

# **Landcare and Livelihoods: The Promotion and Adoption of Conservation Farming Systems in the Philippine Uplands**

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## **Abstract**

Slow adoption of conservation farming systems in the Philippine uplands is a major problem. To address this, the landcare approach, based on community landcare groups, is being piloted in several locations. The results of a study to evaluate the impact of the Landcare Program in Barangay Ned in Southern Mindanao are presented. The sustainable rural livelihoods approach was used as a framework for the evaluation. The study focused on two impacts, the adoption of conservation practices and the formation and development of landcare groups, drawing on four data sources – project reports, key informants, a questionnaire survey, and case studies of landcare groups. The Ned Landcare Program has been associated with rapid adoption of conservation farming practices and the rapid formation of landcare groups linked in an association. The main effect of the Program was to enhance human capital through practical, farmer-led training and extension, enabling farmers to incorporate soil conservation and agroforestry technologies in their farming systems, with desirable outcomes for livelihood security and environmental sustainability. The social capital formed, especially through the landcare association, was crucial to these outcomes. Ongoing partnerships with adequately resourced facilitating agencies were required to maintain the Landcare Program in the long term.

## **Key Words**

Soil conservation, landcare, livelihoods, evaluation, Philippines

## **Introduction**

Agricultural land degradation in the densely populated, steeply sloping upland regions of the Philippines has been recognised as a major environmental problem in the past three decades, with significant on-site and off-site impacts (Cramb 1998). Conservation farming systems have been developed, such as the widely promoted Sloping Agricultural Land Technology (SALT), based on contour hedgerows of shrub legumes, but sustained uptake by farmers has been limited (Cramb, 2000; Cramb et al. 1999, 2000). In recent years, interest has focused on the potential of the landcare approach to enhance the development, dissemination and adoption of appropriate conservation farming measures (Mercado et al., 2001).

Landcare emerged in the mid-1980s in Australia and in the late-1990s in the Philippines as an important strategy for developing collective action at the local level to deal with problems of agricultural land degradation. The landcare approach centres on the formation of community landcare groups, supported to varying degrees through partnerships with government and non-government agencies. Campbell defines a community landcare group as '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' (1994: 31). Such groups identify problems at the local level and mobilise information, community effort, and finances to help improve the management of their soil, water, vegetation, and other natural resources. It is widely held that this is a more effective strategy for achieving adoption of sustainable farming practices than strategies involving government regulation or the top-down transfer of technology.

This paper reports some of the results of a participatory evaluation of the Landcare Program in Mindanao in the Southern Philippines (Fig. 1). The evaluation study was undertaken in the final phase of a four-year action research project (1999-2003) funded by the Australian Centre for International Agricultural Research (ACIAR). The focus of this paper is Barangay Ned, part of Lake Sebu Municipality in the province of South Cotabato in Southern Mindanao. The Landcare Program in Barangay Ned is of particular interest because it has been faced with extremely difficult conditions, has received minimal outside support, and thus indicates perhaps the basic requirements for achieving an accelerated impact on upland farming systems in the Philippines. The sustainable rural livelihoods approach was used in this study as a framework to understand, explain and evaluate the impacts of the Ned Landcare Program.

FIG. 1 ABOUT HERE

## **Background**

### *The Landcare Program in the Philippines*

Independently of the Australian Landcare Program, Landcare in the Philippines grew out of efforts to promote soil conservation innovations among farmers in the upland municipality of Claveria in Northern Mindanao (Arcenas, 2002; Sabio, 2002). The Department of Agriculture (DA) began promoting contour hedgerows of shrub legumes in the early 1980s, in the form of the Sloping Agricultural Land Technology (SALT) package. In 1987, the International Rice Research Institute (IRRI) in collaboration with the DA initiated a farmer-to-farmer training program in Claveria to enhance adoption. By 1992 up to 80 farmers had adopted the technology.

The International Centre for Research in Agroforestry (ICRAF) took over the IRRI research site in Claveria in 1993 and proceeded to conduct field trials on contour hedgerow systems. In

1996 ICRAF identified a low-cost farmer adaptation of contour hedgerows – the use of natural vegetative strips (NVS) as an alternative to the more complex and labour-intensive method of establishing and maintaining hedgerows of shrub legumes or forage grasses (Stark, 2000; Mercado et al., 2001; Arcenas, 2002; Sabio, 2002). A three-person extension team, comprising a farmer who had adopted NVS, a DA extension agent, and an ICRAF technician, was formed to promote the NVS technology. The team worked initially with individual farmers in various villages (*barangay*), but the interest was such that group sessions were organised, involving 20-25 participants. At one of these group-training sessions in 1996, 20 farmer leaders, at the suggestion of one of the facilitators, decided to form a farmer organisation to promote the NVS contour hedgerow system within the Claveria community. The organisation was named the Claveria Land Care Association (CLCA).

The Landcare Program in Claveria developed into a triangular partnership between the CLCA (a people's organisation, working collectively to encourage conservation farming among its members), ICRAF (an international non-government organisation, providing technical and logistic support and facilitation), and local government units (providing public resources and official support for the Association). As a result of this partnership, by early 2000 the CLCA had grown to include 16 chapters, 105 sub-chapters, and about 800 individual farmer-members. Adoption of NVS technology also increased dramatically, from about 75 ha in 1996 to more than 300 ha in 1999. Arcenas (2002) reports that all partners credited the farmer-based, group extension approach of the CLCA as the principal factor in this increased level of interest and adoption.

