THE ROLE OF SOCIAL CAPITAL IN THE PROMOTION OF CONSERVATION FARMING: THE CASE OF LANDCARE IN THE SOUTHERN PHILIPPINES

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Abstract
"Social capital" refers to the relationships of trust, communication, and cooperation that facilitate collective action in a community. It is particularly relevant to soil conservation in developing countries, which requires collective efforts to raise awareness of soil degradation, provide effective training in soil conservation practices, and implement soil conservation measures on individual farms. The Landcare Program in the Southern Philippines promotes simple conservation practices in upland environments through establishing and supporting community landcare groups and municipal landcare associations, thus augmenting the social capital of farmers in these locations. An evaluation of the Landcare Program in Barangay Ned, South Cotabato, based on a survey of 313 farm-households and case studies of 9 landcare groups, shows that, despite extreme isolation and difficult working conditions, farmers responded by rapidly forming landcare groups and a landcare association, and adopting contour barriers on their maize farms. They utilised the bonding social capital inhering in their local communities to build stocks of bridging social capital, linking them to information, training and resources from outside their immediate locality. A logistic regression model of the factors affecting adoption of contour barriers shows that farmers who had undergone the practical, farmer-based training provided by the Landcare Program, and who were members of a landcare group, were significantly more likely to adopt conservation measures. These results confirm the value of investing in social capital to promote soil conservation.

Additional Keywords: soil conservation

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 (Garrity et al. 1993; Cramb 1998; Coxhead and Buenavista 2001). 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). Such measures do not "diffuse" through a population in the manner of classic innovations such as hybrid maize (Rogers 1995; Cramb 2000). Examination of the few successful examples of widespread and sustained adoption in the Philippines (Granert 1990; Fujisaka 1993; Stark, 2000; Cramb et al. 2000; Mercado et al. 2001; Garcia et al. 2002; Cramb and Culasero 2004) suggests that collective action at the community level is needed to:

- raise awareness of soil degradation and conservation within a farming community (including the development or reinforcement of conservation norms);
- develop and test locally adapted soil conservation measures;
- provide effective farmer-led, group-based training in soil conservation practices;
- implement soil conservation measures on individual farms (e.g., small labour-exchange groups to mark out contours and plant hedgerows on individual farms, group nurseries to raise hedgerow species and fruit and timber trees);
- disseminate measures within and beyond the community (e.g., cross-farm visits, farmer-field schools, farmer training groups, extension networks);
- maintain links to government and non-government technical agencies.

These collective activities reflect investment in what has come to be called "social capital" (Glaeser et al. 2002; Bowles and Gintis 2002; Cramb 2004). This cross-disciplinary concept focuses attention on the role of community norms, networks, trust, reciprocity, and collective action in a wide range of fields, including economic development (Woolcock and Narayan 2000) and environmental management (Pretty and Ward 2001; Pretty 2003). Social capital can be broadly defined as "the information, trust and norms of reciprocity inhering in one's social networks" (Woolcock 1998, p. 153). Social capital enables participants in such networks "to act together more effectively to pursue shared objectives" (Putnam 1996, p. 3). Woolcock and Naryan (2000) distinguish between "bonding" and "bridging" social capital. The first category refers to 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). The second category refers to 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). Different combinations of these dimensions of social capital can help explain a range of development and resource management outcomes.

In this paper, the relevance of social capital to the adoption of soil conservation measures by upland farmers in the Philippines is explored, using the case of the Landcare Program in the Southern Philippines. Landcare emerged in the mid-1980s in Australia (Campbell 1994; Lockie and Vanclay 1997; Cary and Webb 2000) and in the late-1990s in the Philippines (Mercado et al., 2001; Arcenas 2002; Sabio 2002; Cramb and Culasero 2004) 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. 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. The central research question addressed in this paper is whether investment in landcare groups and their activities can accelerate the rate of adoption of appropriate soil conservation measures by upland farmers in the Philippines.

Background and Sources of Data

The paper draws on a participatory evaluation of the Landcare Program in Mindanao (Cramb and Culasero 2003). 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 evaluation study in Barangay Ned drew on four sources of data: (1) project reports and statistics; (2) interviews with project staff and other key informants; (3) nine case studies of community landcare groups; and (4) a two-stage questionnaire survey (Cramb & Culasero, 2003). The survey was conducted in mid-2001 and mid-2002. The questionnaire was administered by local, trained enumerators to a stratified random sample of 313 farmers from 18 *sitio* (villages), representing about 11 per cent of the total number of farm-households in Ned.

