Social capital and soil conservation: evidence from the Philippines

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Abstract

The formation of social capital is hypothesised to enhance collective efforts for soil conservation. The Landcare Program in the Southern Philippines promotes simple conservation practices in upland environments by supporting community landcare groups and municipal landcare associations, thus augmenting social capital. A study was conducted in 2002 to evaluate the Landcare Program, using a mix of quantitative and qualitative techniques. In this paper the relationship between social capital formation and adoption of soil conservation is investigated. It is concluded that, although membership in a local landcare group was not a major factor in adoption, the Landcare Program as a whole created a valuable stock of bridging social capital, with significant benefits for long-term natural resource management.

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1. Introduction

Given economists' preoccupation with individuals, markets, and states, the role of communities has long been "the submerged component of economic theorizing" (Rohrlich 1984), the preserve of fringe dwellers such as social economists and institutionalists. In particular, despite the obvious importance of local communities to rural development and natural resource management, agricultural and resource economists have given little attention to their functioning and performance, with important exceptions (e.g., Runge 1986; Hayami 1998; Duncan 2003). The recent emergence of the concept of "social capital" has generated a new, cross-disciplinary interest in 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), thus providing an opportunity to infuse agricultural and resource economics with insights on community life and governance from the broader social sciences.

In this paper, the theory of social capital is introduced and its relevance to the issue of soil conservation in developing countries explored, using data from the southern Philippines. The paper arises from reflections on an evaluation of the Landcare Program at three sites in Mindanao (Fig. 1), undertaken in 2002-3 as part of a project funded by the Australian Centre for International Agricultural Research (ACIAR). The paper begins with a brief review of social capital, drawing on economic and sociological literature. This is followed by a consideration of the requirement for collective action in the pursuit of soil conservation, particularly in developing countries such as the Philippines, and of the emergence of the landcare approach as a means of building social capital to this end. Results from the evaluation of the Landcare Program in Lantapan Municipality are then used to examine the relationship between the adoption of conservation practices and the formation and development of landcare groups and networks, that is, the growth of social capital.

2. Social capital

The concept of capital has been broadened considerably in recent years, giving rise to the "plethora of capitals" deplored by Baran and Hannan (1994, p. 1122). The literature on sustainable rural livelihoods distinguishes five forms of capital – natural, physical, financial, human, and social (Scoones 1998; Ellis 2000). In simple terms, natural capital is what you find, physical capital is what you make, financial capital is what you save, human capital is what you know, and social capital is whom you know. Two distinguishing features of all these forms of capital are: (1) maintaining and building capital entails sacrifice (i.e., foregone consumption), and (2) capital can enhance the productivity of other factors of production, thereby generating a return to the sacrifice incurred (Bannock et al. 1972, p. 56). These features can justify the extension of the concept to phenomena that are traditionally outside the bounds of economics. Nevertheless, it is important to recognise differences as well as similarities between forms of capital. For example, stocks of physical capital depreciate with both use and time, stocks of natural capital typically depreciate with use but can appreciate with time due to natural processes of growth and regeneration (Gaffney 1965), while stocks of

human and social capital typically appreciate with use and have complex relationships with time (Woolcock 1998; Glaeser et al. 2002).[1] Further, arguing that various natural, human and social phenomena have an economic dimension that can be usefully analysed as "capital" is not to suggest they can be reduced to merely economic categories. These phenomena have intrinsic value as well as instrumental value – natural landscapes, good health, education, friendships, and community life are all valued for their own sake, above and beyond their importance for economic production (Sagoff 1988; Dreze and Sen 1995, p. 43; Woolcock 1998).

Social capital, meaning broadly "the information, trust and norms of reciprocity inhering in one's social networks" (Woolcock 1998, p. 153), is the most recent form of capital to attract attention, though the concept has surfaced at various times in the social science literature. According to Woolcock and Narayan (2000), the term dates back to Lyda J. Hanifan (1916), an educational administrator in the US, who described it as "those tangible substances [that] count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit" (p. 130). Hanifan emphasised the role of community participation in enhancing school performance, arguing that "if [an individual comes] into contact with his neighbour, and they with other neighbours, there will be an accumulation of social capital, which may immediately satisfy his social needs and which may bear a social potentiality sufficient to the substantial improvement of living conditions in the whole community" (p. 130). The concept was reinvented by various writers from the 1950s onwards,[2] but received its greatest impetus from the seminal work of Coleman (1988) on education and Putnam (1993, 1996) on civic participation and governance. Coleman (1988) describes social capital as, not a single entity, but a variety of resources available to an actor, with two elements in common: "they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure" (p. S98). He continues: "Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible…. Unlike other forms of capital, social capital inheres in the structure of relations between actors and among actors. It is not lodged either in the actors themselves or in the physical implements of production" (p. S98). For Putnam (1996), social capital refers to "features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives" (p. 3). A wealth of empirical studies has ensued, which Woolcock (1998) groups into nine primary fields: families and youth behaviour; schooling and education; community life; work and organisations; democracy and governance; collective action; public health and environment; crime and violence; and economic development. In recognition of its importance to development in particular, the World Bank, in collaboration with Michigan State University, supports a website on social capital (www.worldbank.org/poverty/scapital/).[3]

Woolcock and Narayan (2000) review the implications of social capital for development. They prefer to define social capital succinctly as "the norms and networks that enable people to act collectively" (Woolcock and Narayan 2000, p. 226). This definition emphasises the sources rather than the consequences of social capital (while recognising that certain

[1] The mobility of capital also varies within and between the five types, with human capital, for example, being typically highly mobile, while various authors have emphasised the essential immobility or community-specificity of social capital (Woolcock 1998; Glaeser et al. 2002; Bowles and Gintis 2002).

[2] The closely related concept of "institutional capital" was used by Cramb (1987, p. 367) and Cramb and Wills (1990, p. 350) to explain the success of a community-based land tenure system in Malaysian Borneo, illustrating Woolcock's (1998) point that the concept of social capital captures ideas that are not new in the social sciences.

[3] The Productivity Commission (2003) has recently issued a research paper reviewing the concept and its implications for micro-economic policy in Australia.

dimensions of social capital such as trust and reciprocity are developed iteratively). Emphasising sources leaves open the possibility that the resultant collective action may be beneficial or harmful to the group or wider society. For example, compare the impact on welfare of a group of poor women accessing micro-finance from the Grameen Bank in Bangladesh with that of a drug cartel in Colombia or an al-Qaeda cell. The definition also focuses on the community as the primary unit of analysis, in line with much of the literature, while recognising, on the one hand, that individuals and households can invest in and appropriate the benefits of social capital and, on the other, that a community's ability to develop and utilise social capital also depends on its relationship with the state. For example, compare the impact on community life and action of a weak, corrupt, or hostile government and one that respects civil liberties and encourages civic participation.

