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g Natural Resources for Sustainable Agriculture
in the Philippine Uplands

learning to change, changing to learn

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DINDO M. CAMPILAN

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STELLINGEN

1. *Managing natural resources for sustainable agriculture involves not only learning to change but also changing to learn.*
2. *There can be as many definitions of "sustainability" as there are islands in the Philippines.*
3. *Problem situations in natural resource management emerge as a consequence not only of biophysical but also of social "degradation".*
4. *"Resources are not, they become." (Zimmerman)*
5. *Far from being powerless and subjugated, subsistence farmers in the Philippine uplands successfully strategise their way towards pursuing their own agricultural goals.*
6. *For a foreign student, living in the Netherlands is as difficult as learning to pronounce the Dutch "g" sound.*
7. *To rethink post-Transfer of Technology (TOT) intervention approaches means to ask: which clients, how participatory and what systems?*
8. *Contrary to what Westerners claim, Magellan did not discover the Philippines -- it was the Philippines which discovered Magellan.*
9. *"Farmers are much like the lowly sweetpotato, we crawl on the ground to survive but deep underground you will see the fruits of our labour." (Matag-ob farmer)*
10. *Production and sustainability are the wheels of a bicycle called agriculture. In order to move forward, we need to keep on pedalling while making sure to maintain balance.*
11. *Doing PhD work is in itself a problem situation that a doctoral candidate seeks to effectively improve by introducing an innovation in the form of a dissertation, and with the support of intervening actors such as the research supervisors.*
12. *In running for public office in the Philippines, politicians try acting like showbusiness personalities -- and showbusiness personalities like politicians.*
13. *"All things are possible for him who believes." (Mark 9:23)*

Dindo M. Campilan

Learning to change, changing to learn:

managing natural resources in the Philippine uplands

Wageningen Agricultural University, 7 June 1995

**Learning to change, changing to learn
managing natural resources for sustainable agriculture in the Philippine uplands**

Dindo M. Campilan

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LEARNING TO CHANGE, CHANGING TO LEARN
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in the Philippine Uplands

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AUTHOR'S ABSTRACT

LEARNING TO CHANGE, CHANGING TO LEARN

Managing Natural Resources for Sustainable Agriculture in the Philippine Uplands

Dindo M. Campilan

The study explores problem situations in natural resource management in the Philippine uplands. It examines, through a knowledge systems perspective, the changing nature of development intervention that is required as sustainability becomes an important criterion of agricultural performance.

As the empirical case studies show, sustainable agriculture in the uplands not only requires introducing technological solutions to the biophysical degradation of natural resources. Equally necessary is that the different actors involved are able to seek ways of synergically managing these resources. The findings suggest that sustainability is an emergent property of intentional, sense-making actors who learn to reach a shared understanding of the problem situation, resolve conflicting perspectives and goals, decide on trade-offs, and agree to work collectively towards desired improvements.

A holistic understanding of the complex social processes in managing natural resources is therefore a precondition to develop effective intervention for sustainable agriculture. Client-oriented, participatory and systems-focused approaches have contributed to refocusing agricultural development in the country towards marginalised farming communities in upland areas. However, in order to better respond to emerging sustainability concerns, these post-Transfer of Technology (TOT) approaches will have to be further adapted to the multiple actors, realities and objectives that characterise problem situations in natural resource management.

Overall, working towards sustainable agricultural development in the Philippine uplands suggests a rethinking of dominant perspectives on: 1) *agriculture*, from being the management of production enterprises to that of natural resources; 2) *sustainability*, from being an objectively determined set of indicators, to being a product of social construction through learning; and, 3) *intervention*, from being a positivist approach of knowledge generation and transfer, to being a tool for creating platforms for social learning.

PREFACE

A casual glance at the new acquisitions list of any major library is all that it takes to convince oneself that the *sustainability* bandwagon seems already filled beyond its carrying capacity. People who profess interest in the subject may thus wonder if the bookshelves still have enough room for one more, such as this one.

How then does this book distinguish itself from other previous works which seek to join the sustainability debate? Firstly, it looks at sustainability from a constructivist position. Taken as a social construction, sustainability is viewed not purely in biophysical terms but rather as an emergent property of a human activity system. Secondly, the book takes an interventionist stance. It maintains that intervention continues to play a relevant role, now more than ever, as development takes a sustainability path. What is not clear yet is the exact nature of such role and how prevailing intervention approaches can be made to adapt to this new challenge. Thirdly, the book is empirically grounded by choosing to be location-specific. International media have seemed to already create an image for the Philippines as a country of ecological disasters and natural calamities. The relevance and urgency of undertaking research on sustainability issues in the Philippine uplands therefore cannot be overemphasised.

In highlighting the above, I am well aware that this book is not a pioneering work dealing with sustainability in general, nor with the Philippine uplands in particular, nor with intervention or even with knowledge systems. It may, however, be the first time that an attempt is made to weave these particular elements into a unified framework to underpin the research upon which this book is founded. By adopting such a framework, the book aims to take a renewed perspective of an otherwise already much-argued subject of discourse. It seeks to expand the mainly technical focus of discourse, and in doing so envisions to provide readers with newer insights, to wit:

- the centrality of human and social factors in problem situations pertaining to natural resource management;
- the critical importance of resolving multiple realities and intentionalities as the first key step to improve such problem situations; and
- the need to reexamine existing development intervention approaches in light of the different nature of innovation that seem to be required.

The stimulus to do research in this particular area of inquiry for a PhD dissertation has come from a variety of sources, both personal and external. Having received early academic training in development communication¹, it thus comes as no surprise that communication-related activities feature prominently in my professional life. Yet the enthusiasm that normally propelled struggling communication specialists like me in the first few years of field exposure was slowly taken over by feelings of inadequacy. To be put in-charge of the communication component of a development program exactly meant just that. As I later fully realised, I was only one link in a full chain of intervening agents who needed my support in the same way that I needed theirs, in order to attain the overall development goal.

Coming to Wageningen and working with Niels Roling² offered me not only the opportunity to do PhD work but also the chance to reconstruct the paradigm guiding my own professional practice through an assimilation of the concepts based on the unique Dutch experience in agricultural

¹At the Visayas State College of Agriculture (VSCA) and the University of the Philippines at Los Baños (UPLB).

²And other staff at the Department of Communication and Innovation Studies.

development. The notion of intervention provided me with a vantage point from which to examine the role of communication as part of a mix of elements in the wider development arena. Meanwhile, the Dutch term *voorlichtingskunde*, for which no English equivalent is said to come close, helped broaden my rather orthodox view of agricultural extension. Finally, my acquaintance with knowledge systems offered me with a meta-framework for undertaking a scientific inquiry on intervention. Incidentally, writing this book took place at an opportune time when such conceptual framework was undergoing rapid and further elaboration through an increased familiarisation with other relevant social science perspectives, e.g., social actors, soft systems and constructivism.

In general though, the Wageningen influence served only to reinforce my earlier thoughts that in terms of intervention practice, the Philippines is already far down the line, primarily as a consequence of the learning experience with the Green Revolution. Quite unfortunately in the country, theorising has not appeared to keep pace with practice in as far as extension science is concerned. Notably, the work of Gelia Castillo was instrumental in pushing for new forms of intervention beyond the Transfer of Technology (TOT) model. As required readings for graduate social science students in the Philippines like me, her books³ were among the very first to outline what have now become popular concepts associated with participatory, farmer-responsive approaches to agricultural development. With Röling and Castillo as joint PhD supervisors therefore, the research was in itself an experiment in north-south complementarities for designing intervention to address a development issue of global significance, such as sustainable agriculture.

Throughout the theoretical journey, what kept my feet firmly on the ground was my earlier field experience in the Philippines⁴, which was rooted, literally, in root crops. The opportunity to participate in extension work for root crop farmers led me to a better understanding of the marginalised situation of farming communities in the Philippine uplands. More importantly, it was a formative stage of my growing interest in sustainability issues when as an intervening agent, it became clear to me that helping root crop farmers improve their productivity would have limited impact unless they are simultaneously assisted in managing the natural resource base on which their agriculture depended.

It was therefore no plain coincidence that the PhD research crossed paths with another root crop R&D program, the User's Perspective With Agricultural Research and Development (UPWARD), a joint undertaking of the International Potato Center (CIP) and Wageningen Agricultural University (WAU). The opportunity to collaborate with Gordon Prain, Antine Hardon-Baars and others interested in user-oriented research was doubly significant because it was at a stage when the program began to address sustainability issues, by seeking to adapt the user-oriented approach to the emerging challenge of working towards sustainable food systems. UPWARD's interest in and support for this work thus set an example of how researchers themselves may converge towards a shared research agenda.

On the whole, this book follows the old adage of *doing what one preaches*, as it in itself demonstrates how the collective efforts of individuals and institutions could effectively support a particular innovation, in this case an academic one. Indeed, this book is not only *about* change, it is change in itself. As the title of this book suggests, managing natural resources for sustainable agriculture requires *not only learning to change a problem situation, but also changing the way we learn*.

³For example, the books *Beyond Manila: Philippine Rural Problems in Perspective* (1979) and *How Participatory is Participatory Development?* (1983).

⁴As staff of the Philippine Root Crop Research and Training Center (PRCRTC).

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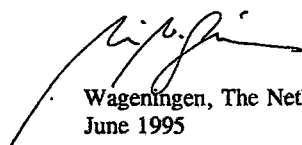
- Wageningen Agricultural University (WAU) particularly the Department of Communication and Innovation Studies, Office for International Relations and the Dean's Office for Foreign Students;
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- Visayas State College of Agriculture (ViSCA) particularly the Department of Development Communication, Philippine Root Crop Research and Training Center, and the ViSCA-GTZ Tropical Ecology Program;
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- Department of Agriculture (DA) and the Department of Environment and Natural Resources (DENR), from the national to local offices;

The principal moving forces who, with their close supervision and helpful advice, guided me through the entire PhD research program were: Prof. Niels Röling, Prof. Gelia Castillo, Dr. Gordon Prain and Ir. Antine Hardon-Baars. The ideas that went into this book are my own responsibility but most of these were generated through insightful discussions with them.

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OVERVIEW

As

what we do in this world is determined by the way we see it,

then

*if we want to change the way we do things,
we need to change the way we go about our "seeing".*

(Bawden and Macadam, 1991)

Since the time when the call for sustainable development was made by the Brundtland Commission and later echoed by the Earth Summit, worldwide interest in sustainability issues in agriculture has grown at an unprecedented pace. Its acknowledged importance can be gleaned from the large body of literature on sustainable agriculture now widely available.

Much of the literature appears to concentrate, however, on still unresolved issues over biophysical indicators of a *sustainable* state. This work is not meant to contribute to the further debate on what constitutes genuine sustainable agriculture but rather to explore why agreeing on its common definition seems elusive. It tries to shift the discussion from a preoccupation with purely technical concerns to an empirical inquiry that examines sustainability as it affects and is affected by the everyday lives of people -- farmers, households, business firms, researchers, extension agents, NGOs, policymakers -- as they go about their own ways in managing natural resources to ensure their own survival, and hopefully those of others in the present and future generations. Given these diverse stakeholders and interest groups all vying for influence over certain natural resources, it is increasingly clear that sustainability needs to go beyond technological measures for controlling the biophysical environment but in many cases has to be an emergent property of various actors synergically managing natural resources.

This research considers a holistic understanding of the complexities involved in managing natural resources as a prerequisite to designing effective intervention for sustainable development. The main thesis underlying this work is that problem situations in natural resource management are basically about people entangled in a web of multiple realities and intentionalities. In other words, meeting the sustainability challenge involves the search for new management tools and insights, not just for managing objects, but for managing people who seek to manage their shared environment.

In particular, the research focuses on the challenge facing current intervention approaches to respond to emerging issues of sustainability in the Philippine uplands. Client-oriented, participatory and systems approaches to agricultural development have been widely recognised for spearheading a giant leap since the Green Revolution days of the Transfer of Technology (TOT) model, particularly in reaching out to and enabling marginalised upland farmers to genuinely participate in their own development. Yet, field experiences in the country are showing that these same *revolutionary* approaches have been inadequate in responding to the different nature of problem situations in natural resource management, proof of which is the continuing unabated pace of ecological degradation in the Philippine uplands. This underscores that in order to remain responsive to changing problem

situations, intervention approaches need to be continuously adapted to the nature of innovation desired.

Chapter 1 - Meeting the Sustainability Challenge in the Philippine Uplands: Introduction to the Research Context. The Green Revolution has been widely credited for enabling developing countries like the Philippines achieve national food security. However, it has also been at the same time sharply criticised for, among others, its differential impact on the farming population. While the program's bias for progressive farmers in well-endowed areas produced spectacular production gains, it virtually ignored small farming households in rainfed, upland areas which form the largest but generally neglected sector in Philippine agriculture. Cognisant of this equitability issue, post-Green Revolution agricultural development has increasingly been targeted towards these marginalised farming households. Such renewed interest in the Philippine uplands has at the same time highlighted the accelerated degradation process of the natural resources supporting agriculture. Various sectors in the country now increasingly recognise that upland development can only come about through a two-pronged approach of helping local people meet their basic needs while at the same time sustaining the productive capacity of the natural resource base on which their long-term survival depends.

Chapter 2 - Beyond Transfer of Technology (TOT): Reaching Out to Upland Farmers. The end of the Green Revolution era in the Philippines signalled a shift not only in development agenda from productivity to equitability, but likewise in the nature of intervention from TOT to client-oriented, participatory and systems approaches. The TOT paradigm underpinning the Green Revolution took a linear view of development, with research generating technology to be transferred by extension workers to farmers who were conceived as its passive recipients. With the increasing awareness of the limitations of the TOT to work as effectively for upland farming households, a number of alternative agricultural development approaches have emerged in the Philippines in recent years, pursuing three distinct but interrelated themes. Client orientation stresses the need to design and target innovation according to segmented categories which are derived through a better understanding of clients' diverse needs and circumstances. Meanwhile, participatory development seeks to generate a better understanding not only about people, but from people, as a basis for building partnership between them and intervening agents in the search for viable solutions to identified constraints. Finally, the systems-based approach takes a holistic view of problem situations and seeks to achieve a synergic relationship among the identified components.

Chapter 3 - User-Oriented Approach: An Illustrative Case of Post-TOT Intervention. The case of the User's Perspective With Agricultural Research and Development (UPWARD) program illustrates a concrete experience in integrating client-oriented, participatory and systems approaches into a unified framework for agricultural research and development. UPWARD's eclectic but distinct user-oriented approach seeks to build the user's perspective and participation in the R&D process. It was originally intended to be applied in diagnosing and improving sweetpotato-associated food systems. Its formative experiences though have highlighted the deteriorating state of the natural resource base of the Philippine uplands where these food systems are mainly found. In light of this, UPWARD has finetuned its R&D agenda to address sustainability concerns in upland sweetpotato-associated food systems, by expanding the application of the user-oriented approach to include an examination of the interface between food production and natural resource management. This research therefore examines whether a similar expansion becomes necessary for the user-oriented framework itself, in order to effectively adapt to the changing development mission it seeks to support.

Chapter 4 - Research Focus: The Role of Intervention in Improving Problem Situations in Natural Resource Management. Intervening agents find problem situations in natural resource management to be generally more complex than those in conventional production-oriented agriculture. Because of the many stakeholders and interest groups normally associated with particular natural

resource units, there inevitably arises a problem situation characterised by a clash of perspectives and goals among diverse actors with regard to how resources are to be managed. Thus, the task of intervention has to shift from technology transfer to facilitating the process whereby different actors learn to share perspectives and act collectively for effective natural resource management. Against this general backdrop, the research asks: How can intervention be designed to effectively support natural resource management for sustainable agriculture in the Philippine uplands?

Chapter 5 - Nature and Methods of Empirical Inquiry. Given the nature of the research problem, an inductive approach set within a general constructivist framework was used in the empirical inquiry. A knowledge systems perspective was taken to examine the following major fields of analysis: problem situation, actors, innovation, intervention and consequences. The purpose of the fieldwork was to gather empirical evidence on the distinct nature of problem situations in natural resource management, how actors perceived and responded to them, what forms of intervention were being taken to support the innovation, and ultimately the extent to which problem situations were improved. A multiple case study approach was employed in the empirical inquiry, with each of the three case studies focusing on a problem situation associated with a particular natural resource unit. Qualitative and iterative data collection methods were mainly used.

Chapter 6 - Eastern Visayas: A Macroview of the Research Area. The field research was conducted in the uplands of Eastern Visayas, officially classified as one of the most economically depressed of the country's 13 regions. It is located in the central part of the archipelago facing the Pacific Ocean and composed mainly of the islands of Samar and Leyte. The region provides a fitting context for exploring problem situations in natural resource management given the following features: 1) inherently poor geophysical characteristics; 2) extremely degraded state of its natural resources; 3) broad institutional framework provided by research and development organisations from both public and private sectors; and, 4) marked influence of policy context on field-level implementation of sustainable agriculture programs.

Chapter 7 - Local Innovation by Default: The Matalom Case. This case study focuses on a problem situation in managing the soil resource in the acid uplands of Calumpang in Matalom town. It shows how local innovation is set into motion as a default option when TOT and client-oriented intervention approaches are perceived by subsistence farmers as serving them inadequately. A local community of subsistence farming households continued to survive in the area despite the difficult agroecological niche in which their agriculture operated and the very limited intervention extended by external actors to help improve the situation. While hillyland households found themselves in an increasingly marginalised situation, they were nonetheless able to survive by learning to manage their limited resources, particularly the soil supporting food production for meeting household consumption needs. As a whole, local people demonstrated their independent capacity to innovate, in terms of designing improvement in the problem situation, while recognising that relevant external intervention remained necessary to complement local initiative for soil resource management.

Chapter 8 - Managing People, Not Just Trees: The Matag-ob Case. This case study focuses on a problem situation in managing the Bulak forest resource in Matag-ob town. It describes how an intervention approach conceived to be participatory instead created an arena of struggle between the intervening and intervened parties. Recent years saw a significant shift in national policy from a government-administered to a people-oriented management of forest resources. Within the larger framework of the National Forestation Program (NFP), the government turned over the task of reforestation to private and local groups through a contractual scheme. One such project was a community-based reforestation of a 100-hectare denuded forestland in Matag-ob, which was subcontracted by the government to a local non-government organisation. The case illustrates the difficulty of managing forest resources given the conflicting interests of the many stakeholders,

particularly the local people's agricultural goals and intervening actors' intention to establish a forest reservation/plantation.

