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Occasional paper 04

# Philippine landcare after nine years

## A study on the impacts of agroforestry on communities, farming households, and the local environment in Mindanao

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## Abstract

This paper reviews the impact of the Landcare Program on, farming households, communities, and the local environments in three sites in Mindanao, Philippines: Claveria in Misamis Oriental; Lantapan in Bukidnon; and Ned, Lake Sebu in South Cotabato. This paper reviews and synthesizes various studies conducted throughout the period from 1996 to 2004, during which the Landcare Program was established and matured. The key intervention studied is the landcare approach which consists basically of two components: conservation farming technologies and landcare processes and institutions. The primary direct impacts from the landcare approach are improved livelihood options, human and social capital, environmental governance, and access to livelihood resources such as financial, physical and technical assistance.

## Keywords

landcare, human capital, social capital, environmental governance, sustainable agriculture, Philippines, Mindanao, agroforestry

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# Contents

# Introduction

Landcare is an approach for developing collective action at the local level to deal with problems of agricultural land degradation (Cramb and Culasero-Arellano 2003). At the centre of this approach is the formation of community landcare groups, in partnerships with government and non-government agencies. A community landcare group is "a group of people concerned about land degradation problems, who are interested in working together to do something positive for the long term health of the land" (Campbell 1994).

Philippine landcare traces back its origins to 1984 when the International Rice Research Institute (IRRI) started working on upland rice farming systems (Garrity 2004). As one of its sites, IRRI in Southeast Asia, selected Claveria in Misamis Oriental (Mindanao), to test interventions on acidic soils. IRRI focused on testing rotations and agroforestry systems for these ecosystems, and its scientists were able to identify important techniques that could improve upland farming, increase income and protect the sloping lands from soil degradation. In 1992, when a principal IRRI scientist (Dr. Garrity) joined the International Centre for Research in Agroforestry (ICRAF), ICRAFs Southeast Asia Program continued the research on agroforestry-based farming system and soil conservation. In 1995, these technologies were identified to be ready for scaling up but ICRAF realized that the agricultural extension services did not have the necessary resources to scale up these activities. ICRAF then took a more proactive direction. A "conservation" team was organized consisting of representatives from various government agencies in Claveria, ICRAF staff, and farmers from the local community. The team made available its services to any farmers who were interested in contour farming or any other types of conservation farming practices. It became logical to mainstream this approach and the landcare system, already established in Australia was believed to be the best vehicle for this. It served as the outreach strategy for the dissemination of mature agroforestry technologies to more farmers and farming communities.

From its roots in Claveria Municipality in the Northern Province of Misamis Oriental, landcare expanded to Central Bukidnon (Lantapan Municipality) and to Southern Cotabato (Ned, Lake Sebu) through the assistance primarily of the Australian Centre for International Agricultural Research (ACIAR). In the later years, it also expanded to some areas in Bohol and Leyte.

After about 9 years of landcare implementation in Mindanao since its beginnings in 1996 at Claveria, Misamis Oriental, it is timely and important to assess the impacts of these activities on the farming communities in the project areas and how they have influenced the way upland agroecosystems are being managed.

# Organization of synthesis

## Objectives

The principal objective of this synthesis is to determine the impacts of the Landcare Program in the Philippines on the productivity of the farms and plots as well as to the overall well-being of households and communities. At the community level (meso level), the study centres on the building and strengthening of social capital, and its significance in the adoption and effectiveness of the landcare approach in the Philippines. The types of impacts examined at the household level include productivity of crops, livestock and trees; conservation/enrichment of land and other natural resources; income, consumption, expenditure and assets; and knowledge and empowerment.

## Methodology and theoretical framework

The study is limited to a review and synthesis of existing literature related to impact assessment of landcare in the Philippines. These include a few monitoring and evaluation reports. Cramb et al. (2003) adopted the "sustainable rural livelihoods framework" of Scoones (1998) and Ellis (2000) when they conducted an evaluation of landcare in the three sites. Ellis for instance defined livelihood as comprising the "assets; and the activities and the access to these (as

mediated by institutions and social relations)." The literature on sustainable rural livelihood distinguishes among five forms of capital: natural, physical, human, financial and social capital. For Scoones, a livelihood is sustainable when it can cope with and recover from stresses and shocks. The sustainable livelihood analysis proceeded to answer the principal question posed by Scoones: *Given a particular context (policy setting, politics, history, agroecology, and socioeconomic conditions), what combinations of livelihood resources (different types of "capital") result in the ability to follow what combinations of livelihood strategies (agricultural intensification, livelihood diversification, migration) with what outcomes?*

Ellis defines outcomes in terms of a) livelihood security (income level, income stability, seasonality, risk) and b) environmental sustainability (soil and land quality, water, forests, biodiversity). The framework applied by Cramb et al. also includes an examination of the investment on social capital building and strengthening to promote the practice of conservation farming in upland agroecosystems.

Much of the literature on the Landcare Program (and hence this assessment) emphasizes the investment on social capital and the hypothesis that it is the most viable and cost-efficient mechanism for the promotion of conservation farming practices in upland areas. Social capital as a concept dates back to Hanifan, an educator, who first described it in 1916 as the intangible substances that count for most in the daily lives of people such as good will, fellowship, sympathy and social interaction among the individuals and families who make up a unit (cf: Cramb 2004). The concept of social capital has been recently re-introduced, defined, and used by researchers. Social capital consists of networks of social relations which are characterized by norms and reciprocity. These elements sustain civil society and enable people to act for mutual benefit and affect the capacity of the community to address and resolve problems they commonly share (Lochner et al. 1999; Winter 2000; Stewart-Weeks and Richardson 1998). A refreshing distinction among different types of capital was made by Cramb (2004). He simplifies natural capital as what you find, financial capital is what you save, human capital is what you know, and aptly, social capital as "whom you know". He also notes that while physical and natural capital generally depreciate with both use and time, human and social capital typically appreciate with constant use and have complex relationships with time (Woolcok 1998; Glaeser et al. 2002).

## The Landcare Program

The project operated in three sites: Claveria, Lantapan and Ned (Figure 1). The guiding model of the program is the landcare approach. The model basically integrates the key features of Australian landcare movement and other experiences of community based development into the Philippines context (Castillo 1998; Rolings and Wagemakers 1998 cf: ACIAR n.d.). The approach combines the strength of community organizations, institutional networks and strong government support so that learning can be facilitated to achieve ecologically sound conservation farming practices. The partnership between government, community groups and other organizations are strengthened so that there is sharing and dissemination of landcare technologies and processes. This multisectoral (community groups, local government, other government line agencies, scientists) and multidisciplinary partnership is a key feature of landcare (Campbell 1994).

Mercado et al. (2001) noted that when landcare began in 1996, it was with an initial 25 farmers who were trained (upon request) by ICRAF on the establishment of natural vegetative strips or NVS. During the training, the farmers decided to form a self-help group, which is now known as the Claveria Landcare Association, that would disseminate and promote the practice among other farmers. From then on, other nearby villages started to organize their own groups. These groups then numbering about 20 (in 2000) were federated into Claveria Landcare Association (CLCA). By 2002, there were about 62 active landcare groups in Claveria.

The Landcare Program is built around three cornerstones (Catacutan 2004): appropriate technologies, partnership building and institution building. Technical innovations include natural vegetative strips (NVS) which was key for these upland systems, and complementary interventions such as nursery establishment for agroforestry development. NVS strategies are promoted as a promising means of contour hedgerow cropping to help sustain crop production in the Philippine uplands (Mamicpic, Tinsley and Magcale-Macandog 1999). The establishment of NVS is quite simple: narrow contour strips are left unploughed during land preparation and grasses and other natural vegetation are allowed to grow. This requires very little labour by the farmer. Some farmers have planted leguminous trees onto the contours. These techniques have been shown to significantly reduce soil loss and increase alley crop yields through hedgerow cropping system (Garrity et al. 1993; Stark 1996 cf: Mamicpic et al. 1999). Lastly, other interventions, such as timber trees, have been integrated into the NVS.

