The Interface Between Poverty and Protection:

The Challenge in Integrated Natural Resource Management*

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ABSTRACT

There are serious methodological and policy hurdles to be overcome in making integrated natural resource management effective in alleviating rural poverty while protecting environmental services in tropical watersheds. This paper reviews the development of an approach to integrate biodiversity conservation and agroforestry development through the active involvement of communities. The work was focused on the Kitanglad Range Nature Park in the upper reaches of the Manupali watershed in central Mindanao, Philippines. Kitanglad is one of the most important biodiversity reserves in the Philippines, and is one of the three global sites of the Sustainable Agriculture and Natural Resources Management (SANREM) Program. The Biodiversity Consortium at the Philippine site was composed of collaborating organizations including a university, NGOs, government agencies, and the International Centre for Research in Agroforestry (ICRAF). We developed technical innovations suited to the biophysical and socio-economic conditions of the buffer zone, including practices for tree farming and conservation farming with annual crops, that have been widely adopted. We also fostered institutional innovations to improve resource management. The elements were put in place for an effective social contract to protect the natural biodiversity of the Park. The knowledge base guided the development and implementation of a natural resource management plan for the Municipality of Lantapan. We assisted the development of a dynamic grassroots movement of farmer-led Landcare groups in the villages near the park boundary that has had significant impact on natural resource conservation in both the natural and managed ecosystems. The experience has been recognized as a national model for natural resource management planning and watershed management in the Philippines. Using an integrated natural resource management research framework, we are currently evolving a Negotiation Support System to resolve the interactions

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between the three management domains: The Park, the ancestral domain claim, and the municipalities.

INTRODUCTION

The Sustainable Agriculture and Natural Resources Management (SANREM) Program is a global research effort that aims to develop a new paradigm for research on sustainable agriculture and natural resources management (Hargrove et al, 2000). The program takes the whole landscape and lifescape of a watershed as the basis for formulating and resolving major management issues. It includes communities and local government bodies as reviewers, partners, and implementers of the research. The approach seems well suited to tackling some of the key methodological issues in protecting the natural habitats of unique tropical biodiversity encountering human pressure.

One of the three global sites where SANREM has been working is the Manupali watershed on the southern border of the Kitanglad Range Natural Park in central Mindanao, Philippines. The Biodiversity Consortium at the Philippine site was a component of SANREM during its first phase (1993-98). It was composed of collaborating organizations including a university, NGOs, and government agencies, convened by the International Centre for Research in Agroforestry (ICRAF). The work was also linked with the global program on Alternatives to Slash-and-Burn. Its objective was to conduct research to develop tools and approaches that combined improved biodiversity conservation with the better livelihood opportunities through agroforestry for the communities that live near the Kitanglad Range Nature Park. This paper reviews that experience. It concludes by examining the implications of an integrated natural research management approach in this context.

THE GLOBAL EXPERIENCE

The classical method of preserving a natural area has always been to declare it off-limits and enforce exclusion. In tropical conditions, enforcement often was not successful because population pressure was intense, or the costs of enforcement were too high. The approach of integrating conservation and development attempts to link enforcement with compensation to the communities that are directly affected by the presence of the natural area (Wells and Brandon, 1992). During the past decade there has been a rapid expansion in participatory watershed resource management projects and integrated conservation-development projects (ICDPs). However, the participatory mode is novel and complex, and such projects have little theory or experience to draw upon (Rhoades, 1998).

The SANREM Biodiversity Consortium began its work by drawing on the lessons learned from the global experience with ICDPs (Wells and Brandon, 1992; McNeely, 1995). One of the key lessons that has emerged is that *cooperation and support of local people is the key.* Communities near protected areas often bear substantial costs in foregone use or extraction from the protected area, yet gain little in return. They are usually poor and quite remote to normal government services. *There must be explicit linkages between project components*. An integrated approach with balanced attention to both enforcement and development is necessary. To achieve the goals of protecting biological diversity and helping to improve the welfare of the people living near the protected area, it is necessary

to pay explicit attention to how the rural development activities directly support the objective of protection. *Some types of development initiatives may increase the pressure on the reserve.* Road construction, or growth in agricultural productivity, may have this outcome under some circumstances. Introduction technologies that raise agricultural productivity may elevate land values, and may make it more attractive to encroach on to reserve land**.** *In promoting local development, compensation to communities may take many forms.* These have often included agroforestry practices, crop intensification & irrigation, conservation farming practices, community forestry and others (Wells and Brandon, 1992). The objectives are to increase people's incomes, and to intensify the production systems away from the more extensive systems currently practiced. *For sustained protection, in-migration must be controlled, and off-farm employment generated*. These factors also impinge upon protection of natural biodiversity areas, and must also be satisfactorily addressed.

