Participatory approaches to catchment management Some experiences to build upon

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Strategic issues in tropical catchment management

As increasing populations expand into steeper, more fragile areas in the tropical uplands, many catchments are affected by severe soil erosion, declining soil productivity, and environmental degradation. Watershed degradation now poses a threat to the economies of many countries in Asia, and to the livelihoods of the ever-growing populations that depend on these resources. Unfortunately, past watershed management programmes to arrest and reverse this trend have not been effective. But the lessons learned from these failures have been instrumental in promoting a major change in thinking with regard to watershed management (Douglas, 1996). The two key elements underlying this approach are better land husbandry practices, and active people's participation.

Better land husbandry represents a shift in emphasis away from a narrow idea of just soil conservation to a more holistic care of the land for sustained production. It follows recognition that, although there will be tradeoffs, the farmer's market objectives can be reconciled with society's watershed objectives such that neither loses and both gain. This affirms that the adoption of appropriate management practices that increase yields can likewise combat land degradation.

Emphasis on active people's participation in watershed management (catchment management in the British terminology) is a recent phenomenon in the tropics. It arose from the glaring pattern of failures observed in past "top down" methods used by the public sector to implement watershed management projects in which the residents were passive recipients of external interventions. These failures have fostered more serious recognition that success depends upon enhancing rural people's inherent abilities to apply and adapt

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new and indigenous technologies, and to involve local institutions to manage and conserve resources.

Successful watershed management in the tropics is built on two pillars:

- Sound, practical, suitable technical innovation, and
- Participatory institutional innovation

This paper explores some successful experiences in the evolution of local people's management of watershed resources in the context of this broader, more holistic vision. It examines several key projects in the Philippines and Thailand that provide instructive case studies. The paper concludes by summing up the key points learned that point the way to greater success in future watershed management initiatives.

Asian watersheds

A watershed (or catchment) is defined as the land area drained by a common river system. In Asia, the land area located above 8% slope is considered operationally as watershed area. Land above 30% slope is considered upper watershed. Thus, the conventionally accepted watershed area of Asia is 900 million ha or 53% of the land mass (Magrath and Doolette, 1990). About 65% of the rural population of 1.6 billion live in these areas. The managers of these lands are smallholder farmers in rural villages. They are constrained severely by poverty and limited access to technology. Therefore, as they seek more farm and grazing land to support their families, they have profound effects on the land and water resources of both the uplands and lowlands.

The population occupying the upper watershed areas is roughly 128 million (Magrath and Doolette, 1990). Approximately 19% of the region is under closed forest. Most of this remaining closed forest is tropical rainforest, the reservoir of about 40% of the biodiversity on the planet earth. Degradation through overcutting and grazing is reducing productivity of much of the remaining stand (Doolette and Smyle, 1990). The forest cover is receding at a rate of about one percent a year. The most recent estimates suggest that the rate of deforestation is not slowing, but is accelerating. In much of the region, forest resources are integral to the agricultural system as sources of fodder and many other products.

The seriousness of soil erosion is not known adequately, but may be deduced from indirect evidence. The most striking picture is that presented by the rate of sediment passing into the oceans from the major river systems of the world. The global data highlights Asia as being a class by itself: Rates of sediment deposition in the oceans are in the order of magnitude higher than from comparable sized areas anywhere else in the world (Milliman and Meade,

1983). Human pressure on the resource base is by no means the only major driving force for these enormous rates of sediment detachment and deposition. Southeast Asian landscapes tend to be geologically young, and exceptionally steep. These factors are also important; but the densest populations in the world are transforming these watersheds at a tremendous rate, and exacerbating their degradation.

The nations of Southeast Asia are progressively opening their economies, and participation in global markets is accelerating. This is having profound changes on upland livelihood systems, and on the upland environment. The economies of mainland Southeast Asia are interacting more vigorously than ever before, as borders open and roads and railroads facilitate cross-border trade. World market demand for key perennial tree products produced in archipelagic Southeast Asia is spurring smallholder expansion of rubber, oil palm, tree resins, and various fruits, as well as timber production on farm. These forces will continue to impact land-use change in complex ways well into the future.

Historical lessons

Early approaches to soil conservation were developed for large landholdings in temperate regions and were based on structural and engineering treatments (for example bench terracing). Attempts to apply these approaches to developing country agriculture, characterized by smallholdings, diverse farming systems, extremes of climate and topography, wrenching poverty, weak government institutions, and very limited skills, have been disappointing (Magrath and Doolette, 1990).

Fortunately, alternative technical and institutional approaches are emerging. The concept of conservation-oriented farming in the uplands in which farming systems and realistic farming practices combine to conserve soil and improve total production is now recognized. Two complementary strategies for the development of conservation-oriented upland farming are evolving. The first is the adoption of a problem-solving approach aimed at identifying the key constraints on a site-specific basis. The second is the promotion of a suite of agroforestry-based practices that can form the basis of a comprehensive approach to farming system evolution in the uplands. One example among these is simple vegetative strip systems that provide a foundation for eventual conversion to tree-based systems. Another is the recognition of the immense potential for smallholder complex agroforests that provide robust, sustainable incomes while conserving soil and water resources in ways that closely mimic natural forests themselves.