The success of Landcare in Claveria encouraged ICRAF in 1998 to introduce the approach at its Central Mindanao field site in the Municipality of Lantapan in Bukidnon (Fig. 1), and to seek external funding both to support the program and to evaluate its potential as a model for community-based natural resource management throughout the Philippine uplands. Operational funding was obtained from the Spanish Agency for International Cooperation (AECI). As mentioned above, the Australian Centre for International Agricultural Research (ACIAR) funded an action research project from 1999 to 2003 to augment and help evaluate the on-going Landcare Program in these and other sites.

#### *The ACIAR Landcare Project*

The ACIAR Landcare Project helped support the Landcare Program in and around the Claveria and Lantapan sites, as well as a third site in Southern Mindanao – Barangay Ned (Fig. 1). Previous projects implemented in Barangay Ned by the Southeast Asian Regional Centre for Graduate Study and Research in Agriculture (SEARCA) had sought to develop and promote conservation farming technologies, partly through the formation of farmer work-groups. Hence this site was readily included in the Landcare Program, with SEARCA as the facilitating organisation, providing a further opportunity to test the replicability of the landcare approach as it had evolved in Claveria.

The principal aim of the ACIAR Landcare Project was to test the effectiveness of the landcare approach as a tool to enhance the adoption of conservation practices suited to the needs of upland farming communities in the Philippines. As in Australia (Campbell, 1994; Lockie & Vanclay, 1997; Cary & Webb, 2000), 'the landcare approach' in the Philippines means many things, making evaluation difficult. In the ACIAR project the impact of landcare was to be evaluated in terms of (1) the adoption of conservation practices (and the effect of these practices on natural resources), and (2) the relevance of the approach as a model for local and regional extension services. That is, the project was interested in the adoption of both landcare *technologies* and landcare *processes and institutions* (notably the formation and development

of landcare groups and networks). These impacts were seen to be critical to the achievement of the longer-term outcomes of rural poverty reduction and environmental conservation – in short, sustainable rural livelihoods.

## Methods

### *The Sustainable Rural Livelihoods Framework*

A major methodological advance in rural development research in recent years has been the recognition that rural households are not necessarily focused exclusively on increasing crop or livestock production and incomes (let alone on resource conservation), but undertake a range of activities, both on- and off-farm, depending on the resources to which they have access and the livelihood strategies they are able to pursue at any given time (Chambers, 1987; Chambers & Conway, 1992). This ‘sustainable rural livelihoods’ approach is now widely advocated as a framework for evaluating and developing policies and programs at the micro level, particularly in terms of poverty reduction (Scoones, 1998; Ellis, 2000). While not inconsistent with a farming systems approach, it goes beyond the focus on agricultural production technology typical of much farming systems research (Ellis & Biggs, 2001).

A livelihood is a means of earning a living. Within the livelihoods approach, ‘a livelihood comprises the assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household’ (Ellis, 2000: 10). This emphasis on assets, activities, and access provides a convenient framework within which to develop an understanding of the complex and dynamic realities of rural households. Ellis (2000) places less emphasis on the sustainability dimension because of what he sees as its inherent vagueness, but Scoones considers that ‘a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base’ (1998: 5).

Scoones outlines the essential components of livelihoods analysis as follows: ‘The key question to be asked in the analysis of sustainable livelihoods is – Given a particular *context* (of policy setting, politics, history, agroecology and socio-economic conditions), what combination of *livelihood resources* (different types of ‘capital’) result in the ability to follow what combination of *livelihood strategies* (agricultural intensification [or] extensification, livelihood diversification, migration) with what *outcomes*?’ (Scoones, 1998: 3). Ellis (2000) gives particular emphasis to the widespread strategy of rural livelihood diversification, which he defines as ‘the process by which rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living’ (Ellis, 2000: 15). Diversification includes on-farm diversification (as measured by the range of crop, livestock and other natural resource based activities undertaken) as well as diversification away from own-account farming to include off-farm and non-farm activities in the household’s portfolio. The potential outcomes of these and other livelihood strategies are grouped by Ellis (2000) into (1) livelihood security (income level, income stability, seasonality, risk); and (2) environmental sustainability (soil and land quality, water, forests, biodiversity).

The livelihoods framework has the advantage of placing the adoption of landcare practices and the formation of landcare groups within the context of the livelihood resources and strategies of farm households and local communities, thus explicitly linking farming systems change, rural development, and natural resource management. In particular, the landcare approach can be seen as promoting sustainable rural livelihoods primarily through investment

in human and social capital. While the notion of human capital is well established, social capital is a relatively new concept, hence it warrants a brief discussion here. Woolcock (1998) and Woolcock & Narayan (2000: 226) define social capital succinctly as ‘the norms and networks that enable people to act collectively.’ They make the useful distinction between ‘integration’ or ‘bonding social capital’, i.e., the intra-community ties that enable poor people in a village setting to ‘get by’ (e.g., monitoring of property rights, labour exchange, emergency assistance, rotating savings groups, provision of communal facilities), and ‘linkage’ or ‘bridging social capital’, i.e., the extra-community networks that enable individuals and groups to tap outside sources of information, support, and resources, not just enabling them to ‘get by’ but to ‘get ahead’ (e.g., links to traders and financiers, extension agents, NGOs). For development to proceed, Woolcock and Narayan (2000) suggest there is a need, not only to mobilise bonding social capital, but also to develop new linkages, or bridging social capital, opening up new opportunities for individuals and communities. The dilemma is that the formation of this latter type of social capital may well undermine the former type over time, because group success both increases demands on existing social bonds and encourages individuals within the community to pursue a greater diversity of linkages and activities. Pretty (2003) and Pretty and Ward (2001) have documented the growth of social capital as evidenced by group activity in a wide range of natural resource management sectors, including watershed management, irrigation, micro-finance, forest management, integrated pest management, and farmer experimentation. The relationship between social capital and soil conservation is examined by Cramb (2004).