## The landcare partnership triangle

The landcare partnership triangle consists of the farmers, local government unit (LGU) and the technical facilitators. Establishing landcare groups among farmers is the major component and is considered to be a key institutional innovation. The formation of the landcare groups followed a planned process (Cramb, Culasero and Catacutan 2003). First, ICRAF started the landcare campaign through a broad information, education and communication (IEC) program on environmental issues and conservation strategies developed from ICRAF's research, especially on NVS. The IEC program, which included a radio program, was implemented in all 'barangays'. A survey was then conducted to determine the level of farmers' interest in participating. Based on the survey results, the majority of barangays selected and given priority were in the upper areas. Major activities in the prioritized barangays were slide shows, trainings and cross farm visits. The main feature of the IEC activities was a slide show which normally ran for 2-3 hours. There were also technical trainings on NVS establishment, nursery establishment, seed collection and handling, seedling production, soil analysis and agroforestry. The trainings were supported by visits to farms where the practices had been adopted. Landcare facilitators guided the conduct of the process. Table 1 shows the breadth of activities undertaken by landcare in two sites.

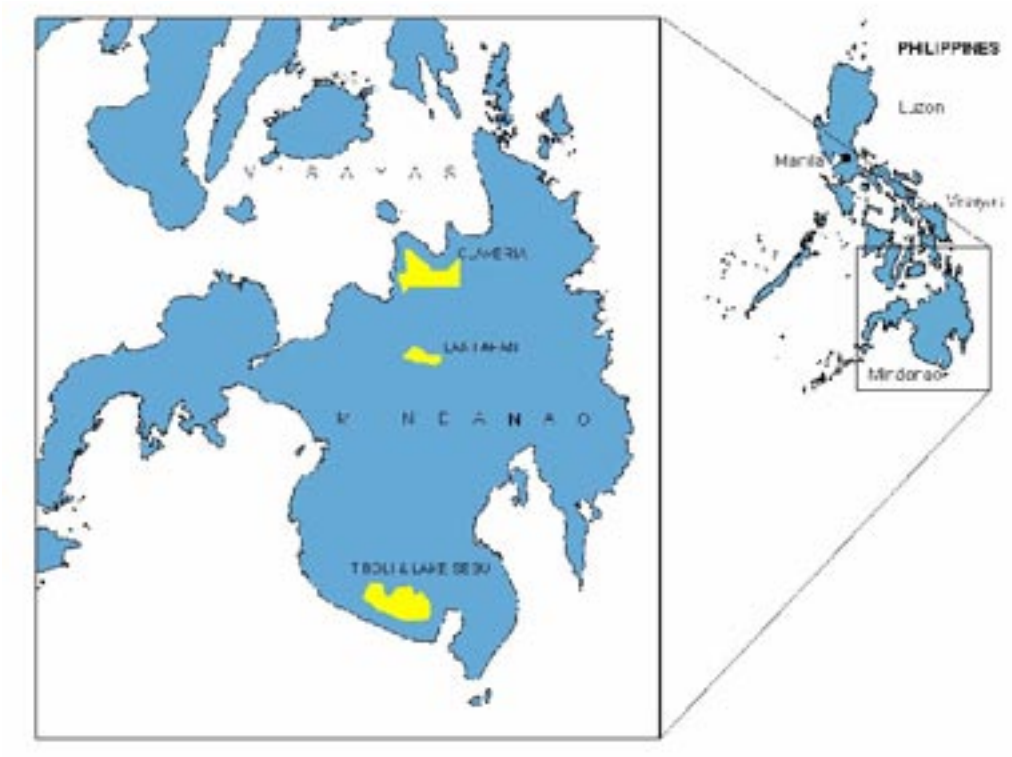


**Figure 1.** Landcare sites in the Philippines.

**Table 1.** Landcare programs and activities conducted in Ned, South Cotabato and Lantapan, Bukidnon

| | Ned, South Cotabato | Lantapan, Bukidnon |
|---|---|---|
| **Trainings conducted** | - Over 50 training events had been organized for the groups, dealing mainly with technical issues such as the production of high-value annuals, nursery establishment and management, fruit tree production, coffee production, and conservation farming principles (Year 1)<br>- A three-day training visit to the Claveria and Lantapan project sites was organized for the facilitators and other farmer-leaders (Year 2)<br>- Nine training events in the year for group members (Year 3) | - Training for landcare leaders: leadership and team building in November 1999; leadership and organizational management<br>- 150 training events were conducted (the first full year of the Landcare Program, 1999) [46 sessions on NVS establishment; 44 sessions on nursery establishment; 19 sessions on soil analysis; 40 sessions on various topics] |
| **Farm visits** | - The groups had conducted 34 meetings and 49 group work activities in nurseries or on farms (Year 1)<br>- Five part-time farmer facilitators were appointed to augment the efforts of the landcare facilitator. They were expected to assist in the formation of groups, visit their designated groups twice a month, and report to the landcare facilitator once a month (Year 2) | - 63 slide shows, generally half-day (i.e., evening) activities for groups of 15-80 farmers<br>- 16 cross-farm visits, generally whole day activities within Lantapan for groups of 15-40 farmers, but including one visit to Claveria and one to Central Mindanao University<br>- 8 other events, including meetings, symposia, and orientations for officials |
| **Seedlings dispersed (quality/ quantity)** | - Raised almost 40,000 seedlings, mainly of coffee (33,000) and forest trees (5,000), along with a variety of fruit trees. About 12,000 trees had been planted out (8,000 coffee trees, 2,599 forest trees, and 1,500 fruit trees). Over 1.5 ha of high value vegetable crops had been planted, mainly beans, onions, capsicum, eggplant, and bitter gourd (Year 1)<br>- By mid-2002, a total of 162 farmers had been loaned 700 kg of seeds, mainly durian (Year 3)<br>Ned Landcare Association Institutions<br>- In year 2000, they requested for fruit trees to the Governor of South Cotabato<br>– 5,000 durian seedlings provided by the provincial DA, exclusively for landcare members - | - 156,000 trees planted on farms |
| **Nursery established** | - 35 individual and 14 group nurseries had been established (Year 1)<br>- A total of 151 individual nurseries were established as of May 2002 (Year 3) | - 64 local nurseries established by mid-2002 for the propagation of fruit and timber trees, including rambutan, durian, lanzones, coffee, and eucalypts<br>- A nursery established through Lantapan Landcare Association - |
| **Demo farms** | - Nursery establishment by the groups (Year 2) | - Demonstration farm established through the Lantapan Landcare Association |

(Sources: Cramb and Culasero-Arellano, 2003; Cramb, Culasero and Catacutan, 2003) Note: For Ned, only 3 years were documented since it started only in 2000 while Lantapan started in 1999. The landcare in Claveria officially started in 1996.

The costs of meetings, trainings and cross farm visits were shared between the farmers, ICRAF and the municipal government (Cramb, Culasero and Catacutan 2003). Meals were borne by farmers; seedlings and other nursery materials were shouldered by ICRAF while the municipal government provided other materials like plastic bags for planting materials as in the case of Lantapan. The formation of a site-level landcare group usually followed the first training event.

## Analysis of Impact

Figure 2 summarizes the major impacts of the Lancare Program in the Philippines and serves as the conceptual framework of the paper. The impacts are examined at two interacting scales: micro and meso scales. While many impact assessment studies focus on the micro level, this paper attempts to study the impacts at both levels since the heart of the program is investing on human and social capital as an approach to promote the well-being of the farmer, the household, the farm and the community. At the meso level, the impacts of landcare are expected to be improved knowledge and understanding of problems, options and management, empowerment of the community, and improved governance.

In this paper, empowerment is reflected in terms of the improvement in decision making of various communities of stakeholders (farmers, line agencies, LGUs and included environmental governance as a parameter). At this scale, the process by which landcare has strengthened social capital and its relationship with the conservation and other land management practices in the uplands of Mindanao is extensively discussed. At the micro level, the focus of the impact analysis is on the rate of knowledge assimilation, and the extent of adoption of technological options promoted through landcare.