Conventional approaches to watershed management have had little effect because they were dominated by top-down solutions to problems perceived by external stakeholders, not by the people that live there. External stakeholders, whether national governments or international entities, prescribed solutions, usually large-scale reforestation, on lands managed by local smallholders whose economic implications were opposed diametrically to the *de facto* land managers' food and income security objectives. Forced reforestation has been time and again passively resisted by the destruction or neglect of the young trees. Fire control is essential, and that can only be possible with the active and self-interested support of local people. Recognition of reasonable and appropriate land-use rights is also fundamental.

Fifty years of disappointment have forced decision-makers to revisit their assumptions, and realize the potential for collaborating with local farmers on solutions that both increase farm productivity as well as meet watershed protection objectives. This evokes a new era in which the smallholder is beginning to be seen as a critical part of the solution, not simply the scapegoat for the entire problem. Despite the availability of a wide range of options, most development projects have relied on a limited and generally high cost set of interventions. Technical solutions are important in resource management, but social capital to facilitate this process is even more crucial. It is becoming clear that agricultural productivity in upland areas can be intensified in an environmentally sound and sustainable manner. But new approaches must be applied to make this a reality.

Service vs. *production function of watersheds*

Outside stakeholders such as lowland populations, national government institutions, and the global community (i.e. all others besides the upland residents themselves) tend to be most deeply concerned about the service functions of watersheds. The attention of national policy-makers is drawn naturally to the concerns of the more affluent lowland populations and the impact of upstream-downstream linkages on these groups.

The key service functions of concern to outside stakeholders are to:

- *Regulate water flow* to the lowlands to reduce flooding, and provide a dependable water supply to the lower watershed for irrigation and power generation.
- *Prevent soil loss* to protect power generation reservoirs and irrigation structures.
- *Conserve biodiversity* and protect natural ecosystems.
- *Sequester carbon* to alleviate the threat of global warming.

These concerns may also be shared to some extent by the resident populations of the watersheds, but they are most urgently concerned about the productivity functions of watershed resources. These are to:

- *Sustain agricultural production*, and
- *Retain forest resources for local uses: Timber, fuel, grazing, nontimber products.*

Can there be practical solutions that can meet both needs? Watershed management involves a range of activities. Each activity would be expected to contribute to the aims of improving the sustained productivity of the natural resources, protect designated natural ecosystems, and improve rainwater management to provide the quantity and quality of water to meet the different needs of water users within and downstream of the watershed.

Participatory resource management in upper watersheds

National parks and natural reserves are the last-ditch bulwarks of protection for the priceless biodiversity resources of the humid tropical forests. They are under serious threat of encroachment. The classical method of preserving them has been to declare them off-limits and to enforce the exclusion of local people. Boundaries have been delineated and guard patrols introduced. Unsurprisingly, this has not been working. It often results in serious conflicts between the enforcement agency and the local communities. Enforcement alone does not work in most countries because population pressure is too great, the gains captured by local elites through encroachment are too lucrative, or the costs of enforcement are too high.

There are now many projects in the tropics called integrated conservation-development projects (ICDPs) that are attempting to save particular natural areas using this approach (Wells and Brandon, 1992). A social contract between communities and outside stakeholders must include enforcement mechanisms in tandem with the development benefits received. Compensation to communities in terms of development activities may take many forms. Most projects attempt to encourage improved natural resource management practices in the areas outside the reserve. The objectives are to increase people's incomes, and to intensify their production systems away from the more extensive, environmentally-degrading systems they may practice currently. There is growing interest in the development of more intensive land-use systems on the margins of protected forests and to identify policy and technology directions to underpin these efforts.

Case study of the Manupali watershed, Mindanao, Philippines: The SANREM experience

Research plays an increasingly important role in providing options and insights for ICDP development. The Sustainable Agriculture and Natural Resources Management Collaborative Research Support Programme (SANREM-CRSP) is a global programme that uses a landscape approach with a strong participatory focus. The International Center for Research in Agroforestry (ICRAF) collaborates in a consortium at the research location in the Manupali watershed in Mindanao, Philippines. The consortium is developing the elements of a practical social contract for buffer zone management, developing improved agroforestry systems for the buffer zone, and assembling a natural resource management system for the Kitanglad National Park (Garrity, 1998; Garrity and Amoroso, 1998). The research team is composed of scientists and practitioners from institutions including ICRAF, NGOs, universities, the tribal community, and local and national government institutions.

The lifescape of the Manupali watershed in Bukidnon, Philippines, is a microcosm of farming families and communities whose diverse vocations exert pressures on both the natural and managed ecosystems, particularly on the remaining protected forest of the Kitanglad National Park. The park is a relatively small ecosystem, less than 50 000 ha, but is of the highest conservation value because of the high endemism of flora and fauna (Amoroso *et al.*, 1995; Pipoly and Masdulid, 1995; Heaney, 1993). The present landscape of the upper reaches of the watershed consists of essentially three belts of land: *The National Park*, consisting mostly of pristine forested land existing at high altitudes (>1200 m asl), a belt of state forestland surrounding the park that is managed by the Department of Environment and Natural Resources (DENR) that serves as *the external buffer zone* of the park, and *privately-owned agricultural land* that is further downslope from the public forestlands.