#### *Sources of Data*

The study in Barangay Ned was based on four main sources of data: (1) project reports and statistics; (2) interviews with project staff and other key informants; (3) two questionnaire surveys; and (4) nine case studies of community landcare groups (Cramb & Culasero, 2003).

The first survey was conducted in mid-2001. The questionnaire was administered by local, trained enumerators to a stratified random sample of 313 farmers from 18 *sitio* (sub-villages), representing approximately 11 per cent of the total number of farm-households in Ned. A follow-up survey was conducted in the third quarter of 2002, using the same sample as for the 2001 survey, though only 310 of the original 313 respondents could be contacted. As well as repeating questions about the extent of adoption, the second questionnaire included questions about landcare membership and farmers’ perceptions of changes in key aspects of their farming operations since the adoption of conservation measures.

Case studies of nine community landcare groups were undertaken. The groups were selected based on their relative accessibility and their reported level of activity. The case studies were based on focus group discussions and key informant interviews, conducted from August to October 2002. There were 21 participants in focus group discussions and 60 key informants, including 51 landcare members, 8 local government officials, and the Landcare Facilitator for Ned. A flexible schedule of open-ended questions was used to probe the informants about their perceptions of Landcare, the history of their group, the factors promoting and inhibiting participation in the group, the development and current status of group activities, the benefits or impacts of these activities, and the prospects for the future.

For the sake of brevity, only the first three sources of data are drawn upon directly in the following section. Nevertheless, the results of the case studies were broadly consistent with the findings from the project interviews and the household surveys, and help to inform the overall discussion below. A full report of the evaluation study can be found in Cramb & Culasero (2003).

## Results

### *The Context of Rural Livelihoods in Barangay Ned*

Barangay Ned, though part of Lake Sebu Municipality, is an atypical *barangay*, given its size and relative isolation from the municipal centre, and is on the way to becoming a municipality in its own right. It encompasses an area of over 41,000 ha, comprising the Ned Settlement Area (22,000 ha) and the Tasaday Reservation (19,000 ha) (a forest reserve created in 1972, ostensibly to protect a small ‘stone-age’ tribe). In 2000 it had a total population of nearly 15,000, grouped into 30 *sitio*. The population density in the settlement area averaged around 65 persons per sq. km, but was higher in the northern half of the area, which had primitive road access.

Barangay Ned was established in 1962, but poor accessibility and lack of security hindered development until the early 1980s. It was originally part of the T’boli homelands but various logging concessions were granted from the 1960s and, from the 1980s, Ilonggo and other settlers moved in an acquired logged-over and other land, leaving the T’boli in the minority. In the 1990s the Department of Agrarian Reform (DAR) allocated titles to 5,575 beneficiaries occupying 16,700 ha, or 75 per cent of the settlement area. DAR also took responsibility for coordinating rural development in Ned, and contracted SEARCA in 1992 to implement the Ned Agro-Industrial Development Project (NAIDP), which included a component promoting conservation farming. However, support for T’boli swidden farmers was limited, leaving many of them feeling alienated from the agrarian reform process.

The climate in Ned is characterised by abundant rainfall (averaging 2,200 mm) uniformly distributed throughout the year, high levels of humidity and cloudiness, and moderate temperatures (averaging 21°C) due to an average elevation of 900 m. Hence continuous cultivation is feasible and a wide range of crops suited to tropical and sub-tropical environments can be grown. The terrain is rolling to mountainous, with dominant slopes of 12-40 per cent. The soils are predominantly neutral to acidic sandy-loams with a clay B horizon, of low to moderate fertility, and highly susceptible to erosion. Permanent cropland accounts for about 14,000 ha (64 per cent of the settlement area), including maize (8,000 ha), upland rice (2,000 ha), and other crops (4,000 ha). Grassland accounts for about 2,750 ha (12 per cent), and forest land (mainly degraded forest with small pockets of primary forest) for perhaps 4,500 ha (20 per cent).

Sitio Kibang, site of the DAR office in the northern part of Barangay Ned, is located roughly 110 km from Koronadal, the capital of South Cotabato, and just over 60 km from Isulan in Sultan Kudarat, the nearest major market centre (Fig. 1). Access is via a former logging road, which becomes impassable after heavy rain. Large trucks, jeepneys, and motorcycles ply this route, but transportation is limited to motorcycles when road conditions deteriorate. Maize, the main commodity produced, is sold to the few private traders in Kibang or directly to Isulan, where prices are 30-40 per cent higher. Likewise, fertiliser, the main farm input used, is purchased from local traders or in Isulan, with a similar price differential. The margins largely reflect the high transport costs. There are six functioning cooperatives in the northern *sitio*, three of which deal with farm produce as well as consumables. Traders provide short-term seasonal credit for farm inputs, at interest rates of 5-25 per cent per month, as well as for consumption needs. Larger and longer-term capital requirements are often financed by mortgaging land.

Employment is largely confined to agriculture, whether on- or off-farm; there is little non-farm employment in the *barangay*. Farm size averages just over 3 ha. While most farmers have titles to their land (Certificates of Land Ownership Award or CLOA), issued by DAR in the 1990s, the tenure situation is complex and dynamic. Despite a ten-year restriction on the sale of CLOA, informal transactions have taken place and are accepted in the community. Some landowners have rented part or all of their land to tenants under a share-cropping arrangement. In other cases the land is mortgaged, with the mortgagee, the mortgagor, or a tenant farming the land. Hence a significant proportion of farmers are not owner-operators.