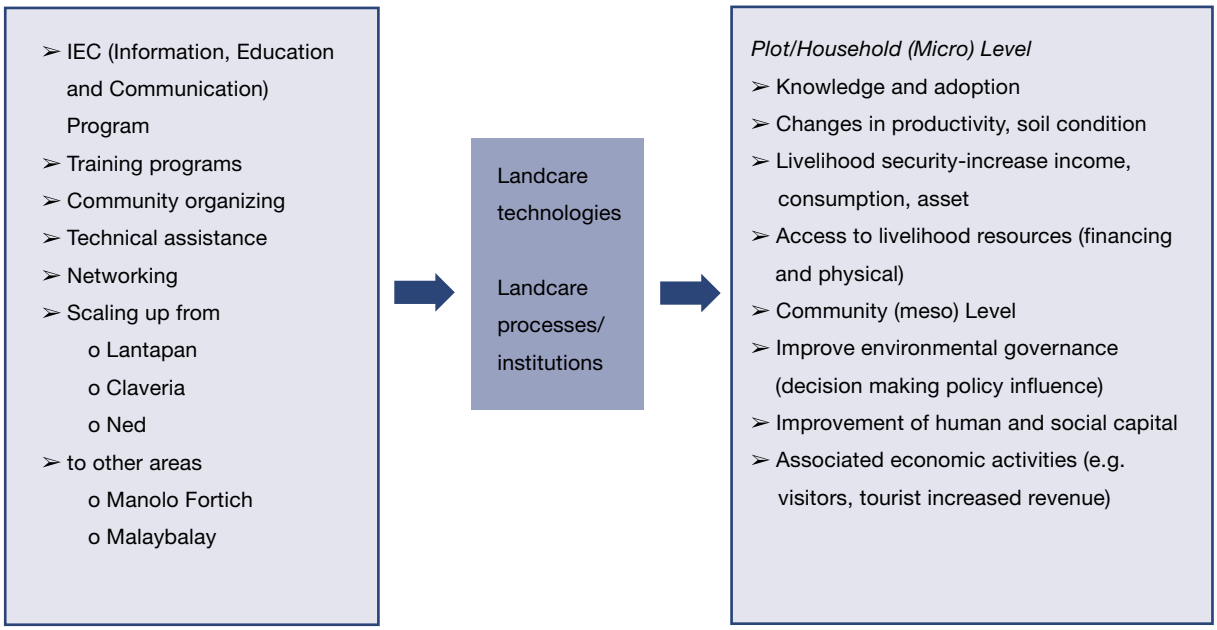


**Figure 2.** Summary of impacts of the Landcare Program in the Philippines.

## Membership in landcare and reasons for joining

Landcare groups are increasing in number in the project sites. By 2002, Lantapan had 62 landcare groups while Ned had 39. However, by mid-2002, ICRAF noted that 39 of the 62 total groups had become inactive for Lantapan while the growth of membership in Ned, South Cotabato gradually declined. However, expansion was high outside the project sites. As of 2003, a total of 363 landcare groups were formed, with 4230 households as members (ACIAR 2003). ACIAR noted that adoption of conservation measures had been taken up by about 65% of the all member households, and protection covered up to 25% of their farmland (household/farm level) (ACIAR 2002). In the synthesis review report of Prior (2003), he noted that the Philippine Landcare Program has been very successful in encouraging the adoption of soil conservation technologies and increased membership of landcare groups. The main reasons people join landcare are: they are learning farm technologies and preserving land (34 of the respondents or 44.7%); they are receiving program benefits (22 of the respondents or 29%); attendance to meetings (7 of the respondents or 9.2%); and improvement in livelihoods (7 of the respondents or 9.2%) (Figure 3).

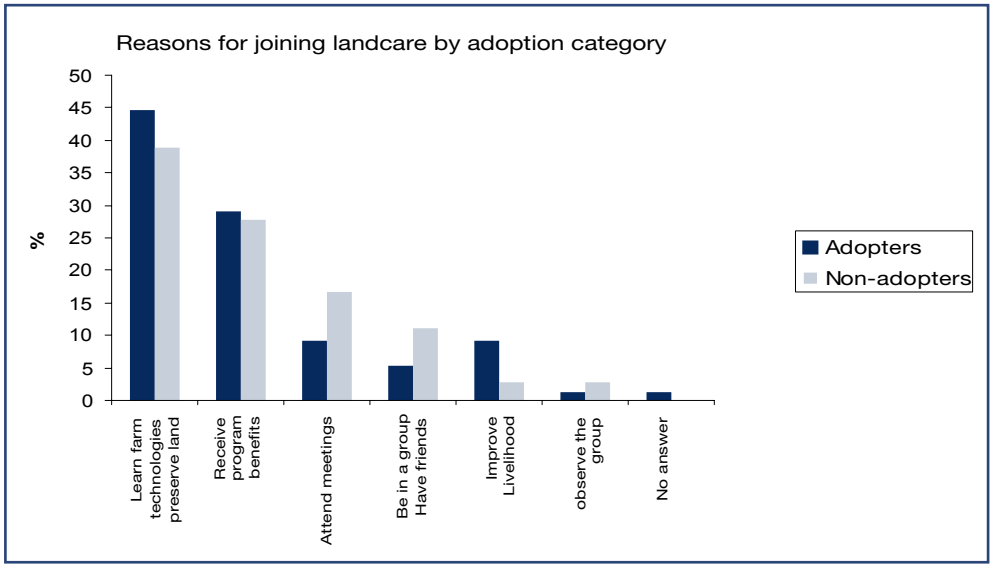


**Figure 3.** Reasons for joining landcare groups.

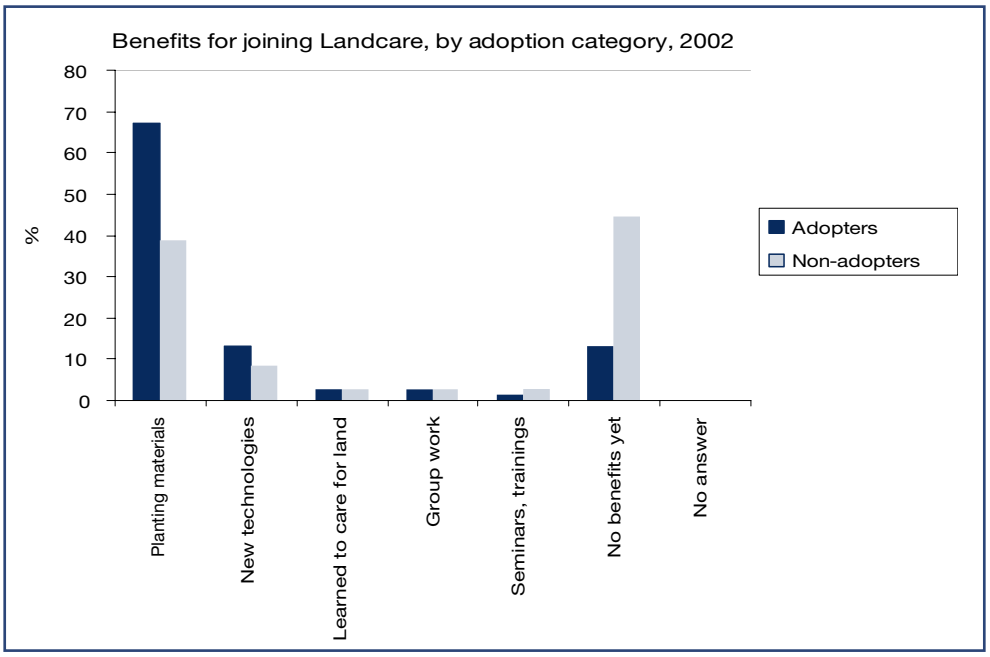


**Figure 4.** Benefits for joining a landcare group.

Respondents identified the major benefits of joining a landcare group. These include access to planting materials, new technologies, and learning to care for their land and group work (Figure 4). The survey results seems to suggest that among adopters of technology, seminars and training programs (1.3%) contributed little to their motivation to join landcare.

It was reported that some landcare groups are not as active as others and some members have opted to become less active than they used to. The major reasons for discontinuing landcare membership include: the groups have been dismantled or separated, lack of information or communication, insufficient time for meetings or group work, lack of perceived benefit, and security problems in the area. Surprisingly, some adopters of technologies noted that they are no longer interested in joining a landcare group in the future because they lack the time. Another reason given was that of lack of land ownership – those that are renting land perceive that their efforts to adopt landcare technologies may be of less benefit to them than if they owned the land.

## Impacts of landcare at the community level

This section addresses the impacts of landcare at the meso or community scale (Figure 2). The landcare project document is clear about the intended effects and impacts of landcare. The objective was to illustrate that adoption of conservation practices can be efficiently and effectively achieved if a landcare approach is used to mobilize community concern and action (Prior 2003). It was also hypothesized that the landcare approach could be applied to a wide range of communities with differing biophysical and socio-political environments and that it should empower communities to solve their own problems. Cramb (2004) considered the research and development efforts in landcare as investments in human and social capital in order to promote the objectives of natural resource conservation and increasing crop yield and consequently the income of farmers. Hence, the following section centres on the formation of human and social capital and the improvement of environmental governance and economic benefits at the community, municipal levels and other sectors.