Chapter 9 - When Intervention Learns to Take the View From Below: The Pinabacdao Case.

This case study focuses on a problem situation in managing the soil resource of the Pinabacdao uplands, the site of a foreign-funded root crop extension research project implemented by a regional state college. It describes how intervening actors learned their way towards adapting an integrated and food systems approach to locally perceived needs and circumstances. While farmers recognised that declining farm yields were primarily due to soil constraints, the project was on the other hand driven by the underlying goal of promoting new root crop varieties which were developed in a previous research project funded by the same donor. However, the poor performance of the supposedly high-yielding varieties under local agroecological conditions later convinced the project staff that introducing root crop varieties and production technologies required prior attention to soil degradation. The shift in innovation from root crop production to soil management further allowed local people to demonstrate their innovative capacity to integrate and adapt knowledge from different sources. The project staff discovered that by offering a menu of options for contour farming, different farmers devised different soil management approaches suited to their individually perceived problem situations.

Chapter 10 - Synthesis of Case Studies. The empirical case studies provided a closer view of three different problem situations while contributing to a broad picture of the dynamics of natural resource management in the Philippine uplands. Resource degradation was shown to have both biophysical and social dimensions, the latter being linked to the diverse actors identified as contributing to the emergence and/or improvement of the problem situation. Innovation did not come about as a linear and unified process of chance, given the multiple perspectives as to what constitutes an improved situation and the means to achieve this. While there were attempts to employ post-TOT approaches, these proved to have inadequately dealt with complex social, political, economic and institutional issues involved. As the actors themselves perceived, the intervention had limited impact on natural resource management as a whole.

Chapter 11 - Rethinking Intervention for Sustainable Agriculture: Conclusions and Implications. On the overall, the study showed the complexity of managing natural resources in the Philippine uplands given the following: 1) many stakeholders and interest groups in a given natural resource unit; 2) the divergent perspectives and goals these actors have; 3) their uncoordinated efforts to manage the resource; and, 4) the inadequacy of prevailing intervention approaches to respond to such different nature of problem situation. These findings imply that client-oriented, participatory and systems approaches need to be further amplified if they are to better deal with the distinct nature of problem situations in natural resource management, and therefore address sustainability concerns more effectively. The chapter ends with a call for rethinking the role, design and epistemological basis of intervention.

Chapter I

THE SUSTAINABILITY CHALLENGE IN THE PHILIPPINE UPLANDS: INTRODUCTION TO THE RESEARCH CONTEXT

This chapter sets the context of the present research by focusing on the emergence of sustainability as a development concern in the Philippine uplands. It starts with a retrospective of the Green Revolution and highlights its significant contribution to national food self-sufficiency while pointing out some of its emerging negative long-term consequences. The chapter specifically discusses the differential impact of the programme on the farming population, particularly its failure to reach the less-endowed upland areas where the poorest farming households are found.

Post-Green Revolution development approaches have sought to remedy the imbalance by targeting the upland farming sector in the country. However, more recently it has been realised that given the inherently fragile nature of the upland agroecology, interventions need to go beyond helping farmers improve their food production, and that is by also ensuring the sustainability of the resource base. As the Philippine uplands continue to be degraded at a pace considered one of the world's fastest, there is now an urgent need to develop better approaches for effective natural resource management.

1.1 The Green Revolution Success Story

The 60s and 70s witnessed one of the most significant agricultural feats ever achieved in the Third World. Beset by widespread hunger and a worsening economic crisis, developing countries launched an all out effort in the uphill task of maximising agricultural production.

A large cadre of trained extension workers, backed by massive research, infrastructure and institutional support, was deployed to transfer high yielding varieties or HYVs and other corresponding production technologies to farmers. This remarkable success story called the Green Revolution not only enabled developing countries to achieve food security but even led in some instances to production levels beyond national self-sufficiency.

The Philippine case is an interesting subplot to this story not only because rice is a staple for 80 percent of the population but also because the country plays host to the International Rice Research Institute (IRRI), the birthplace of the rice HYVs. The Philippine Green Revolution was born out of a critical need. During the first half of the 70s, the country suffered from a series of natural calamities -- typhoons, floods, droughts -- coupled with a severe outbreak of the *tungro* virus. With thousands of hectares of ricefields wiped out, the country's rice supply was at a critical low. Importation was too costly for the government. Aside from the deteriorating domestic economy, the world market was likewise experiencing shortfalls in supply which led to drastic increases in rice prices.

Thus in 1973, the government launched Masagana 99¹ which the country's president described as a programme of national survival. The programme involved a delivery system consisting of high yielding rice varieties, credit, irrigation, subsidies, price support and other modern inputs. After only two years since the programme began, the Philippines attained self-sufficiency in rice production. In 1977-78, the country produced a surplus which enabled it to export 89,000 metric tonnes to some of its neighbours in Asia. This is historically significant considering that prior to that time, the country imported as much as 650,000 metric tonnes annually (Alix, 1978).

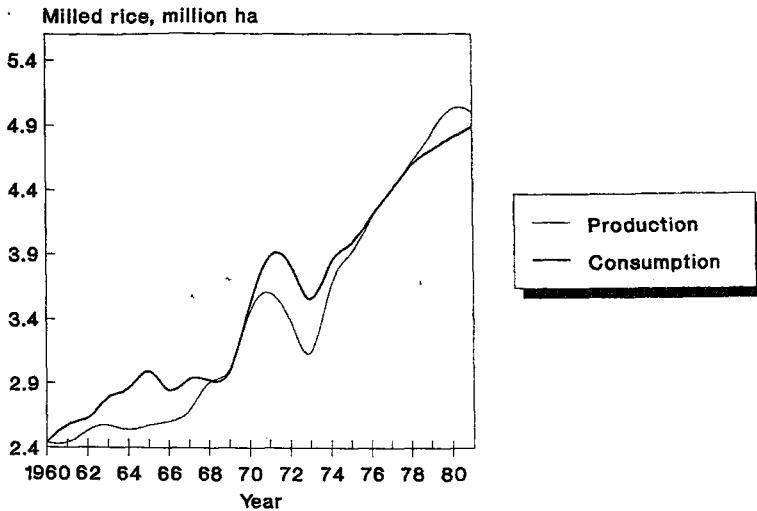
¹The word *masagana* means bountiful and 99 was the targeted yield per hectare, equivalent to about five metric tons of paddy.



Figure 1a. Map of the Philippines.

Box 1a. The achievements of the Green Revolution in the Philippines.

The 70s witnessed dramatic changes in Philippine rice agriculture resulting from the launching of the Green Revolution. The substantial increase in rice production, as reflected in the changing annual growth rate from 2.2 to 4.5 percent, not only resulted in national self-sufficiency, but transformed the country from a rice importer (5 to 10 percent of annual consumption requirements) to a net rice exporter towards the end of the decade.



Source: Adapted from IIRR, 1989

The three main factors generally considered to have accounted for the growth in rice production in the Philippines were (Hsieh et al, 1982; Yoshida and Oka, 1982; Cummings, 1982):

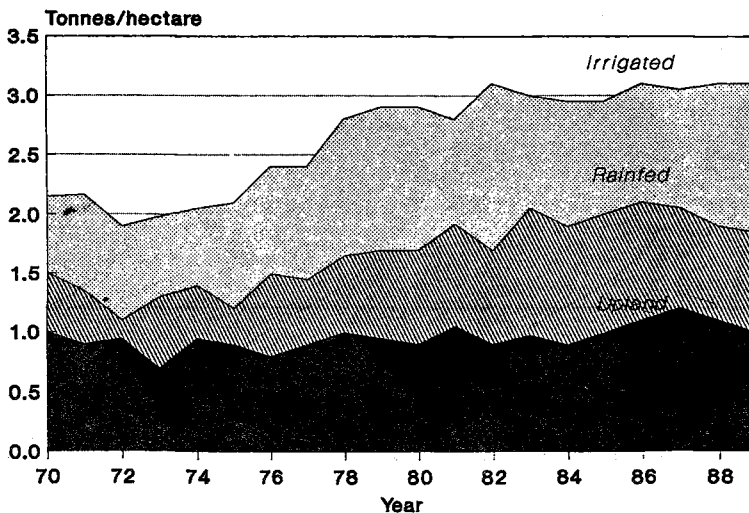
- Adoption of HYVs - within five years of their introduction in 1966, modern varieties were already planted in 50 percent of the ricefields in the country;
- Intensive use of fertiliser - application of fertiliser increased from about 10 kilograms in 1965 to almost 40 kilograms by the early 80s; and,
- Expansion of irrigation - irrigated rice fields expanded in total area from 35 to 47 percent from 1965 to 1980.

1.2 Long-Term Impact of Green Revolution Agriculture

While the Green Revolution did set new records in agriculture in the Philippines, it was becoming apparent in later years that the growth rates were shortlived. Production levels first rose in the late 60s when the HYVs were initially introduced and then in the middle 70s when the Masagana 99 programme went full blast. However, by the early 80s, the rate of production increase reached a plateau and thereafter began to decline. Data from the Bureau of Agricultural Economics (BAEcon) indicate that while the growth rate in yields in irrigated farms increased from 0.1 to 3.5 percent with the introduction of the Green Revolution (1965-80), it dropped to 1.2 percent in the early 80s right after the programme ended.

Box 1b. Trends in Philippine rice production from the pre- to the post-Green Revolution periods.

The general long-term trend in rice production in the Philippine showed a production crises in the early 70s followed by sharp yield increases towards the end of the decade during which the *Masagana 99* programme was implemented. The 80s were however characterised by a levelling off of rice yields in spite of continuously intensified input application.



Source: DA, 1991

The government was starting to face economic constraints in sustaining financial support to the high-input cost and massive credit and infrastructure requirements of the seed-fertiliser technology. In

the first half of the 80s, economic conditions of the country took a turn for the worse, i.e., a serious balance of payments deficit, burgeoning foreign debt, and high inflation and public deficit. Consequently, fertiliser inputs were reduced and delayed. The problem was compounded by a substantial increase in the world market prices of fertilisers, pesticides and other inputs.

Although new rice production programmes were launched in the 80s to provide cheap credit to farmers, only 15 percent was disbursed in real terms as compared to the amount released at the peak of the Masagana 99 programme (IRR, 1989). Meanwhile, further expansion of rice land was also no longer possible as land suited to rice was already being cultivated and urban expansion was steadily forcing more land out of production. Moreover, crop failure due to strong typhoons and severe droughts affected most of the country, and especially Central Luzon which is the rice bowl of the country.

Together with declining national rice production, changes in the agricultural system have emerged concomitant to technology application, such as increasing input requirements, more intensive capitalisation, altered traditional labour patterns, transfer of large portions of gross income outside the farming sector, and declining real income and displacement of small-scale agricultural producers who could not keep pace with the technological race.

A host of new problems have also emerged which were largely unanticipated and are now being blamed for the current threats to the regenerative and long-term productive capacity of the entire agroecosystem in the country. Years of monocropping and monoculture have led to soil exhaustion. Yield response to intensified fertiliser application is decreasing. Large-scale application of highly soluble fertilisers and pesticides have caused pollution and ecological imbalance, not to mention chemically induced pests and diseases. Micro-organisms necessary for the natural maintenance of the soil have virtually disappeared. Additionally, access to seeds has become a problem because most of the major traditional varieties have been replaced by the HYVs (Fernandez, 1988).

Most importantly, while growth rates in Philippine rice production were on the decline, population on the other hand has been rapidly increasing. Data from the Bureau of Agricultural Economics revealed that for irrigated rice production alone, growth rates dropped from 7.0 to 2.2 percent during and immediately after the Green Revolution period. Meanwhile, the population growth rate in the Philippines is estimated to be 2.7 percent, one of the highest in Southeast Asia (Wolters et al, 1989). By the year 2000, more than 86 million Filipinos will have to be fed and the country must be able to produce more than 13 million tonnes of rice (IRRI, 1989).

Table 1a. Protracted increases in population and necessary rice production in the Philippines.

Year	Estimated Population	Rice Requirement metric tonnes
1989	65,000,000	9,330,000
2000	86,000,000	13,013,000
2020	131,000,000	22,069,000

Source: IRRI, 1989

Indeed, while the early success of the Green Revolution brought about greater expectations, the worldwide food shortage taking place in subsequent years finally convinced the programme's architects that it fell short of its ultimate goal. As the then IRRI director-general (Brady, 1982:14) summed it up:

We now know that expectations and reality did not coincide. Food production remained far below the levels predicted. Even with the new cereal varieties, production per capita in the developing countries remained unchanged. During the decade that followed the release of IR8, rice yields increased significantly only in the irrigated areas...The enormity of the problem forced the realisation that simplistic solutions were not the answer to the world's food production problems. It became clear that the new cereal varieties alone were not the answers to the world's food problem. Casual observers said that the green revolution had turned brown.

The post-Green Revolution situation in the Philippines typifies the overall state of rice production in the Third World. Rosegrant and Pingali (1991) attribute such long-term decline in the yield frontier to:

- rapidly degrading micro-environment due to intensive rice monoculture;
- increased input requirements for sustaining current yield gains, particularly declining efficiency of fertiliser use; and,
- increasing losses due to chemically induced pest problems, e.g. brown plant hopper, green leafhopper and white stemborer.

To sustain productivity growth, innovative policy options are necessary in the area of research, extension, fertiliser and pesticide use, irrigation and pricing.

Box 1c. Sustaining rice production growth in Asia (Rosegrant and Pingali, 1991).

The introduction and rapid spread of high yielding rice varieties throughout Asia and the late sixties and the early seventies resulted in strong output growth (Dalrymple, 1985; Herdt and Capule, 1983). Aggregate rice output growth rate for Asia increased from 2.1 percent per annum during 1955-64 to 3.3 percent per annum during 1964-81.

Rapid yield growth from 1964 to 1981 was the primary contributor to rice output growth. Area expansion contributed about one-third of Asian rice output growth in the 1960s and one-fifth in the 1970s. In the past decade, however, the growth in aggregate rice output has declined to 1.5 percent per annum. Area expansion, which was already slow in the 1970s, virtually halted in the 1980s. Rice yield growth in Asia declined sharply in the 1980s, from an annual growth rate of 2.6 percent in the 1970s to 1.5 percent during the period beginning in 1981.

On the other hand, demand for rice in Asia is estimated to grow at a rate of 2.1-2.6 percent per year in the 1990s (IFPRI, 1984; IRRI, 1989). These projected demand increases are substantially higher than the growth in rice production in the 1980s, indicating that a strong effort is still necessary to maintain rice productivity growth to meet growing food demand and to generate income. Virtually all of this growth must come from increased rice yield per unit of land since the opportunities for further area expansion are minimal. There is increasing evidence that the growth in rice yields has slowed down and there is a danger of continued declines in yield growth, especially in the irrigated lowlands of Asia (Pingali et al, 1990).

1.3 Rediscovering the Uplands

In the numerous debates about the real impact of the Green Revolution in the Philippines, what has perhaps generated the most interest, and controversy, is the perceived differential benefits derived from the Green Revolution by different sectors of the farming population. Later studies (Barker and Herdt, 1978; Barker et al, 1985; Delgado and Reardon, 1987) showed that the economic benefits of the programme were concentrated among wealthier farmers in homogenous, intensive, lowland, irrigated agricultural systems of the Philippines. Even within this sector, those farmers who were outpaced by others in the technological race eventually suffered from declining real incomes (Cordova et al, 1981).

On the other hand, the programme had minimal impact on marginal farmers in upland, rainfed regions which are characterised by subsistence production, high crop diversity, low-input agriculture, high risks, environmental degradation, marginal farms, severe poverty and lack of access to government services. These areas were barely touched by the Green Revolution due to the poor adaptability of HYVs to rainfed situation, farmers' limited capacity to meet the high-input requirements, relatively poor access to necessary support services, and the generally risk-prone growing conditions.

Such technology bias is reflective of the general tendency of agricultural research and extension programmes to concentrate on the relatively easy task of serving irrigated cropping systems (Castillo, 1983), as well as of food systems to be geared towards urban consumers. These well-endowed areas are a familiar working ground for researchers since rates of success are expected to be higher and research cost potentially lower. According to David and Otsuka (1994), differential adoption of modern varieties has widened disparities in yields between irrigated and non-irrigated regions since the mid-1960s. Although average yields are now 3 to 4 tonnes/hectare or higher in the irrigated areas of Asia, including the Philippines, yields have remained essentially stagnant at 1 to 1.5 tonnes/hectare in the unfavourable areas where traditional varieties continue to be grown. Thus despite the widespread increases in paddy yields, the Green Revolution constituted a technological solution to rural underdevelopment and did not address the need for redistributive reform (Feder, 1983).

In the 1960s and 1970s, the government's agricultural strategy primarily revolved around the new rice HYVs. In comparison with the effort with which programmes were developed for lowland agriculture, the uplands received little attention. They were regarded as backward and less important for national food production objectives, although the export of timber increased substantially. There were also political reasons for this general apathy towards the uplands since the more isolated areas became strongholds of the communist insurgency movement, which found support in areas with the most extreme local poverty. The workings of the market economy were likewise allowed to continue relatively unhindered in agriculture, fisheries and forestry leading to massive depletion of the natural resource base. This *laissez-faire* policy, which implied a trickle down approach to welfare, was typical of Asian rural development (Miclat-Teves and Lewis, 1993).

Cognisant of these important equity issues, development programmes in later years have increasingly identified upland farmers as target beneficiaries by specifically addressing their needs and problems. Besides equity considerations, however, these once neglected areas have now assumed greater importance as the country seeks to increase food production to cope with population pressures. The declining productivity in existing cultivable lands brought about by decreasing yield response to more intensive input application, indicate that well-endowed areas can no longer adequately support the rapidly increasing population. As opportunities for expanding agriculture in the lowlands have been exhausted, more and more people are now turning to the uplands for meeting their food and other basic needs.

The term *uplands* has been commonly used in the Philippines to distinguish those areas outside the core region of Green Revolution agriculture. It connotes an area with hilly to mountainous terrain, sloping and elevated land, rainfed and highly erodible soil, and erratic climatic patterns. Upland areas can also be very heterogenous, forming a mosaic of micro-patches of agroecosystems. For example, vegetation cover may range from forests and grass/brush to crops or none at all. Land ownership claims may either be state, ancestral, private or other forms. In terms of population, upland areas may be totally uninhabited or totally occupied.

The Philippines has a predominantly hilly and mountainous topographic feature, with three-fourths of its land area having a slope of 8 percent and above. However, while there appears to be a general agreement on the Philippines as being a mainly upland country, the exact area covered by uplands remains largely unsettled because there is no consistent definition of what constitutes *the* uplands.