Though shifting cultivation of rice was once dominant, by the 1990s the farming systems of both indigenous and migrant farmers involved continuous cultivation of maize and (to a lesser degree) upland rice. Use of hybrid maize seed and inorganic fertiliser was increasing. The typical cropping pattern involves two croppings per year, with upland rice or maize cultivated in the first cropping and maize in the second. Maize is mainly cultivated for sale, while upland rice is mainly for home consumption, though maize was also consumed as a staple.

Neither maize nor upland rice cultivation involved the use of soil conservation measures until NAIDP's introduction of contour hedgerows or Sloping Agricultural Land Technology (SALT) in the mid-1990s, which over 100 farmers had at least partially adopted. An on-farm research project within NAIDP (funded by ACIAR) also contributed to awareness of improved practices for steeplands. This project worked with farmer-cooperators to test a range of potentially high-value field crops (e.g., garlic, ginger, and crucifers) and tree crops (e.g., coffee, mangosteen, durian, and rambutan), integrated into three conservation farming options. The Mindanao Baptist Rural Life Centre (MBRLC) established a presence in some of the more remote *sitio* and also promoted adoption of SALT.

The difficult marketing environment had limited agricultural diversification. Taro, peanuts, and beans were cultivated to a limited extent. Bananas were grown extensively, but only for the local market. Limited development of banded rice fields had occurred along stream margins. Tree crops such as coffee, cocoa, and fruit trees had been planted on a limited scale. Many households raised *carabao*, horses, and chickens, while pigs and goats were raised by a smaller number of households.

Barangay Ned thus provided a formidable challenge for the Landcare Program. On the one hand, the site imposed severe limitations. The rural landscape had undergone rapid transformation due to the combined effects of shifting cultivation, logging, and land clearance, exposing the soil to severe degradation. Increasing population density and isolation from markets dictated a farming system based on continuous cultivation of cereals, especially maize, which served as the only cash crop and increasingly as a substitute staple for rice. Farmers were poor, with little education, mostly lacking in experience of this upland environment, and not highly organised, relying on face-to-face contacts in small clan groupings and local neighbourhoods for support. Though aware of soil erosion, they lacked the knowledge and means to combat it. On the other hand, the site's considerable agricultural potential, the dynamism characteristic of a frontier settler society, and the relative lack of previous intervention by agencies providing agricultural research and extension, meant the Landcare Program could expect to generate a positive response among farmers.

### *The Ned Landcare Program*

The Landcare Program was well placed to build on the conservation farming component of the NAIDP and the on-farm research of the earlier ACIAR project. As the implementing agency for both projects, SEARCA could provide institutional continuity for the Landcare

Program, including first-hand awareness of the successes and failures of the previous efforts. Most important, the Landcare Facilitator had five years experience working for the ACIAR on-farm research project, developing and testing new farming practices with farmers and researchers. Thus the legacy of the two previous projects was that: (1) the Facilitator had considerable locally-validated technical expertise, as well as credibility in the farming community; (2) there was already a pool of farmers around Kibang who had adopted contour hedgerows, experimented with alternative annual and perennial crops, and learned the benefits of working and learning together in small groups; and (3) there was experience in working with part-time, paid farmer-trainers.

As part of the larger ACIAR Landcare Project, the Ned Landcare Program brought two new emphases – the promotion of natural vegetative strips (NVS) as a simpler, lower-cost alternative to legume hedgerows, and the formation of community landcare groups (as well as a Landcare Association and Landcare Advisory Group). Apart from the emphasis on groups, the Landcare Program was primarily a program of extension and training in technical aspects of farm development, including conservation measures and the establishment of new crops. Initially the Program emphasised the ‘high-value’ field crops that the earlier ACIAR project had tested, but as problems of pest management and marketing emerged, and as previously planted fruit trees began to bear, the emphasis shifted to perennials – first coffee, then increasingly durian and other fruit trees. Farmers’ interest in acquiring planting materials and technical knowledge for crop diversification was used as the ‘entry point’ to encourage both adoption of conservation measures and membership of landcare groups. This strategy was highly successful – many landcare groups were formed and most landcare members established contour barriers on their farms.

There was rapid formation of landcare groups over the first three years of the Landcare Program, but at a declining rate (Fig. 2). By 2002 there were 39 groups with 366 members, roughly 10 per cent of farm households in Ned. Whereas the Landcare Facilitator had initiated most of the groups formed in the first 12-18 months of the project, the appointment of part-time farmer-facilitators in mid-2000 meant that they took most responsibility for forming and supporting groups from that time, working as intermediaries between the Landcare Facilitator and the groups. Farmers also formed groups on their own, and in some cases helped neighbouring groups to get established. The growth in total landcare membership followed a similar path to the total number of groups, meaning there was no overall growth in the size of groups. Larger *sitio*-level groups tended to break up into smaller *purok*-level groups (a *purok* is a hamlet), reducing the costs to members of participation in meetings and group work, though some of these groups lacked leadership and lost momentum. Security problems in the south of the *barangay* disrupted some groups.

#### FIGURE 2 ABOUT HERE

There was a steady rate of adoption of contour barriers by landcare group members – about 50 ha a year. In most cases group activities (such as meetings and group work) declined once most members had been helped to implement contour barriers. The ongoing interest in fruit tree production was largely met through establishment of individual rather than group nurseries, though landcare membership provided access to group training events and assistance from facilitators. However, a few groups had developed sufficient momentum to move beyond the initial focus on conservation farming, developing their own projects to meet the needs of members, e.g., for cheaper farm inputs and medicines.