Barangay Ned encompasses an area of over 41,000 ha, comprising the Ned Settlement Area (22,000 ha) and a forest reservation (19,000 ha). In 2000 it had a total population of nearly 15,000, grouped into 30 *sitio*, hence it is on the verge of being declared a separate municipality. 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, when settlers began to arrive from the lowlands. In the 1990s the Department of Agrarian Reform (DAR) allocated titles to 5,575 beneficiaries occupying 16,700 ha, or 75% of the settlement area. DAR also took responsibility for coordinating rural development in Ned, and contracted the South-East Asian Regional Centre for Agriculture (SEARCA) in 1992 to implement the Ned Agro-Industrial Development Project (NAIDP), which included a component promoting conservation farming.

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^{o}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 (though transport and market conditions limit actual production to mainly cereal crops). The terrain is rolling to mountainous, with dominant slopes of 12-40%. 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% 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%), and forest land (mainly degraded forest with small pockets of primary forest) for perhaps 4,500 ha (20%).

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, the nearest major market centre. Access is via a former logging road, which becomes impassable after heavy rain, severely restricting the market potential. Maize, the main commodity produced, is sold to the few private traders in Kibang or directly to Isulan, where prices are 30-40% 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. Traders provide short-term seasonal credit for farm inputs, at interest rates of 5-25% 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 available. 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 indigenous farmers once practised shifting cultivation of upland rice, the farming systems of both indigenous and migrant farmers now involve continuous cultivation of maize and (to a lesser degree) rice. Use of hybrid maize seed and inorganic fertiliser is increasing. The typical cropping pattern involves two crops per year, with upland rice or maize cultivated in the first season and maize in the second. Maize is mainly cultivated for sale, while upland rice is mainly for home consumption, though maize is 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.

Analysis and Discussion

Assessment of the Landcare Program

The Ned Landcare Program, commencing in 1999, was well placed to build on the conservation farming component of the NAIDP and the on-farm research of an earlier ACIAR-funded 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: (1) the promotion of natural vegetative strips (NVS), a simpler, lower-cost alternative to legume hedgerows developed by farmers in Northern Mindanao (Fujisaka 1993; Nelson and Cramb 1998; Mercado et al. 2001), and (2) the formation of community landcare groups, linked in a barangay-wide Landcare Association. 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, especially perennials such as coffee, 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.

There was rapid formation of landcare groups over the first three years of the Program. By 2002 there were 39 groups with 366 members, roughly 13 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 initiative, 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.

The landcare groups primarily helped members to establish contour barriers, implementing these measures on 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 Ned Landcare Association (NLCA), formed in 1999, comprised the leader of each landcare group as well as the Landcare Facilitator and staff of other agencies. 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. In terms of social capital theory, the landcare groups built on the high level of bonding social capital that already existed at the *sitio* level, while the landcare association forged new linkages, or bridging social capital, enabling farmers to tap into new sources of information and practical support.

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), nearly four times the number of landcare members, indicating a "spillover" effect of the Landcare Program. The conservation measures affected about 16 per cent of the total cultivated area. However, as they 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. The primary reasons given 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.

Influence of Landcare on Adoption

The preceding discussion shows that the Landcare Program was associated with both rapid formation of landcare groups and rapid adoption of conservation farming, in particular, contour barriers. The question of ultimate interest here is whether investment in social capital in the form of landcare groups was a major cause of accelerated adoption. This requires a multivariate analysis to allow for the many other factors affecting adoption (Cramb 2000; Arecenas 2002). Adoption was analysed as a binary rather than a continuous variable as most adopters implemented contour barriers on about a third of their farms. Hence a logistic regression model was used to assess the impact of landcare membership and a range of other factors on the likelihood of adoption. It was hypothesised that adoption would:

- be higher among members of a landcare group;
- increase with the age of the household head;
- increase with years of formal education;
- be higher among male-headed households;
- increase with years of residence in the area;
- be lower among those who had an additional, off-farm occupation;
- be higher for land owners than tenants;
- increase with farm size;
- increase with the availability of family labour;
- be higher among farmers who ranked soil erosion first in their list of farm problems;
- be higher among farmers who had undergone formal training in contour farming methods;
- be influenced by the geographic zone in which the household resided.