Table 1b. Distribution of land area in the Philippines by slope groups.

Slope	Area (hectares)	Percent
0-8.0	7598030	25.4
8.1-18.0	5331469	17.8
18.1-30.0	8042683	26.9
30.1-50.0	6293362	21.1
50.1 and up	2609900	8.7
Total	29875444	100.0

Source: Bureau of Soils

This apparent difficulty of defining the uplands is mainly because of the term's diverse connotations as a biogeographic, agronomic, sociocultural and ecological unit (Sajise, 1984). The search for a working definition has thus far been confusing and largely open-ended (Fernandez, 1984). One survey of existing definitions made by Librero and Laneyra (1991) revealed that the concept is viewed by different sectors using a combination of any of the following defining elements: 1) topography; 2) land use; 3) general ecological characteristics; 4) land tenure; 5) climatic pattern; 6) dominant vegetation type; 7) population; 8) economy; and, 9) level of development. Obviously, it is this lack of collective effort to redefine the uplands that has impeded the formulation of appropriate development policies in these areas (Ganapin, 1982). For how can the uplands be developed when even intervening agents themselves do not agree on *what* it is?

Box 1d. On defining the Philippine uplands.

Attempts at defining the uplands, for specific and varied purposes, have been made by adding a critical qualifier which reflects an agency's mandate and thrust (Fernandez, 1984) or by being highly sectoral, depending on the agency or kind of project involved (Sajise and Ganapin, 1989).

Box 1d. Continued.

For example, the official definition put forward by the Department of Environment and Natural Resources (DENR) refers to those areas with slopes of 18 percent or higher, including table lands and plateaus greater than 600-metre elevation. The choice of the 18 percent criterion is based on technical recommendations that such slope is the upper limit of mechanised upland farming and that soil erosion starts to become excessive when lands above this slope are farmed (DENR, 1990). Since Philippine laws stipulate that land with a slope 18 percent or higher is public forestland, the definition considers the entire uplands as state property. An even narrower definition limits the uplands to that part of the forest land from the foothills up to the forest zone line, covering those areas from 18 to 50 percent slope. It excludes those above 50 percent slope which is instead categorised as absolute forestland (Jacalne, 1982).

In contrast, agriculture-oriented development agencies take a broader view by extending uplands down to areas with a slope of 3 percent (Fernandez, 1984) bordering on the irrigated lowlands. The Department of Agriculture (DA) often uses the term hillyland, for 15 percent and above, but its overlap with uplands is implicit. This third category of definitions characterise uplands as rainfed, subsistence-oriented and swidden-type agroecologies.

While there are diverse biological, physical and sociocultural determinants put forward to define the concept, there appears to be a consensus on the Philippine uplands as being ecologically fragile, hilly and mountainous areas with the following broad characteristics:

- Uplands cover an extensive portion of the country, consisting of more than half of the total land area. Based on the 18 percent slope definition, the upland region represents 17 million hectares or about 57 percent of the total land area of 30 million hectares (Baguinon, 1989).
- Nearly a third of the country's population are upland dwellers. It is estimated that 18.6 million out of 65 million Filipinos live in the uplands and growing at a rate of 2.6 percent annually (Tacio, 1994). The upland population is projected to double in the next 25 years (USMARC, 1990). With their sheer number, upland farmers form the base of the agricultural sector.
- The majority of upland households belong to the lowest income bracket. Upland farmers are considered the poorest and most deprived of Filipino farmers (Castillo, 1979) and are much worse off than other rural households. Agriculture is basically dependent on rainfall, cost of farm input is high and credit is hardly available. Infrastructures are very limited and the difficult terrain makes the delivery of basic goods and essential services difficult. The inadequacy of the marketing system becomes a disincentive to production. These factors combine to give low incomes of P15,000² or less to households in the uplands which is way below the poverty threshold income of about P36,000³ (DENR, 1990).
- The uplands are a major repository of the country's natural resources. They form the base of forest and wildlife resources, including the rich genetic diversity within them. They likewise form the main watersheds of rivers which provide water, irrigation and energy for agro-industries and households.

²approximately US\$ 600

³approximately US\$ 1,333

- The status of the uplands has wider repercussions for the entire country. The uplands are a vital part of the total ecosystem, influencing the quality of neighbouring lowlying areas to a very considerable degree (Alcober, 1989). The uplands are the life support system of the lowlands and aquatic areas in the dynamic and highly interactive landscape components of a rural system (Sajise and Ganapin, 1989).
- The uplands are a destabilising force in the peace and security situation in the country if environmental and socioeconomic conditions are not improved (Sajise and Ganapin, 1989). The uplands are viewed as the refuge of the economically and politically oppressed, being widely considered as the base of operations of anti-government forces. In the Philippines, the popular expression *to go to the uplands* is often taken as a euphemism which means to join the communist rebel movement.

The Philippine uplands fall under what Chambers (1992) calls DCR areas -- diverse environments, complex farming systems and risk-prone production conditions. A comparison of the three typologies of agriculture helps put the analysis of the Philippine uplands in better perspective.

Table 1c. Three types of agriculture (adapted from Chambers et al., 1989; Chambers, 1991).

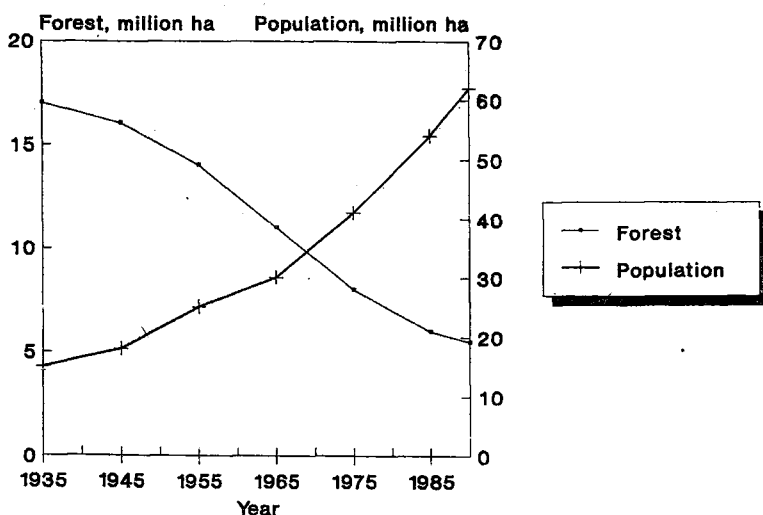
Character	Industrial	G. Revolution	DCR
Main locations	industrialised countries	irrigated and high-rainfall, high-potential areas in Third World	rainfed tropics, hinterlands, etc.
Main climatic zone	temperate	tropical	tropical
Major type of farmer	highly capitalised family farms and plantations	large and small farmers	small and poor farm households
Farming system relatively	simple	simple	complex
Environmental diversity relatively	uniform	diverse	diverse
Relative stability	low risk	low risk	high risk
Use of external inputs	very high	high	low
Condition	overdeveloped	developed	underdeveloped
Current production as % of sustainable production	far too high	often near the limit	low
Priority	reduce production	maintain production	raise production

1.4 State of the Philippine Uplands

A number of indigenous tribal communities have traditionally lived in the uplands by relying on shifting cultivation. The Malaya-Polynesian ethnocultural groups brought into the archipelago slash-and-burn agriculture, primarily as an adaptive cultural practice. Commonly known as *kaingin*, it involves the burning of the vegetative cover and planting of subsistence crops in long cycles of land rotation (Jocano, 1975).

Box 1e. The correlation between population and deforestation (DENR, 1990).

Deforestation is directly related to population. In the Philippines, forests declined slowly when population density was low; rapidly when population pressure was intense.



Pioneering shifting cultivation was generally considered sustainable and not ecologically destructive since the low population densities did not exceed the carrying capacity of the land. The ecological balance started to be disturbed only upon the encroachment of logging activities, the migration of lowland people to the uplands and the population growth of the hill tribes themselves. During the last 20 to 30 years, there has been a steady migration of people from the lowlands to the uplands, settling in the land cleared by loggers. The highest rates of population growth in the uplands are in areas which have logging concessions (Cruz and Zosa-Feranil, 1988).

There remains a controversy in the Philippines as to who between loggers and *kaingin* farmers are the main destructive force in the uplands. While official statistics show subsistence farming as the major cause of upland degradation, it is also accepted that logging activities, both legal and illegal, facilitated the transformation of forest lands for agriculture. Logging roads opened the forest to encroachment by landless lowlanders. Logged-over areas with large trees already removed became easy prey to slash-and-burn farmers (Kummer, 1992).

Table 1d. Direct and indirect causes of deforestation in the Philippines.

Cause	Percent
subsistence/swidden farming	63.4
permanent agriculture	15.8
fuelwood collection	7.9
livestock raising	6.3
logging	5.6
infrastructure	1.0

Source: Umali, 1993

Deforestation has been the most immediate and visible effect of upland exploitation in the country. The Philippines had about 17 million hectares of forest in 1934 but this was substantially reduced to only 6.1 million hectares by the end of 1990, and only about a million hectares of which are virgin forests (DENR, 1990). On the basis of slope, the ideal forest cover of the Philippines should be about 54 percent (Canopy International, 1989). However, the 70 percent forest cover at the beginning of the century was drastically cut down to only 20 percent by 1991 (DENR, 1991).

Table 1e. Percentage forest cover of the Philippines, 1900 to 1987.

Year	Percentage Forest Cover
1900	70
1910	66
1939	60
1950	55
1957	44
1969	35
1974	30
1977	25
1987	22
1991	20

Source: Adapted from Kummer, 1992

From 1978 to 1988, Philippine forests were destroyed at about 336 hectares each day, or 14 hectares of forest per hour (Acosta, 1989). Thus in 1987, while 15.9 million hectares were officially considered as forest land, only about 40 percent was actually covered with forest (PGIP, 1988). Given these statistics, deforestation rate in the Philippines ranks among the highest in the world (DENR, 1990).

Deforestation also carries with it a chain of ecological imbalance, causing the degradation of other resources within the wider ecosystem. Soil degradation is generally acknowledged to be the main environmental effect of deforestation in the Philippines. The rapid depletion of the forest resources brought along its trail heavy soil erosion and sedimentation of rivers and reservoirs, flashfloods and drought. Where forest canopy remains, soil losses from run-off water may be five tonnes per hectare per year. However, degraded forest lands lose soil at 20 to 40 tonnes per hectare per year while open lands and grasslands in uplands lose more than 100 tonnes (Cruz and Zosa-Fernail, 1988). In the Philippines, deforestation-induced erosion alone is estimated to reach 100,000 hectares a year (Baconguis, 1989). One billion cubic meters of soil is lost to erosion annually (Rosario, 1988). According to DENR (1990) estimates, total off-site soil erosion effects reach 6.7 billion pesos⁴ annually. The bulk of soil erosion in the Philippines comes from areas used for extensive agriculture. Such areas cover 22 percent of total land area, with about two-thirds located on slopes steeper than 18 percent.

As much as 20 percent eroded materials from the uplands end up in rivers, reservoirs and irrigation canals thus reducing lowland agricultural productivity. Siltation likewise has caused serious damage to coral reefs and coastal fisheries. Denuded uplands have also been one of the main causes of unusually devastating floods (Tacio, 1994).

Table 1f. Comparative soil erosion values among a number of land uses.

Land Use	% of Total Land Area	% of Total Erosion	Erosion (t/ha/yr)
Extensive agriculture	22.0	68.9	223
Grasslands and brushlands	13.3	17.7	77-122
Virgin and mossy forest	8.0	0.2	1-2

Source: DENR, 1991

The World Bank (1989) considers soil erosion as the most serious environmental problem facing the Philippines today. A 1990 report also listed the Philippines as among the top 30 developing nations most vulnerable to environmental threats. The report explains that the country's agricultural productivity continues to be adversely affected by gradual deterioration of soil and forest resources as a result of rapid population growth in upland areas, and weak management of public resources.

1.5 Launching a New Sustainability Agenda

The alarming state of the Philippine uplands is but a glimpse of the current global threat to about 10 million square kilometres of fragile upland areas, which as a whole is estimated to provide the means of livelihood for up to 1.4 billion people (Chambers, 1989). Needless to say, the need to achieve a more sustainable development in the Philippine uplands, and the world in general, is urgently needed now more than ever to ensure the continued survival of these agroecosystems including the human population that they support.

⁴approximately US\$ 248 million

The problem though with the term *sustainable development* is that it has proven to be difficult to formulate a definition that is comprehensive but not tautological, and that retains analytical precision (Redclift, 1993). One of the sources of conceptual confusion surrounding the term is that no agreement exists regarding what exactly it is to be sustained. Thus when speaking of sustainable development, it becomes necessary for example to make a distinction between lowland and upland agricultural systems.

In lowland areas of the country where the Green Revolution made its greatest impact, sustainable agriculture can mean consolidating the earlier gains in production while simultaneously dealing with second-generation problems emanating from high-input and production-oriented agriculture. In this context, sustainability implies that the yields are kept more or less at the same level over medium- and long-term periods through increased overall efficiency while avoiding the use of ecologically harmful inputs and practices.

The Philippine uplands, which were barely reached by the Green Revolution, poses a different and more complex sustainability challenge. Given their increasingly marginalised conditions including limited access to external inputs, upland farmers are heavily reliant on whatever available resources in their immediate environment, thus exerting more pressure on the natural resource base. Rising populations have complicated the situation with the increasing need for food, fibre, fuelwood, timber and other products, consequently putting even greater strain on the ecosystem's optimum productive capacity.

With their inherently fragile nature, upland areas are most susceptible to environmental stress and degradation. On the other hand, poor farming households are left with no option but to continue their agricultural activities to ensure continued survival. Thus, there arises the dilemma of averting progressive environmental destruction and intensively exploiting natural resources to meet population pressures.

Two fundamentally intertwined problems form the core of sustainable agriculture in the Philippine uplands -- declining capacity to produce sufficient food supply and worsening environmental degradation. Therefore, strategies for change should simultaneously address the two-pronged challenge of assuring sufficient household food supply for subsistence farming households while maintaining the long-term capacity of the productive resource.

Aside from its location specificity, sustainable agriculture also needs to be viewed from a macroperspective because of the wider and long-term agroecological impact of the uplands on the other components of the larger ecosystem, particularly the lowlands. Not a few writers (e.g., Conway, 1987; Allen et al, 1991; Castillo, 1992) have pointed out that a systems perspective at different levels and varying scales is essential to better understand the inherent complexity of sustainability.

This was best illustrated by the 1991 flashfloods that engulfed the entire city of Ormoc in central Philippines, leaving thousands dead and homeless. This major natural disaster serves to remind the interdependent nature of different components of the agroecosystem. The deforestation process in the nearby watershed area previously caused little concern among urban dwellers who thought that the threat was too isolated and far away, not until the tragedy struck.

One of the much neglected aspects of sustainable agriculture is the extent to which resource degradation is induced by government policies. Unsuitable use of resources has often been exacerbated by government policies that are either misconceived or have unforeseen repercussions on sustainability (FAO, 1991). In the Philippines, the imperiled state of the upland agroecosystem is in

large part an indirect consequence of longstanding government policies which largely focused on the market economy.

Recognising the wide disparity in priorities given to economic and ecological goals, the Philippine government sought to undertake a general review and overhauling of its national development policies to better reflect important environmental concerns. This effort was marked by an important milestone in 1990 with the drafting of the Philippine Strategy for Sustainable Development which among others stresses that development efforts shall be made complementary to environmental programmes/projects in the country into a unified, comprehensive sustainable development framework. The strategy hopes to resolve and reconcile the diverse and sometimes conflicting environmental, demographic, economic and natural resource-use issues arising from the country's development efforts. The multifaceted strategy, as presented by Canopy International (1990), packs ten streamlined programmes which relate to the various concerns of sustainable development, namely:

- Integration of environmental consideration in decision-making;
- Proper pricing of natural resources;
- Property rights reform;
- Establishment of the integrated protected areas system;
- Rehabilitation of degraded ecosystems;
- Strengthening of residuals management in industry (pollution control);
- Integration of population concerns and social welfare in development planning;
- Inducing growth in the rural areas;
- Promotion of environmental education; and,
- Strengthening of citizens' participation and constituency building.

Already, the government has enlisted the active participation of the private sector while assuring the necessary financial and manpower support in what seemed to be a serious intention on its part to embark on these new development priorities. In view of the country's poor record with previous environmental programmes, it is a critical challenge for the government to ensure that this new initiative avoids the pitfalls of the past.

In the final analysis, the crucial question would be how far current development interventions will be able to translate policy goals into concrete contributions towards realising sustainable development in the Philippine uplands and, from a macroperspective, doing its share in the worldwide effort to preserve planet Earth.

Box 1f. Global agenda for change.

Environmental concerns have long been recognised in the international development scene although it has generated not as much attention as it has recently. In the early 70s, the publication of *Limits to Growth* (Meadows et al. 1972) attracted widespread attention and the United Nations Conference on the Human Environment in Stockholm in 1972 brought the issue squarely on to the agenda of international politics for the first time. However, it was not until the publication of the report of the World Commission on Environment and Development (WCED), *Our Common Future* (1987), that the issue began and emerged as a priority theme on the international agenda.

The main achievement of the WCED was not so much that it revealed new insights, rather that it placed environmental problems and issues, environmental concerns on the agenda – on the local, national regional and international levels – more forcefully than ever. It has also produced one of the most quoted definitions of

Box 1f. Continued.

sustainable development, that which meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Stokke, 1991). WCED also stressed that it would be futile to deal with the systems of global ecological degradation without at the same attacking the problems at its roots -- world poverty.

The call for a more sustainable development was echoed in 1992 during the United Nations Conference on Environment and Development (UNCED) held Rio de Janeiro, Brazil. Popularly known as the Earth Summit, the conference produced another landmark document called *Agenda 21*, a programme of action for sustainable development to which over 150 countries all over the world, including the Philippines, are signatories.

As a whole, the history of agricultural development in the Philippines has been marked by the shifting focus towards the country's vast but generally ignored upland regions. Yet it is now also increasingly realised that genuine upland development can only come about by sustaining the productive capacity of the natural resource base supporting agriculture in these less favourable areas. Having established the general social context for sustainable upland agriculture, the book goes on to examine the potential contribution of intervention towards this end -- an issue which becomes a focal point of discussion in the succeeding chapters.

