLCA, this study identifies three basic ingredients that are crucial to its success and successful duplication

First, the institution must provide a mechanism for regular interaction among the farmers such as community meetings, cross-visits or informal training. From the experience of the CLCA, the farmer-to-farmer interaction was crucial in creating a perception of membership and willingness to participate in the activities of the organization. It is through these interactions -- the creation of bonding social capital -- that information about the organization and the soil conservation movement was disseminated most effectively.

Second, a strong relationship must be forged between the local government units, an organization like ICRAF, and the leaders of the farmer organization for a soil conservation movement to be launched and sustained. In Claveria, the conservation

movement is a "triangular" partnership between the organization, the local government units, and ICRAF. Each partner has made a significant contribution to pushing the movement forward. In the case of the CLCA, ICRAF provides the technical support and shares its reservoir of social capital with political figures to the CLCA to gain access to assistance from regional and national government offices. The local government units (*i.e.*, the municipal and *baranggay* officials) provide direct funds and assistance to the organization to supplement its activities. But it is the CLCA which is in the center of all these tasks and efforts. It is the venue by which the community can take part in the conservation movement.

Finally, the organization must have committed and resourceful leaders. This is the most difficult of all, since leadership in an organization like the CLCA requires a large amount of time and resources that the average farmer may not have an abundance of. The CLCA is fortunate to have found a charismatic leader like Mr. Patindol, who because of his background, can devote time and resources to the organization.

7.1.6 Is the CLCA Sustainable in the Future?

The contribution of the CLCA in promoting contour plowing has been established. The organization is now synonymous with protecting the threatened soil in Claveria. The question remains: Is the CLCA sustainable, as it faces changes and challenges to pursue its objectives?

Past empirical studies have shown that an organization's continuous existence depends on its ability to meet its objectives and the objectives of the members. This

ability, in turn, depends on sufficient resources to fund the organization's activities, proper management of the organization, and the support of committed members. Given these criteria, this study examines the ability of the CLCA to be a "sustainable" organization.

A key objective of the CLCA is to promote sustainable farming, through the promotion of contour plowing. This is done by conducting training sessions, organizing cross-visits, informal and unstructured farmer-to-farmer discussions in the *sitios*, and by recruiting farmers in the municipality to join the organization. All these activities require funds and resources to which the farmer leaders and member of the CLCA do not have independent access.

Currently, ICRAF assists the CLCA in these activities by providing transportation, seedlings, use of equipment, communication and extension agents. The local government units help out through the *baranggay* budget by providing refreshments and meals for the CLCA general assembly, providing limited amount of seedlings and plastic bags, and by providing the venues for the organization's meetings. All other expenses are personally shouldered by the CLCA leaders, as the organization has virtually no cash to draw on.

Is this arrangement likely to continue in the future? ICRAF has plans to gradually wean the CLCA from its dependence on ICRAF by reducing its involvement with the organization and concentrating on technology research and general extension work. The LGU's financial assistance, on the other hand, is limited and is not consistent across *baranggays*. In the future, it is not expected that financial assistance from the LGUs will increase (given the slow down of the Philippine economy, which affects tax collection) and may in fact decline, if the worldwide recession continues.

This leaves the CLCA's leaders with the responsibility to voluntarily finance their own transportation to attend meetings, to pay for supplies and to provide their own meals when they are in the field representing the organization. Currently, there is the weakly enforced ₱ 5 membership fee, but the pooled money is intended as emergency assistance to CLCA members who have been struck by personal loss or hospitalization. Furthermore, the CLCA's self-generated funds are quite low (approximately ₱ 200 or US$ 5) and the leaders can not draw on this money.

To date, the CLCA sub-chapters have not identified a reliable source of funds to finance their activities. The majority of the sub-chapters do not impose a membership fee and rely mostly on voluntary contributions from their officers. This situation undermines the financial ability of the CLCA to continuously pursue its current objectives, and to expand their activities in the future. With very limited income, the farmer leaders will not be able to consistently use their household's money to pay for their commitment to the CLCA. This might even discourage potential leaders from assuming office in the organization. In order to survive in the future, the CLCA -- from the Federation down to the sub-chapters -- must engage in its own fund-raising activities and relieve the leaders of the burden of paying to lead the organization.

The CLCA's ability to be independent and be participatory in nature also relies on its ability to be financially self-sufficient. However, funding self-sufficiency will not be enough. Although it has not happened yet, the CLCA must also learn how to manage its own funds efficiently, and not compromise its activities because of the possibility of -- although it is unlikely -- funds mismanagement which all organizations potentially face.

To address this concern, the CLCA could benefit from outside assistance. Currently, ICRAF and the Spanish government have a joint project that focuses on providing training to farmers in Claveria in any area that they identify as critical. This is a possible solution to the potential issue of funds management that the CLCA might face in the future.

A final determinant of organizational sustainability is its membership. An organization requires membership and without members, an organization can not pursue its objectives and will cease to exist. The question now becomes: can the CLCA assure itself of sufficient number of active members in the future?