The training provided to landcare groups appeared to decline over time, which may have been one reason for the general decline in group activity. The training was mainly technical,



dealing with contour farming, vegetable production, and propagation and establishment of perennials, though there was an increase in the number of training events dealing with group organisation and facilitation.

The Ned Landcare Association (NLCA), formed in 1999, comprised the leader of each landcare group as well as the Landcare Facilitator and staff of DAR and MBRLC. It was an active association, no doubt helped by the involvement of the Facilitator. It met quarterly to exchange information, planned and organised *barangay*-wide landcare activities, and took initiatives on behalf of the landcare groups, securing grants and loans for nursery materials and seeds. A Landcare Advisory Group was established but probably added little to the informal linkages developed by the Landcare Facilitator.

Linkages with local government units (LGU) were relatively weak. Officers of the Barangay Council gave little attention to Landcare, though more recently there were moves by landcare leaders to get representation on the Council, and the Landcare Association had secured a grant from the Council. As Barangay Ned was remote from the municipal LGU, the mayor and other officials knew little about the Landcare Program. Other institutions provided minimal support, though the MBRLC collaborated closely with the Landcare Program.

### *Impacts of the Program*

Based on the household survey, over a third of farmers in Barangay Ned (38 per cent) had adopted conservation measures (vegetative barriers, physical barriers, and/or tree planting), affecting about 16 per cent of the total cultivated area (Table 1). As conservation measures were adopted preferentially on steeply sloping land, the impact of adoption on the catchment as a whole would have been greater than the figure of 16 per cent suggests. In most cases the adopted measures were considered effective in controlling erosion and had been maintained or expanded. Further expansion of vegetative or physical barriers on adopters' farms was slow, but expansion of tree planting, especially fruit trees, was underway. There was evidence that diffusion of conservation practices to additional farmers was still occurring.

### TABLE 1 ABOUT HERE

The primary reasons for adopting (or planning to adopt) conservation measures were to control erosion and restore soil fertility. Prospective adopters were also hoping to receive benefits from the Landcare Program, especially fruit tree seedlings. The main reasons given for not yet adopting were the lack of time or interest, the perceived difficulty of maintaining contour hedgerows, and lack of ownership rights to the land.

A statistical comparison between adopters and non-adopters suggested that age, education, gender, place of origin, farming experience in the region, availability of family labour for farm work, engagement in off-farm employment, and accessibility to the market centre and to extension personnel were not in themselves major factors in the adoption decision (Table 2). Non-adopters seemed as *aware of soil erosion* as adopters. Farmers with larger farms who owned part or all of their farms were significantly more likely to be adopters (Table 2), though the relationship between farm size, tenure and adoption was complex and dynamic. The main difference between adopters and non-adopters was that more of the former had acquired *knowledge of conservation measures*, mostly within the previous eight years (Table 3; Fig. 3). This had occurred primarily through practical, farmer-led training events arranged by SEARCA and other agencies (both before and during the Landcare Program), and secondarily through observation of neighbour's farms where conservation measures had been implemented (Table 4).

TABLE 2 ABOUT HERE

TABLE 3 ABOUT HERE

FIGURE 3 ABOUT HERE

TABLE 4 ABOUT HERE

Farmers' perceptions of trends within their farming operations gave some insight into the impact of adopting conservation measures. Adoption was associated with relatively favourable net trends in maize yield (though not necessarily in total maize output), soil loss, soil fertility, use of fertiliser, forage supply, and the planting of fruit trees. However, adoption was also associated with an increased workload for men and did not yet result in a clear trend in farm cash income.

The Landcare Program was widely known and about 25 per cent of the farmers surveyed were members of a landcare group. Landcare membership was positively associated with adoption (51 per cent of adopters were landcare members compared with only 8 per cent of non-adopters; Table 5). However, membership in itself was neither necessary nor sufficient to induce adoption of conservation practices – almost half the adopters were not landcare members and over 20 per cent of landcare members were not adopters. This suggests that extension and training, and observation of neighbouring farms, were more influential in encouraging farmers to adopt conservation measures than landcare membership per se. Landcare members were more likely to have participated in formal training and cross-farm visits, however in some cases this would have preceded rather than followed the formation or joining of a landcare group.

TABLE 5 ABOUT HERE

The main reasons given for joining a landcare group were economic – to learn about farm technologies and receive benefits such as tree seedlings. Secondary reasons were social in nature – to have a group of friends and attend meetings. Where problems were encountered they centred on misunderstandings, poor communication, lack of participation, and disunity within the group, all related to lack of leadership or regular contact with a facilitator. In some cases this had led to members dropping out or the group disbanding. Non-members generally felt they were too busy to join or that there was no point as they were not landowners.

## **Discussion**

In this section, the facts of the Landcare Program in Ned as summarised above are analysed and interpreted explicitly from a sustainable livelihoods perspective. At the outset the farming community in Ned was severely lacking in access to livelihood resources, including physical, financial, human, and social capital (especially bridging social capital), and as a consequence was rapidly depleting its natural capital. The dominant livelihood strategies from the early 1980s had been, first, migration into the Ned Settlement Area, followed by 'extensification' through land clearing, then intensification of the farming system, with very little opportunity for on- or off-farm diversification. For indigenous farmers, the opening up of their lands to logging and settlement had also necessitated a strategy of agricultural intensification. The main institution mediating access to resources had been DAR, allocating equal-sized lots to agrarian reform beneficiaries. However, informal land and capital markets developed, leading to a rapidly growing inequality in access to land. The result was differential livelihood

outcomes for different classes of farm household, especially owners and tenants. Though outcomes varied, for many households livelihood security was not assured and environmental sustainability was also under threat. Hence there was a ready interest in the Landcare Program's twin emphasis on soil conservation and developing new livelihood activities.