The questions that the project address are: "How can the biodiversity of the Manupali watershed be protected under the social and economic realities? What is a practicable social contract? And, what are the processes leading to its successful implementation?" It is hypothesized that there are two essential conditions for sustainable buffer zone management and biodiversity conservation in the Kitanglad National Park, and other protected areas in the tropics:

1. Community-endorsed and supported enforcement of the boundaries of the natural forest ecosystem, and
2. Agricultural/agroforestry intensification in the buffer zone in order to enhance income growth on static land resources, complemented by other forms of off-farm employment generation in the local and national economy.

The work focuses on both aspects. The first concerns institutional development while the second is based on research that induces appropriate technical change suited to the biophysical and socioeconomic conditions of the buffer zone. The consortium sought a model of buffer zone management that works, and that could be extrapolated to other protected forest situations. The social contract underlying the model links the provision of assistance in intensifying agriculture to local responsibility for park boundary protection. An approach that involves community-endorsed and assisted enforcement of the integrity of the park by harmonizing management with ancestral domain claims has been adopted. The elements for a municipal natural resource management plan for the municipality of Lantapan that could provide a model for such endeavours all around the park were assembled. The conservation farming systems research and development provides farmers with economically attractive options that also promote biodiversity. The approach included the following elements explained hereunder.

The National Park

The mechanisms for community enforcement as the primary enforcement mechanism, complemented with education are being developed. The proposed approach is a suitable ancestral domain management plan, with boundary enforcement through contractual understanding with each village along the boundaries. The village would take upon itself responsibility to assist public and tribal entities to prevent encroachment inside Kitanglad National Park.

It is assumed commonly that the interests of local communities living in the environs of protected ecosystems are opposed diametrically to those of outside stakeholders concerned with global biodiversity (Brandon and Wells, 1992). The research provided evidence that there is significant self-perception among communities on the boundary of Kitanglad National Park that the protection of the natural biodiversity is in their own self-interest, particularly among the Tala-andig indigenous people, who regard the public lands as their ancestral domain (Cairns, 1996). These values are articulated by local people as protection of the hydrological resources of the upper watershed for water supplies, and of the spiritual and cultural values of the forest, among others. The current failure to protect these resources is due to the lack of institutional mechanisms that provide a framework for management of these systems. Lack of secure land tenure by the households residing in the buffer zone outside the park boundaries is a critical limitation.

The tribes' demonstrated commitment to conservation suggests that granting them ancestral domain would not be antagonistic to National Park objec-

tives. Rather, it could form the basis of a contractual agreement in which the tribes would guarantee protection of the forest margins in exchange for commensurate development programmes. The cultural diversity of the tribes has contributed to maintenance of the park's biodiversity, suggesting that cultural conservation should be an integral goal in National Park protection. The findings indicate that while both Tala-andig and migrant settlers are guilty of park and watershed encroachment, Tala-andig communities represent the best bet for implementing sustainable land-use systems that protect the integrity of the park (Cairns, 1996).

The buffer zone lands

The development and implementation of a management plan through a participatory approach that melds the perspective of farmer-occupants, tribal leadership, local government entities, NGOs, and the DENR are being fostered. Such a plan may include the recognition of an ancestral domain claim and stewardship contracts in the buffer zone, in the context of the overall management vision to protect and enhance the biodiversity of the National Park and the buffer zone. The research on reliable indicators of sustainable land use will provide appropriate stipulations for future social forestry contracts and community conservation education will increase local compliance with stipulations.

Forest-based communities need to be empowered in the planning and implementation of natural resource management projects (Wynter, 1993; Fisher, 1994; Gakou and Force, 1996; Prein and Lopez, 1995) that employ tree-planting as an approach to forest replenishment (Postel and Heise, 1998; Rao, 1985; Cernea, 1989; Koffa and Garrity, 1996). Experience indicates that smallholders will plant trees on their land if they have some form of rights to the trees and land, and have a suitable supply of adapted tree germplasm with a ready market (Garritty, 1994; Garrity and Mercado, 1994).

Private lands

The work here assists in assembling the elements of a municipal natural resource management plan, combined with proactive farming systems development through participatory research and education. Economically attractive farming options that promote agrodiversity and natural biodiversity, with emphasis on the capacity of ravines to function as wildlife corridors extending downslope outside the protected area boundaries are evolving. The work on

natural resource management strategies and policy had two components. The first focused on assembling the information needed to guide the development and implementation of a natural resource management plan for the municipality of Lantapan. The second aimed to analyze the ancestral domain claim of the Tala-andig people in relation to the natural resource management issues of the National Park and the surrounding municipalities. It became clear that the interactions between these three domains (the park, the ancestral domain claim, and the municipalities) must be clarified and reconciled (Figure 1). The work aimed to provide options leading to a consensus that would meet the various stakeholders' concerns.

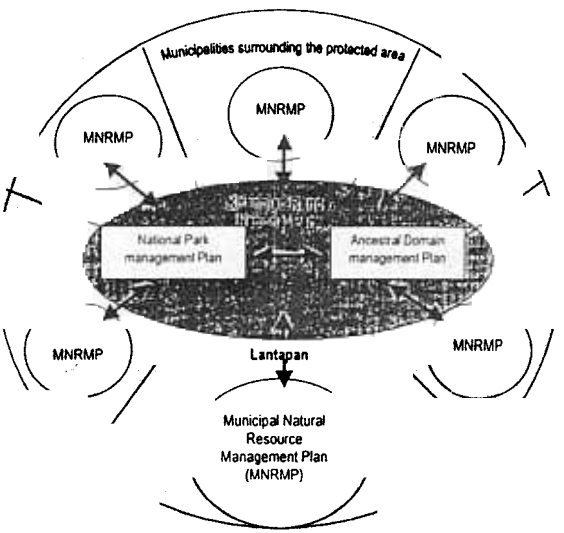


Figure 1. Diagrammatic representation of the linkages between three types of natural resources management plans.