### Human and Social Capital

Landcare is often considered to be an approach that harnesses the potentials of communities for resource conservation (Cramb 2004; Mercado et al. 2001; Sabio 2002). Improvement of human and social capital was perceived to be the major benefit from Landcare Program by some analysts (Cramb et al. 2003; Cramb et al. 2003; Metcalfe 2004). A variety of trainings, study tours and hands-on activities are perceived to have contributed to improving the quality of human capital in the community. This improvement was in the form of heightened environmental knowledge and consciousness among farmers and farming communities and the emergence of a conservation ethic among farmers (Sabio 2002).

Social capital on the other hand, consists of networks of social relations which are characterized by norms of social trust and reciprocity. It is “the quality of social relationships between individuals that affect their capacity to address and resolve problems they face in common” (Stewart-Weeks and Richardson 1998 cf: Stone 2001). This is evident in the perception of one landcare facilitator (Cramb et al. 2003) who noted that the program increased volunteerism and group work and enhanced group dynamics and decision making to address the problem of land degradation. The formation of 363 landcare groups in the three sites is proof of the many farmers who were able to attend to training programs on conservation practices and to extend to other farmers, landcare members or not, the lessons they learned from these activities. Hence, landcare became a means to rapidly diffuse a range of land management practices, including agroforestry, among upland farmers (Garrity2004).

Cramb (2004) succinctly described Landcare Program in the Philippines as one that promotes simple conservation strategies by supporting local landcare groups and municipal landcare associations, hence enhancing social capital. For example, ICRAF initially trained 25 farmers and that initiative sparked a process which led to the formation of 62 active landcare groups, known to be the Claveria Landcare Association (CLCA), by 2002. Mercado et al. further noted that CLCA became a mechanism for vertical and horizontal information dissemination, sharing and learning. The organization also became a mechanism for articulating needs and mobilizing resources from the local government and other support agencies.

Landcare groups are organized at the level of neighbourhoods of 20-30 households which then join into chapters at the village (administrative jurisdiction), which corresponds to a microwatershed level (ecological). The chapters, consisting of 8-12 neighbourhood groups, are then federated at the municipal or macrowatershed level. This kind of structure allows information to flow from the household to the municipal level, and back (Mercado et al. 2001).

The landcare triangle involving the people's organization, local governments and technologists (ICRAF/ and other technical/scientific support) embodies the strength of the social capital (Figure 5). Sabio (2002) noted that the collaboration of actors in the landcare triangle emanated from performing respective, non-duplicating and complementary roles. In the case of Claveria, the CLCA championed the adoption of technologies that reduced soil erosion and land degradation. Facilitators of ICRAF and the Municipal Agricultural Office promoted these technologies. The local government units (LGUs) extended financial, policy and moral support to CLCA. This support generated responsibility and accountability for LGU to monitor the progress of the conservation activities. The CLCA also felt an increased obligation to report and to rationalize the use of public funds for soil and water conservation initiatives. Sabio highlighted these mutual expectations and obligations that emerged from the interaction. According to him, social capital promoted collaborative behaviour among implementers and stakeholders of the landcare approach. The triadic relationship appeared like a "triangle in a balance" because if one collaborator does not perform its obligations, it will affect the system's balance. The landcare approach in effect was a multifaceted approach involving at least five components linked by both content (e.g. NVS technology) and process (e.g. extension and education, institution building and strengthening, multi-agency collaboration and network). These components interplayed in the course of implementing soil and water conservation activities at the local level. The level or degree of collaboration however differed from village to village.

Plate 1. On-farm training of farmers

Plate 2. Building landcare groups

Sabio (2002) also examined several elements of social capital within the Landcare Triangle. These included: a) communication and coordination, b) convergence of intentions and common goals, c) rewards and recognition, d) sanctions, leadership and authority, e) participation, f) collective action, g) network, h) inter-dependence and i) reciprocity. An interesting social capital balance sheet in landcare approach is shown in Table 2.

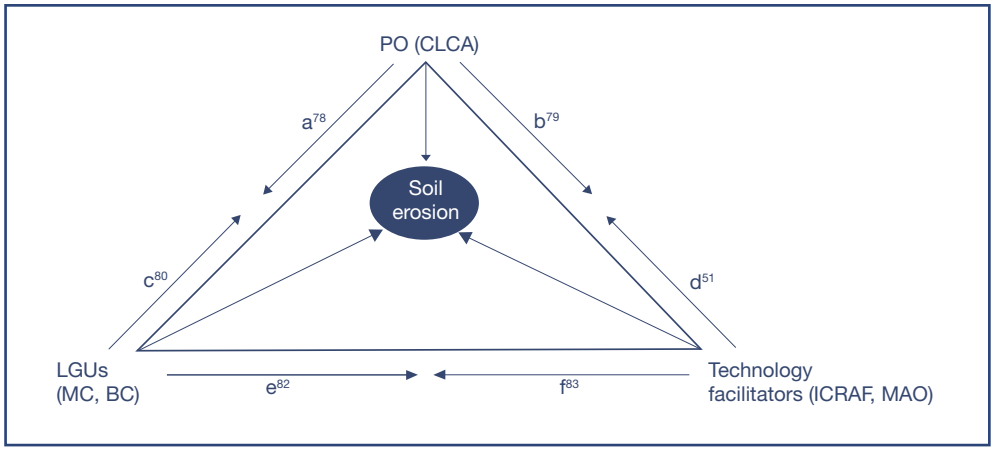


**Figure 5.** The Landcare Triadic collaboration process (Sabio 2002)

**Table 2.** Social capital balance sheets in the landcare approach

| Partners | GIVE (What you share/do in the triadic partnership) | TAKE (What you receive from the triadic partnership) |
|---|---|---|
| People's Organization (CLCA) | • Technology application<br>• Compliance<br>• Participation in collective activities<br>• Sharing knowledge/experience<br>• Attendance to meetings<br>• Information on needs and problems | • Knowledge and skills<br>• Financial and material support<br>• Soil erosion control<br>• Arrest of continued decline in farm productivity<br>• Increase income from crop diversification<br>• Awards and recognition |
| Local Government Units (MC and BC) | • Financial support<br>• Educational campaign and awareness building<br>• Official sanction of CLCA activities<br>• Passage of local ordinances<br>• Integration of the landcare with local development plans and budget<br>• Moral support and encouragement<br>• Information | • Greening and community<br>• Strengthen touch/connection with constituents<br>• Knowledge and skills<br>• Seedlings/planting materials<br>• Popularity with local constituents |
| Technical Facilitators (ICRAF and MAO Technologists) | • Extension and education support<br>• Technical and research information<br>• Group building and strengthening<br>• Inter-PO network building<br>• Financial and material<br>• Logistical and administrative support | • Practical experience in working and dealing with groups and LGUs<br>• Better task/job accomplishments<br>• PO and LGU positive response |

Source: Sabio 2002.

Using a mix of key informant interviews and focus group discussions, he found that this triangle has enabled a transformative learning process to occur among the various actors of the triadic alliance (Figure 6). This learning process shifted the mindsets of the actors in the triangle towards a conservation and preservation ethic which is a positive indicator of sustainability of landcare.

### Environmental governance

Assessment interviews indicated that local government units' (LGU) officials viewed landcare as a program that helped the government implement environment and natural resources management priorities. Key interviews conducted indicated that the Landcare Program has become a point of interest for various sectors by providing learning resource sites (Cramb 2003).

According to local government officials, they attract visitors, tourists and investors and hence indirectly help to increase local revenues. Landcare also helped the government to identify priority projects for farmers and helped bridge the knowledge gap of local officials. This, in a way, influences the policy making process at the LGU level. From the point of view of the LGUs, the program helped to develop an attitude of self reliance among farmers and thus minimized their dependence on the government.

Another indication of the positive influence of landcare activities on environmental governance is in terms of mobilizing resources of the local government units. Some of the activities of the landcare groups such as purchase of plastic bags and other materials came from the Human and Ecological Security Funds of the local government (Sabio 2002). Municipal ordinances, such as on implementation of soil conservation structures, were also passed to improve the environmental management in the study areas.

Mercado et al. (2001) reported that the new Philippine Strategy for Improved Watershed Resources Management published in 1998 by the Department of Environment and Natural Resources (DENR) incorporates the landcare approach. The approach is part of the key institutional elements and operational framework of the DENR management plan.