The independent variables were measured as follows. Dummy variables were used to indicate landcare membership (1=yes), the gender of the household head (1=male), engagement in off-farm work (1=yes), land ownership (1=full or part owner), soil erosion ranked highly (1=yes), and training in contour farming (1=yes). Age, education, and period of residence were measured in years. Farm size was measured in hectares. Labour availability was measured as the number of family workers per hectare. Three dummies were specified to capture four geographic zones in the barangay, with Zone 1 the closest to the barangay centre (where the Landcare Program was based) and Zone 4 the most remote.

The results of the regression analysis are presented in Table 1. The estimated equation was significant at the 1% level and provided an acceptable fit of the data. The significant variables were landcare membership, age, education, land ownership, training, and geographical zone. The most influential variable was training, which increased the odds of adoption by a factor of 7, reflecting the effectiveness of the practical, farmer-based, group training conducted by the landcare facilitators and other agencies. Landcare membership increased the odds of adoption by a factor of 3. Landcare groups built on the knowledge and skills acquired in formal training events to help members implement the contour farming measures on each other's farm. Older, more experienced, and better educated farmers were more likely to adopt, suggesting that at least a basic education is needed to understand the principles of conservation technologies. The odds of adoption were twice as high for landowners, security of tenure being widely recognised as a prerequisite for investment in farm improvements. Adoption also varied by geographic zone, the odds of adoption being twice as high in Zones 2 and 3, the intermediate zones, than in either the most or least accessible zones. Farmers in Zone 1, though close to the headquarters of the Landcare Program, had a wider range of livelihood options, hence soil conservation may not have ranked as highly. Farmers in Zone 4 were very remote, hence could not be followed up as easily, and were subject to periodic security problems, at times requiring evacuation.

Table 1. Logistic regression of adoption of contour barriers on characteristics of household head, Barangay Ned, South Cotabato (n=313)

Variable	Coefficient	St. error	Odds ratio
Constant	– 6.025***	2.148	0.002
Landcare member	1.082***	0.363	2.952
Age	0.041***	0.013	1.042
Education	0.132***	0.055	1.141
Gender	0.737	1.121	2.091
Years resident	0.015	0.027	1.015
Off-farm work	– 0.261	0.384	0.771
Land owner	0.711*	0.393	2.035
Farm size	0.007	0.077	1.007
Workers per ha	– 0.048	0.100	0.953
Erosion problem	0.079	0.327	1.082
Conservation training	1.948***	0.328	7.014
Zone 1	0.138	0.445	1.147
Zone 2	0.817*	0.445	2.263
Zone 3	0.883**	0.430	2.418
Model chi-squared		94.385***	
Nagelkerke R^2		0.374	
H-L chi-squared		3.625	
% correct		75.8	

* significant at 0.10 level; ** significant at 0.05 level; *** significant at 0.01 level

Conclusions

In the past, soil conservation in upland farming systems in developing countries has been seen as primarily a matter of investing in physical capital on a large scale (Blaikie 1986). New-style conservation measures such as contour hedgerows or natural vegetative strips are designed to permit small-scale adoption by individual landholders without major outside investment or coordination. However, achieving accelerated adoption requires collective action on various fronts, involving investment in social capital. This study has shown that the major factors influencing adoption of contour barriers in Barangay Ned were participation in farmer-based, group training events and membership in landcare groups. These two factors were complementary. Farmers drew on their stocks of bonding social capital to form local landcare groups, primarily in order to invest in the bridging social capital provided by the Landcare Association and the landcare facilitators. This gave them improved access to the information and training they needed to address their soil erosion problems and develop new livelihood activities based on agroforestry. While adoption was by no means confined to landcare members, it was the investment in social capital facilitated by the Landcare Program, particularly farmer-to-farmer training, that led to an accelerated rate of adoption in the region as a whole. These results help confirm Pretty's (2003) finding that investing in social capital is a prerequisite to achieving better outcomes in natural resource management.

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