Municipal natural resource management plan

Natural resource management planning is a new research and development endeavour for the municipality of Lantapan (as it is for all Philippine municipalities). It aims to identify courses of action and to frame policy options for environmental management. Appropriate strategies and processes

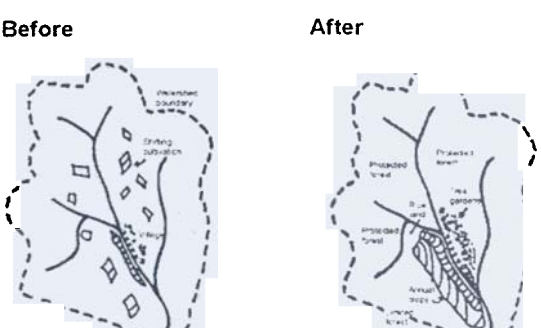
are being evolved to attain environmental goals that address the natural resource conditions of Lantapan. The approach applied to planning was participatory. It involves a comprehensive set of processes that lead to consensus-building in decision making. In carrying out the planning process, the local government unit (LGU) partners in the community were represented on a Natural Resource Management Council (NRMC) whose composition was a cross-cut of community sector representatives from government and nongovernment groups. The council was developed as an output of the LGU project workplan. Knowledge and experience gained from collaboration with SANREM-CRSP was a major influence on the LGU to spearhead this important step towards environmental management planning (Pajaro and Catacutan, 1998). Thus, appropriate links between development activities and enforcement are being established. The Management of Soil Erosion Consortium (MSEC) has selected the SANREM research watershed as its target site in the Philippines. These partnerships will enable MSEC to build upon the SANREM experience and increase the opportunities for evolving a model of participatory catchment management that has extrapolation value elsewhere.

Applying the landscape-based agroforestry concept: The case of the Sam Muen project in northern Thailand

In Thailand, forest destruction and watershed degradation are of particular concern in the northern highlands, which are the headwaters of all major tributaries of the country's major river artery, the Chao Praya River. Hundreds of farming villages exist in the upper watersheds, which have spurred the Royal Forest Department (RFD) to attempt to reforest lands with timber plantations, to remove populations from protected areas, and to enforce regulations against farming there, resulting in conflict with the resident villagers. These efforts have had limited effect.

ICRAF is working with numerous partners to develop landscape management systems in key watersheds. The concept is to move beyond individual households to include management functions at a community level (Thomas, 1996). The agroforestry system is a community watershed land-use mosaic that includes forest, tree, and crop components that interact in numerous ways. The utility of the landscape-based agroforestry concept is illustrated by the experience of the Sam Muen Highland Development Project (Limchoowong and Oberhauser, 1996). This was a pioneering example of the development of a community watershed mosaic system that is having a major impact in spurring a revision of the whole approach of the Thai government in managing upland watersheds.

A framework was necessary that recognized the legitimate rights of communities to reside in upper watersheds and that explored ways in which the service functions of the watershed could be maintained or enhanced while enabling the communities to pursue farming activities that were in reasonable harmony with these objectives. The boundary was drawn around the perimeter of a small highland subcatchment. A participatory land-use planning approach (Tan-Kim-Yong, 1994) provided a mechanism for villagers and the forestry department to negotiate and implement mutually a suitable solution. Three-dimensional models of the portion of the watershed occupied by the village proved to be conducive tools by which land-use zoning was done. Watershed committees were established that identified the problems and developed community-enforced land-use rules in place of rigid government regulations. The landscape was categorized into a mosaic of areas for various types of land use, which may include appropriate simultaneous combinations of protected natural forest, managed natural forest, field-based agroforestry, boundary plantings, annual crops, rice paddies, and others (Thomas, 1996). Specific zones for agroforestry and annual crops are identified; these are managed by individual households. They are subject to necessary conditions imposed by the community. After realistic boundaries were established for protected forests, and the security of land-use rights was confirmed in areas designated for agriculture, the communities became active agents in forest protection. The result has been dramatic improvement in the watershed environment (Figure 2).



Land-use change with participatory land-use planning

Figure 2. Schematic representation of land-use change with participatory land-use planning in northern Thai villages (adapted from Tan-Kim Yong, 1994). Continuous farming and agroforestry are expanded near the village while shifting cultivation in the protected forest is reduced.

Forest cover has increased substantially and the area in annual cropping has decreased. The establishment of fruit tree gardens has diversified income sources while enhancing soil conservation. Intervillage relations are managed through a watershed management network, which is authorized by the local subdistrict government. The experience demonstrated clearly that local communities can become enthusiastic partners with the government to solve watershed management problems. This may be particularly true on land claimed by the state on which villagers have tenuous land rights and seek to gain recognition of their *de facto* occupation. However, a major challenge remains in sensitizing the bulk of personnel in the responsible government agencies if the lessons are to be applied on a wide scale in the upper watersheds throughout Thailand.