Chapter II

BEYOND TRANSFER OF TECHNOLOGY (TOT): REACHING OUT TO UPLAND FARMERS

The previous chapter presented a general overview on how development priorities in Philippine agriculture have shifted towards a greater emphasis on sustainability concerns. This chapter meanwhile traces the historical progression of intervention approaches which have emerged in response to the changing development priorities in the country.

Although the Transfer of Technology (TOT) model made a significant impact on high-input agriculture at the height of the Green Revolution, the same results were not sustained nor reproduced in less favourable areas. The underlying assumptions of the TOT are thus examined to show their lack-of-fit with marginal farming situations. With the eventual recognition by development professionals of the need to target upland farmers as a hard-to-reach category, a number of post-TOT intervention approaches have emerged pursuing three distinct but interwoven themes – client-oriented, participatory and systems approaches. For turning the TOT and its basic assumptions upside down, these approaches have been considered influential in revolutionising the dominant thinking on agricultural development. Still, there is the crucial question as to the responsiveness of such approaches to the newer challenges posed by sustainable agriculture.

2.1 A Closer Look at the Transfer of Technology Model

After the quick and broad review of the achievements and shortcomings of the Green Revolution in the Philippines, this chapter closely examines the nature of intervention supporting the programme and how this has been radically changed over time to suit the country's changing goals in agricultural development.

Much of the success of the Green Revolution in the Philippines has been credited to the effective mobilisation of a nationwide network of public agricultural extension service, banking and financial institutions, and other supporting government agencies. HYVs and associated farm practices generated through research breakthroughs were packaged into a standardised set of rice production technologies and transferred to farmers through a delivery system composed of thousands of agricultural technicians fielded across the country. At that time, scientists saw their responsibility as ending at the experiment station gate (Barker et al, 1985). Meanwhile, the extension mission was to acquaint the farmers with a new package of technology under a supervised scheme of farming. This involved daily sessions with the farmers and a closely supervised 16-step programme to be religiously followed by the participants – step-by-step (Alix, 1978).

The Transfer of Technology (TOT) paradigm (Chambers and Jiggins, 1987) underpinning the Green Revolution and many other similar programmes rests on the notion that agricultural technology is to be generated by researchers, transferred by extension agents and finally adopted and utilised by farmers. As a linear model (Kline and Rosenberg, 1986) of technology development and utilisation, it demonstrates the effective combination of: 1) component innovations produced by reductionist research; 2) sequential knowledge processes such as generation, transfer and utilisation; and, 3) institutions that can be arranged on the science-practice continuum (Röling, 1992).

The TOT conceptualises knowledge as having a vectorial quality (Blum, 1989), taking a unidirectional flow from research through extension and finally to utiliser groups. The unidirectional path of technology leading *downstream* towards farmers is emphasised while downplaying the essential contribution of feedback/feedforward activities. This fundamental premise gives rise to several other associated features of the model.

Science is taken as the sole source of knowledge while technology is taken as applied science. Thus, it often neglects certain successful innovations that have been initiated largely outside the formal scientific research community. Because it is assumed as such, the model sees the need to deliver technologies, as ready-made commodities, from the single source to their intended users, who are misconceived as passive receivers. Furthermore, research and development institutions are seen as engaged in knowledge processes that can be calibrated along the science-practice continuum. (Lionberger and Chang, 1970; McDermott, 1987), starting from basic science and ending with technology utilisation.

The model emphasises the need to maximise macroreturns to scarce resources, without regard to those who might be left out of the technological race by virtue of their disadvantaged position, such as limited access to inputs. And, finally it takes a reductionist orientation as exhibited in the development of component technologies through disciplinarian knowledge.

It is widely recognised that there is perhaps no other model that has made greater impact on agricultural development than the TOT. For so long, it has been the accepted corporate model for much of current development thinking and practice in the Third World. Its dominance cannot be denied as it underlies most policy, design, investment and training decisions in agricultural technology development, exchange and utilisation. The pervasiveness of the model seems unavoidable since strong incentives and political dynamics keep it alive (Röling, 1992).

Box 2a. Farmers as seen through the TOT lens.

The Green Revolution experience demonstrated how the TOT model was effectively able to design and employ an intervention mix to meet the urgent need for increased agricultural production. On the other hand, the programme's shortcomings to address equity issues raised later were indicative of the lack of attention to other criteria for agricultural performance. As later realised, the focus on macro-objectives compromised the attention given to the following field realities:

- Farmers do *not* consist of a homogenous group of individuals;
- Farmers are *not* passive receivers of technology generated by formal research;
- Farmers are *not* driven by purely economic motives;
- Farmers do *not* adopt technologies completely and uniformly;
- Farmers do *not* always need to be provided with a standardised set of instructions/recommendations;
- Farmers who are late adopters of technology are *not* necessarily laggards and non-innovative; and,
- Farmers *cannot* obtain the same results of technology application as researchers do in experiment stations.

There is a generally held contention over the universal applicability of the TOT model (Agudelo and Kaimowitz, 1989). Its assumptions however reflect little perception of the complexity and diversity of farmers' physical environments, let alone the diversity of the economic and social environment (Barker et al, 1985). Thus, while the TOT has demonstrated its usefulness as a tool for attaining national self-sufficiency, a closer examination shows that it has worked best only on high-potential areas which approximate the growing conditions in research stations. The same favourable results were not obtained under less favourable circumstances. In a way, the Green Revolution has become a concrete testimony to the failure of the TOT to comprehend and respond to the different needs and situations of upland farmers, including their own capacities to deal with the problems facing them.

With the evident inadequacies of the TOT as the general paradigm of agricultural development, alternative approaches that seek to reflect farm realities more closely have begun to take shape in recent years. Particularly in the Philippines, these approaches may be lumped under three main but overlapping streams of thought:

- **Client-oriented Development**, as exemplified by intervention programmes seeking to specifically address small, marginal farming communities in the uplands;
- **Participatory Development**, as exemplified by intervention programmes emphasising bottoms-up approach and people empowerment; and,
- **Systems Approach**, as exemplified by intervention programmes adopting an integrated and holistic view of agricultural development problems.

2.2 Client-oriented Development: Targeting the Upland Farmer

The differential impact of the Green Revolution on the farming population has led to increased awareness of the heterogeneity that characterised the farming population. As such, gaining a better understanding of different client categories is central to the development and diffusion of appropriate technologies. Thus it was thought that in order to serve upland farmers, a different approach from that used for the more stable and homogenous conditions of the Green Revolution agriculture was thought to be needed (Merrill-Sands et al, 1991).

The increasing client orientation that has swept agricultural development in the post-Green Revolution era takes particular interest in marginal farming households to correct the imbalance in benefits brought about by the TOT which largely catered to the needs of the more progressive and resource-rich farming sector. The focus on this specific category stems from the recognition that these farmers:

- represent a major share of the world's poor and most vulnerable people;
- survive in difficult agroecological and socioeconomic conditions;
- cannot afford to assume high risk;
- have limited access to information; and,
- have little power to exert influence on research, extension and policy.

The benefits of client orientation has long been recognised in the private, commercial firms. Since their survival depends on whether clients purchase their products, considerable investments is made in understanding clients' needs and preferences, and capitalising on their ideas and innovations (Merrill-Sands and Collion, 1993).

In agriculture and rural development, pioneering attempts to apply procedures in marketing research were made by Ascroft et al (1973) but the general transition in dominant thinking from adopter categories in the diffusion research tradition to target categories in the marketing research tradition seemed to have occurred much later (Röling, 1988).

In client-oriented development, farmers are not seen as a uniform mass of people but represent a number of categories identified through certain criteria in relation to a given situation. Heterogeneity within the client population is considered critical since it has important implications for how people perceive problems and their actions to achieve desired change. Client-oriented agricultural development primarily rests in the twin concepts of segmentation and targeting, borrowed from the field of marketing. It stresses that development must be geared towards the needs of multiple, segmented client groups. This concern to address special categories of clients implies a corresponding concern for targeting extension offerings to farmers who are homogenous in, among

others, access to resources, production objectives and opportunities (Röling, 1988). Technologies are no longer expected to create uniform effects for everyone but are appropriate only for specific recommendation and/or diffusion domains. Segmentation helps in reaching specific client groups while targeting ensures that technologies are relevant to their needs and conditions.

In the Philippines, client-oriented development was widely observed to come into vogue during the post-Green Revolution years with programmes carrying labels such as *upland/rainfed area development* and *small-farmer development* entering the agricultural intervention scene.

2.3 Participatory Development: Redefining the Farmer's Role

While client-oriented development has brought about major changes in prevailing simplistic notions of farmer homogeneity and trickle-down effect, farmers' participation in development remained limited. It is clear that client-oriented development has benefitted much from the field of marketing by drawing on such concepts as segmentation and targeting, but at the same time the conceptualisation of farmers as clients only served to reinforce the idea of farmers as mainly passive targets of development initiatives as predetermined by external agents. Applications of the client-oriented approach not only enabled a better understanding of farmers' problems but also the discovery of their inherent and potential capacity to devise solutions to perceived problems. Thus, the second wave of post-Green Revolution approaches has taken an even more revolutionary stance by seeking to share with farmers the control over the development process.

Participatory development pushes the client-oriented approach a step further by using the closer view of client situations as a means and basis for promoting the participation of the ultimate users of agricultural technology in the development process. While the concept of *participation* had long before been cited in the literature, definitions and views had been incomplete and narrow (Oasa, 1985), such as those in community development programmes (Holdcroft, 1978) where local participation was almost entirely in the implementation stage.

Instead of a top-down and linear flow, the development process is thought to involve a partnership between external agents and local people through their mutual recognition of their complementary contributions. This is operationalised in terms of close interaction and shared learning in the search for appropriate technological solutions.

Rather than just passive receivers and users of finished technological products, farmers are conceived to play potential roles at different stages of the process. This collaborative process extends from joint diagnosis to participative action. Ideally, a high degree of control by farmers over the development process is envisioned -- in terms of the goals, directions and priorities as well as in the means for achieving them. This is made possible, as the approach suggests, through optimising the use of and building on local knowledge, capacities and resources.

Participation was earlier conceived to cover people's involvement in decision-making processes and in implementing programmes and decisions, as well as their sharing in the benefits of development programmes, and/or their involvement in efforts to evaluate such programmes (Cohen and Uphoff, 1979). Van Dusseldorp (1981) proposed an analytical framework for various forms of participation using nine factors: level of voluntariness, base of involvement, involvement at different stages of project planning, intensity and frequency, range of activities, organisational level, efficiency, participants and style of planning.

In practice however, the concept has been so overused and misused that it becomes almost impossible to arrive at a single and all-encompassing definition. The term *people's participation* and

popular participation have become part of the normal language of development agencies worldwide but their interpretation and use vary widely. In a synthesis of participatory development experiences in the Philippines, Castillo (1983) identify at least five types: participation in the implementation of a project, participation in the decision-making on what the project should be, participation in evaluation, and participation in control over how the project is directed in the long run.

Moreover, it was also observed that historically the emergence of participatory approaches, notably by NGOs, provided an alternative and grassroots-based path towards development, not only in agriculture but in Philippine society in general (Constantino-David, 1992). Under the popular banner of people empowerment, development was pursued through effectively mobilising, organising, training and providing opportunities for the rural poor. The political and economic crisis in the Philippines during the 80s in a way created the enabling conditions for the spread of participatory approaches in the country. It fuelled the growth of popular movements, pressure groups, coalitions and networks that, with the framework provided by the NGO sector, became the mass movement of people power which eventually brought down the Marcos regime in 1986 (Villegas, 1990).

Box 2b. ^aA typology of participation: how people participate in development programmes and projects (Pretty, 1994).

Drawing on the range of ways that development organisations interpret and use the term participation, there are at least seven different types of participation. This typology suggests that the term participation should not be accepted without appropriate qualification.

- **Passive participation** - People participate by being told what is going to happen or has already happened.
 - **Participation in information giving** - People participate by answering questions posed by extractive researchers using questionnaire surveys or similar approaches.
 - **Participation by consultation** - People participate by being consulted, and external agents listen to views.
 - **Participation for material incentives** - People participate by providing resources, for example labour, in return for food, cash or other material incentives.
 - **Functional participation** - People participate by forming groups to meet predetermined objectives related to the project, which can involve the development or promotion of externally initiated social organisation.
 - **Interactive participation** - People participate in joint analysis, which leads to action plans and the formation of new local institutions or the strengthening of existing ones.
 - **Self-mobilisation** - People participate by taking initiatives independent of external institutions to change systems.
-

2.4 Systems Perspective: Towards a Holistic Framework

In reaction to criticisms against piecemeal, fragmented and uncoordinated development efforts, new approaches espousing a more integrated, interdisciplinary and holistic view of agricultural development began to take shape under the *systems* label.

The concept of a *system* was first introduced by Aristotle many centuries ago when he postulated that the whole is more than the sum of its parts. The initial scientific exploration of wholes and wholeness, however, is attributed to Ludwig von Bertalanffy who in 1937 first presented the idea of a general systems theory. Since then, other novel developments associated with the study of organised wholes have proliferated in the world of science, particularly in the field of cybernetics.

It is interesting to note that by the time agricultural sciences adopted general systems theory, systems approaches were already well established in advanced studies in other scientific disciplines (Dent, 1975). In recent years, the systems approach has so much become a generally accepted tool for effective agricultural research (Fresco, 1986) such as those in the study of biochemical and physical systems, farm business systems, economic systems, cropping systems and farming systems.

The systems perspective mainly evolved in reaction to the perceived failure of reductionist science to deal with complex problems posed by modern technology. General systems theory provided a unifying theoretical framework in trying to understand and predict complex phenomena by describing them as systems of organised complexes. Within the past few decades, it has become increasingly clear that very diverse phenomena, from phytoplankton to national economies, display similar characteristics that can be explained by their behaviour as systems.

To do systems thinking is to set some constructed abstract wholes, often called *system models*, against the perceived real world in order to learn about it. The purpose of doing this may range from engineering (in the broad sense of the world) some part of the world perceived as systems to seeking light or illumination (Checkland and Scholes, 1990). From the various interpretations of systems concepts forwarded by different authors, Checkland (1981) pieced together a coherent concept of the *system* by taking the notion of a whole entity exhibiting emergent properties, hierarchy, communication and control. As elaborated upon by Checkland and Scholes (1990:19):

Systems thinking takes seriously the idea of a whole entity which exhibits properties as a single whole (emergent properties), properties which have no meaning in terms of the parts of the whole...The concept of emergent properties itself also implies a view of reality as existing in layers in a hierarchy. In fact, it is the ability to see emergent properties which define the existence of a layer in hierarchy theory.

To complete the idea of a system, two further concepts which bring in the idea of survival need to be added. The hierarchically organised whole, having emergent properties, may in principle be able to survive in a changing environment if it has processes of communication and control which would enable it to adapt in response to shocks from the environment.¹

Systems may be classified as belonging to five classes (Checkland, 1981):

- natural systems originating from the universe;
- designed physical systems created by man;
- designed abstract systems representing the consciously ordered products of the human mind;
- human activity systems or consciously ordered wholes of human activities; and,
- transcendental systems where all other types beyond human knowledge may fall.

The interest in systems approach to agricultural development was reflected in the wide adoption of such concepts as agricultural systems (Spedding, 1979), cropping systems (Zandstra et al, 1981), farming systems (Hilderbrand, 1986) and agroecosystems (Conway, 1986).

In the Philippines, the development of farming systems research actually started with the need for research into alternative crops for rice areas where the self-sufficiency brought about by the new varieties was anticipated to lead to a decrease in rice price and farmer profit. Later various terms such as multiple cropping, cropping systems, farming systems and integrated farming systems were

¹Emphasis added

popularly used. But as Carandang (1987:25) observed, very few of the research ever lived up to their names:

Our experience showed that many researchers prepared projects under the label of 'farming systems', such as cashew-based farming systems project, when all they wanted to do was to plant other crops between old cashew trees, with no intention of using the cashew yield or added productivity as part of a combined evaluation...When farming systems became popular, many scientists working in various disciplines such as crops, livestock, soil science or economics, suddenly became researchers in this field. In many cases, however, they continued to emphasise their own discipline, and only added a flavour of farming systems.

2.5 Beyond the TOT: An Overview of Alternative Approaches

The post-Green Revolution era saw the mushrooming of various alternative approaches that contributed to a conceptual revolution in agricultural development, particularly by inducing reversals (Chambers, 1989) in the basic assumptions of the linear model. The emerging approaches, although many and diverse, are not discrete but instead reflect certain overlapping characteristics while emphasising any or a combination of the three main themes presented above. The list below seeks to highlight some of these major perspectives. It is not meant to be exhaustive but merely intended to illustrate the wide variety of post-TOT approaches that have been developed.

Farmer-back-to-farmer model (FBF). The basic philosophy upon which FBF is based holds that successful agricultural research and development must begin and end with the farmer. Applied agricultural research cannot begin in isolation on an experimental station or with a planning committee out of touch with farm conditions. In practice, this means obtaining information about, and achieving an understanding of, the farmer's perception of the problem and finally to accept the farmer's evaluation of the solution (Rhoades and Booth, 1982). In short FBF sees agricultural research and development as a process that starts with an understanding of the farmer's circumstances and be brought full circle back to the farmer's evaluation of the technology.

In the FBF, diagnosis to arrive at a common definition of the problem is fundamental and serves as springboard for research. FBF recognises this as a crucial stage since farmers frequently define their problems differently from change agents, in the same way that researchers often view problems within disciplinary boundaries.

Farming systems perspective (FSP). The farming systems concept is usually associated with the idea that it is necessary to understand the conditions of a farm as an agricultural production unit and for which technology is being developed in order for it to be efficiently and rapidly adopted (Hilderbrand, 1986). This basic idea has been transformed into several variants and called by different names, i.e. Farming Systems Research and Development, Farming Systems Research and Extension, Adaptive Research, Adaptive On-Farm Research. Though emphases vary, they are all attempts to take biological experimentation to farmers' fields early in the research process and to build farmers' feedback into evaluation at various points (Jones and Wallace, 1986). In general, three major forms of FSP can be identified (Stoop, 1987):

- FSP *sensu stricto*, i.e., the description and base data analysis for existing farming systems in a holistic way to obtain an understanding of the interactions between various components of the system, involving technical, biological, socioeconomic and institutional aspects.
- On-farm research with a FSP, which is complementary to on-station research and should be directly linked to it. This type of research assumes that production increases are more likely to

be achieved by stepwise changes in the components of the farming systems than by a revolutionary change in the entire system.

- Development of new farming systems, which would involve a radical restructuring of the entire system (e.g., changes from shifting and/or fallow cultivation to permanent cultivation).