## Impacts of landcare at the household level

In this section, several questions are explored using data and insights primarily from monitoring assessments of the Bukidnon and South Cotabato, supplemented by other landcare-related studies and publications. Landcare groups are known to influence the decisions and practices of farming households. Major questions that are addressed in this section are the following: What is the extent of knowledge assimilation and adoption among farmers and farming households through landcare activities? Are there measurable changes in the productivity of crops, livestock and trees? Are there measurable changes in the income, consumption and expenditures?

### Extent of knowledge assimilation and adoption of conservation farming

While there was no direct study that examined the relationship between the extent of knowledge assimilation, adoption of conservation farming and landcare membership, the adoption of technologies being promoted by the program has been monitored in several sites. One study was conducted by ICRAF and SEARCA in 2001, involving over 400 households in Lantapan and Ned. Of the total of 313 respondents for Ned, 21.1% were landcare members. In Lantapan, of the total of 104 respondents, 24% were landcare members. A closer look at the data showed that landcare membership in Ned, South Cotabato was associated with adoption of conservation farming (Cramb and Culasero 2003). They reported that that 59.1% of landcare members were adopters compared with 27.1% adoption rates among non landcare individuals. The same trend was observed in Lantapan. Eighty (80.0) percent of the landcare members adopted while only 53.2% of others adopted the same techniques. In Lantapan, at the end of 2002 there had been 862 adopters or 16% of the total number of farming house-

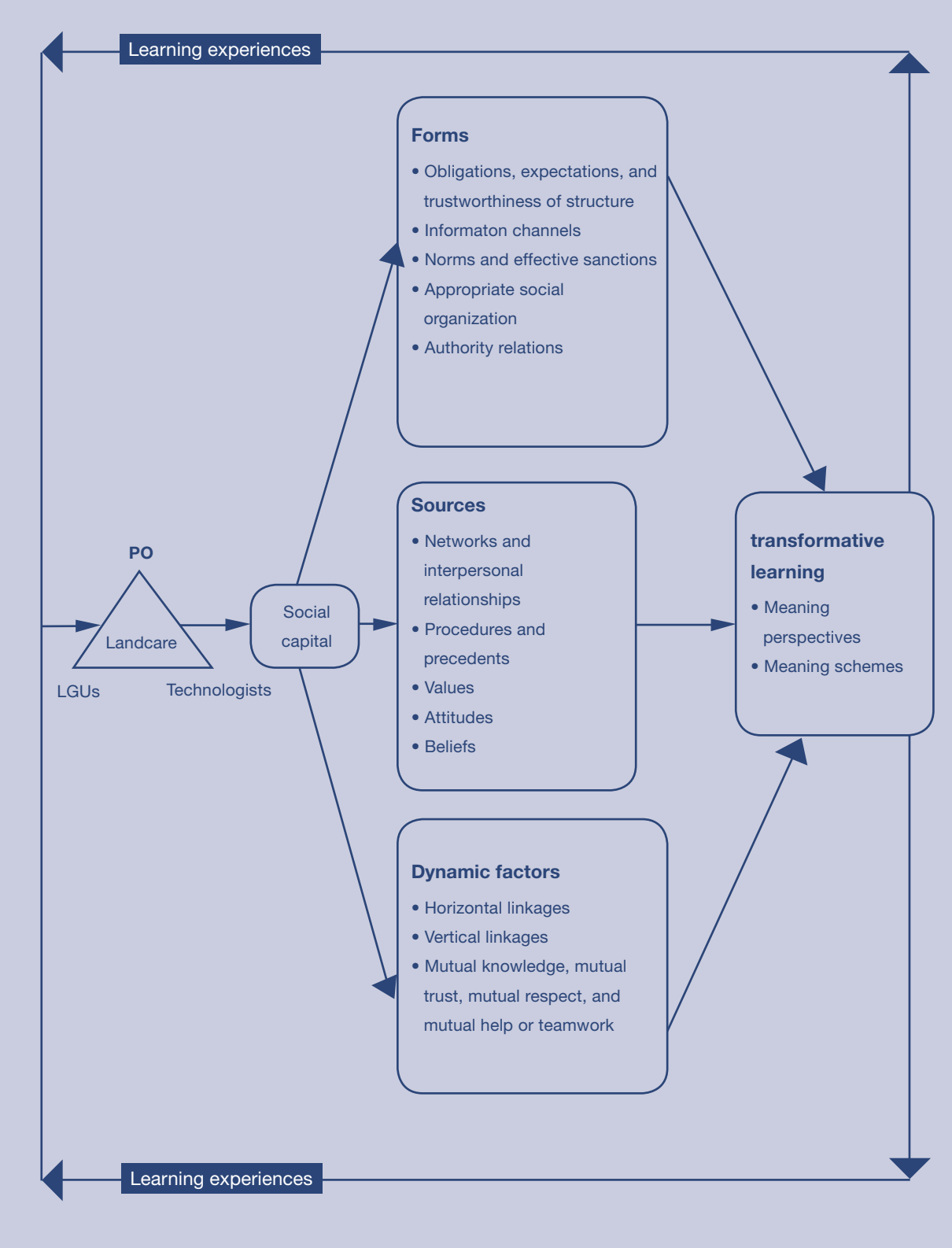


**Figure 6.** Conceptual framework for the study of social capital-transformative learning leakage (Sabio 2002)

holds. The total area under conservation measures was about 1150 ha, of which 43% was covered by NVS and 59% by agroforestry. This area consisted of 7% agricultural land, 14% maize and vegetable land, and 23% environmentally critical land. This is a significant impact at the landscape level. The change in land use practices was led by the adoption of the contour barriers. This not only helped farmers to reduce soil erosion and run-off but also served as the take-off point for the adoption of agroforestry in the area (Cramb 2005). A household survey was conducted in Barangay Sungco in August 2001 with a total of 104 households from various sitios. The survey results showed that 62 households or 60% have adopted contour farming measures (NVS, hedgerow, or other contour barriers) on their farm while 42 households or 40% that have not adopted any of the farming measures that the landcare offered. Most of the farmers see the institution of landcare as a concept or entity that cares for their land (42.3%) and that promotes conservation technology (36.5%) (Figure 7).

Farmers have diverse ideas about the benefits of adopting contour barriers (Figure 8). These are that adoption: prevents soil erosion (82.3%), maintains soil fertility (33.8%), creates terrace formation and easier cultivation (16.1%), and increases crop production (9.7%) to name the most common responses.

The 2001 survey in Ned, South Cotabato made use of involved farmer respondents from 18 sitios, which is 11% of the total number of farm-households. Of these, 106 farmers or 24% were adopters and 207 or 66% were non-adopters. A follow-up survey was

**Table 3.** Landcare membership and adoption category, 2001 (row percentages) (Cramb and Culasero 2003; Cramb, Culasero and Catacutan 2003)

| | % Adopters | % Non-adopters | Total Numbers |
|---|---|---|---|
| Landcare members (%) in Ned | 59.1 | 40.9 | 66 |
| Landcare members (%) in Lantapan | 80.0 | 20.0 | 25 |
| Non landcare members (%) in Ned | 27.1 | 72.9 | 247 |
| Non landcare members (%) in Lantapan | 53.2 | 46.8 | 79 |

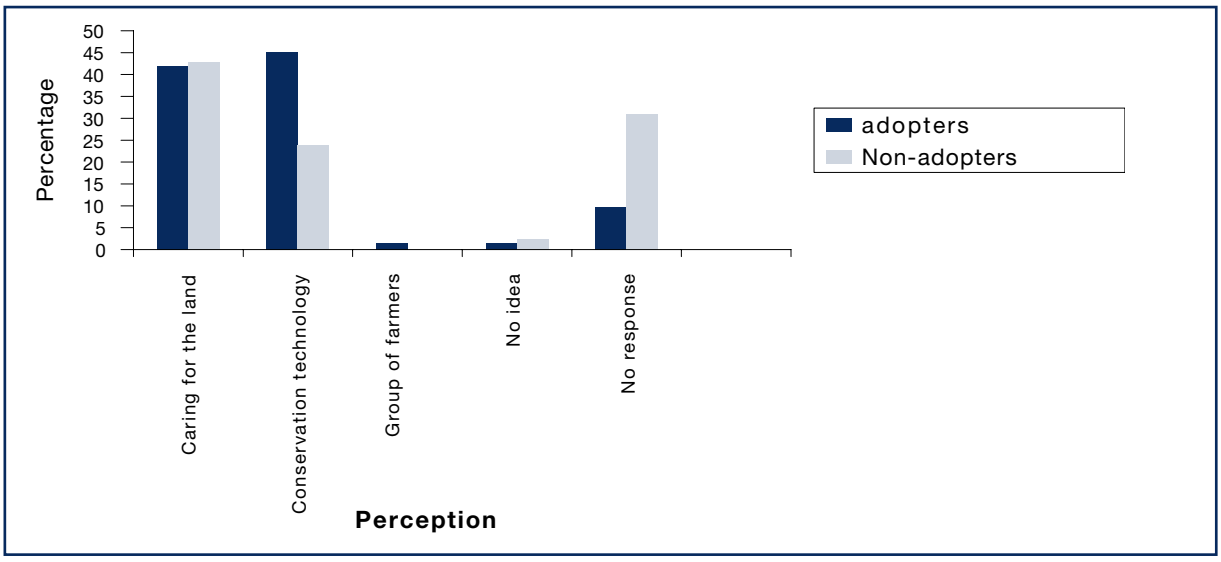


**Figure 7.** Respondents' perception on landcare

conducted in the third quarter of 2002 with the same sample. An improvement in the adoption soil conservation was found with 38% of farmers classified as adopters and 62% remaining non-adopters. Based on the studies conducted in Ned, it is likely that landcare membership contributes to adoption. Out of the 106 landcare respondents surveyed 66.7% had adopted contour barriers as opposed to just 21.9% for the non-members.