Economists, imbued with methodological individualism, prefer to emphasise individual decisions about social capital. For example, Glaeser et al. (2002) develop an investment model in which the individual's stock of social capital (and the flow of investment in social capital formation) is a function of his or her age, discount rate, expected mobility, opportunity cost of time, and occupational returns to social skills, as well as the aggregate stock of social capital in the specific community and the rate of social capital depreciation (including that due to relocation). They compare the predictions of the model with available evidence, using data from the General Social Survey, a repeated cross-sectional survey in the US. To measure individual social capital they use membership of organisations rather than subjective measures of trust, arguing that the latter do not necessarily reflect trusting behaviour in practice, while the membership measure is reasonably well correlated with other measures of community-mindedness, such as working to solve a local problem, forming a new group to solve a local problem, or contacting local government regarding a local problem. Their results indicate that social capital (1) first rises then falls with age, (2) declines with expected mobility, (3) rises in occupations with greater returns to social skills, (4) is higher among homeowners, (5) falls sharply with physical distance, and (6) is correlated with investment in human capital. However, their prediction that social capital investment falls with the value of time is not supported by the available data. Moreover, while their model allows for group-level effects on individual investment decisions, they find no robust evidence for such effects. Their overall conclusion is that "individual incentives, not group membership, drive social capital accumulation decisions" (Glaeser et al. 2002, p. F456).

While providing useful insights, the individual investment model runs in to grave difficulties in the aggregation process, which is extremely complex due to the pervasive interpersonal externalities generated by social capital (Glaeser et al. 2002). If social capital is thought of as an individual's social status, then investment in social capital will generate negative externalities to the extent that one person's enhanced social status is at the expense of another's. If social capital is thought of as networks (the more common view in the literature), then individual investment is likely to provide positive externalities for group members, in that a decision to participate in a group will enlarge the network and enhance the benefits to other group members. Hence aggregate social capital will be more than the sum of the social capital of the constituent individuals. However, there may well be size effects such that beyond a certain group size an additional member may actually diminish the value of the network to existing members, because of the increased difficulty of maintaining trust and reciprocity among a larger number of members (e.g., villages which grow too big to rely on regular face-to-face contact to monitor the use of a common property resource). To add to the complexity, while investment in social capital can result in positive externalities among group members, the impact on the social capital of non-members can be either positive (e.g., a farmer group that organises a field day for other farmers in the area) or negative (e.g., Queensland's infamous Mounted Native Police, a small solidary group of aboriginal troopers under European command whose task was to "disperse" aboriginal communities in areas being settled by European graziers).

Because of the externalities involved, individual investment in social capital is also highly contingent on others' investment (or disinvestment) decisions, suggesting multiple equilibria, strategic behaviour, and path dependency (Glaeser et al. 2002; Bowles and Gintis 2002). Individual investment in a situation of low aggregate investment can lead to a low social capital equilibrium point, while individual investment in a situation of high aggregate investment can lead to a high level of social capital over time (Glaeser et al. 2002). Conversely, though social capital is more easily destroyed than it is created (Woolcock 1998), individual acts that tend to undermine trust and cooperation (e.g., absenteeism, shirking, theft) may have a greater effect when a community's social capital is low than when it is high (Bowles and Gintis 2002). Game theory and experimental economics have been used to shed light on these phenomena. For example, Runge (1986), analysing common property institutions in a village economy, describes how a norm of cooperation (or "principle of reciprocity") can emerge in repeated plays of the Multiperson Prisoners' Dilemma, thus potentially overcoming the free rider problem. He articulates an alternative model, the Assurance Problem, in which a cooperative outcome is again possible, though not guaranteed. "An inferior outcome is no longer inevitable; if everyone is assured that a critical mass of others will obey a common property agreement, then it is in their individual interest to do likewise, since this outcome is preferred" (Runge 1986, p. 630). Bowles and Gintis (2002) cite experimental evidence from repeated plays of the Public Goods game that undermines the conventional self-interest assumption. They find a considerable fraction of subjects display a willingness to punish low contributors. This behaviour, which they term "strong reciprocity", is based on feelings of anger, and in turn engenders feelings of shame in those punished – part of the reason for the effectiveness of punishment beyond mere pay-off maximisation. Further, "the pro-sociality of strong reciprocity is … more strongly manifested, the more coherent and permanent the group in question" (p. F427).

Thus both the comparative static and game theoretic approaches suggest the importance of dynamic, historical factors in explaining differences in a community's social capital.[4] Glaeser et al. (2002) remark that "multiple equilibria models explain how small differences in initial conditions can generate large divergence in long-run levels of social capital" (p. F442). Likewise, Bowles and Gintis (2002) conclude that "a heterogenous population with some civic-minded members, ready to punish those who violate norms, and some self-interested members, may exhibit high or low levels of cooperation depending not on the distribution of types in the population but rather on the recent history of the group" (Bowles and Gintis 2002, p. F430). Hence greater understanding of success and failure in building social capital requires moving beyond the approach of methodological individualism and adopting the community as the primary unit of analysis. As Woolcock (1998) argues, "a more fruitful approach invokes a social-structural explanation of economic life and seeks to identify the types and combinations of social relations involved, the institutional environments shaping them, and their historical emergence and continuity" (p. 185).

Woolcock (1998) himself has provided a useful starting point for this kind of analysis by distinguishing different forms of social capital and examining the changing combinations between them as development proceeds. He draws on the sociological concepts of "embeddedness" and "autonomy" at both the micro and macro levels to develop a typology of social capital. Only the micro level is considered here, which Woolcock (1998), following Uphoff (1993), defines as including individuals, households, small groups, and communities, but not extending to the lower levels of government bureaucracy such as the sub-district or municipality. Embedded social relations at the micro level are termed "integration" or "bonding social capital". These are 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). Autonomous social relations at the micro level are termed "linkage" or "bridging social capital". These are the

[4] Prasetyo (2002) also argues for recognition of the cultural specificity of social capital.

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). Table 1 illustrates how different combinations of these dimensions of social capital can account for a range of development outcomes.

The point that emerges from this kind of analysis is that focusing on only one kind of social capital, and assuming that more is always better, can be seriously misleading (Woolcock 1998; Woolcock and Narayan 2000). In particular, a community with a high level of bonding social capital, while it may provide essential support to its members, may also be holding them back in other ways (e.g., by restricting opportunities for innovation, education, or engagement with markets) or imposing costs on other groups (e.g., those excluded from membership on ethnic or religious grounds). 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. This has been the basis of successful group-based credit programs such as the well-known Grameen Bank (see the lower-right quadrant in Table 1). The dilemma is that the formation of this latter type of social capital may well undermine the former type over time, both because success increases demands on existing social bonds (e.g., as more community members seek to join a credit group, diminishing its value to existing members) and as individuals within the community pursue a greater diversity of linkages and activities (e.g., long-term members of a credit group may seek to escape some of their social ties in order to take advantage of more remunerative opportunities beyond their immediate community).

Woolcock and Narayan (2000) conclude that the challenge for social capital research and policy is "to identify the conditions under which the many positive aspects of bonding social capital in poor communities can be harnessed and its integrity retained (and, if necessary, its negative aspects dissipated), while simultaneously helping the poor gain access to formal institutions and a more diverse stock of bridging social capital" (p. 233). They note, however, that the process "is fraught with multiple dilemmas, … especially for external nongovernmental organisations, extension services, and development agencies, because it may entail altering social systems that are the product of longstanding cultural traditions or of powerful vested interests" (p. 233). Bowles and Gintis (2002, pp. F429-432) suggest a number of elements that might form part of public policy aimed at enhancing the desirable dimensions of social capital or, as they prefer to term it, community governance[5]: (1) community members should "own the fruits of their success or failure" in solving their collective problems; (2) opportunities for mutual monitoring and punishment of non-cooperators should be built into social interactions; (3) there needs to be a legal and governmental environment favourable to the functioning of well-working communities; (4) there needs to be active advocacy of ethical norms and policies to minimise the trade-off between good governance and discriminatory parochialism (e.g., because of the tendency for successful communities to be relatively homogeneous). Thus these and other writers do not see the formation and evolution of a community's social capital as entirely a "grassroots" or "bottom-up" phenomenon but recognise a crucial, if difficult, role for the state and/or other outside actors in facilitating positive social change at the community level.