FSP can be briefly summarised as an interdisciplinary approach in the integration of experiment station research with socioeconomic investigations and on-farm trials of technologies in the field. The flow of information and feedback permit a constant refinement of activities in an iterative fashion to better address the conditions of the target population (Jones and Wallace, 1986).

Farmer-first approach (FF). The essence of the FF paradigm is that farm families are from start to finish the primary actors and points of reference, with their priorities coming first, and with outsiders supporting farm families in their innovations, experiments and trials (Chambers, 1991). FF is a further elaboration of the Farmer-First-and-Last Model developed by Chambers and Ghildyal (1985) and Chambers and Jiggins (1987).

With farmer first, the main objective is not to transfer known technology, but to empower farmers to learn, adapt and do better; analysis is not by outsiders – scientists, extensionists or NGO workers – on their own but by farmers, and by farmers assisted by outsiders; the primary location for R&D is not the experiment station, laboratory or greenhouse, necessary through they are for some purposes, but farmers' fields and conditions; what is transferred by outsiders to farmers are not precepts but principles, not messages but methods, not a package of practices to be adopted but a basket of choices from which to select.

FF is conceived to be most appropriate for undervalued agriculture where TOT had been noted to perform poorly. It sees farm families as having a comparative advantage over scientists to innovate and experiment under such extreme agricultural conditions given their close familiarity with and knowledge on their local biophysical environment. Recently, a Beyond Farmer First approach has emerged that tries to further develop such concepts as power, knowledge, social processes and institutional frameworks (Scoones and Thompson, 1993).

Gender studies. In spite of women's important contribution to agriculture, conventional research generally overlooks the key roles that they play from production to utilisation. This is primarily due to the strong bias of many research approaches in favour of the male farmer as household head.

Evidence from the Philippines, for example, suggests that where gender issues were not systematically and thoroughly taken into account, women ended up relegated to secondary household roles, in the process masking their other equally important roles and ignoring their interests in relation to key natural resource management issues (Li, 1993; Illo and Veneracion, 1988).

Cognisant of this imbalance, gender-sensitive approaches to agricultural R&D have surged in recent years that are directed towards highlighting women's role in agriculture. This type of research first came to be popularly known as Women in Agricultural Development (WIAD) research. With the feminist orientation of early gender studies, there was a tendency to view women in isolation from their social context. Recently, gender research has fully lived up to its name by adopting a more neutral perspective of gender-role differentiation in agriculture.

The incorporation of gender issues and analysis in agricultural research and extension has resulted largely from the intersection of two fields of research and practice -- Farming Systems Research and Women in Development (Feldstein and Poats, 1989). Gender analysis is the analysis at

any stage of the project cycle of intersection of male and female roles and responsibilities against the backdrop of research on project goals, strategies and outcomes. (Russe et al, 1990). The conceptual framework for gender analysis covers four areas -- labour or activities, resources, benefits and incentives, and inclusion (Feldstein and Poats, 1989). The increasing gender responsiveness of mainstream research and development programmes is already evident in the integration of gender criteria in, for example, technology development and design.

Indigenous knowledge (IK). One of the revolutionary perspectives in the post-TOT period is that farmers are far from being passive technology receivers and instead are actively engaged in both knowledge generation and application as they cope with perceived constraints. Their knowledge, insights and adaptive skills accumulated and developed through years of farming experience form a valuable resource for agriculture (Warren et al, 1991). Through sense-making processes (Brouwers, 1993), rural people identify shared objectives, make theories and use them, and learn in a complex and multi-dimensional reality.

This recognition of the existence and potential value of indigenous knowledge has led to the serious study of farmers' stock of knowledge with the aim of utilising this for strengthening formal research and development, illustrating a strategy of development from below. Richards (1985) however reveals that interest in IK for development is not entirely new since, as in the case of Africa, it dates back to the early part of the 20th century.

An underlying principle which characterises the diversity of approaches to developing participatory research is that the long history of farmers' adaptation and knowledge of their environments can and should influence research agenda to generate technology specifically tuned to local conditions (Amanor, 1990). However, as many of its advocates point out, IK is not only a technological adaptation but is also derived from cultural tradition, epistemological systems and the social role of people in a community. IK is based on a totally different conceptual framework from that of formal science and thus it tends to be marginalised (Thrupp, 1989).

Current interests generally fall under such themes as IK documentation and legitimisation, complementation between IK and formal science, and institutional frameworks to support IK systems. A more recent perspective argues that the focus should move from local knowledge per se to local knowledge processes, emphasising that their facilitation by external intervening agents is a potential key strategy for sustainable agriculture (Röling and Brouwers, in press).

The increasing attention given to IK is evident in its growth into a worldwide movement with the establishment of a network of 17 international, regional and national centres dealing with IK documentation, research, advocacy and promotion (Indigenous Knowledge Monitor, 1993).

Participatory technology development (PTD). PTD observes that despite claims of researchers that they base their work on elaborate assessment of farmers' perceptions of constraints, despite on-farm research and farmer-first rhetoric in extension, the step to acknowledge farmers' role as technology developers in their own right has not been made by mainstream research and development organisations. Such a step would imply that, in addition to on-station research, on-farm research and extension activities, a separate domain of development intervention needs to be put in place, geared toward enhancing farmers' capacity to develop technology (Haverkort, 1991). The focus of PTD is to harness the untapped potential knowledge and capacities of local people in the design of technology for agricultural development in marginal areas with lack of access to external resources.

The PTD looks at farmers not as clients but as managers who need assistance from external actors in the role of consultants, brokers, mobilisers, catalysts, etc. The PTD approach seeks to

combine the indigenous knowledge and research capacities of the local farming communities with that of research and development institutions in an interactive way. Its two-fold goals are to identify, generate, test and apply new techniques and practices, and to strengthen the existing experimental and technology management capacities of the farmers (Reijntjes et al, 1992).

A major feature of PTD is its emphasis on farmers and their social networks as having primary control over the technology development process while maintaining a dialogic relationship with external agents. PTD is generally operationalised in terms of clusters of activities that form a six-step process involving different forms of collaborative actions between farmers and external agents (Jiggins and de Zeeuw, 1992). Rapid rural appraisal (RRA) and participatory rural appraisal (PRA) are among the most prominent diagnostic techniques used in PTD.

2.6 Post-TOT Approaches Face the Sustainability Challenge

Apparently, the various forms of intervention approaches earlier outlined were mainly a reaction to the limitations of the TOT to address post-Green Revolution development concerns. Foremost among these issues was social equity, translated primarily into the need to give attention to peripheral areas of the Philippine uplands, as much as that enjoyed by the well-endowed lowlands.

Through client-orientation, intervention has sought to target marginalised farmer groups. Participatory development meanwhile has designed intervention as a means for mobilising and empowering local people, making them not only beneficiaries but also participants in the development process. Finally, systems approach has emphasised that only a holistic perspective can lead to a better understanding of problem situations and ways to lead to their improvement.

As the focus of agricultural development in the Philippines, however, shifts towards concerns for sustainability, these post-TOT intervention approaches are faced with the newer task not only of helping increase farm yields or outputs under less-favourable agricultural systems but of ensuring that these increases are sustained over time. The challenge for intervention in the Philippine uplands now becomes demonstrating its continuing relevance and capacity of being able to effectively respond to emerging issues surrounding problem situations in natural resource management.

Exploring the nature of these problem situations, in the succeeding chapters, provide an opportunity to examine whether sustainable agriculture can be effectively introduced within the framework of post-TOT intervention approaches, considering among others:

- their emphasis on clients and/or focus on actors that fall almost exclusively within the agricultural sector;
- the thread of populism running through them, particularly in conceptualising participation;
- the holistic perspective espoused is generally limited to systems that are said to exist objectively;
- their heavy emphasis on technological solutions to agricultural problems; and,
- the apparent gaps between the concept and practice of these approaches.

Chapter III

USER-ORIENTED APPROACH: AN ILLUSTRATIVE CASE OF POST-TOT INTERVENTION

The first two chapters discussed the evolution of post-TOT intervention approaches and how these have now been confronted by the challenge of responding to emerging sustainability concerns. As an illustrative example, this chapter presents the case of the user-oriented approach of an R&D programme called the User's Perspective With Agricultural Research and Development (UPWARD).

UPWARD's distinct feature is its user-oriented approach to agricultural research and development, which synthesises post-TOT approaches into an eclectic participatory, user-centred, food systems framework. The programme's underlying principle is that building the user's perspective and participation into the research and development process leads to innovation that is more relevant to user needs and circumstances. UPWARD's initial programme phase was mainly a diagnostic research of sweetpotato-associated food systems in the Philippines and other Asian countries. Its formative experiences however not only highlighted the prevalence of low-input and subsistence upland systems but also uncovered that the food production-utilisation cycle was increasingly constrained by the continuing degradation of natural resources supporting such food systems.

This significant realisation has prompted a reorientation of programme thrusts with UPWARD consequently integrating sustainability concerns in its R&D agenda. In light of UPWARD's increasing recognition of the crucial interface between natural resource and food systems, the main programme phase has specifically sought to broaden its areas of concern by applying the same user-oriented approach to improve problem situations in natural resource management.

3.1 Focus on Users

The preceding chapter described different alternative approaches considered to deal more effectively with agricultural development in the Philippine uplands. While these client-oriented, participatory and systems approaches reflect high diversity, the common logic that runs through all of them is the importance of involving, right from the start of the technology development process, those people for whom agricultural research and development is supposed to serve, in short the users.

The users' perspective concept first gained some official recognition in the international agricultural research community during a 1985 conference of Consultative Group in International Agricultural Research (CGIAR) on *Technology Development: the Users' Perspective*. For the first time, CGIAR institutes/centres specifically discussed the degree to which they have considered the different categories of persons who are potential users of the technology generated, and how much users' considerations should influence their respective research programmes (ISNAR, 1985). At that time though, the emphasis was mainly on women as a specific user category given the budding stage of gender research at that time. The CGIAR conference consequently recognised the need to establish a programme that will spearhead in the development of the users' perspective approach. As succinctly expressed by Hardin (1985:1):

This review suggests that the IARCs now employ a substantial array of instruments to reflect users' perspectives in the planning and implementation of their programmes...Due to the manner in which national and international research institutions share responsibilities, NARS-IARC collaborative initiatives appear to be the key to further advances in user orientation.

Concrete data concerning the diversity of needs and constraints of users are only now becoming available...A special effort needs to be made so that the results of studies of women and of

other user groups are shared with all of us. This suggests that a clearinghouse-cum-network type of initiative may be needed.¹

3.2 Birth of UPWARD

The vision of the 1985 CGIAR conference to establish a users' perspective network was realised in 1988 with the initiation of the programme on *Improving the Food Systems of Asia: The Role of the Farm Household in Potato and Sweet Potato Research and Development*, a collaborative effort of the International Potato Center (CIP) and the Wageningen Agricultural University (WAU) with support from the Netherlands Government.

The programme later came to be known as the User's Perspective with Agricultural Research and Development (UPWARD), reflecting its emphasis on building user's perspective in the technology development process. While UPWARD considers itself part of the second revolution² (Prain et al, 1993), it stresses that the user-oriented approach remains distinct from other post-TOT approaches in the sense that:

- unlike most client-oriented approaches which drew influence from marketing research, it originated from the household and consumer sciences and therefore looks at users from an actor orientation;
- it rejects the notion of a farmer stereotype by seeking to explore heterogeneity within farmer groups;
- in contrast to farmer-centred participatory development approaches, it views farmers as only one of the different types of user groups; and,
- it examines not just farming systems or agricultural production but the larger food systems encompassing the entire food production-utilisation cycle.

The user-oriented framework can thus be said to be uniquely eclectic, having its roots³ in other systems, participatory and client-oriented approaches, namely:

- *food systems perspective* which examines technological change as a process covering pre-, main and post-production phases, one of the main research thrusts of CIP (CIP, 1989);
- *farmer-back-to-farmer model* which views agriculture R&D as a process starting and ending with farmers, developed by Rhoades and Booth (1982);
- *household systems perspective* which takes the household system as a socioeconomic unit for decision-making, production and consumption, applying the research framework developed by the Department of Household and Consumer Studies, Wageningen Agricultural University (Hardon-Baars, 1990);
- *gender studies* which analyzes gender-related aspects in agricultural development, as stressed in CGIAR research (ISNAR, 1985); and,
- *farmer first model* which seeks to develop farmer participatory approaches in agricultural development (Chambers et al, 1989).

¹Emphasis added

²post-Green Revolution era

³UPWARD traces its history to over two decades earlier as being inspired by the ideas of three individuals who all later became associated with CIP – Richard Sawyer, Gelia Castillo and Robert Rhoades (Rhoades, 1991), and later combined with the contributions by Antine Hardon-Baars and others from the Department of Household and Consumer Studies of the Wageningen Agricultural University (Prain, 1994).

Anchored on its user-oriented philosophy, UPWARD has formulated its overall mission as follows (UPWARD brochure, 1994:1):

To make sweetpotato- and potato-related agricultural research and development responsive to the needs and circumstances of users by building user-sensitive, food systems research capacity among young Asian professionals and by supporting the integration of this research within technical programmes.

In its programme formulation and development phase which started in 1989, UPWARD highlighted three main goals (UPWARD programme proposal, 1993):

- develop research methodologies which integrate the perspectives of technology users within the R&D process;
- support user-sensitive agricultural research which analyzes the needs and problems associated with sweetpotato and potato production and utilisation, identifying and exploiting opportunities for improvement; and,
- build the capacity of Asian-researchers to conduct users' perspective research and support the integration of the approach within technical programmes.

3.3 Why Sweetpotato?

People behind the programme readily acknowledge that UPWARD was born *with a sweetpotato in its mouth* (Prain et al, 1993). Though more focused on a philosophy than a commodity, UPWARD was *fathered* by the International Potato Center (CIP), whose mandate is to solve priority problems that limit potato and sweetpotato production and consumption in developing countries.

However, UPWARD considers that the focus on sweetpotato to illustrate the user-oriented approach has proven to be highly appropriate for several reasons. Sweetpotato is one of the developing world's most widely distributed and versatile crops, adapting relatively easily to a range of cropping systems and is a candidate for diversifying and intensifying food systems. It has been commonly found as an alternative staple in upland systems and homegardens as well as a diversification crop in lowland systems. The bulk and perishability of root crops and their vegetative reproduction raise a whole series of food systems questions and problems about conservation (including via processing), storage, marketing and the maintenance of planting material. Sweetpotato is also a nutritious crop, with significant production of edible protein and important quantities of micro-nutrients and is thus potentially important for improved household nutrition, especially against children's vitamin A deficiency (UPWARD programme proposal, 1993). As Castillo (1992) noted, sweetpotato best typifies a secondary crop with primary functions.

Yet of all major food crops, sweetpotato has probably received the least research attention. Despite its important contribution to providing food for the world's poor, especially in developing countries, research focusing on sweetpotato agriculture, especially the human and social aspects, is rare (Rhoades, 1987).

Box 3a. Sweetpotato: an untapped food resource (Woolfe, 1992).

Sweetpotato is an extremely important crop in many parts of the world, being cultivated in more than 100 countries. As a world crop, it ranks seventh from the viewpoint of total production. In monetary terms, it ranks thirteenth globally in the production value of agricultural commodities, and is fifth on the list of the developing countries' most valuable food crops. The sweetpotato's adaptation to, and hence presence in, the tropical areas where a high proportion of the world's poorest people live, together with its nutritional advantages, make it an attractive focus for further increase in its production and consumption, both directly (as fresh or processed food) and indirectly (as animal feed).

Crop	World		Developing countries		
	Production (10 ⁶ tonnes)	Dry matter (10 ⁶ tonnes)	No. of countries	Production (10 ⁶ tonnes)	Value (in 10 ⁶ \$)
Wheat	530	463	69	162	24
Rice	478	421	97	383	65
Maize	456	393	119	154	18
Potatoes	317	64	95	91	13
Barley	175	155	*	*	*
Cassava	131	53	95	127	9
Sweetpotato	119	35	100	137	12

*no data available

Sources: Horton, 1987; FAO, 1984; FAO, 1987

Little is known of the needs, problems and circumstances of sweet potato farming households and their interrelations with other individuals and groups involved in the production-utilisation cycle. Rhoades (1987) said that this neglect can be attributed to a number of factors, such as the:

- crop's lowly image and its being associated with poverty, i.e., socio-culturally labelled as a poor man's crop;
- political importance given to primary crops (staple cereals) over secondary crops
- market-driven mode of research which gives priority to commercial over subsistence crops;
- crop's high adaptability and hardy character thereby suggesting little need for research on care and management; and,
- weak research orientation towards upland, sweetpotato growing areas.

On the other hand, it is this apparently limited scientific knowledge on sweetpotato vis-a-vis the demonstrated capacity of subsistence farmers to manage the crop that has given UPWARD a challenging task and suitable opportunity to develop a user-oriented, participative food systems R&D approach.

Table 3a. Sweetpotato production in selected countries of Asia, 1987-89 average (Prain, 1994).⁴

Country	Production (in tonnes)
China	112,059,874
Indonesia	2,092,624
Vietnam	1,958,333
India	1,395,767
Philippines	690,202
Korea REP	568,206
Bangladesh	550,233
Korea DPR	497,000
Papua New Guinea	472,000
Laos	164,116
Thailand	106,000

3.4 From Idea to Action: UPWARD's Formative Years

Since its launching in 1989, the programme has established a network of nearly 50 researchers conducting UPWARD projects in seven Asian countries, and over 200 associates pursuing or interested in user-oriented research in Asia and other parts of the world.

Table 3b. Distribution of UPWARD network members (UPWARD programme proposal, 1993).

Country/Region	UPWARD researchers	Network Associates
Philippines	28	43
Indonesia	11	15
Nepal	6	10
Sri Lanka	4	11
Vietnam	3	6
China	2	3
Thailand	2	22
Bangladesh	-	5
Pakistan	-	3
Bhutan	-	2
India	-	20
Taiwan	-	1
Europe and North America	-	56
Africa	-	10
Latin America	-	10
Total	49	217

⁴Actual production figures may actually be higher than official statistics since the latter often fail to consider less conventional modes of growing the crop, e.g., homegardens, and the commonly practised staggered method of harvesting sweetpotato (Hardon-Barrs, in prep).

They are based in colleges and universities, research centres, extension agencies and non-government organisations. There is a very wide disciplinary spread in UPWARD research, fairly evenly distributed between the socioeconomic and biophysical fields which is consistent with its interdisciplinary approach. Meanwhile, the activities of UPWARD in the programme development phase highlighted the three-fold goal of developing methods, research framework/priorities and the researchers to conduct this type of research.