Cramb (2004) further explored whether the investment in social capital in the landcare project sites has an impact on the adoption of soil conservation practices. In particular, he examined the relationship between landcare membership and adoption of contour strip technology which farmers and scientists found out to be a cost effective technology. To do this, Cramb (2004) using the 2001 survey data from Lantapan conducted a logistic regression model to assess the impact of a range of factors on the likelihood of adopting natural vegetative strips (NVS). Results of the study showed that significant variables were age, main occupation, other occupation, farm size, slope of farm, and training. Among these factors, of specific interest was the training variable. The coefficient for the training variable was highly significant and indicated a large effect on adoption. The odds of adoption were shown to be increasing by a factor of 15 for those who have participated in NVS training. These findings seemed to confirm the importance of the practical, farmer-to-farmer and group-based training, that was facilitated by landcare. The results also indicated that farmers could proceed to implement the technology after they acquired the knowledge and skills, "with or without the support of the landcare group".

Predo's (2002) study conducted among 192 smallholder tree growers in Misamis Oriental also indicated that the decisions of smallholders to tree growing are significantly associated with landcare membership. A study by Arcenas (2002) conducted a survey in Claveria, Misamis Oriental with 274 randomly-selected farmers from 45 sitios shows a different result. In the study Fifty-eight percent (58.8%) of the respondents were landcare members while 41.2% were non-landcare members. Similarly, the percentage of adopters of conservation practices which were landcare members was also about 60% suggesting that the two groups were equally likely to adopt.

### Landcare and improvement of knowledge, attitude and behaviour

There is no formal examination of knowledge, attitude and behaviour (KAP) changes in the literature but

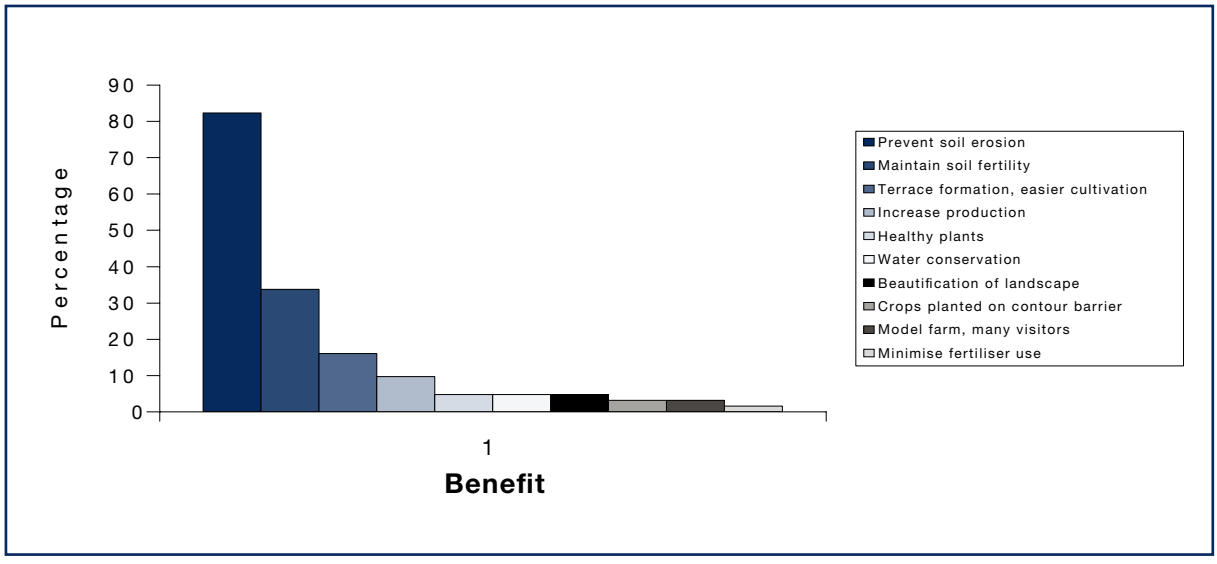


**Figure 8.** Benefits of countour barriers

there are numerous testimonies from landcare people and personalities. This was documented in a delightful and informal manner in a book entitled, "Landcare in the Philippines: Stories of People and Places" edited by Metcalfe (2004). Personal accounts of farmers noted that they especially appreciated and learned the value of contour lines in preventing soil erosion. A lady farmer from Claveria narrated that before landcare, she observed that soil was being eroded from her field and ended up in the river. She was thinking of planting bamboo to control soil erosion. She considered it fortunate that she was invited to attend a landcare meeting where she was elected as a sub-chapter president. Another farmer from Claveria recounted that ICRAF taught them how to propagate seeds from fruit and timber trees. A Lantapan farmer further noted that farmers benefited immensely from the trainings that were conducted. They were able to get access to a lot of relevant information through this venue.

### Productivity of crops, livestock and trees

Although there were no direct studies that linked membership to landcare and improving the productivity of the farms, landcare farmers generally perceived that the conservation practices being promoted by ICRAF through the landcare groups improved their productivity and livelihood. Using results from a long-term on-farm trial, Garrity (2001) noted that the productivity impacts from adopting natural vegetative strips are the sum of direct effects (from soil conservation) and indirect effects (through increased use of complementary inputs). He calculated that the technology would generate an additional 1 ton of maize per hectare per year, once fully operational. He further estimated that if adoption were to take place on just 2% of the 186 million hectares of strongly acid uplands, the total national impact would be 3.6 million tons of maize, enough to feed 36 million people annually.

Farmers also benefited from the other technologies that were integrated into the niches formed by the natural vegetative strips. For example, Mr. Alejandro Lobiano, a farmer who grows fruit and timber trees in Claveria, recounted that they have problems with building materials for their houses because their landscapes are dominated by grasses with very few trees. From their membership in landcare, they have planted fruits and timber trees on their farms which are potential sources of timber and fuel for households, as well as providing income (Metcalfe 2004).

The trends towards crop diversification and crop mix are notable among farmers who are landcare members or those who have been influenced by landcare. For instance farmers like Mrs. Judith Hermis of Ned, South Cotabato noted that they used to plant maize up and down the slopes. Today however, they have a variety of crops like rice, corn, peanuts and fruit trees planted along contours. She expects additional income from these diverse crops.

Plate 3. Contour farming on hillsides

Plate 4. Integration of livestock in upland farms

**From a seedling to a house…**

*"…I think fruit trees are very useful because if we plant annual crops all the time, we face the ongoing problems of preparing and working for the next crop. Fruit trees can provide us with a 'pension' when we grow old and we can harvest the fruit from the trees that we planted."*

These are the lexis of Alejandro Lobiano, farmer, and the Leader of Sitio Tunggol Landcare Group in Barangay Patrocenio, Claveria, Misamis Oriental, Northern Mindanao. He is satisfied by how landcare helped his small sitio. Like most of the beneficiaries of the Agrarian Reform Program, building a house is his problem. But from the time when ICRAF came, this has been put to an end. ICRAF provided tree seedlings and taught them how to propagate seeds from fruit and timber trees. Now they have trees to make houses and wood to produce fuel. Other technologies that they have learned are the method of establishing contour lines and preventing soil erosion. Landcare has helped their small sitio as well. Currently, aside from the technologies they have obtained, they have a small amount of group funds that is use for emergency needs of the members. They plan to do some other projects that will help their fellow residents to generate more income.