Farmer-led grassroots initiatives to conserve resources The Landcare approach

The examples described above of participatory approaches to catchment management (SANREM and Sam Muen) were driven largely by innovative public sector leadership. In the case of SANREM this was manifested through a research project collaborating with enlightened municipal government institutions. In the case of Sam Muen it was driven by progressive leadership in the Royal Forest Department backed up by university researchers. Public-sector driven approaches to evolve participatory resource management systems undoubtedly will play a crucial role in the future. But there are alternative ways of building wide-scale participation in the management of natural resources that will play an increasing and complementary role in the future. These are grassroots organizational approaches that are driven by nongovernmental efforts, and especially local organizations (LOs). In countries such as the Philippines, where the decentralization of power and fiscal responsibility is occurring, and democracy is institutionalized down to the village level, the development of leadership skills in the farming population is maturing rapidly. These skills provide a basis for the evolution of grassroots organizations led by farmers to address their own problems and to attract (or demand) the public sector to assist them solve these problems.

Soil conservation and conservation farming are key concerns of huge numbers of farmers in tropical Asia, and may provide a sound basis for farmers to organize their own associations to address practical ways of overcoming the problems as they see them. Grassroots farmer organizations are seen to become the basis for successful soil and water conservation in the temperate world (Conservation Districts in North America and the Landcare move-

ment in Australia). ICRAF's experience on the sloping upland catchments in Claveria, northern Mindanao, (and more recently in Lantapan) suggest that there is major potential for enhancing this grassroots approach in the tropics of Southeast Asia as well. This section relates the lessons learned from this experience that are relevant to the development of participatory approaches to catchment management.

Participatory contour-hedgerow initiative

Continuous crop production on steep slopes in Mindanao induces annual rates of soil loss that often exceed 100 t ha^{-1} (Garrity *et al.*, 1993). The installation of contour hedgerows reduces these losses by 50-95% and creates natural terraces that stabilize the landscape and facilitate further management intensification. These advantages have led to the wide promotion of hedgerow technology by the DENR and the Department of Agriculture (DA). But adoption has been poor, and installed hedgerows are abandoned often. This is because the increased labour demands in managing tree hedgerows are not compensated sufficiently by the yield increases from the tree-leaf prunings applied as green manure (ICRAF, 1997). An adoptable technology must have minimal cost to the farmer, and be easy to extend to large numbers of farmers.

ICRAF has been working intensively with an indigenous practice: Natural vegetative strips (NVS). These very simplified hedgerows are made by laying out contour lines and then allowing the natural vegetation to grow (Garrity *et al.*, 1993). The NVS are exceptionally effective in soil conservation. They require minimal maintenance and require no outside source of planting materials. The NVS concept was included in our farmer-to-farmer training programme conducted in collaboration with the DA. It was observed subsequently that some 200 farmers adopted the technique, most of them on the basis of observing a neighbour's success. NVS technology seems particularly well-suited to vegetable farming systems because there is little possibility of competition between NVS and the crops.

Landcare as a two-pronged approach

Late in 1995, ICRAF was approached by farmers for assistance in installing contour hedges to prevent soil erosion. In response, the Contour Hedgerow Team (CHET) composed of ICRAF technical staff, a technician from the DA, and a motivated farmer was formed. The team initially worked with individual

farmers who requested their assistance (Figure 3). Subsequently, group training was conducted to reach more farmers: This involved 5-7 participants from each of the seven villages in which the team was working. Before the end of the training, the participants decided to organize themselves into a people's self-help organization on conservation farming. Officers were elected and the organization came to be known as the Claveria Land Care Association (CLCA).