In this paper, both the individual approach of economics and the group-level approach of sociology are used to analyse the relationship between social capital and soil conservation in the Philippines. Before proceeding to that analysis, it is necessary to provide some

[5] For Bowles and Gintis (2002) "capital" implies private ownership whereas norms, social networks, and governance structures are necessarily held in common. However, the distinction is really between degrees of divisibility and excludability (i.e., of "publicness") rather than between private and common ownership.

background regarding the changing nature of soil conservation initiatives and, in particular, the emergence of the landcare approach.

3. Soil conservation and landcare

3.1 The collective nature of soil conservation efforts

Pretty and Ward (2001) and Pretty (2003) 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. However, it is not immediately obvious that investment in soil conservation requires or is enhanced by investment in social capital at the community level. Soil conservation programs initially emphasised the implementation of large-scale engineering works designed to manage surface run-off on a catchment basis (e.g., the US and Australian model of contour banks and grassed waterways). This approach certainly required coordination among landholders but the policy was to rely on legislative means rather than community action to achieve this. Legislation (e.g., the Queensland Soil Conservation Act) provided for areas of soil erosion hazard to be declared, resulting in obligations being imposed on landholders within those areas to implement conservation works according to a plan specified by a technical soil conservation agency. In some versions both positive incentives (subsidies) and negative incentives (penalties) were put in place to induce conformity with the plan (Coughenour and Chamala 1989). The problem with this approach in Australia is that it was only selectively enforced, hence soil conservation remained essentially voluntary, while land degradation proceeded largely unabated (Bradsen and Fowler 1987; Coughenour and Chamala 1989). More generally, Pretty and Shah (1994) conclude: "By all performance measures, conventional SWC [soil and water conservation] programmes have been remarkable failures. Little has changed this century.... Few farmers benefit, structures rarely persist, and inadequate implementation by outside technical teams causes erosion rather than prevents it" (p. 18). They emphasise three factors that have undermined success, namely "the high cost of project packages, the selection of inappropriate technologies, and the lack of incentives for farmers to maintain conserving measures and practices" (pp. 11-12).[6]

However, there has been a major change in recommended soil conservation practice in recent decades, particularly in developing countries such as the Philippines, involving a trend away from the implementation of engineering works on a catchment basis towards the utilisation of a combination of contour-based biological and physical measures designed as far as possible to retain run-off within individual farmers' fields, while at the same time providing short-term production benefits (Hudson 1992, 1995; Norman and Douglas 1994). The new approach involves a change in emphasis from erosion control as an end in itself to improved soil and water management for crop and livestock production, or "land husbandry" (Hudson 1992; Shaxson et al. 1997). The potential role of agroforestry measures, such as contour hedgerow intercropping, within this new approach to soil conservation has been given special prominence (Kang and Wilson 1987; Young 1989). The point to make here about this new approach is that it places the emphasis on adoption of conservation measures by individual smallholder farmers, thereby circumventing the need for complex land-use planning on a catchment basis, which in densely populated developing countries may entail attempting to coordinate the actions of hundreds of farmers over several villages. Once again, a question arises about the need for investment in social capital, given that a patchwork of individual adoption, if sufficiently extensive, is expected to have the desired landscape effect.

[6] See also Blaikie's (1985) excellent review of conventional or old-style soil conservation efforts in developing countries.

Notwithstanding the seriousness of the land degradation problem in the Philippine uplands and elsewhere in the developing world (Cramb 1998), the adoption of these more divisible soil conservation measures has been generally disappointing (Cramb et al. 1999). 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.

All these activities involve aspects of social capital, whether utilising or strengthening bonding social capital or investing in the stock of bridging social capital. In sum, recent experience suggests that, although adoption of soil conservation measures such as contour hedgerows is a decision taken by individual households, the rate of adoption is considerably enhanced where appropriate forms of social capital are either already in place or are being developed. The landcare approach to soil conservation is premised on such investments in social capital.

3.2 Landcare in Australia and the Philippines

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, p. 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. Thus they can be viewed as a means of investing in both bonding and bridging social capital.

Landcare in Australia had its origins in four pilot community projects funded under the National Soil Conservation Program in 1984 (Lockie and Vanclay 1997; Cary and Webb 2000). The term "landcare" itself was used in 1986 to describe a broad community-based program initiated by the Victorian state government to deal with a range of land degradation issues, including soil erosion and salinity. In 1988 the Australian Conservation Foundation and the National Farmers' Federation proposed a National Land Management Program that would, among other things, provide funding for the establishment and development of community landcare groups. The proposal received support from the Federal Government, which declared the 1990s the Decade of Landcare and launched the National Landcare Program in 1992. From 1996 the Landcare Program received additional funding from the A$1.5 billion Natural Heritage Trust. By the end of the decade there were over 4,000 community landcare groups across Australia, and about 38 per cent of broadacre and dairy farms had a representative who was a landcare member (Lockie and Vanclay 1997; Alexander et al. 2000; Cary and Webb 2000). Alexander et al. (2000) found a correlation between

landcare membership and the reported use of a range of conservation practices. However, Cary and Webb comment that, "while community landcare and the wider landcare movement have raised awareness of resource management issues among the rural community, adoption of more sustainable farming practices has been slow" (2000, p. 2).

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 Misamis Oriental, Northern Mindanao (Arcenas 2002; Sabio 2002) (Fig. 1). The Department of Agriculture (DA) began promoting contour hedgerows of shrub legumes in the early 1980s. 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. 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 (Nelson and Cramb 1998; Stark 2000; Mercado et al. 2001; Arcenas 2002; Sabio 2002). An extension team, termed the Contour Hedgerow Extension Team (CHET), comprising a farmer who had adopted NVS, a DA extension agent, and an ICRAF technician, was formed to promote the NVS technology (though eventually the DA ceased to be involved).

The CHET worked initially with individual farmers in various *barangay* (villages) 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 from throughout the municipality, at the suggestion of one of the ICRAF facilitators, decided to form a farmer organisation to promote the NVS contour hedgerow system within the Claveria community. The organisation was named the Claveria Landcare Association (CLCA), the name "Landcare" being taken from a logo painted on the ICRAF vehicle used to transport farmers during field visits (Stark 2000). The CLCA, being a municipal-wide organisation, moved quickly to form local groups and recruit new members at the *barangay* (village) and *sitio* (sub-village or hamlet) levels (Mercado et al. 2001; Arcenas 2002; Sabio 2002). ICRAF supported the CLCA in the conduct of training sessions and cross-farm visits, which were also used as a means of recruiting new members and forming local groups. The recruitment drive initially raised suspicions among local government officials such as *barangay* captains who, as a consequence, were invited to become involved in meetings and other activities of the CLCA. This soon resulted in widespread support from local government units (LGUs), particularly at the *barangay* level, including financial contributions and even legislative backing for adoption of the NVS technology.