**From Interest to business…**

*"With landcare, …, we don't need money to start up our activities. We are able to produce our own seedlings and collect our own seeds for sale, providing a steady income*."

This is a testimonial of Ms. Restie Gamayon on how her involvements in landcare have lent a hand on improving her small business. She has been farming for 22 years in Barangay Victory, Lantapan, Central Mindanao. Formerly, Restie was the Secretary of Lantapan Landcare Association. Her nursery business is doing well and has helped her increase her income. The appeal of joining Landcare came from her interest in using trees on farm, nursery management and soil and water conservation. Landcare taught her the proper techniques of land management, soil and water conservation and agroforestry. She has been aware of the current scenario of diminishing tree cover in the Philippines. For her landcare has offered simple solutions on how to help the environment.

**From landcare to people care…**

*"Land is like an animal that you need to take good care of because it will then give you a good response. In the same way, soil will give back good crops if you take care of it. Landcare is also about organizing farmers to have a common voice that can easily be heard by government officials and politicians."*

This is how Orlando Berdin defines landcare. Orlando is a farmer and member of Kibang Purok 2 Landcare Group, Barangay Ned, Municipality of Lake Sebu, Southern Mindanao. He has been a pioneer of the Ned Landcare Association on 1999. Landcare has provided him with knowledge of several farming techniques such as contour ploughing, zero tillage, and many more. He has learned how to protect his soil from erosion and retain its fertility. These have improved his land as his soil is easier to plough, erosion has been reduced, and above he has created beautiful terraces. Landcare has provided them partnerships for training opportunities, credit facilities, and output marketing opportunities as well.

Reference: Metcalf, Jenni Editor. LANDCARE IN THE PHILIPPINES. Stories of People and Places. Australian Centre for International Agricultural Research Canberra. ACIAR Monograph Series No. 112, 170p. 2004

### Income, expenditures and assets

There has not been a rigorous ex post study of the impacts of landcare on income, through the adoption of improved land management practices. Now that there has been widespread adoption of technology for sufficient time, it is timely to initiate such a study. Scientists did, however, conduct qualitative case study interviews and ex ante economic impact assessments, and these are summarized in this section.

One farmer from Lantapan defines landcare as a project that enhances his livelihood and increases the benefits for his children in the future (Metcalfe 2004). According to Mr. Basilio Decano, he saw an improvement in his maize harvest with landcare. He said that when he first did NVS on his sloping farm, he was harvesting a total of 224 kg of shelled maize from his 7 alleys. His harvest increased to 1600 kg from the same area, now using native seeds, fertilizers and other inputs. He said he also planted taro along the contours, with a harvest of 3 sacks per alley. Sold at 2 pesos per kilo, he earned 300 pesos per one contour line. “This is a lot higher than the money I earned from maize”, he said.

Another Lantapan farmer with two hectares of land planted to a variety of crops and trees such as maize, coffee, timber trees, and medicinal herbs related that landcare has added income to their activities by providing them with many beneficial options. Specifically, he learned of new timber species that can be planted with higher market potential.

Although not yet quantified and should be subject to further study, farmers are reported to earn additional income from selling seedlings which are grown in their nurseries. Mrs. Restie Gamayon of Lantapan, who grows maize and vegetables and rents out lands to other farmers, related that the nursery they have been managing for less that a year has already sold seedlings (Metcalf 2004). She opined that there is higher earning from nursery management than maize production because the latter requires a larger investment than running a nursery.

While active landcare farmers attest to the acceptability, appropriateness and economic feasibility of tree farming in the study areas, an interesting study was conducted to examine the environmental and economic dimensions of alternative land uses in grassland areas in Misamis Oriental, Mindanao using bioeconomic modelling (Predo 2002). It specifically compared tree-based land use systems with other land uses and identified the underlying tree-growing objectives and the factors that explain land use decisions by smallholder farmers. Predo used 192 farmer-respondents, 86% of whom practiced tree-based farming systems and the rest with cash crops, maize being the dominant crop.

Results of the bioeconomic analysis showed that tree-based land use systems have significantly higher financial profitability and environmental benefits (Predo 2002). The environmental benefits were measured in terms of higher carbon sequestration, least soil erosion, and sustained soil nutrients compared with maize cropping. The results of the benefit cost analysis of 6 alternative land use systems are presented in Table 2. With a discount rate of 25% and 10%, all alternative land use systems have positive net present value (NPV), which implies that they were all profitable these levels of discount rate. The timber plantation system obtained the highest NPV (P241,170/ha), followed by the social forestry model of timber with maize (P98,121/ha), and the lowest NPV being found in the Imperata-grazing system. Reducing the discount rate to 10% had no effect on the relative ranking of the alternative systems in terms of net present and annualized income (Table 4). The lower rate does however increase the financial profitability of the tree-based systems relative to other systems since the lower discount rate over longer periods increases the present value of future outputs. Despite these predicted returns, farmers still continue to practice the Imperata-grazing system and the extent of adoption of tree based systems is found to be low although it is the most profitable option. He quips: “why are smallholders hesitant to increase investment in tree based farming system?” He opined that

smallholders and poor farmers are risk averse to trade current consumption with future income from trees since tree growing generates substantial income risks that directly affect the households' viability to meet consumption needs at a point in time.

The study showed that the extent of tree farming remains low (<10% of land area). A Tobit regression analysis of farmers' tree-growing decisions revealed that high relative price variability (timber price vis-à-vis cash crop prices) deters tree planting. According to Predo, risk analysis indicated that while timber-based systems earned the highest net present value (NPV), they seemed to be the most risky options as reflected by the high coefficient of variations of the NPV ranging from 164% to 205%.

The study also showed that smallholders have multiple objectives in tree growing such as economic, recreational and aesthetic, and environmental protection and restoration. Consistent with other studies (Metcalfe 2004; Cramb 2003), economic related objectives were found to be the primary consideration. Predo found that farmers' tree-growing decisions depend on: (1) current price levels, forecast price changes and relative price availability; (2) socio-economic characteristics such as household size, age, and education; (3) farm characteristics given by cultivable land-man ratio, and farm size; (4) land tenure; (5) knowledge about tree-based land use systems; and (6) membership in landcare association.

The study recommended that since price risk appears to be the major deterrent to expansion of tree farming, measures to reduce this risk or to improve the risk management capability of farmers should be explored (Predo 2002). He recommended that provision of relevant and timely price information and price risk insurance are some of the possibilities. Other economic incentives need to be examined to encourage farmers to invest in more sustainable farming systems for the uplands. In this context, payments to farmers for environmental services such as carbon sequestration can be explored to encourage expansion of tree-based land use systems.

Farmers' perception of the impact of conservation practices like NVS on increasing farm productivity and income are consistent with other studies conducted by Predo (2002), Mamicpic et al. (1999), Garrity (2000)

**Table 4.** Private net present value (NPV) (P/ha) and annualized net benefits (ANB) (P/ha/year) of alternative land use systems over 20 years using a discount rate of 25% and 10%, Claveria, Misamis Oriental, Philippines, 2001.

| Land Use System | NPV | | ANB | |
|---|---|---|---|---|
| | 25% | 10% | 25% | 25% |
| a) Imperata-pasture | 271 | 498 | 69 | 58 |
| b) Annual maize | 21,161 | 30,913 | 5352 | 3631 |
| c) Timber with Imperata | 35,031 | 149,459 | 8860 | 17,555 |
| d) Timber trees hedgerow with maize | 56,074 | 185,762 | 14,182 | 21,819 |
| e) Timber w maize social forestry model) | 98,121 | 381,466 | 24,816 | 44,807 |
| f) Timber plantation | 241,170 | 1,019,206 | 60,996 | 119,716 |

and Stark 1994) among others. Predo, in his bioeconomic modelling, showed that tree-based farming systems have higher financial profitability compared with annual crops partly due to low management effort (Mamicpic et al. 1999).

But other studies found that the many types of farming systems can be compatible with improved soil conservation and under different assumptions about prices and timing of benefits, their rankings in economic performance can change. For example, Bertomeu (2004) study noted that depending on timber prices, maize monocropping can generate a higher return to land than tree-maize system. But even at very low prices, the return to labour of the tree-maize system is better than annual monocropping. Mamicpic et al. (1999) studied the long term economic viability of the NVS based cropping systems with and without livestock using a computer simulation model, SCUAF. Two systems with and without cattle were compared: NVS alley cropping where contour strips remained unploughed; and Gmelina block planting system. Modelling results showed that there are almost immediate returns to all systems because of the low labour cost of establishing the NVS and their short-term impacts. The model also found that systems integrating cattle performed better, that improved soil fertility management is critical to the long-term sustainability of income, and that integration of higher value crops and trees into the NVS or alleys can greatly increase income. How these interactions have played out in reality and what the role of landcare has been in promoting their testing and uptake requires further study.