Building on previous project experience in Ned, the Landcare Program became an important new element in the farmers' institutional environment, particularly in the form of the resident Landcare Facilitator, whose commitment, skills, and local reputation were crucial to the Program's success. As described above, the Program targeted: (1) the training of farmers in soil conservation (especially NVS) and agroforestry, with a high degree of involvement of farmer-adopters in the training process; and (2) the formation of landcare groups, linked in a landcare association. In other words, the Program focused on building human capital (in the form of knowledge and skills to implement soil conservation measures and other farm improvements) and social capital (in the form of improved communication and cooperation through local landcare groups, linked in a *barangay*-wide landcare association). The Program provided little in the form of financial capital, though planting materials were an important input. In evaluating the Program it is important to assess the relative importance of these different forms of capital investment, and their interrelationships.

The evidence suggests that the enhancement of human capital was the key to the rapid adoption of soil conservation measures. While adoption was positively associated with farm size and ownership, the main distinguishing feature of adopters was their exposure to training. The practical, farmer-to-farmer nature of this training was the key to its effectiveness, combined with the relative simplicity and effectiveness of the contour farming technology promoted. While soil conservation was a primary focus of landcare training activities, farmers were at least as interested in accessing new livelihood opportunities, principally through planting fruit and timber species in their contoured farms. Linking adoption of conservation measures to these new opportunities was an effective strategy.

On the face of it, the building of social capital was of secondary importance. Though formation of landcare groups assisted members to learn about and implement conservation practices, many adopters were not landcare members and not all landcare members were adopters. Those farmers who joined landcare groups did so primarily to access training, technical advice, and assistance (e.g., with planting materials), that is, to augment their human and, to some degree, their financial capital. While a few landcare groups developed a dynamism of their own, identifying new needs and organising activities to meet those needs, most groups became less active once members had been assisted to contour their farms. Some groups disbanded because of internal conflicts or external changes. The personal qualities of the group leader were a key factor in maintaining and expanding the group's activities, along with the degree of contact and support from landcare facilitators (including farmer-facilitators).

Nevertheless, some members of apparently defunct groups suggested that because group members were close neighbours or kin, they could readily re-activate the group if there was a perceived need, suggesting that their social capital had not been eroded and, in fact, existed independently of the formation or demise of their landcare group. Moreover, the Landcare Association, working on behalf of the local groups and in conjunction with the Landcare Facilitator, was influential in organising training and accessing outside resources, e.g., from local and provincial government, as well as bringing together and supporting local group leaders who would otherwise have been very isolated (in particular, farm leaders from remote T'boli settlements).

The key to understanding these developments lies in the distinction between bonding and bridging social capital, mentioned above. Typically, there was already a high level of bonding social capital in the local communities where landcare groups were formed – hence the ease of group formation. Forming a landcare group was a reflection of this initial stock of social capital rather than a means of generating greater local-level integration. For example, implementing contour barriers through small work groups was a natural extension of the system of labour exchange already in place in both indigenous and immigrant communities. The persistence of a group both reflected and reinforced the degree of trust and cooperation inhering in these pre-existing social bonds.

However, forming or joining a landcare group also meant linking to a much wider network than provided by the local community. Hence it can be viewed primarily as an investment in bridging social capital. The bridges included horizontal linkages with progressive farmers in other localities through the municipal-wide landcare association, as well as vertical linkages with SEARCA and other outside agencies. (Some writers now make a conceptual distinction between such horizontal extra-community ties, which they term ‘bridging social capital’, and vertical ties, termed ‘linking social capital’.) This dimension of landcare clearly augmented the stock of social capital in ways that provided significant benefits, both to members and non-members of community landcare groups (note that many farmers learned the new conservation practices directly from their neighbours). Hence the decline of local group activity often merely reflected a declining immediate need for that kind of activity (contouring, nursery establishment) but not a declining interest in the bridging social capital provided by the landcare network.

In some respects, the development of this bridging social capital actually undermined the bonding social capital encapsulated in the local groups, as predicted by Woolcock (1998). In particular, as members gained knowledge and experience in nursery management through the communal landcare nurseries, some preferred to develop private nurseries and pursue commercial outlets for their planting materials (a phenomenon that had occurred earlier in the landcare sites at Claveria and Lantapan). However, such individuals still valued the links to the Landcare Facilitator and the Association.

On-going investment to maintain and expand the stock of bridging social capital was clearly needed. In particular, the support of local government units (LGUs) at the *barangay* and municipal levels that was evident in the Claveria Landcare Program was not found to the same degree in Ned. This did not appear to have hindered landcare activities in the short term and may in fact have encouraged the Association leaders to organise, including the mobilisation of political support. However, the presence of a strong facilitating institution (SEARCA) had been essential, offsetting the immediate need for partnership with LGUs. In the longer term, stronger links with an array of government and non-government agencies would be needed to sustain the Landcare Program in Ned.