This study discovered that the membership structure of the CLCA is vague. The survey had to be re-designed to investigate perception of membership, rather than actual membership because formal membership in the CLCA is an image, rather than a reality. Currently, the membership criteria are not consistent across the sub-chapters, leaving the leaders and the "members" at a loss as to what constitute membership. In more than one-half of the sub-chapters, automatic membership for all the residents in the *sitio* is implemented. Some farmers become members because of their affiliation with active members, leaders of the sub-chapter, or the local government officials. Although the CLCA leaders themselves make a distinction between formal members and informal members (based on who have paid the membership fee and have contour plowed their land), this is an *ad hoc* distinction and does not separate the two "kinds" of membership in practice. If any, it creates a division between the members who paid their dues, and those who are in effect, free riding members. The practice of automatic membership for *sitio* residents diminishes the value of membership and also opens up the possibility that

the members' objectives will not be in synch with the organization's objectives. Based on the experiences of other organizations that do not have exclusive membership, this situation will most likely result in a decline in the membership base, thereby jeopardizing the future of the CLCA.

Furthermore, membership benefits are not clearly laid down. At first impression, the members of the CLCA enjoy exclusive benefits such as access to free training, cross visits, and free seedlings. However, closer inspection indicates that the sub-chapter leaders do not discriminate between members and non-members in terms of who can participate in the programs of the CLCA. This poses a problem for the organization because without clear and exclusive membership benefits, the CLCA sub-chapters have low commitment from their members to participate in the organization's activities. Once again, the future of the organization's membership base will be seriously compromised if this non-exclusion persists because free-riding becomes a lesser cost option.

As far as organizational strengths are concerned, the CLCA rates strongly in the areas of: (1) institutions for consensus and participatory decision making; and (2) leadership selection.

Drawing from the key informant interviews of sub-chapter leaders, this study concludes that the CLCA sub-chapters are inclined toward participatory governance. The use of sub-chapter meetings to provide the venue for members' participation in the choice of activities for the organizations has been institutionalized within the organization. The members suggest and vote on the choice of activities that the organization will take on. This works well, given the predisposition of small farmers toward democratic and

participatory processes. Finally, since the CLCA sub-chapters are small in size (limited by the number of residents living in the *sitios*), participation and consensus building is not costly in terms of time, and is efficient because it eliminates the possibility of dissent while maximizing possible participation.

The democratic institution of leadership selection is also well-established in the CLCA. Although the LGU's (e.g., the *baranggay* leaders) tendency is to use their political influence in the *sitios* to appoint leaders of the CLCA sub-chapters, the sub-chapter members have successfully defended the institution of popular election in selecting their leaders -- either by appealing to the LGU's, or by temporarily accepting these appointments, and later on, holding an election wherein the appointees have to run against other possible candidates. Although critics may argue that some appointments will most likely persist, appointees are almost always installed in office only when the sub-chapter is initially established. Subsequently, the voting members validate their appointment either by an election (where other members are free to run for the position), or by a show of hands during an organizational meeting to ratify the appointments. This places the CLCA officers above suspicions of harboring hidden agenda that serve the interest of the LGU's and not that of the organization's. Further, an elective process ensures the independence and sovereignty of the CLCA sub-chapters from outside groups, which thereby allows them to pursue their objectives creatively and effectively according to their ability.

In the end, this study concludes that based on the above mentioned criteria, the CLCA rates fair in sustainability. The two weaknesses of the organization are major -- membership recruitment and funding -- and must be addressed immediately while its

activities and objectives are still relatively simple, inexpensive and straightforward. However, its system of participatory governance is sound, and its leadership selection process is firmly in place. There are of course other areas that determine an organization's ability to adapt to changes in the future, but these are beyond the scope of this research study. The four assessment points mentioned in this study are the most crucial and basic for simple organizations such as the CLCA.

7.2 Recommendations for Further Research

The results indicate that the CLCA's *sitio*-based activities -- particularly cross-visits and training sessions -- and not membership *per se* that significantly contribute to adoption of contour plowing in Claveria. Further, the study observes that attachment to the community and to the other farmers in the community are also factors to be considered in formulating village-based adoption strategies.

This suggest that social capital is an important component of farmer membership and adoption of conservation technologies. However, the analysis of the role of social capital in these activities was limited to the use of the variables membership in CLCA and participation in *pahina* as measures of social capital created between the stakeholders. Clearly, social capital is created and used to move farmers toward adoption of contour plowing during the cross-visits and training sessions. However, there is a need to more closely investigate the significance and amount of social capital that is generated during these farmer-to-farmer interactions. Further research and analysis of the impacts of these training and cross-visits in strengthening a community's consciousness and sentiment of

civic duty in the form of conservation, and how these can harnessed to effect action, are therefore, suggested.

This study concludes that in many aspects, the CLCA is still an infant organization. This has implications in terms of the support it needs to help it mature into a sustainable organization in the future. To fully assist the CLCA institutionally and logistically, further study is needed to examine its strengths and weaknesses as a functioning but extremely unique organization.

Finally, this research focused on the activities of the *sitios* that currently have CLCA presence, but did not investigate the remote *sitios* in Claveria that currently do not have sub-chapters. There are reports that some farmers from these *sitios* have adopted conservation farming on a limited scale. Clearly, without the services of the CLCA, these areas have relied on other institutions to mitigate the problem of information access and other constraints to adoption. Future research in these areas would contribute to further understanding the dynamics behind the farmers' adoption of conservation technologies.

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