Thus the Landcare Program in Claveria had developed into a triangular partnership between the CLCA (a people's organisation, working to encourage conservation farming among its members), ICRAF (an international non-government organisation, providing technical and logistic support and facilitation), and the LGUs (providing government resources and official support for the Association). As a result of this partnership, by early 2000 the CLCA had grown to include 16 *barangay*-level groups, 105 *sitio*-level groups, 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. This rate of expansion was almost unprecedented in the Philippines. Sabio (2002) concludes that the social capital formed in the links between the three partners resulted in "transformative learning" among the participants, giving rise to new ways of thinking and acting. Arcenas (2002) reports that all partners credit the farmer-to-farmer, group-extension approach of the CLCA as the principal factor in the increased level of interest and adoption. Compared with the landcare movement in Australia, landcare in Claveria showed less dependence on government and more dependence on a technical agency (ICRAF). Further, the key role of the municipal landcare association in fostering, linking, and

supporting local landcare groups was a distinctive feature that was to be replicated in other sites.

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 (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.[7] The Spanish Agency for International Cooperation (AECI) provided project support for landcare activities in Claveria and Lantapan (as well as in the Visayas) from 1998. The Australian Centre for International Agricultural Research (ACIAR) funded an action research project from 1999 to 2004 to augment and help evaluate the landcare approach in Claveria, Lantapan, and another, non-ICRAF site, Barangay Ned in Southern Mindanao (Fig. 1). The principal aim of the ACIAR Project was to test the applicability of the landcare approach as a tool to enhance the adoption of conservation practices suited to the needs of upland farming communities in Mindanao (Vock 2002). The impact of the landcare approach was to be evaluated in terms of two key indicators: the adoption of conservation practices (and the effect of these practices on natural resources); and the formation and development of landcare groups and networks (i.e., the growth of social capital).

In the remainder of the paper, data from the evaluation of the Landcare Program in Lantapan are used to examine the relationship between these two impacts (soil conservation and social capital). The Lantapan evaluation study was based on four main sources of data: project reports and statistics; interviews with project staff and other key informants; a questionnaire survey of farm households in one *barangay*; and case studies of community landcare groups (Cramb et al. 2003). The survey was conducted in Barangay Sungco, which occupied a representative transect of the topography in the municipality, had responded well to the Landcare Program, and was less affected by large-scale agribusiness developments than other parts of the municipality. The survey was conducted in August 2002. A stratified random sample of 104 households was drawn from all but one *sitio* in the *barangay* (a remote community whose members all belonged to an exclusive sect),[8] giving a sampling fraction of 19 per cent. Two research assistants administered a one-hour questionnaire to each selected household. Sixty per cent of the respondents had adopted contour farming measures (NVS or contour hedgerows) on at least part of their farms, and 27 per cent were landcare members. Case studies of 12 community landcare groups were undertaken. The groups were selected to include the diversity of experiences in Lantapan. Hence there were four continuing groups, four disbanded groups, and four groups with particular characteristics (e.g., a female-headed group and a pre-existing group that had incorporated landcare activities). The case studies were based primarily on focus group discussions, in which a flexible schedule of open-ended questions was used to probe the informants about the development and impacts of their group. Thus the survey provided mostly individual household data, suitable for applying an individual, cross-sectional approach to social capital (Section 5), while the case studies were more suited to group-level analysis with a historical dimension (Section 6). However, ultimately, all sources of data were needed to get a rounded view of the interaction between social capital and soil conservation.

[7] Many groups of farmers and extension workers came to the ICRAF sites at Claveria and Lantapan for training in the landcare approach, multiplying the extent of the "landcare movement" in Mindanao to an extent that is yet to be fully evaluated.

[8] This community, which believed in the mystical powers of the nationalist hero, Jose Rizal, and was bound by the supreme authority of its allegedly polygamous leader, was an excellent example of a group with a high level of bonding social capital but extremely low bridging social capital, hence its backward state.

4. The Landcare Program in Lantapan

The Municipality of Lantapan occupies 33,000 ha in the upper reaches of the Manupali River, which flows from the environmentally significant Mt Kitanglad Range (Coxhead and Buenavista 2001). The landscape rises from river flats at 400-600 m in the south of the municipality to mountainous terrain at 1,100-2,200 m in the north. Soils are generally clayey, moderately acid, of low fertility, and susceptible to erosion. Rainfall averages 2,500 mm, 70 per cent falling in the wet season from May to October. Lantapan has experienced major demographic, agroecological, economic, and institutional changes over the past half century. In that time, the indigenous Talaandig have become a minority as immigrants from the central and northern Philippines have taken up land and introduced more intensive farming practices. The population increased from under 1,000 in 1948 to over 43,000 in 2000, resulting in a population density of 136 persons per sq. km and a modal farm size of 1-3 ha. Hence shifting cultivation of rice and other crops for subsistence has given way to continuous cultivation of maize for both subsistence and sale, and the production of an array of vegetable crops such as beans, tomatoes, cabbages, and potatoes, destined exclusively for urban markets to the north. More recently, the spread of sugarcane cultivation and the establishment of two large banana plantations have further transformed the landscape in the more productive and favourably situated parts of the municipality. The net effect of changes in land use is that forested land has declined while annual cropping has expanded, as the agricultural frontier has been pushed higher in the landscape. This has resulted in loss of forest biodiversity as well as the rapid degradation of soil and water resources.

The Landcare Program in Lantapan built on ICRAF's experience with landcare in Claveria, described above, and the opportunities created by the interventions of an array of government and non-government organisations in Lantapan under the auspices of the USAID-funded Sustainable Agriculture and Natural Resource Management (SANREM) Program. Initially the strategy was to build landcare into the municipal program for agricultural extension and natural resource management, but subsequent political shifts meant that ICRAF had to take most of the responsibility for the Landcare Program. ICRAF managers were conscious of the need to preserve as far as possible the farmer-led or "demand-driven" nature of landcare as it had evolved in Claveria. Hence the Landcare Program began with a broad information campaign on environmental issues and conservation technologies developed from ICRAF's research, especially natural vegetative strips (NVS). This campaign was implemented in all 14 *barangay*. A survey was then conducted to determine the level of farmers' interest. As a result, seven *barangay* in the upper part of the municipality were given priority. Subsequently, major activities in these barangay included slide shows, cross-farm visits, and training. The first landcare group was formed six months after the information campaign, in May 1999.

The increasing demand for information sessions and training activities at the *sitio* level necessitated additional staff. From 2000 the landcare team in Lantapan comprised two experienced facilitators and four "intern" facilitators, all employed by ICRAF. With additional staff, the number of information activities and training events doubled. Information activities mainly focused on slide shows in the *sitio* that usually ran for 2-3 hours. Technical training concentrated on NVS establishment and nursery techniques. These were half-day or whole-day sessions. They usually began with hands-on training in establishing NVS, using different techniques to identify contour lines, or with training in nursery management. This training was supported by visits to farms where the practices had been adopted.

The recorded rate of adoption of NVS during the implementation of the Landcare Program was impressive at over 50 adopters per year, though this was similar to the preceding three years when ICRAF had been working informally with farmers as part of the SANREM Program. This suggests that the characteristics of the NVS technology itself and the use of practical, farm-level demonstrations were key elements in achieving rapid adoption. These

elements were continued in the Landcare Program, along with more intensive training and organised cross-farm visits. By the end of 2002 there were about 400 adopters of vegetative contour barriers, or 7 per cent of all farm households. The area of land under contour barriers averaged about 1.2 ha per adopter and totalled about 500 ha. This was about 3 per cent of agricultural land in Lantapan, 6 per cent of land used for maize and vegetables, and 10 per cent of land identified as "environmentally critical". Based on the household survey, the perceived impacts of NVS adoption at the farm level were that soil erosion was reduced, soil fertility was maintained, and terraces were formed. There was no perceived short-term impact on crop production or farm income. In the longer term, these impacts were likely to come about, first, because yields of field crops were maintained relative to yields from unprotected land and, second, because of a transition to agroforestry, as natural vegetative strips were progressively enriched with productive crops, including timber species.