It can be concluded that the Landcare Program had made a significant investment in livelihood resources, notably human and social capital, with the investment in social capital providing the necessary linkages for the adaptive research and farmer-to-farmer training activities that led to the growth of human capital. However, the outcomes of the Landcare Program for both livelihood security and environmental sustainability were not as easy to establish. There was clear evidence that adoption of the recommended conservation practices had a significant impact on reducing soil erosion, hence on maintaining farmers’ natural capital. The catchment-wide impacts remain to be investigated. Although these wider impacts are likely to have been positive, with only 16 per cent of the total cultivated area under conservation measures the total impact is unclear. The impact on farm incomes was not

obvious in the short term and was likely to be primarily a function of the changed cropping practices implemented on the contoured farms, that is, the diversification of livelihood activities. Farm budgets suggest that the expansion of tree crops will ultimately lead to a quantum jump in farm incomes, relative to merely maintaining maize yields. The full realisation of these livelihood benefits will depend to a large degree on continuing investment in physical capital in the form of improved transport infrastructure, something that is beyond the scope of the Landcare Program.

## **Conclusion**

The study found that the Landcare Program in Barangay Ned has been associated with rapid adoption of simple conservation farming practices, especially natural vegetative strips, and the rapid formation of local landcare groups and a *barangay*-wide landcare association. Such rapid adoption has not often been observed in the Philippine uplands. Using a sustainable rural livelihoods framework for the evaluation study helped to place these phenomena within the context of the agro-ecological and institutional changes that had been taking place in the preceding two decades, and the evolving livelihood strategies of rural households in Ned, particularly their interest in on-farm diversification to augment their meagre cash incomes. The most important effect of the Landcare Program was to enhance the human capital of the farming population through practical, farmer-led training and extension, enabling farmers to incorporate soil conservation and agroforestry technologies in their farming systems, with desirable outcomes both for livelihood security and environmental sustainability. The social capital formed through the Program, particularly the bridging social capital in the form of the Ned Landcare Association and its networks, was crucial to the growth in human capital. Nevertheless, on-going investment was required to maintain and expand the stock of social capital for the longer term success of the program, including its capacity to be scaled up to embrace other localities.

The larger message from the study is that the promotion of conservation farming systems in fragile and impoverished upland environments requires an approach that embraces sustainable rural livelihoods, both for farm households and local communities, rather than narrowly focusing on the transfer of technology or the imposition of environmental regulations. While the availability of simple, well-adapted conservation practices is a key starting point, program interventions such as the Landcare Program that invest in human and social capital – thus building the capacity of farmers and farming communities to identify and pursue sustainable livelihood strategies – are essential to achieving the twin goals of rural development and environmental conservation. However, such farmer-led approaches still require ongoing partnerships with adequately resourced facilitating agencies, whether local government units or non-government organisations, or (preferably) both.

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Table 1 – Extent of adoption of conservation measures in Barangay Ned, 2002

Conservation measure(s) adopted	Vegetative barriers (VB)	Physical barriers (PB)	VB and/or PB	Tree planting (TP)	VB, PB and/or TP
No. of adopters	84	29	99	32	119
% of total farmers in sample	27.1	9.4	31.9	10.3	38.4
Average farm size of adopters (ha)	3.8	3.8	3.8	3.6	3.8
Area of adopted measure – mean (ha)	1.3	1.0	1.4	0.8	1.4
Area of adopted measure – range (ha)	0.25-5.0	0.1-3.0	0.25-5.0	0.25-3.0	0.25-8.0
Area of adopted measure as % of adopters' farms	34.8	26.7	36.6	22.9	36.8
Area of adopted measure as % of total farm area in sample	10.5	2.8	13.3	2.5	15.8

Table 2 – Characteristics of farm households in Barangay Ned, by adoption category, 2001

Characteristic	Adopters (n=106)	Non-adopters (n=207)	Total (n=313)
Mean age of household head (years)	42.5	38.9	40.1
Mean education of household head (years)	6.9	6.0	6.3
Mean residence of household head (years)	13.9	12.5	13.0
Indigenous to area (T'boli) (%)	15.1	18.8	17.6
Female-headed households (%)	1.9	1.9	1.9
Occupation of household head			
– on-farm work only (%)	77.4	75.4	76.0
– off-farm work only (%)	0.0	1.0	0.6
– both on- and off-farm work (%)	22.6	22.2	22.4
Mean no. of household members	5.5	5.2	5.3
Mean no. of farm workers	2.6	2.5	2.6
Mean area of farm (ha)*	3.5	3.0	3.2
Tenure status*			
– owner-operator (%)	61.3	48.3	52.7
– non-owner (%)	16.0	34.8	28.4
– mixed tenure (%)	22.6	16.9	18.9

\* Indicates means or proportions for adopters and non-adopters were significantly different at the 5% level.



Table 3 – Knowledge of conservation measures reported by farmers in Barangay Ned, by adoption category, 2001

Conservation Measures	Adopters (n=106)		Non-adopters (n=207)		Total (n=313)	
	No.	%	No.	%	No.	%
Hedgerows*	71	67.0	49	23.7	120	38.3
Natural vegetative strips*	30	28.3	15	7.3	45	14.4
Contour ploughing*	11	10.4	9	4.4	20	6.4
Bench terraces*	9	8.5	1	0.5	10	3.2
Contour bunds*	12	11.3	3	1.5	15	4.8
Contour fencing	4	3.8	2	1.0	6	1.9
Contour composting	3	2.8	2	1.0	5	1.6
Drainage canals	2	1.9	2	1.0	4	1.3
Soil traps	3	2.8	0	0.0	3	1.0
Minimum tillage	2	1.9	0	0.0	2	0.6
Rockwalls	1	0.9	0	0.0	1	0.3
Contour canals	0	0.0	0	0.0	0	0.0
Other field measures	3	2.8	0	0.0	3	1.0
Planting trees*	33	31.1	18	8.7	51	16.3
Any measure*	105	99.1	75	36.2	180	57.5

\* Indicates proportions for adopters and non-adopters were significantly different at the 5% level.