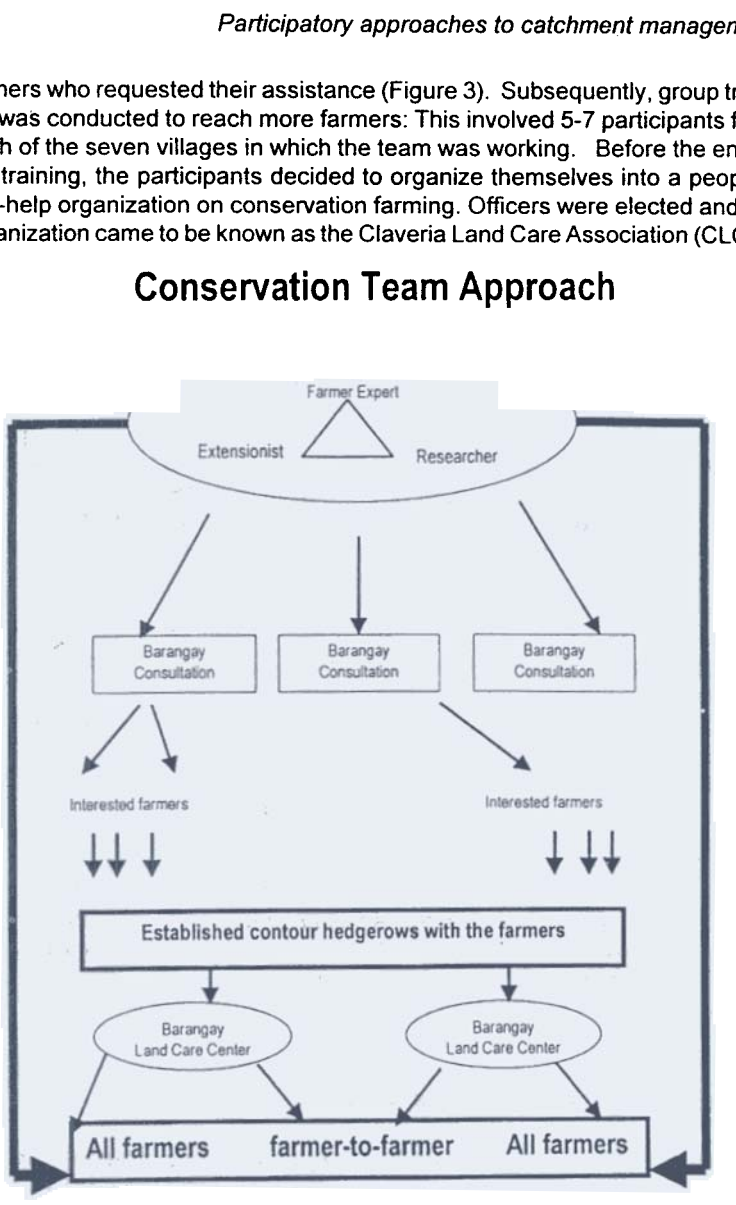


Figure 3. The conservation team approach to the dissemination of conservation farming innovations.

After the CLCA was formed, the participants grouped themselves according to the villages they represented. Groups of farmers from each individual village formed separate chapters, each chapter being a Land Care Centre (LCC), a subgroup of the CLCA. Chapters elected their officers and expanded their membership within their respective villages. Experienced chapter members spread the NVS technology to other neighbouring farmers in their village. Subsequent group training was organized upon request from the chapters; the events were conducted in the village where the requesting chapter was located. The newly trained farmers joined their respective village chapters, thus increasing the LCC membership. The Conservation Team's role shifted from working with individual farmers to backstopping the chapters as they pursued their objectives in disseminating the NVS technology.

Fifty-eight chapters of the CLCA have now been activated in villages across the municipality. The CLCA has a monthly meeting attended by the Chairs of each of the different chapters. Chapter Chairs discuss issues and problems in their respective chapters, thus giving regular feedback to the CLCA and the Conservation Team. The chapters each have regular meetings also.

One of the key issues that emerged in various meetings was the establishment of cash perennials on the NVS. Most farmers are keen to establish timber and fruit trees on their NVS. *Gmelina arborea* has been planted widely, and farmers have been looking for other species, particularly *Eucalyptus deglupta*, because of its better market potential for poles and lumber. The CLCA has put up a central nursery. It was agreed that each chapter contributes the labour required and costs of the establishment and maintenance. ICRAF has provided the improved seed. The NVS are proving to be a foundation for the evolution of more productive timber or fruit tree-based agroforestry systems.

Over 200 village and private nurseries have now been set up and are producing timber and fruit trees seedlings for the NVS. The seedlings raised are *Eucalyptus spp* such as: *deglupta, robusta, camaldulensis*, and *torillana*. Chapter members provide the nursery sheds, fencing, cellophane bags, and potting material, and implement all activities in the nurseries. Members rotate in maintaining the nurseries for tasks such as watering and cleaning.

As the barangay (village) officials became increasingly aware of the ongoing activities, interest to participate in the programme expanded rapidly. The decentralization programmes of the national government gave increased power to the LGUs to manage their natural resources. Many national government programmes have been devolved to the municipal level such as: Agriculture, health and nutrition, natural resources management, police, etc. The barangays are given funds to be directed toward environmentally-related projects such as soil and water conservation, tree planting, waste manage-

ment, and others. Some of these funds are now channeled to the activities of the Landcare movement, which has boosted momentum and helps ensure its sustainability.

Building on past experiences

The Landcare approach is a method to rapidly and inexpensively diffuse agroforestry practices among thousands of upland farmers. It is based on the farmers' innate interest in learning and sharing knowledge about new technologies that earn more money and conserve natural resources. The essential elements of the approach are: A flexible set of proven technologies for smallholder agroforestry and conservation farming; farmers' exposure to these technologies through observation and trial on their farms; development of farmers' organizations to widely diffuse knowledge about the technologies within the municipality; and (in the event that the prior steps are successful) financial support from local government (municipality and village) to enhance the sustainability of the movement.

Analysis of the current experience with the Landcare approach showed that the costs to implement it in new municipalities would be modest (Garrity and Mercado, 1998). This is because implementation of the technologies is well within the farmers' own capabilities. Even the development of effective community nurseries has proven to be quite practical through volunteer effort alone. If the Landcare organization proves to be useful within the community, the municipal and local governments will have the incentive to provide financial support for the acceleration of the spread of conservation practices and tree planting. This will ensure sustainability more than dependence on outside resources.

Some outside resources, however, will be important to the success of the approach. The most critical of these is ensuring the presence of sensitive, soundly trained, and highly motivated persons to facilitate the process of conveying the technologies and developing a sound farmers' organization. They will have to be capable of identifying and nurturing the leadership qualities of farmers to become leaders in their organizations. The facilitators will need both technical skills and people skills. Beyond this, resources will be needed for fielding these people, and ensuring that the needs for transport, communications, and training materials are met.