In addition, by 2002, 64 community nurseries had been established and 162,000 trees planted on farms. This reflects the particular interest of farmers in the income-earning potential of various fruit and timber tree species and hence the early emphasis on training in nursery management techniques. There were 585 adopters of tree planting recorded by the end of 2002, or about 11 per cent of farm households. The area planted was around 660 ha, accounting for about 4 per cent of agricultural land, 8 per cent of maize and vegetable land, and 13 per cent of "environmentally critical" land.

Combining adopters of the two main conservation measures – contour barriers and agroforestry – there were about 862 adopters by the end of 2002, or 16 per cent of the total number of farm households in Lantapan (though not all households were potential adopters). The total area under conservation measures was about 1,150 ha (43 per cent under NVS and 57 per cent under agroforestry). This was 7 per cent of agricultural land, 14 per cent of maize and vegetable land, and 23 per cent of "environmentally critical" land, suggesting a significant impact at the landscape level. However, these figures do not account for any "dis-adoption" (failure to maintain NVS or planted tree seedlings), the rate of which has not been measured. Also, they can be only partially attributed to the Landcare Program as such, due to the prior activity of ICRAF and other SANREM partners.

There was also rapid formation of landcare groups and a Landcare Association. The formation of a *sitio*-level landcare group usually followed the first training event. By the third quarter of 1999, 41 landcare groups had been formed. These were then associated at the *barangay* level and later at the municipal level. The Lantapan Landcare Association was registered on 21 June 2000, with 840 members, making it the largest farmer group ever organised in Lantapan. By 2001, 58 landcare groups had been formed and four existing farmer groups were affiliated with the Landcare Association, making 62 groups in all. These groups were an important source of information on conservation practices for their local community and encouraged members and others to work together, especially in the establishment and maintenance of communal landcare nurseries. However, many groups became inactive once the initial adoption of NVS and/or tree planting had occurred, and especially in those *barangay* where plantation development and other agribusiness ventures had led to the demise of smallholder farming. Nevertheless, the Landcare Association remained active and had the potential to take on more aspects of the Landcare Program, especially the provision of training to outside groups.

5. Analysis of social capital, landcare membership, and adoption

In this section, the survey data for Barangay Sungco are used to explore three interrelated questions: (1) What were the factors influencing individual social capital? (2) In particular, what factors influenced landcare membership? (3) How did landcare membership affect adoption of NVS (the principal soil conservation technology promoted)? Answers to these

questions will help advance understanding of the relationship between social capital and soil conservation in this setting.

5.1 Factors affecting individual social capital

The survey data were used, first, to assess the factors affecting the individual social capital of the household heads interviewed and, by extension, their households. Following Glaeser et al. (2002), social capital was measured by the number of groups to which the household head belonged. This number varied from 0 to 5 and included a range of agricultural, forestry, conservation, indigenous, cooperative, and other community groups (Table 2). The number of groups could be taken to indicate either the individual's stock of social capital or the flow of investment in social capital formation.[9] It was assumed, in the absence of the sorts of empirical data cited by Glaeser et al. (2002) for the US, that this measure was well correlated with other, more qualitative dimensions of social capital, such as trust, reciprocity, and information flows.

It was hypothesised that social capital as measured would:

- first increase then decrease with age (given that younger community members are busy getting established and need time to build up their social capital, while older members are allowing their capital stocks to depreciate);
- increase with years of formal education (enhancing awareness of group benefits and the skills required to engage in group activity);
- increase with the longevity and strength of ties to the local community (assuming that recent immigrants would have had less time and resources to acquire social capital);
- be higher among those whose primary occupation was farming (given the importance of group activity to agriculture, farm forestry and natural resource management);
- be lower among those who had an additional (usually non-farm) occupation (assuming this meant less time available for group activity);
- increase with farm size (an indicator of income and wealth, hence the ability to invest in social capital);
- be higher for land owners (assuming this meant having a greater and more permanent stake in the community);
- be influenced by the local neighbourhood or hamlet (*sitio*) in which the household resided (i.e., a group-level effect, reflecting that individual investment in social capital is contingent on the aggregate stock in the relevant community).

The independent variables were measured as follows. To allow for the hypothesised rise and fall of social capital with age, five age brackets were used, hence four dummies were specified with the age bracket 60+ years as the reference category. Education was measured by the number of years in school. Several variables measuring ties to the community were considered – a dummy for place of origin (1=born in the *barangay*), total years resident in the community, and ethnic category (1=indigenous). However, as might be expected, these variables were highly inter-correlated, with Pearson pair-wise correlation coefficients exceeding 0.5, and years resident was also highly correlated with age. Hence only the place of origin dummy was included. Dummies were also defined for the main occupation (1=farming), the presence or absence of a secondary occupation (1=secondary occupation undertaken), and land ownership (1=full or part owner). Farm size was measured in hectares. To ascertain the effect of the local neighbourhood on individual social capital, five dummies were specified to capture the six hamlets (*sitio*) included in the survey.

[9] Glaeser et al. (2002) point out that expected influence of all but one factor (age) is the same, regardless of the interpretation given to the dependent variable. They expect the flow of investment in social capital to decline with age but the stock of social capital to first increase then decrease with age.

Two models were estimated, Model 1 excluding the location dummies and Model 2 including them, in order to assess the overall impact of their inclusion on the explanatory power of the equation. The results from the ordinary least squares estimation of the two models are presented in Table 2. R squared values were low, as expected for such crude models and data-sets, but the results for the individual coefficients were suggestive.

In Model 1 only the age dummies were significant at the 10 per cent level, the size of the coefficients consistent with social capital rising to 50-59 years, then declining (see Fig. 1). Those aged 50-59 averaged 0.8 more group memberships than those aged 20-29, and 0.9 more memberships than those aged 60+. Though not significant at the 10 per cent level, the results for farm size and education provided weak confirmation that social capital increases with these variables. There was no confirmation that the variables for local origin, main occupation, additional occupation, or land ownership were important factors affecting social capital.

The inclusion of the location dummies in Model 2, however, improved the adjusted R squared by 0.127 and raised the F ratio to a significant level. The dummies for locations 3 and 6 had coefficients around 1.0 that were significant at the 0.15 level, suggesting that residing in these hamlets added an additional group membership relative to location 8. (If the omitted sectarian hamlet had been included in the survey this effect would probably have been stronger.) Hence, contrary to the findings of Glaeser et al. (2002), both individual incentives and group-level characteristics helped explain an individual's stock of social capital in this setting.

5.2 Factors affecting landcare membership

The next question concerns the factors affecting the particular form of social capital provided by membership in a landcare group. Landcare membership being a binary variable, logistic regression was used to estimate the influence of the independent variables on the likelihood of membership. It was hypothesised that the likelihood of membership would be influenced by the same variables used above to explain investment in social capital in general – age, education, place of origin, primary occupation, engagement in additional occupations, farm size, land ownership, and local neighbourhood. In addition, it was hypothesised that the likelihood of membership would be higher in hamlets situated in the more environmentally sensitive upper part of the *barangay*; among those who had steeper land; and among those who had received training in contour farming methods, especially NVS. Training in contour farming occurred independently of landcare membership, though the experience of such training often encouraged trainees to form or join a landcare group, as described above, hence its inclusion as an explanatory variable. Occasionally, however, this training followed the act of joining a group, raising a question about the direction of causation. Consequently two models were estimated, one with and one without the training variable.