Table 3c. Disciplines involved in recent UPWARD projects (1992-1993).

Discipline	Number of Projects Involved With
Agronomy	9
Extension	8
Economics	7
Sociology	5
Nutrition	4
Plant breeding	4
Household and consumer studies	4
Environmental science	3
Development communication	3
Crop protection	3
Food technology	2
Horticulture	2
Anthropology	2
Forestry	1

UPWARD points out that its most concrete accomplishment in the first programme phase was the user-oriented diagnosis of Asian sweetpotato-associated food systems⁵. Researchers worked with users to illuminate the different production systems, distribution channels and utilisation patterns of sweetpotato in different countries of Asia. These broad diagnostic studies have helped identify particular needs and opportunities in establishing the programme's research framework and directions for the next phase.

Through a wide range of research projects, it has been possible to identify and describe a rich diversity of both intensive, commercial systems and more extensive, low-input, semi-subsistence systems in which sweetpotato is grown. Moreover, these have led to the identification of three main research areas wherein UPWARD's efforts are deemed especially important for users: production systems; genetic resources; and, marketing processing and consumption.

3.5 Primary Functions of Sweetpotato as Secondary Crop

UPWARD's user-oriented R&D has reaffirmed the significant role of sweetpotato in Asian food systems by highlighting the crop's multiple functions across different agroecological and socioeconomic boundaries. These functions may be grouped into four major categories --

⁵The term *sweetpotato-associated food systems* is used to emphasize that while the crop may play an important role(s), sweetpotato only forms part of a multi-crop food system in most cases.

consumption/ nutrition, income/employment, equity and sustainability. Below are the highlights of sweetpotato research in the first programme phase of UPWARD, as synthesised by Prain (1994).

Consumption/nutrition. Results of a countrywide minimum data set on sweetpotato production show that over 90 percent of sweetpotato grown in household gardens is destined for household consumption. There are certainly major nutritional implications in the choice of sweetpotato as food over other crops, or of particular varieties of sweetpotato over others.

Sweetpotato has long been an emergency crop providing a survival and buffer function when other major food crops are limited or threatened, e.g., natural disasters, seasonal fluctuations in supply, general economic crises. Currently, its food uses range from being a staple in many ethnic, upland communities to being a favourite snack item for children. Moreover, its food value is not limited to human beings but extends to animals since the crop is a popular feed in backyard animal raising.

Income/employment function. While sweetpotato is generally for domestic consumption, evidence suggests that subsistence and commercial production systems represent not a dichotomy but two extreme points of a continuum, with most farms in-between being of the mixed type.

In some countries, sweetpotato is regarded as a low-cost, relatively high return cash crop. Although it does not command a high market price, its low-input requirements result in at least a significant contribution to household income. In one Nepalese farming community, for example, an average net annual income of \$35 from sweetpotatoes may seem very modest, but with a national per capita GNP of only \$170, it actually represents a surprisingly major portion of rural income. Recent research has also developed processing technologies with potential commercial and industrial applications, e.g., starch, flour, feeds, beverage and other food products. These technological advances provide new added-value opportunities and wider utilisation options to increase income from sweetpotato.

Equity. Sweetpotato, in common with other secondary crops, can be an important additional resource for marginal, low-income families and as such contribute towards reducing inequalities within the rural population. In other words, secondary crops can be a modest source of power to less powerful segments of society.

Household gardens, where sweetpotato for domestic use is commonly grown, are primarily the preserve of women in most parts of Asia, oftentimes becoming an extension of the kitchen. Their contribution to a woman's position seems to be mainly in terms of greater flexibility and independence in provisioning the family. In some cases they may also offer some financial flexibility in that some of the products from the garden can be sold. The crop also provides women greater participation in household decision-making such as on varietal choice in sweetpotato production since they are the ones most knowledgeable with the culinary and nutritional character of the different varieties.

Participation of women in sweetpotato cultivation has long been recognised and is unfortunately now being pushed to the extremes; male outmigration, for instance, has led to women's assumption of additional responsibilities by taking over farm and household tasks previously associated with men. Meanwhile, male dominance is noted to have resurged as more upland farms are being transformed into commercial areas for vegetable production.

Sustainability. A number of agronomic traits of sweetpotato make it a suitable food crop for marginal, upland production systems - adaptability to various microniches, low input requirements, perennial growing habit and resilience to environmental stress. Yet, it is in these fragile environments where threats to agricultural sustainability are also most serious.

Although reports are contradictory and still need scientific validation, there are widespread farmer observations about the crop's contributions towards enhancing the long-term productivity of upland agriculture. In comparison with other crops, sweetpotato probably has the lowest level of input requirements, i.e., fertilisers and pesticides, to support production thus making it a popular subsistence crop. In addition, the hardy character of the crop is easily demonstrated by its tolerance to poor growing conditions such as low moisture and high salinity. In fallow systems, sweetpotato is used for its soil conditioning function. Additionally, the crop is recognised as a natural agent for soil erosion control.

3.6 Sustainability Issues in Sweetpotato-associated Food Systems

UPWARD's diagnostic research has originally tried to focus on the bottlenecks in the food production-utilisation cycle and how appropriate technical knowledge on production, postharvest, processing, marketing and consumption can help improve the performance of the food system. In the course of research, however, a number of relevant problems have been identified highlighting sustainability issues in sweetpotato-associated food systems. As reflected in the different research project reports, some of these sustainability issues are (UPWARD, 1992):

- A large fraction of sweetpotato production is concentrated in upland agroecologies characterised by rainfed areas, sloping land, degraded soil and unfavourable climatic conditions. Agriculture under these inherently fragile environments is now facing serious ecological stress. Thus, sweetpotato production cannot be viewed apart from natural resource management.
- Sweetpotato is synonymous with swidden agriculture and commonly forms part of short-fallow upland rotation systems. Since it is closely associated with subsistence, swidden farmers, the perceived villains of the environment, sweetpotato production is often equated with ecologically destructive forms of upland agriculture.
- In the uplands, sweetpotato production is common in deforested areas and other public lands that have been converted to agricultural use. Renewed efforts by the government to undertake rehabilitation of these degraded areas such as through reforestation involves measures to control subsistence farmers' continued agricultural activities within public domain, including sweetpotato cultivation.
- On the positive side, sweetpotato have been known to make favourable contributions towards long-term agricultural productivity because of its low-external input requirement coupled with persistent farmer reports about its soil-enhancing effects, i.e., structure, moisture and temperature, largely attributed to the crop's unique vegetative character and growing habit. Recent research has also shown the potential application of sweetpotato as a natural control agent for nematode pests in rice.

- Sweetpotato-associated food systems are highly dependent on the establishment and maintenance of a system for genetic resources conservation to ensure the continued availability of varieties suited for specific food uses.
- Discussions on sweetpotato-associated food systems are frequently caught in the longstanding conflict between food production and resource conservation, and the serious debate among development professionals between agriculture and the environment. The lack of scientific knowledge has created high uncertainty on whether the crop is a boon or bane in sustainable upland development.

3.7 Redefining UPWARD's R&D Agenda

UPWARD's diagnostic research in the first phase has highlighted the interdependency of food and natural resource systems. The findings show that food systems cannot be dissociated from the natural resource base on which they depend. Therefore, for UPWARD to effectively intervene in sweetpotato-associated food systems it must equally consider the ecological dimensions of the food production-utilisation cycle.

These emerging sustainability concerns are now more explicitly contained in the proposed R&D agenda for the next phase. Recently, the research themes have been streamlined into three: genetic resources; production systems; and marketing, processing and consumption (UPWARD brochure, 1994). Within each key theme, problem areas are more specifically defined and natural resource management issues more visibly integrated and prioritised.

Box 3b. Key UPWARD R&D goals in natural resource management.

The expansion of UPWARD's R&D framework towards sustainable sweetpotato-associated food systems has been translated into a number of concrete programme goals for the second phase which address problem situations in natural resource management (UPWARD programme proposal, 1992):

- **To identify the role of sweetpotato and the interest of users in sustainable agriculture.** Sweetpotato is often championed for its low input requirements, adaptability to relatively poor conditions and soil conservation properties. It is a relatively short duration crop which adapts to very varied cropping systems, thus making it a good candidate for crop diversification schemes. The many overview studies conducted during the programme development phase have recorded local users' ideas on these properties, but without, in most cases, going into much detail. Second stage research needs to join disciplines with farmer knowledge to explore such properties in much greater detail.

In trying to contribute to greater sustainability of production systems through these studies, UPWARD research has a comparative advantage to explore and clarify the complex issue of user interest in conservation. Of particular importance is the possibility of developing supra-household conservation measures: how can and do some groups of households take measures that probably benefit all in the long term, but offer no clear advantages for individual households in the short term. These issues should lead to cooperation with both GO and NGO community resource management initiatives.

- **To explore the role of seed supply systems in upgrading and sustaining production and diversity of sweetpotato and potato.** This has emerged from some of the previous UPWARD studies as of considerable importance and which requires further study. These systems involve both complex management of several
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Box 3b. Continued.

fields at different stages of development, use of seed plots and intricate social exchanges among neighbours. Management of these systems is not only to maintain planting material, but also to preserve genetic diversity. UPWARD research has highlighted the need to ensure a continuous supply of planting materials, particularly of the preferred varieties, especially in the face of serious agroecological and socioeconomic constraints.

- To identify strategies for user conservation and evaluation of genetic resources. Although genetic resources research will give considerable attention to the interdisciplinary collection of sweetpotato germplasm and associated indigenous knowledge and the evaluation of local and modern germplasm, particular efforts will be made to explore methods for establishing *active* in situ genebanks and in situ *memory banks* of local knowledge about the germplasm.
- To identify the ways in which policy influences and is influenced by peripheral production systems. There are at least two areas where UPWARD could make a significant contribution here. First, it is important to study in more detail the influence of different kinds of macro food and resource management policies on micro-level decision-making on sweetpotato production and use. Mention has already been of UPWARD research which has associated the reduction of plantings of sweetpotato with reforestation policies. The perspectives of users on these kinds of policies need to be much better understood, to help both in improved policy formulation and in support to rural people for alternative options in the face of policies. The second area takes the opposite perspective, examining ways in which local people can influence policy which affects sweetpotato production and use, through different forms of group advocacy.

The preliminary specific areas indicated in the proposed R&D agenda for the second phase further provide concrete examples of how natural resource management concerns have been integrated into UPWARD's general research themes.

Table 3d. UPWARD's R&D agenda for the second phase (UPWARD programme proposal, 1993).

Theme	User Integration			General user concerns	Policy & inst. concerns
	<i>consultants</i>	<i>R&D partners</i>	<i>local R&D managers</i>		
Production systems	-envtl. effect of SP -seed systems -indigenous pest knowledge	-soil fertility management -homegarden improvement	-community-based disease management	-trade-offs between households & community -empowerment of women	-effects of envtl. policies on upland root crop prodn. -institutional perception of sustainable root crop agric. -communication of techn. knowledge
Genetic resources	-documentation of ethnobotanical knowledge	-evaluation & selection of germplasm	-community-based genebank	-local genebank management: what group? -variability in user knowledge	-farmer rights over germplasm & associated knowledge -institutional linkages between <i>in situ</i> & <i>ex situ</i> collection
Marketing, processing & consumption livestock feed	-small-scale marketing systems.	-user evaln. of processing technology		-household micro-enterprises on household feed prodn.	-images of rootcrops food -effects of feed sector policy -

Having outlined the historical development of the UPWARD programme particularly on how it has recognised the importance of paying equal attention to natural resource management in food systems, the succeeding sections explore the conceptual framework upon which the user-oriented approach is anchored.

3.8 User-oriented R&D Framework

In developing the user-oriented approach, UPWARD recognises the significant contributions made by other post-TOT models. The latter have laid the foundation for what has become the conceptual framework guiding the programme (UPWARD, 1992:7):

UPWARD has not been the first project to involve users in research, nor the first to study the household, nor the first to study marketing, consumption and other postharvest issues together with production as part of the food system. It may however, be the first time that an agricultural research and development project has attempted to integrate these particular elements in a holistic, user-centred framework (UPWARD, 1993).

UPWARD projects follow a two-step approach consisting of the diagnostic and action phases. The diagnostic part seeks to generate local people's knowledge of their own situations in order to gain a fuller understanding of key sweetpotato production, processing and utilisation problems particularly under marginal situations. The diagnostic results are deemed necessary as valuable inputs in the action phase where projects embark on a participative approach with users in developing appropriate interventions to overcome identified constraints.

Many of the assumptions of the user-oriented R&D framework though have remained largely implicit. In most UPWARD research projects, there has been more emphasis on methods development and documentation of sweetpotato-based food systems and less on the conceptual implications of research findings. Within UPWARD itself, there has been an expressed need to define clearly the *users perspective* concept (Verdonk, 1990; van Eijnatten, 1991; UPWARD programme proposal, 1992). Fortunately, the work of Rhoades (1986, 1990, 1991), Hardon-Baars (in prep), Prain (1993), Castillo (in press) and Sandoval (1992) have been particularly helpful in putting together and articulating what could be labelled as the user-oriented R&D framework. Based on the aforementioned sources, an attempt is made below to outline the concepts on which this framework is anchored upon.

Users. UPWARD sees user orientation as a concept with both logical and ethical bases. Firstly, users are the ones most familiar with local situations, needs and opportunities. This is especially true in the case of sweetpotato-associated food systems where scientific knowledge is relatively limited. Secondly, they are the ones with most to gain -- and lose -- from technology use.

For UPWARD, the term *users* generally denotes people who use technological knowledge in the context of sweetpotato-based food systems. However, UPWARD is quick to add that *users* as used in the programme refers not to passive receivers of others' outputs or products but to dynamic individuals and groups performing a wide range of activities in relation to certain food system goals. Hardon-Baars (in prep) stresses that the term originates from the field of household and consumer studies which refers to those engaged in informed decision-making and rational action. Prain (1993) meanwhile relates the concept to computer users who make creative use of hardware and software as a means for achieving desired outputs.

The flexibility of *users* also provides a broader perspective of the range of actors, rather than just farmers, in the context of food systems. It allows making distinction among different types of

users. In its inaugural workshop (UPWARD, 1990), a preliminary attempt was already made to identify these different user categories. *Endusers* are those people envisioned to apply technology (e.g., farmers, rural women) while *intermediate users* include applied researchers, extension agents, policymakers or even local actors engaged in transforming and disseminating technology to endusers. *Users* are those who actually apply technology while *non-users* include those who may potentially use technology but lack the motivation or capability to do so due to factors internal (e.g., risk aversion) or external (e.g., structural constraints) to them. *Direct users* are those involved in technology application while *indirect users* are those who are affected by, benefit from or influence technology application (e.g., consumers, traders).

The user-oriented approach not only underscores that there are different groups of actors among users. It also provides a hierarchical framework for dealing with different user categories. The multi-level sense of *users* enables the concept to be used in reference to a wide range of collectivities appropriate to a given situation, such as an individual (e.g., sweetpotato farmer), group (e.g., rural women's association), household (e.g., upland farming family) and community (e.g., barangay). As such, it highlights the relative autonomy of individual users while recognising their potential for synergic functioning.

User's perspective. User's perspective is basically locally situated knowledge or local people's understanding of (aspects of) their environment and how they deal, i.e. adapt and control, with it to achieve certain goals. It forms the basis for the explanations users have for the phenomena around them and which determine their practices. Users' perspectives are characterised by their: pragmatic rationality, concreteness and link to directly perceivable evidence, close attachment to the sociocultural context, interlocking of learning and practice, location specificity, holistic view, and synthetic or integrated approach. User's perspectives are essential inputs at different stages in the R&D process, such as in:

- establishing local agroecological, socio-economic and cultural profile;
- identifying constraints and opportunities;
- setting a more responsive R&D agenda;
- adapting existing technology to specific niches;
- conducting field experiments;
- knowledge storage and retrieval; and,
- monitoring and evaluation.

The idea of incorporating users' perspectives in the R&D process appears simple and straightforward until one realises that different users can have different perspectives about the same subject or object. This means that there is the added task of sorting out these different perspectives by trying to grasp their differences and similarities. One way to understand them is by probing into the underlying assumptions which users' adopt as lenses for viewing and dealing with their environment.

The user-oriented approach takes the concept of a cognised model which is defined as the description of a people's understanding about their world (Nazarea-Sandoval, 1990). It rests on the notion that such an *image of objective reality* influences how people evaluate, decide and behave given certain conditions and alternatives in their daily lives. Quoting Rappaport (1979: 97):

Nature is seen by humans through a screen of beliefs, knowledge and purpose and it is in terms of their images of nature, rather than on the actual structure of nature, that they act. Yet, it is upon nature itself that they do act and it is nature that acts upon them.

Since different individuals are socialised in different groups with different expectations and sanctions, it is not surprising that the lenses through which they view the world differ and that the more disparate their backgrounds, the more incongruent their models are (Nazarea-Sandoval, 1990). In other words, much could be gained if diagnostic exercises need to go beyond examining perspectives, and into probing their underlying mental frameworks.

Systems framework. The user-oriented approach involves an inquiry into the state of the food production-utilisation cycle in general, and the constraints and opportunities faced by users in particular. It looks not only at production but at the full food chain including postharvest handling and storage, processing, marketing, consumption and nutrition. A fundamental assumption is the integrated nature of these different domains of the food system therefore suggesting the need for a holistic framework.

The approach cautions against looking at a problem in isolation from its wider context because of the assumed interdependence of the various components of the food system. For example, pest problems in the field will certainly have important repercussions on the marketability of the produce or on the nutritional status of consumers.

A user-oriented diagnostic framework therefore seeks to highlight the interrelations among perceived problems and view them as a complex whole, in other words the problem situation of a food system. User orientation helps ensure that R&D is responsive to the problems in food systems by identifying and defining a problem situation based on the perspectives of users who are most knowledgeable about their own circumstances aside from being the ones directly affected and who have to deal with the situation.

Innovation. The user-oriented approach is not limited to simply looking at the perspectives of users in order to gain an understanding of the local situations. The ultimate goal is for these perspectives to be the cornerstone in promoting the participation of the ultimate users of agricultural technology in the development of production and post-production innovations. Thus, the transition from the diagnostic to action phase.

Innovation is seen as the emergent property of the partnership between local and global experts in a two-step R&D process of joint diagnosis and participative action. The following elements are central to this process:

- *partnership* through mutual recognition of the complementary contributions of users and scientists;
- *interaction* through effective communication;
- *participation* through active collaboration; and,
- *integration* through shared learning.