Four key steps in extrapolating the Landcare approach to new locations have been observed (Garrity and Mercado, 1998). These are:

1. **Expose farmers and farmer leaders from target municipalities to successful technologies and organizational methods.** The process

begins by organizing cross visits to the fields of farmers who have already adopted and adapted the technology successfully into their farming systems. If there is interest on the part of those exposed to the conservation technologies (such as natural vegetative strips or other agroforestry practices), then provide training experiences for farmers in the target communities to learn about the practices through seminars in their villages. Also provide opportunities for farmers to try out the technologies on their land through unsubsidized trials to convince themselves that it works as expected. If so, these farmers become the core of a "conservation team" to diffuse the technology in the municipality. The aim of these activities is to develop strong awareness among prospective key actors of the opportunities to address effectively production and resource conservation objectives through the new technologies. The success of these activities can be measured through the development of enthusiasm to adopt the technologies within the community.

2. **Organize a conservation team at the local level.** Once it is clear that there is a critical threshold of local interest in adopting the technologies and a spirit of self-help to share the knowledge within and among the villages of a municipality, then the conditions are in place to support the implementation of a municipal conservation team. The team is composed of an extension technician (the DA and/or the DENR), an articulate farmer experienced in the application of the technology, and an outside technical facilitator. The team will assist initially individual farmers in implementing their desired conservation farming practices. Later, they will give seminars and training at the village level if sufficient interest arises. During these events they will respond if there is interest in organizing more formally so as to accelerate the spread of agroforestry and conservation practices.

   Each village may have its own Conservation Team. Some villages may organize subchapters. The municipal level organization, the Landcare Association, is a federation of all of the village (barangay) Landcare chapters. The municipal conservation team is part of the municipal level organization, which also includes the agencies supporting the programmes (e.g. the DA, the DENR, and NGOs). The conservation teams will facilitate activities such as training, field demonstrations, nursery development, workgroups, and others.

3. **Organize a land care association.** If and when the preconditions are in place for a farmers' land care organization, then the facilitator may assist the community in developing a more formal organization. A key ingredient of success is identifying and nurturing leadership skills among prospective farmers in vision and organization. This may involve arranging

for special training in leadership and management for the farmer leaders, and exposing them to other successful land care organizations. The land care association will be composed of village-level chapters integrated into a municipal-level association. Figure 4 shows the structure of the Landcare Association of Claveria, Misamis Oriental.

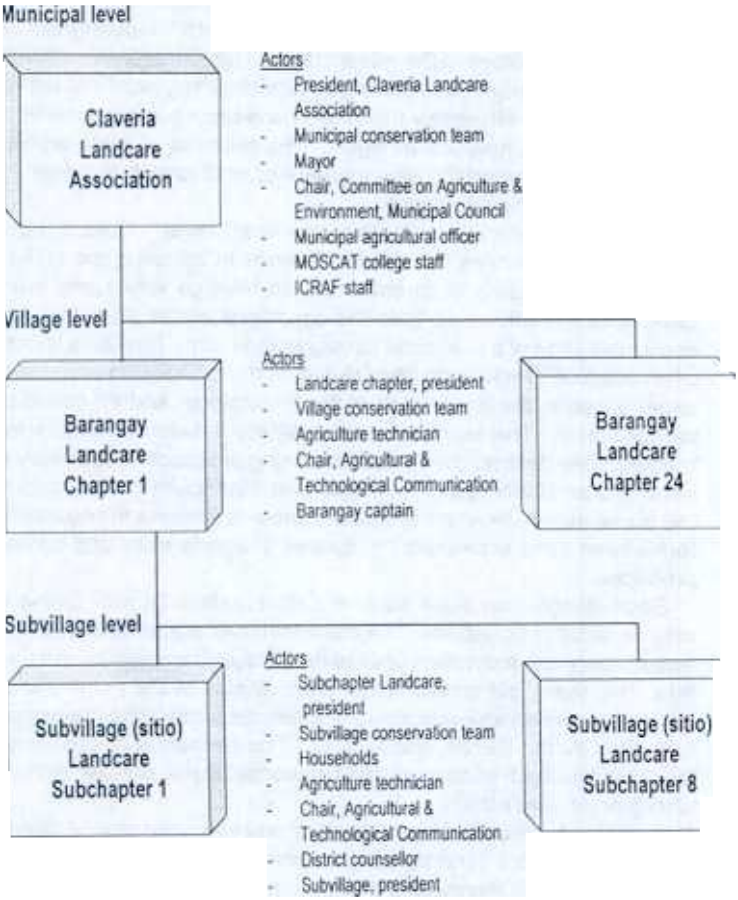


Figure 4. The structure of the Claveria Landcare Association at the subvillage, village, and municipal levels.

4. **Tap local government support for political, human, and financial aspects.** Local government can provide crucial political and sustained financial support to the association to assist it to meet its objectives. The municipality has its own funds that are budgeted to be spent on environmental conservation. These can be targeted to land care activities that enhance natural resource conservation. The municipality can be encouraged to develop a formal natural resource management plan to guide the allocation of conservation funds. The villages can also allocate financial resources from their regular internal revenue allotments. These funds can be used to organize the conservation teams and land care association activities from the village down to the subvillage level, including training and honoraria for the different actors if the time commitment required exceeds that possible with purely voluntary efforts.