The independent variables were measured as in the previous analysis, except for local neighbourhood. Because the estimation of a logistic regression uses a maximum likelihood approach, the sample size was too small to allow the use of separate dummies for each hamlet. Instead, hamlets were classified according to their position in the landscape, with 1=lower, 2=middle, 3=upper. This variable thus had a dual interpretation. In part it captured a group-level effect (indicating if joining a landcare group was affected by one's neighbourhood) and in part a landscape effect (indicating if landcare membership was more likely in the more environmentally sensitive zone). Two additional dummy variables were defined, one for the topography of the individual respondent's farm, with a value of 1 indicating the presence of moderately to steeply sloping land, and one for training in contour farming, with a value of 1 indicating that the respondent had received such training.

The results of the logistic regressions are presented in Table 4. The equations for both models were significant at the one per cent level (as indicated by the model chi-squared) and provided

an acceptable fit of the data, with Model 2 providing the better fit (as indicated by the Hosmer-Lemeshow goodness-of-fit test, the Nagelkerke R^2, and the percentage of correct predictions). In Model 1, the significant factors were age, farm size, and location. Specifically, respondents aged 50-59 years were more likely to be landcare members than those in other age groups, corresponding to the result for social capital in general (see Table 3 above). An increase in farm size also increased the likelihood of landcare membership. There were probably two reasons for this: farmers with more land were generally better off, hence had more time to be involved in a landcare group; farmers witih more land had greater potential to adopt the technologies (NVS, tree planting) being promoted by the Landcare Program. Location higher in the landscape also increased the likelihood of membership, reflecting both the greater need for the services of a landcare group in the upper slopes of the catchment and that local communities in this zone responded more readily to the Landcare Program, thereby encouraging individual community members to participate (again highlighting the importance of group-level effects in individual decisions about social capital).

In Model 2, which included the training variable, the significant factors were age, education, local origin, main occupation, other occupation, farm size, location, and training. Once again landcare membership was much more likely among those in the 50-59 age group (followed by the 40-49 age group) and among respondents with larger farms located in communities higher in the landscape. The significant but negative coefficient for education implied that those with more education were less likely to be landcare members, perhaps because they felt they could access improved practices without having to participate in group activities. The significant but negative coefficient for local origin implied that those born outside the *barangay* were more likely to be landcare members, perhaps because they had less local knowledge and hence greater need for the information flows provided by the landcare network. The significant but unexpectedly negative coefficient for farming as the main occupation was probably an artefact of there being few respondents (6) for whom farming was not the main occupation (hence a small absolute number of landcare members in this category could result in a relatively high proportion).[10] However, the significant and negative coefficient for having a secondary occupation was expected, as this generally meant less focus on farming and less time for landcare activities. While location in the landscape was a significant and relatively important factor, the presence of sloping land in the farm was not. This suggests that the location variable was largely capturing group-level rather than topographic effects. The training variable was highly significant and had a high odds ratio, indicating that this was the most important variable in explaining landcare membership. This was presumably because training in contour farming was conducted on a group basis and highlighted the need to work together to implement the practice (at least initially). In addition, much of the training was provided by landcare facilitators, who also encouraged group activity and networks.

5.3 Factors affecting adoption of natural vegetative strips

The question of ultimate interest here is whether investment in social capital in the form of landcare groups has an impact on the adoption of soil conservation practices, in particular, the contour strip technology that farmers and scientists have found to be a particularly cost-effective strategy for erosion control, as well as a first step in a step-wise sequence of farm development (Cramb 2000, ch. 10). A logistic regression model was used to assess the impact of a range of factors on the likelihood of adoption of natural vegetative strips (NVS). Since 91 per cent of farmers who adopted NVS applied the technology to less than 50 per cent of their farm area, with a pronounced mode at 20-29 per cent, it was considered better to model adoption as a binary variable. The independent variables were the same as in the landcare membership model in Table 4, with the same expected impacts. In addition, a landcare membership dummy (1=member) was included as an independent variable.

[10] Omitting this variable did not noticeably alter the coefficients or their standard errors.

The results of the regression analysis are presented in Table 5. The estimated equation was significant at the one per cent level and provided an acceptable fit. The significant variables were age, main occupation, other occupation, farm size, slope of farm, and training. Interestingly, the age dummy with the highest odds ratio was 30-39 years, compared with 50-59 years for the landcare membership model (Table 4), suggesting that younger farmers were more likely to adopt NVS whereas middle-aged farmers were more likely to be landcare members. The coefficient for farming as the main occupation was significant and positive, and that for additional occupation was significant and negative, in both cases confirming that adoption was more likely among those who were exclusively focused on own-account farming (as opposed to engaging in some off-farm or non-farm employment). Farm size was also significant, the odds of adoption increasing by 33 per cent for each additional hectare. This has been a consistent finding (e.g., Cramb et al. 1999), reflecting that those with smaller farms are reluctant to sacrifice productive area to contour strips, while those with additional land can afford to maintain their cultivated area. There was weak confirmation that location in communities higher in the landscape was a factor in adoption (significant at the 15 per cent level), but much stronger support for the hypothesis that farmers with more steeply sloping land were more likely to adopt (the odds of adoption being eight times higher than for those with gentler slopes). This points to adoption being more an individual than a group decision, related to the degree of erosion hazard on a specific parcel of land. The coefficient for the training variable was also highly significant and indicated a large effect, the odds of adoption increasing by a factor of 15 for those who had participated in a training session on NVS. This confirms the fundamental importance of the practical, farmer-to-farmer, group-based training facilitated by the Landcare Program. However, somewhat surprisingly, membership of a landcare group as such was not a significant factor in adoption. This suggests that, once farmers had acquired the knowledge and skills to adopt, they could then proceed to implement the technology on their farms with or without the support of a landcare group. This is consistent with adopters' responses, indicating that, while 55 per cent had learned about contour barriers from ICRAF or other agencies and 39 per cent from other farmers, 81 per cent implemented the technology by themselves (Table 6).

6. Summary of results from case studies

The preceding analysis, based on individual data, suggests that social capital in general, and landcare membership in particular, were influenced both by individual incentives and group-level factors, whereas adoption of NVS was based mainly on individual circumstances. The 14 case studies of landcare groups, drawing on focus group discussions, shed more light on the group-level processes at work during the Landcare Program (Cramb et al. 2003). In the interests of space, only a brief summary is presented here.

The focus groups indicated that the initial response to the landcare campaign in 1999 was generally very positive, for a number of reasons:

- The landcare facilitators were seen to be dedicated and enthusiastic and they made interesting presentations. This naturally generated positive feelings towards the Program and perhaps engendered a personal "debt of obligation" towards the facilitators (who thus acquired social capital).
- The environmental issues raised by the campaign were seen to be important, and the technologies promoted (NVS and agroforestry nurseries) were viewed as highly relevant and adoptable.
- The cross-farm visits and farmer-to-farmer training stimulated interest and were effective in communicating knowledge about the new technologies and bringing about their rapid adoption.