Table 4 – Source of knowledge about conservation measures reported by farmers in Barangay Ned, by adoption category, 2001

Source of knowledge about conservation measures	Adopters (n=106)		Non-adopters (n=207)		Total (n=313)	
	No.	%	No.	%	No.	%
Seminar/training	56	52.8	30	14.5	86	27.5
Observation of other farms	43	40.6	36	17.4	79	25.2
Parents	10	9.4	10	4.8	20	6.4
Farm leader	8	7.6	5	2.4	13	4.2
Organised cross-farm visit	10	9.4	1	0.5	11	3.5
Another farmer's advice	2	1.9	5	2.4	7	2.2
Demonstration plot	2	1.9	2	1.0	4	1.3
Other	9	8.5	5	2.4	14	4.5

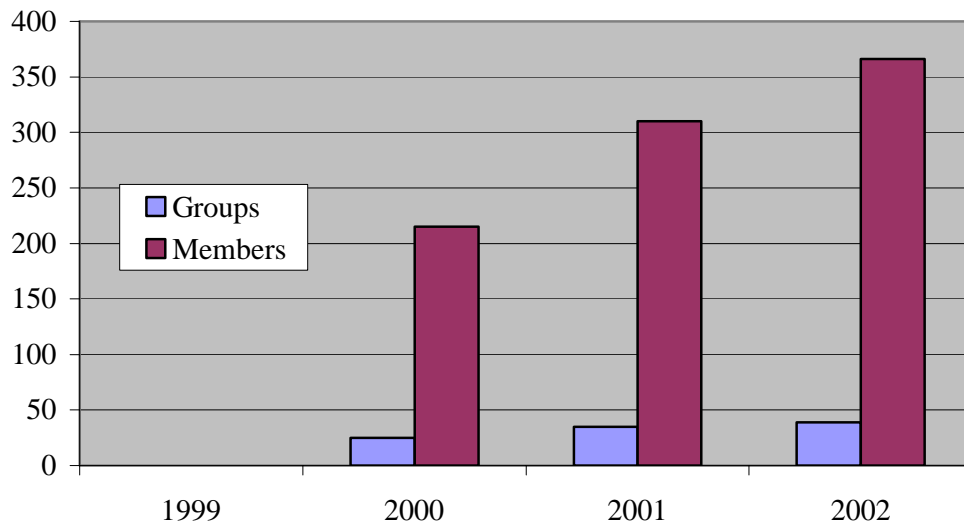
Table 5 – Landcare membership status, by adoption category, 2002

Landcare membership status	Adopters		Non-adopters		Total	
	No.	%	No.	%	No.	%
Current member*	61	51.3	16	8.4	77	24.8
Former member	15	12.6	20	10.5	35	11.3
Current or former member*	76	63.9	36	18.9	112	36.1
Never a member	38	31.9	107	56.0	145	46.8
No answer	5	4.2	48	25.1	53	17.1
Total	119	100.0	191	100.0	310	100.0

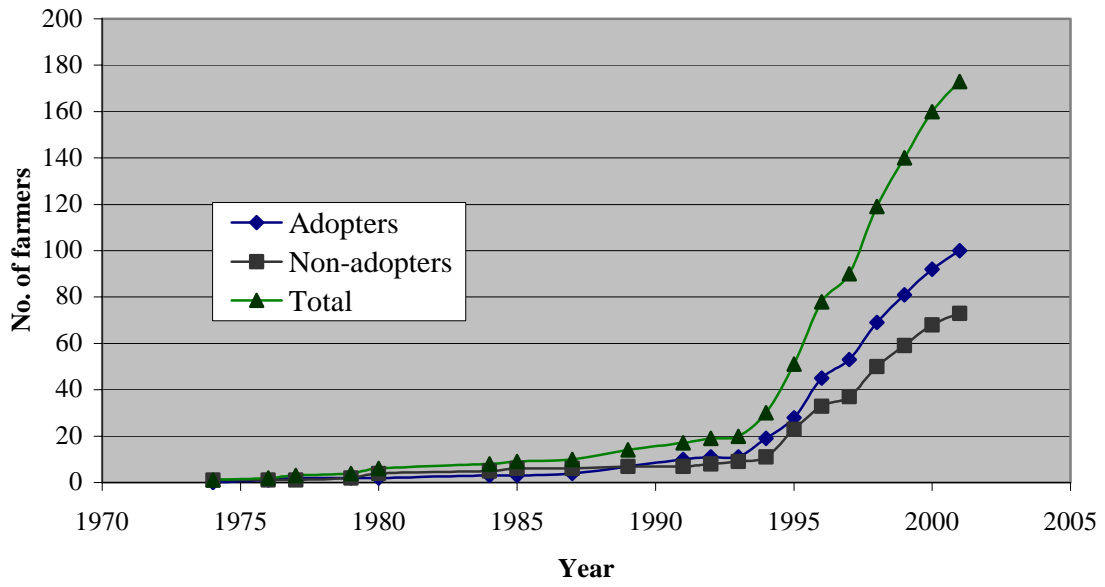
\* Indicates proportions for adopters and non-adopters were significantly different at the 5% level.



Figure 1 Location of principal landcare sites in Mindanao, Southern Philippines



**Figure 2** No. of Landcare Groups and Members in Ned



**Figure 3** Growth in knowledge of soil conservation measures among survey farmers in Barangay Ned to 2001