External donor agencies can best support the development of the land care programme by allocating resources for leadership and human resources development, communications equipment, and transportation. Effective local action is the basis for achieving real stewardship of a community's natural resources. Solutions to problems that farmers face in their search for sustainable farming systems often come from the ground up. But experience indicates that a national vision and national leadership is also essential for a country to achieve success in conserving its soil and water resources.

Without a common vision, and the information and understanding to help people to work together at the local level to meet mutual objectives, local efforts lose momentum. The stream of new conservation farming technologies that provides a basis for hope may dry up. Therefore, finding a suitable way of expanding the Landcare movement to other municipalities, and developing a national system of technical support for the movement are key challenges to be faced in the coming years. Figure 5 illustrates the structure for a coordinated national system of government and nongovernment support for natural resources conservation on private lands. A slightly revised version of this vision was proposed as the basis for the new Philippine Strategy for Improved Watershed Management (DENR, 1998). The system is based on two pillars: A strong national association of farmers' land care organizations that provide grassroots demand for new ideas and action, and a strong natural resources conservation service (or soil conservation service) that can provide leadership and technical support at the national and local levels. The reach of both the land care association and the government natural resources conservation service extends from the national to the local levels. They are backed up by a host of other government organizations (such as the

agricultural universities) and many nongovernmental organizations active in agricultural development and conservation. Mobilizing the vision and the appropriate organizational mechanisms to implement a truly national system of natural resources conservation is a great leadership challenge.

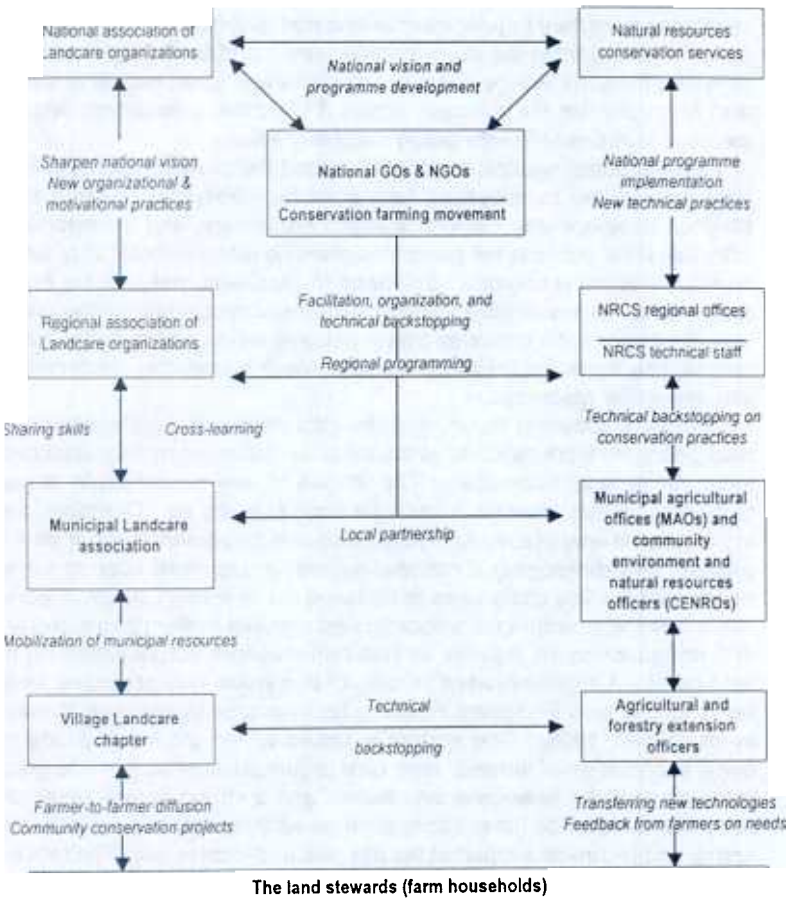


Figure 5. A vision for a national natural resources conservation system based on public-private partnerships.

Conclusions

Watershed management requires an integrated and multisectoral approach to sustainable development. But government departments are compartmentalized and geared for top-down operations. They will need to change. Participatory approaches transfer principles rather than standard solutions, and make available a basket of choices rather than a set package of practices (Garrity and Agus, in press). Problem analysis must not simply be done by outsiders for the community, but must be done by the community itself with backstopping from the outsiders. The solution is not to transfer some known technology, but to assist farmers to adapt technologies to their own circumstances. This is predicated on the recognition that rural people, educated or not, have a much greater ability to analyze, plan, and implement their own development activities than was assumed previously by outsiders.

Experiences from selected watershed management projects in the Philippines and Thailand were able to draw conclusions on the effective pathways toward effective land husbandry and local natural resource management. These examples included participatory natural resource management initiatives spearheaded by the public sector, and by grassroots farmer-led organizations. They suggest a bright promise for watershed management through local organizations in partnership with government institutions. Eventually, these locally-led processes will take a lead role in transforming the way extension and research in upland management is done. Further work is needed to build on these and other experiences to further evolve workable approaches that show clearly how this can be done on a much bigger scale in the tropics.

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