Within the global scientific community, a major distinction can likewise be made between the social and biophysical sciences. As Prain (1992) puts it, the biophysical scientist tends to focus on the *agri* part while the social scientist on the *culture*. Thus, instead of a dual partnership between global and local experts, a triangular relation among users, biophysical scientists and social scientists emerges. There are at least three ways in which the R&D process can be conceptualised based on the mode of user participation involved (UPWARD brochure, 1994):

- Users as consultants - common situation in the early diagnostic stage when interdisciplinary teams consult with users on perceptions of local systems and needs. In other words, the view from below.

- Users as research partners - jointly evaluating solutions to problems and improvements to management practices proposed by researchers. Maximises relation user-biological scientists with social scientists as facilitator of dialogue and documenter of socio-cultural and economic variables.
- Users as local R&D manager - users run the show. For example, research curators of community-based germplasm collections or organisers and executors of seed production evaluations. Biological and social scientists support and facilitate local initiatives and introduce options for evaluation.

Intervention. While user orientation denotes the centrality of users in the technology development process, it likewise recognises the supportive role of intervention in introducing innovation. Science can potentially strengthen local expertise by offering a wider range of technology options; enhancing explanatory and predictive power; speeding up knowledge processes; and, enhancing local capacity for experimentation. However, this potential capacity of science-based intervention is rather limited especially when applied in marginal situations because of its limited knowledge and experience on upland agriculture, difficulty of conducting experiments under complex environments, and analytical or reductionist mode of inquiry.

Thus, science-based intervention is thought to be most effective when combined with local expertise in a synergic fashion. It needs to be characterised by:

- interdisciplinary cooperation among scientists;
- interdisciplinary mentality of individual scientists;
- genuine recognition of the value of users' perspectives; and,
- a menu of methods (e.g. formal, informal) and roles to suit specific situations.

3.9 Applying the User-oriented Approach in Natural Resource Management

The user-oriented R&D framework provides a tool for empirical inquiry with a trilogy of analytical fields -- users, perspectives, actions -- within the context of food systems. Each field looks at one particular dimension of a problem situation. The general scope of the individual fields of analysis is described below:

- Users - individuals, organisations and institutions involved in the food production-utilisation cycle; their functional and structural interrelations
- Perspectives - users' world views; goals and expected outputs, constraints in the effective performance of the food system; their probable causes and effects; gaps between the existing and desired situations; opportunities for improving the situation
- Actions - development and application of technological innovation to improve the situation; who does what with whom and how?; types and levels of user participation; perceived extent to which situation is improved

UPWARD's integration of natural resource management in its R&D agenda presents a new and different challenge for examining the wider applicability of the user-oriented approach in what Knorr (1983) refers to as *sustainable food systems*. After having been demonstrated to work in dealing with problem situations in agriculture and food production, the continued relevance of the user-oriented approach will have to be tested as UPWARD begins to explore problem situations in natural resource management in the context of sweetpotato-associated food systems.

The UPWARD case provides some grounding for the present study in its goal of examining the responsiveness of post-TOT intervention approaches to sustainability issues. As a tool for overcoming constraints in managing natural resources in the Philippine uplands, the approach faces a number of key issues, foremost of which are the adequacy of:

- a user orientation, in identifying the relevant actors;
- a sweetpotato-associated food system, as general framework for inquiry;
- user's perspective, in covering the plurality of world views with respect to a problem situation;
- the three modes of user participation, in reflecting the wide range of potential roles that intervention needs to play; and,
- technology, as the standard takeoff point for introducing innovation in natural resource management.

Chapter IV

RESEARCH FOCUS: THE ROLE OF INTERVENTION IN IMPROVING PROBLEM SITUATIONS IN NATURAL RESOURCE MANAGEMENT

The previous chapters described how sustainable agriculture in the Philippine uplands has become a focal development concern, with the UPWARD programme provided as a case in point. This chapter now zooms in on problem situations in natural resource management, as it initially explores their distinct nature vis-a-vis the post-TOT intervention approaches that seek to address them.

Managing natural resources for sustainable agriculture leads to problem situations involving issues of definitions, centrality of the human factor, conflict between agriculture and other management goals, difficulty of managing people with multiple realities and goals, and actors' lack of recognition of their interdependency. Such nature of problem situations in natural resource management suggests a form of innovation that is more than just technological but one that involves creating platforms for social learning, integral decision-making and collective action. This chapter thus highlights the main research objective which is to examine the role that intervention can play to support innovation for improving problem situations in natural resource management. Based on such findings, the research expects to be able to recommend how current intervention approaches can be designed to better respond to sustainability concerns in the Philippine uplands.

4.1 Refocusing the User-oriented Framework Towards Sustainability

There is already mounting and compelling evidence to indicate that bringing the user's voice into agricultural research and development is a vital ingredient for innovative, relevant and efficient technology development (Merrill-Sands and Collion, 1994). For this basic reason, client-oriented, participatory and systems-based intervention approaches have emerged to compensate for the TOT's lack of mechanisms to bring user's perspective and participation into the priority-setting and solution-seeking processes with respect to agriculture. UPWARD's user-oriented framework represents one such concrete attempt to develop an alternative intervention design that is responsive to user needs and circumstances. It integrates ways of targeting specific client groups, creating opportunities for their participation and adopting a holistic view of agricultural problems.

User-responsive approaches have been widely regarded as successful, among others, in contributing to intervening agents' understanding of diverse production systems, identification of niches for new technologies and sharpening the focus on hard-to-reach farming categories (Merrill-Sands and Collion, 1994). However as agricultural development turns to concerns involving sustainability issues, these post-TOT approaches are faced with the task not only of confronting constraints in agriculture per se but also in the management of natural resources supporting agriculture. Proponents of user-responsive approaches themselves recognise that in refocusing their respective development missions, they also have to deal with the greater challenge of demonstrating the capacity to sustain the achievements of post-TOT intervention, by introducing improvements on how natural resources for agriculture are to be effectively managed.

In the preceding three chapters, a general background of the research problem was presented by discussing: 1) the emergence of sustainability as a development concern in the Philippine uplands; 2) the various types of intervention offered as alternatives to the TOT; and, 3) the user-oriented approach as an illustrative example for both of the above. This chapter sets out to look more closely into the research problem by highlighting the need to reexamine how intervention could effectively support sustainability as a development mission, considering the different nature of problem situations involved. It begins by exploring concepts associated with natural resource management.

4.2 Natural Resource Management: Problem With Definitions

Sustainability can be simply viewed as the goal of maintaining the natural resource base at a level that will enable future generations to produce the same value output that is consumed by the present generation. This would require depleted renewable resources to be renewed, and nonrenewable resources to be conserved, with the expectation that substitutes can eventually be found for them (Mikesell, 1992).

The task of natural resource management however begins by asking what it is to be managed. Yet, determining what *is* and what *is not* a resource can be problematic. For example, an object that is considered as a resource by one individual may be viewed as just a piece of garbage by another. In other words, the mere physical presence does not suffice as a criterion because a resource is determined largely by its subjective, relative, cultural and functional value. Contrary to popular notion of its being an intrinsic aspect of nature, resources are essentially a human invention (Rambo, 1991).

Rather than just a tangible object, a resource represents a functional relationship that exists among people's wants, their capabilities and their attitudes towards the worth of an environment. In essence, anything can be regarded as a resource if it offers a means of attaining certain socially valued goals (Cloke and Park, 1985). However, differences in value systems, aspirations and technology mean that whether a neutral stuff is a resource or not depends on factors like time, culture or place. Its being a socially defined and abstract concept is perhaps best expressed in the classic definition of the economic geographer Zimmerman, "*resources are not, they become*".

Box 4a. Classification of natural resources (Mikesell, 1992).

For purposes of analyzing sustainable development, three types of resources can be recognised:

- Global resources, such as the atmosphere and oceans, which are essential to all life and the degradation of which is irreversible, except over very long periods of time. Although in time the economic costs of further accumulation of greenhouse gases or of ozone depletion can be estimated, for the time being at least these estimates are little more than guesses. This does not mean that economic measures cannot be used for controlling actions that impair the global environment, but it is still a long way from being able to relate the marginal cost of reducing carbon dioxide emissions to the marginal social damage caused by an additional unit of greenhouse gases.
 - Renewable natural resources, which include forests, soil fertility, and the quality of regional air, rivers, lakes and wetlands. In many cases, costs of both depletion and renewal can be determined. In most cases, destruction of and damage to the quality of the resources may be reversed. However, the line between reversible and irreversible damage for some resources is not always clear, and in some cases, such as old-growth ecosystems and severely eroded land, restoration may require hundreds or even thousands of years. In such cases, damage must be regarded as irreversible within the context of the present and near future generations.
 - Nonrenewable natural resources consisting of minerals, fossil fuels, and plants and animal species that become extinct or whose numbers are reduced to a few examples in zoos and small wildlife refuges. Social values can be estimated for minerals and some progress has been made in valuing wildlife. Most or other natural areas of the world have been occupied and their amenity services impaired. The best that can be done is to save the remaining parcels for human enjoyment and for making some contribution to the ecological conditions that sustain life.
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A similar problem on definition can be said with the concept of *natural resource management*, being basically prompted by human intentionalities. Resource managers, whether villagers or civil servants, have as their objective the manipulation of ecosystems to produce certain desired outputs (Rambo, 1991) and/or exhibit system properties (Conway, 1987). These various objectives influence the range of activities considered as comprising natural resource management, e.g., planning, organisation, implementation, coordination, direction, control and supervision. Different interpretations of *management* similarly give rise to varying conceptualisation of the resource manager, such as whether individual or collective, and detached or involved. A survey of current definitions offer a glimpse of the broad range of key management themes. Depending on whose perspectives, the emphasis and scope of each of these themes can vary and overlap with each other:

- resource allocation (e.g., classification, valuation, distribution);
- resource development (e.g., transformation, processing, enhancement);
- resource conservation (e.g., preservation, maintenance);
- resource exploitation (e.g., utilisation, extraction); and,
- resource rehabilitation (e.g., restoration).

This primary definitional constraint only serves to highlight the multifaceted nature of agriculture when viewed within the context of natural resource management. It implies that agriculture is not only a question of production -- of transforming inputs into outputs. Instead, agriculture involves the management of natural cycles in the ecosystem, e.g., water, mineral and organic matter. It means managing the cycles in their entirety with production taken as only one of the important moments in these cycles (Howard, 1947). In sum, it shifts from viewing the farm as a production unit to an agroecosystem or a component thereof.

Research questions relevant to this issue would be: *Which natural resources are the problem situations concerned with? What types of management are the natural resources being subjected to?*

4.3 Agriculture as a Managed Ecology

Agricultural development has long been associated with the task of feeding an exponentially growing population. This will continue to be a critical need in the years to come since as FAO (1992) estimates, by the year 2020 an increase in production of 60 percent will be required to meet the needs of 4.3 billion food consumers.

However, in spite of the acclaimed research breakthroughs, agriculture in the developing world has generally suffered from declining rates in production increases over the recent years. Such a trend puts in question the long-term capacity of agriculture to feed the world's hungry people.

In irrigated lowlands, there have been insufficient technological breakthroughs to keep pace with rising production requirements, leading to the breakdown of training and visit systems of extension which previously worked to support the Green Revolution. In addition, declining crop responsiveness to chemical inputs, i.e., fertiliser and pesticides, has resulted in a significant drop in rate of output growth. The situation in rainfed, upland areas where the Green Revolution never took off is even doubly worse. These areas have simply been degraded, leading to massive loss of productive resources, increased sensitivity to drought and poverty (Dwarakinath, 1994).

The demand to meet surging levels of food requirements by the expanding population and the need to intensify production in the face of declining yield gains have combined to put undue pressure on the natural resource base, which now leads to its accelerated degradation. To ensure continued food supply for succeeding generations, it becomes imperative to view agricultural production in the

longer term and to work towards effectively managing the natural resources for food production, e.g., land, water, energy, forest and other biological resources. With this comes the increasing recognition that production technologies compose only one side of the equation in food production; attention must also be given to the management of the natural resources supporting agriculture.

The present worsening natural resource situation serves to underscore the urgency of what Bloome (1990) refers to as the need to renegotiate the role of agriculture in society. Such call for a renegotiation is at the core of global efforts to achieve a more sustainable agriculture, which among others seeks to follow a development path that emphasises the task of maintaining the regenerative capacity of the resource base.

The two-pronged objective of assuring food supply while maintaining the capacity of the productive resources has emerged as the most important but difficult challenge facing agriculture today. Such difficulty arises from the inherent contradictions in integrating the economic and ecological imperatives into a coherent development perspective. Therefore, taking up the challenge of sustainability not only means redefining goals and values but developing a new perspective on agriculture, one which sees it as a design for the management of natural resources and as an integral part of society (Röling, 1994). In other words, by recognising that food is produced from the resources found in the ecosystem, agriculture needs to be analysed within the broader context of natural resource management, which entails adopting a holistic framework that takes agriculture and food systems as sets of human activities for managing natural resources.

However, it is important to note that while agriculture may represent a major goal of natural resource management, food production is only one of the many objectives for which natural resources are managed. These goals can be as varied as the number of stakeholders involved, i.e., from aesthetic to commercial, and may be expressed in precise quantified targets or as broad human aspirations. These other competing goals affect the availability of certain resources for agriculture, and ultimately for food. To understand problem situations in natural resource management, it becomes necessary to view food systems alongside other human activity systems, focusing on their interrelations with reference to the natural resource. Instead of a linear food chain to convert natural resources into food via agriculture, natural resource management involves competing demands for available resources to meet diverse goals, including but not limited to food production.

Research questions related to this issue would be: *What other management goals complement or compete with agriculture in relation to the natural resources? What are the consequences of these goals for the productive capacity of natural resources?*

4.4 The Human Element in Natural Resource Management

Concepts such as agroecosystem, agricultural system and food system are reflective of the continuous effort by human beings to manipulate the ecosystem to meet desired goals. More importantly, they denote the transformation of natural ecosystems to people-managed ecosystems. Such dominating stance of the human species toward their natural environment is reflected in conventional biophysical research that seeks to understand how natural ecosystems operate and how they can be managed to suit a variety of human goals.

However, such popular image of man as the master of planet earth is now starting to fall apart as the survival of the world's population is being threatened by the very same spirit of conquest that has guided human dealings with the natural environment. The rise in population necessarily brings about an increasing demand for food and thus leading to greater competition among individuals and groups in the utilisation of natural resources for food production.

This emerging situation has broadened man's desire to assert supremacy by no longer merely taking control of the natural ecosystem but also by exerting power and influence over other members of the human species in securing their own individual needs and wants. Consequently, people find themselves dealing increasingly with each other as much or even more than with their natural environment, as they are preoccupied not only with manipulating biophysical factors but strategising to win over others in exploiting natural resources.

As the social dimension assumes critical importance, it becomes clear that natural resource management can no longer be tackled merely in terms of *soil-plant-animal-water* relationships (Shen and Meiman, 1988) or input-output criteria, as it involves not only a technique for human beings to treat objects nomologically but an entire system of human transactions. In essence, natural resource management is no longer just a task of controlling nature but of achieving voluntary change among the human actors who do the controlling (Röling, 1994). Furthermore, sustainability represents a common goal agreed by different stakeholders and thus becomes an emergent property of a soft system (Bawden and Packam, 1991).

Viewing ecosystems as people-managed and natural resource management as a human activity system (Checkland and Scholes, 1988) takes the focus of analysis to problem situations involving intentional, epistemological actors engaged in purposeful activities associated with a particular natural resource. At the same time, a people-centred perspective highlights the relevance of a dynamic and comprehensive framework that integrates social considerations in the problem-solving process.

Research questions relevant to this issue would be: *Who are the various stakeholders in these natural resources? What are their perspectives and actions with respect to natural resource management?*

4.5 From Managing Objects to Managing People

Scientific research has made great strides in as far as agricultural production is concerned. Through technology, it has been possible for instance to control biophysical factors to increase crop yields. Science capitalises on the law-like behaviour of organisms by subjecting them to external manipulation to achieve desired outputs.

However, recent efforts to maximise food production to meet the demands of an increasing population have instead resulted in declining rate of production increase, thereby indicating that there are certain limits to the productive capacity of a resource. As yield response to technological control diminishes, there results an increased competition among people for more scarce resources to meet their individual needs. These new constraints present themselves in various forms of social conflict as people seek to outpace each other in the race for resource exploitation.

Solving such problems means dealing with complex realities and intentionalities and will have to require fundamental changes in human behaviour, social structures, economic activities and power relations. In other words, the new task of natural resource management is to manage people as they deal with each other in relation to their biophysical environment. It is for this reason that instead of individual problems, the study refers to a *problem situation*, to emphasise the need for a systemic way of looking at a messy situation wherein actors perceive a range of diverse but interrelated problematic issues -- or gaps between existing and desired states -- in relation to the management of particular natural resources.

In many cases, natural resources in the Philippine uplands, e.g., watershed, forest land, are rarely managed and utilised by a single individual or household. More often, groups, communities,

tribes, companies and even nations are involved. Relationships among them can be described as points along a continuum from very stressful to very cordial, and the state of these relationships have an important bearing on resource management itself.

While it is now fashionable to talk in terms of people-oriented resource management, people remain largely viewed in the hard systems tradition, that is to assume in-built objectives just like any other organism. On the other hand, at the heart of most problem situations in natural resource management are the contrasting views and goals of the various stakeholders on how natural resources should be allocated, conserved, developed, controlled or utilised. Natural resource management is a veritable battleground for multiple actors with different perspectives, conflicting goals and competing demands. A *soft systems* view therefore seems to be appropriate, where the construct of a system is used not as a model to describe or predict the world, but as a vehicle for debate about desirable and feasible changes in it (Sriskandarajah et al, 1989). The task of management then appears to be the transformation of such arena for conflict into a mechanism for creating levels of relevant social aggregation at which actors engage in shared learning, integral decision-making and collective action.

Research questions relevant to this issue would be: *How do the various actors relate to each other with respect to the management of natural resources? What are the consequences of these relationships for the productive capacity of natural resources?*

4.6 Interdependency Among Stakeholders

While there are multiple actors independently pursuing their individual interests, their actions will inevitably affect not only the natural resource itself but also each other.