INTEGRATING CONSERVATION AND DEVELOPMENT IN THE MANUPALI WATERSHED

Biodiversity Value

The Kitanglad Range Nature Park is acknowledged as one of the most important biodiversity reserves in the Philippines. It supports the richest known vertebrate fauna (mammals and birds) in the country (Amoroso et al., 1996; Heaney, 1992, 1993 unpublished). It is the habitat of many endangered, endemic, rare and economically important species of animals and plants. Heaney (1992) observed thirteen of the fourteen species of birds endemic to Mindanao, including the critically endangered Philippine Eagle (*Pithecophaga jefferyi*). One genus of mammal is endemic to the park alone, the poorly known *Alionycteris paucedentata*. The park is a relatively small ecosystem of approximately 50,000 hectares, but is also of exceptionally high conservation value in terms of high endemism of the vascular flora (Amoroso et al. 1996; Pipoly and Masdulid, 1995 pers. com.). This includes the endangered rootless vascular plant (*Tmesipteris lanceolata* Dang.) (Amoroso et al, 1996). The park was recently found to have the highest tree density ever reported in a tropical forest (Pipoly and Masdulid, 1995 personal communication). This combination of a small, manageable size, and a rich, singular biodiversity, conforms to the type of protected ecosystem that Sayer (1995) proposes ought to receive the most determined attention in tropical biodiversity protection.

The Watershed

The people residing in the Manupali watershed, downslope from the Park, exert pressures on both the natural and managed ecosystems, particularly on the remaining protected forest. Amoroso (1997) noted an alarming rate of habitat destruction due to human activities, including illegal cutting of trees, over-harvesting of minor products, shifting cultivation, and conversion of forest lands to agricultural production. The present landscape of the upper reaches of the Manupali watershed consists of essentially three belts of land:

1) *The national park*, consisting mostly of pristine forested land existing at high altitudes (>1200 masl) with few current household land claims and National Park status,

2) A zone of land surrounding the park that is managed by the Department of Environment and Natural Resources (DENR) as production forest: *this is the external buffer zone* of the park. This is land on the fringe of the forest and has now been mainly converted to agricultural fields interspersed with *imperata*-dominated grassland. Encroachment here has been partly sanctioned through the expectation of social forestry stewardship contracts, with eviction no longer a tenable management option, and
3) *Privately-owned agricultural land* that is further downslope from the public DENR lands. These landholdings comprise a mosaic of agroforest, crop, and fallowed fields, with remnant forest existing in the steep ravines which border the streams that drain the national park.

The Participatory Learning Landscape Appraisal (PLLA), and our research during the initial years (1993-96), documented the land use practices (COPARD, 1996, Banaynal, 1996). This work highlighted the urgent need to develop an integrated and sustainable buffer zone management program. The indigenous Tala-andig people regard the public lands as their ancestral domain. Initial research indicated there was a significant self-perception among communities on the boundary of the Park that the protection of the natural biodiversity was in their own self-interest (Cairns, 1996). Key concerns of the local people were protection of the hydrological resources of the upper watershed for water supplies, and of the spiritual and cultural values of the forest. They attributed the current failure to protect these resources was due to the lack of institutional mechanisms to manage these systems that explicitly included local needs for more secure land tenure and alternative livelihoods. Lack of secure land tenure by the households residing in the buffer zone outside the park boundaries was a critical problem.