**Environmental sustainability**

There have not been any ex-post studies made that directly measure the effect of adoption of improved practices on the natural resource base for a large number of households. However, as described earlier, there has been monitoring of the uptake of conservation technologies along with scientific evidence on the effectiveness of these technologies. A review of landcare in 2003 noted that its reach was growing steadily with a total of 363 landcare groups (262 in Claveria, 62 at Lantapan and 39 at Ned) involving an aggregate of 4,230 households. Almost 50% or half of these households have adopted conservation measures like NVS which can reduce soil erosion by 67-95% (ACIAR 2003). Indirectly, this indicates that landcare membership has the potential to reduce environmental degradation through reducing soil erosion. However, it was also noted that many adopters do not belong to landcare groups but that they may nonetheless benefit from the presence of landcare in their villages (Prior 2003; Cramb 2004; Cramb, Culasero and Catacutan 2003; Cramb and Culasero 2003). In this regard, there needs to design research to provide specific evidence that the landcare approach has and/or can eventually reduce natural resource degradation beyond what might have occurred in its absence (Gomez 2003). In this respect, ICRAF, with collaboration of other research groups based at SEAMEO Regional Center for Research and Graduate Study in Agriculture (SEARCA) and University of the Philippines at Los Banos, is currently analyzing data from surveys conducted in Ned, South Cotabato and Claveria which includes both landcare and non-landcare households.

Despite the need for increased scientific basis for direct associations between landcare membership and soil erosion, what makes landcare acceptable to many other farmers and partners are the stories of successes that individual farmers are experiencing through landcare. Farming communities and their experiences remain to be the well spring of knowledge with respect to how landcare has influenced the quality of the physical environment. Farmers like Mr. Eduardo Llausas of Claveria attest to the positive impacts that landcare has had on improving the condition of soil on his farm.

The high adoption rates of conservation practices has the potential long term impacts on improving the catchment processes such as decreasing runoff, decreased sedimentation and turbidity of the streams and improved water quality (Prior 2003). Furthermore,

turning upland farms into economically viable and sustainable enterprises can reduce the pressure on the remaining forested areas. Yet again, there is a need to verify these expected trends and causality with empirical evidences. A continuing monitoring and evaluation (M&E) will be imperative to do this.

To a lady farmer, here's how she viewed landcare and its impact on the quality of the environment (Metcalfe 2004):

*"Landcare teaches proper land management, soil and water conservation and agroforestry. The trees are being depleted rapidly, and if we do not want to replant and replenish, they will all be gone. …it also provides simple solutions to prevent loss of soil on sloping land."*

This view is supported by results of some modelling studies conducted in the area. An analysis using Soil Changes Under Agroforestry (SCUAF) model showed that under the NVS with no ploughing and natural vegetation on contours, the soil loss still occurs during the first 5 years. After the 5th year, however, there is a more dramatic decrease in the rate of soil loss which can be attributed to the gradual natural terrace formation (Mamicpic et al. 1999). The use of tree block planting system has also been promoted as appropriate upland farming technology. In Claveria, for example, Gmelina is used for block planting which not only can generate income but is expected to mitigate against soil erosion in previously open and sloping areas.

## Gaps and other areas for further inquiry

Landcare in the Philippines is at the junction of an exciting period. Nine years of landcare has witnessed the growth and strengthening of both the bonding (organic or horizontal) and bridging (networking or vertical) social capital designed to promote upland technologies that address the problem of soil erosion and land degradation. Soil erosion has been acknowledged as one of the major problems in the uplands of Southeast Asia, particularly the Philippines. The number and quality of landcare-related publications attested to the achievements of landcare in mobilizing communities. Reviewers like Prior (2003) and Lantican (2003) were consistent in this regard. Both agreed that the Philippine component of landcare has been particularly successful. The entry point was to encourage the adoption of simple soil conservation strategies through formation of landcare groups. From there, a large number of other natural resource management practices have been promoted, including agroforestry.

There remain several areas that can be further explored to provide empirical evidence that indeed, landcare approach, or investment in social capital, is a cost effective and simple mechanism to spread conservation practices in the Philippine uplands. Now that there has been widespread adoption, the relationships among landcare membership, corresponding effects on adoption of technology, productivity, income and well-being of farmers, need further study. Also, there is need to understand whether landcare is benefiting the poor and vulnerable of society equally as well as other types of individuals. A key puzzle to sort out at this point is: does membership in landcare groups itself have an impact or is it the characteristics of particular households that are likely to have impacts. Are certain types of people more likely to join landcare and are those characteristics rather than the membership per se that causes the impacts to be observed. Might residence in a landcare community be sufficient for learning about new innovations so that membership per se is not important?

Along the same vein, there is still a need to set up and/or continue a monitoring and evaluation system which considers the predicted impacts of improved conservation practices in alleviating resource degradation such as improvement in the catchment processes, decreased sedimentation and turbidity of the streams, and improved water quality. These impacts are long term so there is a need to maintain a quality data base that will allow for comparison after a period of time.

Exploring how landcare groups can be compensated for improving the ability of the upland ecosystem to provide environmental services would be challenging work in the next phase of landcare. The environmental service payment (ESP) concept has already gained ground as a mechanism to enable rewards (or payments) for upland farmers' efforts to protect and/or rehabilitate a watershed (Francisco 2004). This can help ensures the sustainability of the practice as noted by Predo (2002) especially in the case of tree-based farming systems that take longer time to provide returns.

A more systematic study of how tenurial rights affect interest in and impact of landcare would also be important. From the many materials written about landcare, this has not been explored fully (compared with other variables such as social capital). This is probably because most of the upland farmers and members of landcare groups seem to be under similar tenure arrangements. For example, most of the upland farmers in Ned, South Cotabato are beneficiaries of the Agrarian Reform Program. However, there are important differences across households, such as owners versus tenants, conflicts over of ancestral land and state land claims, land versus tree rights, and gender rights to resources, all of which could affect the impact of landcare.

## Conclusion

Landcare in the Philippines has come a long way. From its beginning in Claveria, Misamis Oriental, it spread to other municipalities in Bukidnon and South Cotabato. It is now being adopted in some municipalities in the Visayas. Its main objective is to use collective action to improve livelihoods through improved land management. It does this by first promoting simple soil conservation strategies and more generally investing in human and social capital. Having an entry point such as soil conservation is seen as important to build the social capital of groups. Groups are then empowered to set many other goals, to undertake a wide range of activities, and to test new technologies. The impact can be felt at the farm, household and community levels. Qualitative accounts of farmers attest to the contribution of landcare technologies to increasing farm productivity, reducing soil erosion and increasing income. Separate studies using modelling techniques corroborated these accounts by demonstrating that NVS systems are economically viable and tree based farming system is financially profitable. But the greatest contribution of landcare is at the community or meso scale: the enhancement of the human and social capital of the upland communities. Landcare respects and adheres to the idea of the farmer-driven voluntary action in partnership with the government and technologists. This triadic alliance promotes the collaborative behaviour of the different stakeholders and implementers of landcare and the approach has become legitimized and highly acceptable to the various sectors including the local government units.

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## Occasional Papers

1. Agroforestry responses to HIV/AIDS in East and Southern Africa. Proceedings of the HIV/AIDS Workshop held at the World Agroforestry Centre in Nairobi 2003.

2. Indigenous techniques for assessing and monitoring range resources in East Africa.

3. Caractérisation de la biodiversité ligneuse dans les zones en marge du désert :Manuel de procédures.

## Who we are

The World Agroforestry Centre is the international leader in the science and practice of integrating 'working trees' on small farms and in rural landscapes. We have invigorated the ancient practice of growing trees on farms, using innovative science for development to transform lives and landscapes.

## Our vision

Our vision is an 'Agroforestry Transformation' in the developing world resulting in a massive increase in the use of working trees on working landscapes by smallholder rural households that helps ensure security in food, nutrition, income, health, shelter and energy and a regenerated environment.

## Our mission

Our mission is to advance the science and practice of agroforestry to help realize an 'Agroforestry Transformation' throughout the developing world.

FUTURE HARVEST CGIAR

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