The subsequent formation of *sitio*-level landcare groups was not difficult. In most cases, existing *sitio* and *barangay* structures were adequate to arrange the initial information session, cross-farm visits, and training sessions, and the subsequent formation of a group. Often the *sitio* leader or the chair of the agriculture committee would head up the group. In some cases an existing tribal or women's group took on landcare functions. Nevertheless, in most cases, taking on landcare activities was seen to add something of benefit to the local community or organisation and was not merely a formality (i.e., changing hats to satisfy different outsiders). Landcare was thought to be more beneficial and enduring than previous community-based efforts in the municipality, of which there had been many. The primary interest was no doubt in gaining access to useful technology through the information, training, and support provided to landcare members by ICRAF (though non-members were not in fact excluded from such benefits). In addition, landcare linked fairly isolated farming communities to a wider network of like-minded farmers and professionals within and beyond the municipality. Hence, even where there was already close social interaction within the local community, there was an incentive to link with landcare to achieve this wider contact. Relatedly, there was also often a feeling of enhanced pride and purpose in being part of landcare, helping to confirm a traditional sense of stewardship (especially in indigenous communities) and energise new efforts towards improving the farming system.

Those groups that had continued their landcare activities tended to be in stable, cohesive communities and were led by a well-respected and dedicated local leader. They were highly focused on farming on their own land, with few off-farm activities, hence members had more time and incentive to be involved. They were also in regular contact with landcare facilitators and continued to receive benefits from the Program. Disbanded groups, on the other hand, had often been hampered by poor leadership, lack of follow-up, and a loss of interest or rationale once initial training and implementation of NVS was completed. Political factionalism sometimes hampered the development of the group. Many disbanded groups had been affected by the major and rapid change from smallholder farming to dependence on the banana plantations or the commercial poultry industry. Having leased or sold their land and taken up wage employment, there was no need or opportunity for them to continue in the Landcare Program. Others were too dependent on vegetable traders and financiers or lacked secure tenure, hence they felt locked in to their current farming practices.

Both continuing and disbanded groups felt that for landcare groups to survive at the local level there was a need for on-going support from the Landcare Program, which in their experience primarily meant support from ICRAF through research, extension, and training. Even without an organised group, they hoped to continue to be informed and educated about new opportunities to improve their farming. They also looked to the municipal government for stronger and more consistent support. This ties in with survey data showing that the principal reasons for joining a landcare group were to learn about technologies, i.e., to tap into a wider network of information and technical support, more so than to facilitate cooperative activities locally (Table 7).

Thus, typically, there was already a high level of bonding social capital in the 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 (which was formed very

early in program), as well as vertical linkages with ICRAF and other outside agencies.[11] 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. Hence the decline of local group activity often merely reflected a declining immediate need for that kind of activity 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 Claveria).

7. Conclusion

The concept of social capital provides an important new focal point for cross-disciplinary research, not least on issues of environment and development in countries such as the Philippines. Economists have instinctively adopted an individual approach to social capital, while social and political scientists have tended to take a group-level approach. While the first approach provides some insight into individual incentives for investment in social capital, it becomes unhelpfully complex when attempting to deal with the pervasive interpersonal externalities involved. The group-level approach allows for additional insights into the nature and dynamics of social capital. Especially helpful is the distinction between bonding and bridging social capital and the hypothesis that their relative roles change as a community develops, highlighting some of the dilemmas for outside agencies seeking to facilitate positive change in poor rural communities. In this paper, both individual and group-level approaches have been used in a complementary fashion to explore the relationship between social capital and soil conservation in the Philippines.

Currently recommended soil conservation or "land husbandry" practices, such as contour strips or hedgerows, are highly divisible, and their adoption by individual farmers can generate on-site and off-site benefits within a reasonably short time-frame. Nevertheless, evidence shows that collective action is needed to raise awareness of the need for these practices; adapt them to local conditions; provide farmer-led, group-based training; implement measures on individual farms; disseminate measures within and beyond the community; and maintain links to technical agencies. Hence there is a prima facie case for investment in both bonding and bridging social capital to help build the knowledge and skills (human capital) needed to change destructive farming practices.

The landcare approach to promoting soil conservation is based on such investments in social capital. Landcare in Australia has particularly emphasised bonding social capital, bringing together individualistic and geographically dispersed landholders in community landcare groups. Though genuinely grassroots in nature, and able to seek out technical solutions to the problems they identify, these groups have been highly dependent on the National Landcare Program for funding in order to implement their projects. Landcare in the Philippines, on the other hand, has been able to build on existing stocks of bonding social capital at the level of the local community in order to create an important new stock of bridging social capital, notably through a municipal landcare association, linking individual farmers and local groups both to local government and, crucially, to a competent research/extension agency. Though also genuinely farmer-led, and with a low level of financial support from government, these groups and associations have shown a higher level of dependence on outside technical and organisational support, for obvious reasons.

[11] 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".

Since 1998, the Landcare Program in Lantapan, implemented by ICRAF and building on earlier interventions and experience, has achieved impressive outcomes. By the end of 2002 there were 862 adopters of contour vegetative strips and/or tree planting, or 16 per cent of farm households, affecting an area of 1,150 ha, or perhaps a quarter of the environmentally critical land in the municipality. By 2001 an active landcare association was formed with 840 members in 62 community landcare groups. The key question addressed in this paper has been: What was the relationship between these two parallel phenomena – the adoption of soil conservation and the investment in social capital?

Analysis of household survey data showed that social capital in Lantapan varied with individual incentives, rising then falling with age (peaking at 50-59 years) and increasing with farm size and education, but group-level factors were also important. That is, contrary to Glaeser et al. (2002), an individual's social capital depended as much on his or her local community as on individual characteristics. Similarly, landcare membership was affected by age (also peaking at 50-59 years), education, local origin, occupation, farm size, location, and training. The last two factors captured group-level effects – location was related to the aggregate stock of bonding social capital in the local community, and training to the community's investment in bridging social capital. Adoption of contour strip technology was influenced by age (in this case peaking at 30-39 years), occupation(s), farm size, the slope of the farm, and training, but landcare membership as such was not a significant factor. Hence adoption was more a response to individual and farm-specific incentives and opportunities. However, it would be wrong to conclude that the social capital created through the landcare approach was unnecessary for adoption. A community-level analysis helps to explain why.

The case studies of landcare groups in Lantapan showed that groups were most easily formed, and persisted longest, where bonding social capital was already at a high level (and was not undermined by exogenous developments such as plantations). This confirms the survey finding that landcare membership was significantly affected by community characteristics. However, it raises the question: Why form a landcare group when bonding social capital is already in place? The apparent contradiction is resolved when it is realised that the main incentive for forming groups was not to enhance bonding social capital (though this occurred to some extent, e.g., by reinforcing traditional conservation norms and organising communal nurseries) but to tap into the emerging landcare network, involving the landcare association, local government, and ICRAF. That is, the decision to form or join a landcare group was a decision to invest in bridging social capital. Individual adopters benefited from this bridging social capital whether or not they were members of a local landcare group. Likewise, former and prospective landcare members all hoped to maintain the flow of information and support made possible through these extra-community links.