The Project Framework

The project goal was to elucidate a more fundamental understanding of people-ecosystem interactions to guide development of practicable natural resource management plans and processes. The research aimed to develop the elements of a workable *social contract* between buffer zone communities and the non-local stakeholders concerned with resource protection. We hypothesized that there were two essential conditions for sustainable buffer zone management and biodiversity conservation in the Kitanglad National Park:

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

Our work focused on both aspects. We investigated appropriate technical innovations suited to the biophysical and socio-economic conditions of the buffer zone, and we studied how to induce institutional innovations to enable better natural resource management. The social contract underlying the model links the provision of assistance in intensifying agriculture to local responsibility for park boundary protection.

ENHANCING AGRODIVERSITY

Agriculture is the dominant livelihood in the villages near the Park, as is the case with most other protected areas in the tropics. The boundary area of Kitanglad Park is located at an elevation of 600-1700 m, where temperate vegetable crops (including potatoes, cabbages, and tomatoes) are quite productive. Vegetable production is expected to further expand in the future. Our analysis indicated that the most likely future trajectory for farming systems in the buffer zone is toward continuous vegetable production on a portion of the farm (0.1-1.0 ha), with perennials (timber nad fruit trees) grown on the remaining farm area, particularly on the steeper parts. A farm planning exercise with 67 families in three buffer zone villages (COPARD, 1996) found that the greatest interest was in establishing contour hedgerows on the annual crop areas of the farm, and increasing the area of fruit and timber tree crops on the remainder. The farmer-participatory research effort thus focused on enhancing the environment for smallholder tree production and contour hedgerow systems to sustain annual cropping.

SMALLHOLDER TREE PRODUCTION SYSTEMS

Prior attempts to reforest the buffer zones of deforested areas in the Philippines focused on the planting of large blocks of trees with local wage labor by the Department of Environment and Natural Resources (DENR). Such a project was implemented in the Manupali watershed during the late 1980s, prior to SANREM. Like many other such top-down attempts, it failed. The plantations were burned out, often by local smallholders, across whose land the trees were planted. Only a few small remnant stands now remain in the 'reforested' buffer zone area. Research in northern Mindanao documented a major transformation toward smallholder timber tree production in this region in response to market development (Garrity and Mercado, 1994). There is increasing evidence that smallholders are a key to future reforestation efforts in the tropics (Pasicolan, 1996; Garrity, 1994).

Our approach was to ensure that improved germplasm was available for a variety of species to enhance income and reduce risk, and that best management practices suited to local farm circumstances were in place. Our initial work focused on determining an appropriate mix of species of interest to farmers, and testing diffusion strategies to incorporate them into farming systems. A farming systems survey (COPARD, 1996) and several training exercises (Koffa and Garrity, 1996, unpublished) indicated that farmers in the buffer zone and private lands were very interested to expand the area of timber trees on their farms. The constraints to accelerating the process were a lack of seedling supply, knowledge of which species were most profitable, appropriate tree management, and availability of a wider range of tree germplasm to diversify risk.

We conducted a farm survey that developed a comprehensive knowledge base on multipurpose tree species performance at different elevations in the upper watershed (Glynn, 1996). The most common timber species planted in the upper watershed were *Pereserianthes falcateria, Gmelina arborea*, and *Eucalytus camaldensis*. Farmer observed that *Eucalyptus species* perform particularly well at the buffer zone elevation levels (Glynn, 1996). We introduced germplasm of a range of other fast-growing timber species, with emphasis on new accessions of *Eucalyptus deglupta* and others. This was followed by a series of experiments that evaluated the available commercial species for comparative

performance by elevation. This work is being complemented by investigations to domesticate a number of local species identified and used by farmers for timber (Palis, 1997). We also experimented with three types of smallholder nursery systems. These activities resulted in a major acceleration of tree-production in the buffer zone (see section below on Landcare).

Enhancing Conservation Farming

Continuous crop production on steep slopes in Mindanao induces annual rates of soil loss often exceeding 100-200 t/ha (Garrity et al, 1993). The installation of contour buff strips reduces these losses by 50-99% and creates natural terraces that stabilize the landscape and facilitate further management intensification. These advantages have led to wide promotion of contour hedgerow systems by the DENR and the Department of Agriculture (DA). But adoption has been poor, and installed hedgerows are usually abandoned because it takes too much labor to manage the tree hedgerows (ICRAF, 1997). We began working with an indigenous practice called *natural vegetative strips (NVS*). These are made by laying out the contour lines on sloping fields, and then allowing them to re-vegetate naturally (Garrity et al, 1993). We found that NVS are exceptionally effective in soil conservation with minimal maintenance, and require no outside source of planting materials. Nelson et al (1998) modeled the long-term trends in maize yields, and found that the yield advantage of NVS increased to about 0.5 t/ha. Since 1996 about 300 farmers have now adopted the NVS practice on their farms in the upper watershed.

The tree farming and contour buffer strips practices had immediate potential to help farmers in the buffer zone intensify land use and increase profitability, while sustaining land resources. Their widespread adoption is now backstopping the institutional innovations, and provides pragmatic alternatives to encroachment in the Park. Current research is estimating the aggregate effects of these vegetative buffers and filters on the hydrological functions at the landscape level (van Noordwijk et al, forthcoming). We now turn to the process of evolving participatory institutional innovations for local natural resource management.

ASSEMBLING THE ELEMENTS OF A SOCIAL CONTRACT

The foremost policy issue impinging on local natural resource management systems is the reality of overlapping land rights and management priorities. There are three sets of overlapping management claims and systems in the vicinity of the Park. These are: the Park and production forest land administered by the state (DENR), the ancestral domain claim of the Tala-andig people, and the jurisdictions of the six municipalities that surround the park Figure 1 shows how these interact geographically. SANREM policy research focussed on understanding the ways in which the three overlapping jurisdictions can be reconciled, and in developing a scientific basis for management plans by the three sets of entities. The work aimed to provide options leading to a consensus that would meet the various stakeholders' concerns. We envision the development of a natural resource management system for the buffer zone of the Park that is based on a holistic Park management plan, coordinated with an ancestral domain management plan. These need to be supported by the municipal-level natural resource management plans. We are using an integrated natural resource management research framework to evolve a Negotiation Support System to resolve the interactions between these three management domains (van

Noordwijk et al, forthcoming). The following sections review the current status of that work.

Municipal Natural Resource Management Planning Model

SANREM research evolved a knowledge base for a scientifically-based local natural resource management planning process. In late 1995, the Mayor of the municipality of Lantapan committed human and financial resources to the development and implementation of such a plan, for which there was no precedent in the Philippines (Catacutan et.al. 1999, pers. com.). The municipal government created a multi-sectoral Natural Reources Management Council, and a local planning team. The draft plan was circulated and subjected to public hearings, and enacted by the Municipal Council in early 1998. The municipal government has currently allocated 5% of the municipal budget for plan implementation. Ten villages within the municipality have allocated an average of 10% of their budgets for activities related to the plan. The initial impact of the plan has included a number of new policies and regulations related to resource conservation. Many activities have been implemented related to the conservation of land, water, and biodiversity.

The Consortium's technical contributions to the plan stemmed from its research on agroforestry, conservation farming, and biodiversity conservation. For example, numerous steep ravines emanate from the Kitanglad range out into the agricultural landscape. These valleys are the least disturbed parts of the agricultural area, and they harbor diverse natural communities. They may be valuable in radiating strands of natural biodiversity outward from the protected area into the agricultural parts of the landscape. We worked to develop an appropriate strategy to enhance the biological integrity of the ravines. Glynn (1996) developed a methodology to survey and map the vegetative communities of major ravines of the Alanib River. The maps provided a basis for identifying the hot spots where change in land management practices was needed to protect stream water quality and riparian biodiversity. Based on this information, a ravine habitat management component was incorporated into the municipal natural resource management plan. The communities have now been actively re-vegetating the degraded streambank areas with trees.

The Lantapan experience is a significant advancement in municipality-led and participatory local NRM planning. In 1998, the DENR recognized the Lantapan experience as a national model for natural resource management planning in the ***Philippines Strategy for Improved Watershed Resources Management*** (DENR, 1998). We are now seeing the model implemented in other municipalities in Bukidnon and other provinces throughout the country. It is a significant step in the devolution of planning and management for natural resource protection to the local level, and a major shift from traditional top-down planning approaches towards participatory multi-sectoral planning and research-based decision-making.