Thus the relationship between social capital and soil conservation is not a straightforward matter of investing in the rapid formation of self-sufficient community landcare groups (the "community organising" beloved of NGOs) in order to accelerate adoption of soil conservation practices on farms. Nevertheless, social capital has clearly contributed to changing farming practices in Lantapan. Although membership in a local landcare group was not a major factor in adoption, the landcare approach as a whole (information sessions, training, cross-farm visits, follow-up by facilitators, farmer-to-farmer information exchange) created a valuable stock of bridging social capital, with significant benefits for long-term natural resource management. Hence it would be a mistake to think of established landcare groups as needing to be weaned of support and made to stand on their own, or to see the demise of some landcare groups as necessarily a sign of failure. The very success of the landcare approach has been because of the horizontal and vertical extra-community links established. Continuing support from either local government or non-government organisations is needed to maintain this valuable stock of social capital, the quality of the services it provides, and hence the momentum of the landcare initiative.

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Table 1 Dimensions of social capital at the community level

Extra-community networks (bridging)	Intra-community ties (bonding)	
	Low	High
Low	Outcasts	Poor villagers
High	Recent rural-to-urban migrants	Successful members of micro-finance programs

Source: Woolcock and Narayan (2000, p. 231)

Table 2 Distribution of Number of Group Memberships of Household Heads in Barangay Sungco, Lantapan (n=104)

No. of memberships	Frequency	Percentage	Cumulative %
0	42	40.4	40.4
1	34	32.7	73.1
2	21	20.2	93.3
3	3	2.9	96.2
4	2	1.9	98.1
5	2	1.9	100.0

Table 3 OLS of group memberships on characteristics of household head, Barangay Sungco, Lantapan (n=104)

Variable	Model 1		Model 2	
	Coefficient	St. error	Coefficient	St. error
Constant	– 0.477	0.816	– 0.924	0.922
Age 20-29	0.137	0.476	0.390	0.482
Age 30-39	0.539	0.433	0.684	0.419
Age 40-49	0.816**	0.373	0.948***	0.356
Age 50-59	0.941*	0.403	0.941**	0.398
Education	0.050	0.038	0.059	0.038
Local origin	0.129	0.229	– 0.080	0.230
Main occupation	0.211	0.495	0.175	0.485
Other occupation	– 0.109	0.272	– 0.052	0.260
Land owner	0.199	0.312	0.079	0.298
Farm size	0.060	0.048	0.066	0.049
Location 1			0.287	0.654
Location 2			– 0.073	0.712
Location 3			1.035	0.678
Location 4			– 0.160	0.707
Location 5			0.360	0.719
Location 6			1.099	0.702
Location 7			– 0.075	0.734
R squared	0.120		0.292	
Adj. R squared	0.025		0.152	
F value	1.265		2.090**	

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

Table 4 Logistic regression of landcare membership on characteristics of household head, Barangay Sungco, Lantapan (n=104)

Variable	Model 1			Model 2		
	Coeffic.	St. error	Odds ratio	Coeffic.	St. error	Odds ratio
Constant	– 2.865	2.268	0.057	– 0.650	2.463	0.522
Age 20-29	0.754	1.184	2.124	1.708	1.491	5.516
Age 30-39	0.071	1.147	1.074	0.189	1.602	1.208
Age 40-49	1.039	0.895	2.827	2.037*	1.215	7.664
Age 50-59	2.068**	0.992	7.912	3.396**	1.348	29.850
Education	– 0.175	0.110	0.839	– 0.656***	0.217	0.519
Local origin	– 0.833	0.607	0.435	– 2.115**	0.974	0.121
Main occpn.	– 1.483	1.226	0.227	– 4.141**	1.776	0.016
Other occpn.	– 0.983	0.754	0.374	– 2.659**	1.197	0.070
Land owner	0.965	1.151	2.624	1.659	1.470	5.252
Farm size	0.273**	0.119	1.314	0.353**	0.170	1.424
Location	1.074***	0.404	2.928	1.190**	0.521	3.286
Slope of farm	0.024	0.635	1.024	– 0.050	0.761	0.951
Training				4.493***	1.202	89.349
Model chi-square		34.759***			62.358***	
Nagelkerke R^2		0.413			0.655	
H-L chi-square		7.215			3.837	
% correct		81.7			85.6	

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

Table 5 Logistic regression of NVS adoption on characteristics of household head, Barangay Sungco, Lantapan (n=104)

Variable	Coefficient	St. error	Odds ratio
Constant	– 10.474**	3.736	0.000
Age 20-29	1.863	1.250	6.443
Age 30-39	2.615**	1.138	13.674
Age 40-49	2.084**	1.017	8.083
Age 50-59	2.405**	1.221	11.079
Education	0.115	0.107	1.122
Local origin	– 0.060	0.619	0.942
Main occupation	3.911*	2.337	49.961
Other occupation	– 1.487*	0.794	0.226
Land owner	0.666	0.854	1.946
Farm size	0.284**	0.144	1.328
Location	0.639	0.443	1.894
Slope	2.157***	0.707	8.641
Training	2.762***	0.888	15.828
Landcare member	0.456	0.915	1.578
Model chi-squared		58.434***	
Nagelkerke R^2		0.580	
H-L chi-squared		5.223	
% correct		81.7	

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

Table 6 Adopters' sources of information and assistance for implementation of contour barriers, Barangay Sungco, Lantapan (n=62)

Source	Information		Assistance	
	No.	%	No.	%
Self	0	0.0	50	80.7
Other farmers	24	38.7	3	4.8
ICRAF	15	24.2	2	3.2
NGO	13	21.0	1	1.6
University	5	8.1	1	1.6
Department of Agriculture	1	1.6	0	0.0
No response	4	6.5	5	8.1
Total	62	100.0	62	100.0

Table 7 Reasons for joining a landcare group, Barangay Sungco, Lantapan (n=58)

Reason	Current members		Intending members		Total	
	No.	%	No.	%	No.	%
Learn technology	18	64.3	26	86.7	44	75.9
Like the program	4	14.3	1	3.3	5	8.6
Plant trees	2	7.1	2	6.7	4	6.9
Improve livelihood	1	3.6	1	3.3	2	3.5
Influence the group	2	7.1	0	0.0	2	3.5
Follow others	1	3.6	0	0.0	1	1.7
Total	28	100.0	30	100.0	58	100.0

Fig. 1 Location of principal landcare sites in Mindanao, Southern Philippines

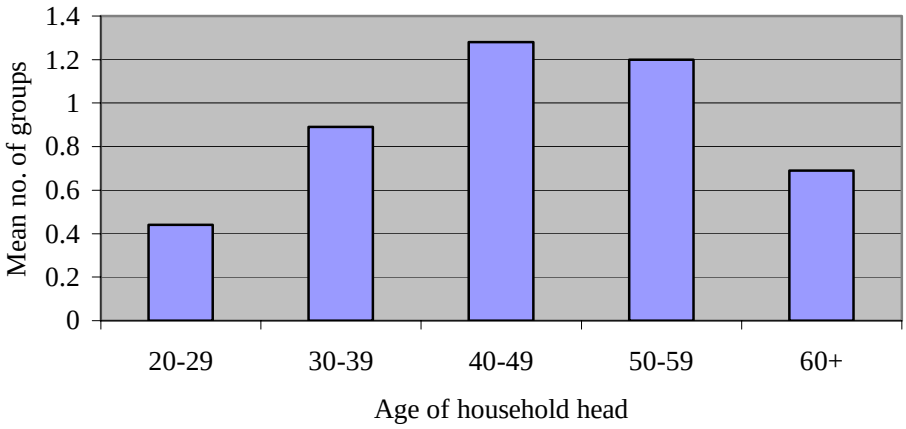

Fig. 2 Social capital vs age in Barangay Sungco, Lantapan