The Landcare Movement Mobilizes Grassroots Conservation

The villages immediately surrounding the protected area are on the conservation interface. They are embedded physically in the competing jurisdictions of the local municipality, the state forest land claimed by DENR, and the ancestral domain claim. Ultimately, the success of natural resource conservation depends on the support of the villagers. This requires strengthening of a conservation ethic at the community level, the adaptation and

adoption of conservation-oriented and more productive farming practices, and collaboration between villagers and the Park in boundary enforcement (Garrity, 1995). Our hypothesis was that village-level knowledge-sharing community action organizations are key to addressing these natural resource management challenges.

ICRAF had observed and helped facilitate the development of a movement of farmer-led organizations in the nearby municipality of Claveria. This Landcare movement began primarily to diffuse agroforestry practices among groups of upland farmers, based on farmers' innate interest in learning and sharing knowledge about new technologies that increased income while conserving natural resources. The agenda rapidly expanded to many other aspects of community action for local natural resource management. The movement is composed of self-governing groups people concerned about land degradation problems. Today, there are more than 2,000 households in Claveria who are members of the 145 chapters of the Landcare Association. They initiated more than 300 fruit and timber tree nurseries, and are actively doing extension work to disseminate conservation farming technologies to fellow farmers. More than 1500 farms in Claveria have adopted contour buffer strip systems on sloping agricultural lands. The movement has attracted strong support from local governments, and technical support from NGOs (Mercado et al, 2000).

The Landcare approach was introduced in Lantapan in 1998, through networking with the local government and the extension agents. The movement grew rapidly. Currently, there are more than 45 Landcare groups with a total of over 800 members, most living in the villages near the park boundary. The groups formed a federation in order to share information and plan larger-scale activities. The municipal and village governments actively supported the Landcare groups through annual budgetary allocations. The chapters stimulated the development of over 40 nurseries for timber and fruit trees, and fostered the adoption of contour buffer strips on nearly 300 farms. They have begun community-wide environmental protection by assisting in the planting of thousands of trees to protect the riparian buffer zone along the Kalasihan River. This is the stream encountering the most severe pollution problems in the municipality. Environmental awareness has increased substantively during the past three years. The effects of these developments on protection of the natural park are now clearly evident. The annual number of park encroachment incidents during the past three years has declined by about 95% (F. Mirasol, Park Director, pers comm.).

Douthwaite et al (forthcoming) has pointed out that in complex environments integrated natural resource management (INRM) interventions must be able to foster and motivate the innovative potential of local people. They noted that a grassroots, communitarian development model can lever enormous amounts of creative talent, and this has striking implications for INRM. Our ongoing evaluation of the Landcare experience in Mindanao has suggested that it embodies creation of these types of human and social capital.

CONCLUSION

Significant progress has been achieved in assembling the elements for an effective social contract to protect the natural biodiversity of Kitanglad Range Natural Park while improving the livelihoods of the communities on the park boundary. Figure 2 presents the entire body of our work in the context of an integrated natural resources management

(INRM) research framework (Izac, forthcoming). This framework is an intellectual and methodological successor to the farming systems research framework, but places more emphasis on the links and trade-offs between enhanced biological productivity, ecosystem integrity and resilience, and human well-being.

There is significant evidence that the integrated approach we implemented has created an effective linkage between development and conservation. Through the strong support for natural resource management planning and implementation at the local level, and the efforts of the grassroots Landcare farmer groups, a conservation ethic is evolving and biodiversity protection is coming to be viewed as a local responsibility, pursued with pride. Some of the key success factors identified have been a strong consortium of both research and development institutions, local government entities, and donors that were committed to an integrated systems approach. This group evolved with a common vision, and the patience to nurture that vision under highly constrained funding conditions. Indeed, the funding constraints experienced may have been a blessing. Increasingly, it is observed that higher levels of commitment and impact for integrated conservation-development may be stimulated by a drip-feed approach rather than by large, externally funded efforts.

The major challenge yet to be resolved is the reconciliation of the ancestral domain claim, the Park jurisdiction, and the tenurial security of immigrant settlers in the buffer zone. These kinds of critical upland tenure issues are manifested in various forms throughout Southeast Asia. The Negotiation Support System is a tool being developed to facilitate the resolution of such conflicts (described in van Noordwijk et al, forthcoming). The components of this tool are being developed and refined through work at three key watersheds in the region, including Sumberjaya, Indonesia, Mae Chaem, Thailand, and the work at Manupali, Philippines described above.

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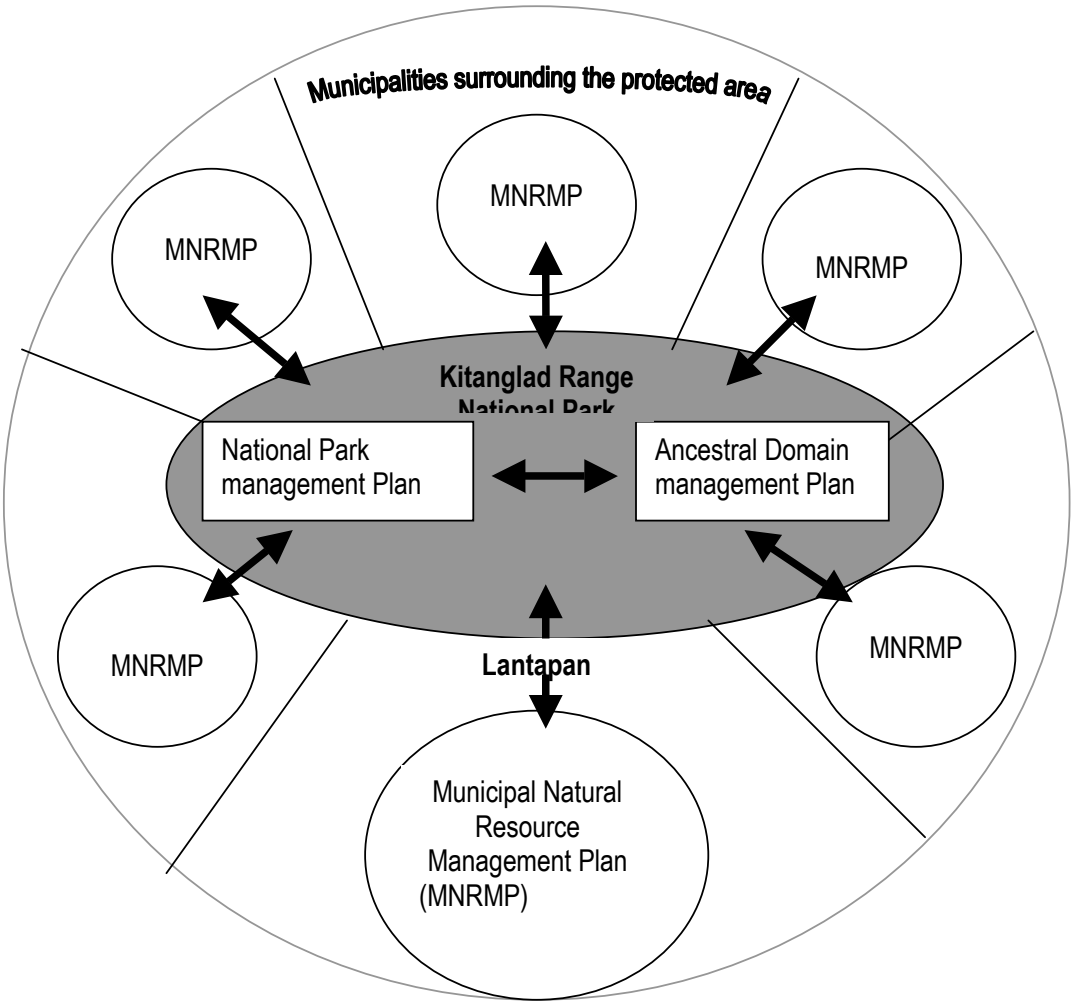

Figure 1. Diagrammatic representation of the linkages between three types of natural resources management plans.

Figure 2. Elements of the approach in the Manupali watershed to alleviate poverty and protect environmenl services in an integrated natural resource management research framework.