People usually engage in certain actions mainly for personal benefit but this involves cost that will be borne by the larger collectivity of which they form part. In extreme situations, far greater costs are likely to be generated than the benefits absorbed by individuals (Orbel and Dawes, 1981). As Savory (1988:23) noted:

The concept of holism at first strikes most people as a bit too ethereal to have much use. The farmer plows out a new wheat field. The rancher clears brush. The forester sprays bark beetles. The engineer designs a dam. The economist advises a government. They put the utmost concentration and energy into their chosen tasks, never reflecting that they work within a greater whole, which their actions will affect, slowly, cumulatively, and often dramatically.

In the case of natural resource management for example, excessive pesticide application or soil erosion creates problem situations that extend beyond the physical boundaries of a farm unit. To improve them requires management decisions and actions taken at higher levels of ecosystem aggregation. Otherwise, piecemeal or uncoordinated efforts would be like *missing the forest for the trees*. Natural resource management problems are often beyond the ability of individuals to solve alone and instead require a higher level of collectivity above the individual. Management will have to involve collective decisions and cooperative action. But how then could different parts be managed to function synergetically when they do not see themselves as components of a larger whole, or do not see common boundaries of a problem situation?

One major challenge for natural resource management therefore is in overcoming social dilemma situations (Messick and Brewer, 1983) by devising approaches to avoid the destruction of the commons or to provide collective goods. This entails giving up some or accepting a smaller, immediate benefit in exchange for a long-term, collective benefit. In both cases, voluntary actions by individuals are necessary to produce cooperative or pro-social outcomes. Without such recognition of the interdependency among actors, their actions could lead to collective failure.

Research questions relevant to this issue would be: *To what extent do actors recognise their interdependency? Do they share and work towards common goals with respect to natural resource management? Why or why not?*

4.7 Beyond Technological Innovation

Agricultural development has long been associated with an excessively high technological focus. The emphasis of technological innovation is to exert instrumental control over the biophysical environment through the routine application of standardised component technologies directed at specific aspects of agriculture. However, given the already described nature of problem situations in natural resource management, the applicability of a reductionist, technology-driven approach for sustainable development needs to be reexamined.

Central to natural resource management is the knowledge of how things will work when functioning together as a whole. It requires careful examination of the dynamic interactions and interdependent relationships among the various components of a natural ecosystem. Rather than taking a more compartmentalised view typical of agricultural practice, the task of natural resource management has to be simultaneously considered in its entirety, that is by considering how changes in one aspect of an ecosystem will induce change in other aspects, as well as to entire natural cycles and processes. In all, this suggests taking a systems perspective of natural resources.

However, problem situations in natural resource management frequently involve actors who lack recognition of their interdependency in terms of their taking technical control of the biophysical environment. Thus, a type of innovation would be required wherein people cooperate in achieving a goal that is both in their collective and individual interests to pursue, e.g., ensuring production of individual farms while protecting the productive capacity of the natural resource base on which they jointly depend. In short, innovation has to involve more than just technology application but also helping people seek ways of working together to reach a point of convergence for action (Chamala and Mortiss, 1990).

Dominant biophysical models, however, assume that technological options are sufficient to solve natural resource problems. By considering that prediction and control of biophysical factors are all that it takes to manage natural resources, they remain inadequate tools for dealing with problems of multiple realities and human intentionalities.

Over and above technological innovation, what may seem necessary is some knowledge that enables people to behave as members of social groups and to participate in social processes involving how resources are to be managed. To do this would first require that actors see the need for them to behave as interrelated and interdependent parts of a larger whole. In this case, natural resource management entails managing not only a natural ecosystem but a human activity system as well.

From the above, it can be understood that designing improvement of a problem situation in natural resource management would have to be supported by a dual systemic framework for holistically examining the biosphere (i.e., organismic relations) and sociosphere (i.e., relations among members of a social group). Viewed in this manner, sustainability becomes the emergent property not only of a hard ecosystem, as often regarded by biophysical scientists, but also in combination with a soft learning system (Bawden and Packam, 1991). As a coupled system (Röling, 1993), actors can learn systemically to take effective action for managing natural resources in a sustainable manner.

The notion of a coupled system basically acknowledges multiple realities with respect to the natural environment by considering the human mind not as a mirror but a screened window to the

external world. That reality is constructed in social interaction is supported even by biological research which maintains that projection of the environment on the nervous system through the senses is impossible (Maturana and Varela, 1992).

If stakeholders in a given resource unit are then viewed as social actors (Long, 1992; Leeuwis, 1993) who actively construct their own realities, divergent and often conflicting goals, attitudes, values, aspirations and standards are inevitable even for any single natural resource unit. Innovation for natural resource management therefore requires not only the emergence of a social platform but also that such collective agency (Giddens, 1984) matches the ecosystem level upon which the problem situation hinges.

Box 4b. Coupled system: an illustrative example.

The boundaries of problem situations in natural resource management often need to be arbitrarily set depending on each specific case involved. For example, the varying extent of soil erosion requires viewing the problem situation, and acting on it, at different agroecosystem levels. Innovation to improve the problem situation would then require a platform for decision-making corresponding to the perceived ecosystem level.

Hard Agroecosystem

Soft System

farm (e.g., crops, livestock)

household (e.g., family members)

upland zone (e.g., farms, forest land)

community (e.g., swidden farming households, loggers, fuelwood gatherers)

agroecological region (e.g., uplands, lowlands)

locality (e.g., upland communities, lowland communities, fisherfolks)

The coupled systems framework closely approximates the ecosystem and social hierarchies proposed by Rambo (1991) for looking at natural resource management. Many management approaches indiscriminately mix systems defined according to ecological criteria (e.g., field plot, mini-watershed) with systems defined according to social criteria (e.g., farm household, village)⁴ and political-administrative criteria (e.g., province, region). But as Rambo rightfully pointed out, in many cases systems defined according to ecological criteria are rarely if ever isomorphic with those defined employing social or political criteria.

Research questions relevant to this issue would be: *What types of social platform are necessary to systemically manage an agroecosystem? How can such platforms be established?*

4.8 Focus of Inquiry: Exploring the Role of Intervention

Professionals in the food, agriculture and natural resources field spend a good deal of their time solving problems and improving situations. This activity takes the form of intervention into ongoing social processes and even into people's lives (Wilson and Morren, 1990). Intervention paradigms, such as the TOT and post-TOT models, are examples of underlying frameworks that guide systematic efforts to reorient social processes in desirable directions.

However, the continuous process of changing problem situations suggests a corresponding *adaptation* in the nature of innovation as well as in the type of intervention. As Agudelo and Kaimowitz (1989) indicated, certain types of innovations are likely to require certain types of knowledge processes and certain types of institutional structures to support them.

Notwithstanding its limitations, the TOT was generally considered necessary and effective in its own time. By being able to generate and transfer a package of standardised technology to farmers, production was significantly increased leading developing countries to overcome the food crisis. Meanwhile, development thinking in the post-Green Revolution era has rightfully given technology users a central and more dynamic character. More importantly, it has allowed upland farmers greater participation and benefit from agricultural technology for enhanced food production. Together, the various alternative approaches have revolutionised the dominant TOT paradigm by making a flip (Chambers, 1990) of long-accepted roles, set-ups and processes.

Increased familiarity with upland farmers has at the same time brought about heightened concern over the fragile environments under which their agricultural systems operate. The carrying capacity of the natural resource base is increasingly being threatened by the heavy pressure put by farmers and other user groups. As such, there is now greater attention to the sustainability of agricultural production in marginal situations in terms of the need to manage the natural resource base that support food production and other modes of utilisation.

Box 4c. The need to redefine the role of intervention to address sustainability.

The history of agricultural development in the Philippines illustrates that no single intervention paradigm works effectively across space and time. Changing problem situations call for a continuous redefinition of development goals and priorities, which lead to certain trade-offs (Conway, 1994) in the desired innovation. The shift from TOT to post-TOT approaches reflects the acknowledged need for intervention to adapt itself to the nature of innovation it seeks to support, from productivity to equity. Given the emergence of sustainability, it becomes necessary to explore the nature of intervention required and how prevailing intervention approaches can be amplified to remain responsive to new development concerns.

<u>Problem</u>	<u>Development Goal (Innovation)</u>	<u>Intervention</u>	<u>Features</u>
food crisis (60s - 70s)	national self-sufficiency (productivity)	TOT	linear flow of science-based knowledge
neglect of resource- poor farmers (late 70s - early 80s)	poverty alleviation (equity)	client-oriented, participatory and systems approaches	design of appropriate technology, people empowerment, community organisation and mobilis ation, integrated and interdisciplinary approaches
resource degradation (mid-80s - 90s)	natural resource management (sustainability)	?	?

Changing problem situations and needs in agricultural development, i.e., *from* national food security *to* greater farmer equity and participation and now *to* sustainability, call for the continuous

adaptation of intervention to support the shifting development mission, or in the words of Richards (1985), to take agriculture as a performance. Therefore, the key feature of agricultural development is the capacity of actors to continually learn about their changing conditions so that they can act quickly to transform existing activities (Pretty, 1994). People in problematic situations are prospective learners (Wilson and Morren, 1990) as they seek to cope through adaptation or control of their complex environment.

Post-TOT development paradigms now find themselves facing the challenge of sustainable agriculture and dealing with problem situations in natural resource management. What is not certain yet is whether these approaches which have been developed mainly in response to constraints in agricultural production of upland farmers would also work for problem situations in natural resource management, considering the distinct nature of the latter, such as:

- a wider, more diverse set of actors;
- a greater multiplicity of perspectives and goals;
- an increased competition between food and other resource use goals;
- a close link of biophysical to social constraints;
- a need for innovation involving social in addition to technical change; and,
- a need for collective rather than individual action.

The locus of problem situations in natural resource management has shifted from instrumental relationships between people and their environment, to strategic and communicative relationships (Habermas, 1980 as cited by Brand, 1990) among people themselves. Thus, sustainability is not about a specific farming strategy, a fixed set of practices or technologies, nor a model to describe or improve the world (Pretty, 1994). Rather, it is but part of a wider process of managing social learning for a sustained approach to understanding and dealing with the complex and ever-changing biophysical and social environment. In other words, such problem situations are primarily about how people construct and share their realities of natural resource and the actions that they take based on these mental representations. Much of the problem situation is not found in the *real world out there* but in the mental realities that people hold and which they use for interacting with their biophysical environment.

Since it involves more than just the routine application of technical fixes, natural resource management would require more than just the linear, downward flow of knowledge through such typical processes as technology generation, transfer and utilisation which are fundamental in the TOT. Instead of transfer of ready made technologies, the task of intervention would be to provide a toolbox of resource management principles to be combined and tailor-fitted to local agroecological conditions.

Introducing innovation in natural resource management emphasises decentralised and collective application of management-intensive technology through social processes for devising solutions highly specific to local circumstances. While client-oriented development approaches recognise diversity, it now has to face local people not as clients and targets of knowledge transferred from outside, but as active agents of change who are independently engaged in learning to deal with their environment and manage the resources available to them.

Management of the biophysical environment though can only proceed based on mutually agreed goals by different stakeholders concerned. There is therefore the danger of falsely assuming that the problem situation is well-structured and all that remains to be done is designing how to effectively organise the means of achieving it. A systems approach is thus questionable when it assumes the existence of a system when all that could be found is a heap of spare parts.

The nature of social reality in natural resource management appears to be more complex since problems are usually ill-defined, given the different stakeholders involved. Agreeing on shared goals is far from being a smooth and orderly process. Autonomous individuals and institutions can establish shared perceptions only by negotiating, arguing and testing in a complex social process (Checkland, 1989). All these however run counter to many of the populist concepts common in participatory development approaches.

In all, natural resource management can be interpreted as: 1) *managing people* who; 2) *manage technology* for; 3) *managing natural resources*. As such, intervention appears to require more than just TOT and post-TOT models but instead suggest a consensual approach for:

- exploring the problem situation through the actors' multiple perspectives;
- creating social platforms to support innovation for natural resource management;
- facilitating social learning for enabling actors to share perspectives and arrive at common goals; and,
- support social processes where actors form collective arrangements, at various levels of aggregation, in dealing with their biophysical environment.

In light of all of the aforementioned, the main research question is: *How can intervention be designed to effectively support natural resource management for sustainable agriculture in the Philippine uplands?*

Within the above context, the general objective of this research is to examine the nature of development intervention necessary to support innovation for improving problem situations in natural resource management in the Philippine uplands.

Specifically, the research seeks to:

- Empirically explore and describe problem situations in natural resource management;
- Determine how actors perceive and act on these problem situations;
- Examine the role of intervention in supporting innovation to improve these problem situations; and,
- Discuss the implications of the study for current intervention approaches in addressing problem situations in natural resource management.

4.9 Practical Relevance of the Research

As the state of the environment continues to be degraded by human forces, both developing and developed countries are now increasingly under pressure to integrate sustainability concerns into their main development agenda. The call for a more sustainable form of agricultural development takes on greater significance in vast upland areas where environmental threats continue to plague the majority of the world's poor. The challenge to development in these areas is to strike a harmonious balance between the survival of these farming households and the maintenance of the productive capacity of the natural resource base that supports their livelihood.

Past research has generated biophysical knowledge necessary to the understanding of the natural ecosystem and to the development of various technical measures now widely promoted to enhance long-term resource productivity. While this type of research continues to be needed, it is clear that improving natural resource management takes more than just technical answers to sustainability questions.

However, the rise of different forms of human conflict resulting from increased competition for resource use has highlighted the centrality of the social dimension in natural resource management. It becomes clear that technology-driven development is inadequate for bringing about an improved situation with respect to how people relate with each other in relation to their biophysical environment. As yet, the complex social factors and processes that influence how people perceive and manage resources remain poorly understood.

Development interventions are thus in need of new tools in order to address head-on the challenge of sustainability. To guide decision-making, planning and action, intervening institutions, i.e., research, extension, policy, etc., this research seeks to generate practical insights that would help enable intervening agents to:

- gain a closer and holistic view of the conflict-laden process of natural resource management;
- examine prevailing development paradigms that have guided institutional missions;
- redefine their roles and tasks in light of the nature of problem situations;
- reassess institutional priorities, norms, staffing and resources; and,
- demonstrate adaptability and flexibility in conforming to changing development needs.

Just as the TOT has brought about greater national self-sufficiency in the Green Revolution while client-oriented, participatory and systems approaches revolutionised dominant thinking of resource-poor farmer development, sustainable agriculture now poses a revolution of a second order in relation to how people and institutions view and manage natural resources to ensure their survival and those of others in the present and future generations.

Chapter V

NATURE AND METHODS OF EMPIRICAL INQUIRY

This chapter describes the nature of empirical inquiry undertaken to investigate the research problem. The first few sections discuss the constructivist position taken by the study and the conceptual framework underpinning the field research. The chapter then introduces the knowledge systems perspective, particularly the fields of analysis on which the fieldwork is focused. It also deals with how the case study approach was chosen and designed as a general method of data collection and analysis. Each of the fieldwork phases is described, emphasising their respective objectives, activities and outputs. The chapter ends with the researcher's own reflections of relevant aspects of the fieldwork experience.

5.1 Rethinking Social Science Inquiry in Natural Resource Management

Agricultural technology development has been traditionally based on the notion that the discovery of natural laws enables human beings to predict and take control of nature. This dominant mode of scientific inquiry is generally known as *positivism*. The epistemological basis of positivist science is the assumed existence of a reality operating mechanistically as determined by certain immutable laws. The goals of science are thus to explore the nature of this reality, establish causal relationships, and draw generalisations which are thought to be applicable across time and space.

A positivist scientist considers oneself as a detached observer of an objective reality whose task is to employ reductionist and experimental methods to build factual knowledge for explaining how the biophysical environment works. This same stock of knowledge is used as a tool to enable people to simulate reality, predict future states and manipulate nature to suit their desired ends. Through positivism, scientific investigations in agriculture have generated knowledge for designing technologies that have helped overcome various agronomic constraints faced by farmers. It has become pervasive such that it is widely thought as the only means for learning about the world, as well as the sole source of knowledge.

The universal applicability of positivism has consistently been upheld until the emergence of newer development concerns such as sustainability. As is becoming increasingly recognised, if there are to be new ways of farming developed which will be more socially and environmentally responsible, then this will be predicated by the development of new ways of thinking, knowing and learning (Bawden, 1992). The worsening state of the world's environment is testimony to the inadequacy of positivist science to deal with problems in managing natural resources. As Pretty (1994:38) notes:

Many positivists are inevitably frustrated and confused when faced with the notion of sustainability. In as much as they believe an independent reality exists, then so must it be possible precisely to define sustainability in value-free terms. To show that something is sustainable, positivists also need indicators against which to measure performance. These help to show how close is a system to being sustainable.

But no scientific method will ever be able to ask all the right questions about how we should manage resources for sustainable development, let alone find the answers. The results are open to interpretation. All actors, and particularly those stakeholders with a direct social or economic involvement and interest, have a uniquely different perspective on what is a problem and what constitutes improvement in an agricultural system.

It is now increasingly recognised that the methods and assumptions of positivist science do not capture the human dimension that holds the key to resolving natural resource management conflicts. While positivism continue to provide an important scientific view of the world, such a view is but partial and only one of the multiple but equally valid views of what constitutes reality.

Increasing disenchantment with positivism and its hard systems approaches (Checkland, 1981) has prompted calls for new forms of post-Newtonian science (Uphoff, 1992) in the pursuit of alternative systems of inquiry (Pretty, 1994) that will give justice to the dynamic, complex and messy situations that form the social battleground for natural resource management. If research on natural resource management is taken to be a study not only of natural but also of social phenomena, then it requires an understanding of the social world which people have constructed and which they continuously reproduce through their encounters with other actors.

Table 5a. Positivism and constructivism compared (adapted from Easterby-Smith et al, 1991).

Characteristic	Positivism	Constructivism
Basic beliefs	World is external and objective Observer is independent Science is value-free	World is socially constructed and subjective Observer is part of what is observed Science is driven by human interests
Research should...	Focus on facts Look for causality and fundamental laws Reduce phenomena to simplest elements Formulate hypotheses and then test them	Focus on meanings Try to understand what is happening (reasons) Look at the totality of each situation Develop ideas through induction from data
Preferred methods	Operationalising concepts so that they can be measured Taking large samples	Using multiple methods to establish different views of phenomena Small samples investigated in depth or over time

As sustainability enters the mainstream of agricultural development, positivist thinking will inevitably have to give way to new modes of scientific inquiry designed to deal more effectively with the different nature of problem situations in natural resource management. Such alternative approaches need to provide a suitable analytical framework that recognises the:

- centrality of human and social factors;
- autonomous character of actors;
- existence of multiple realities;
- social construction of these realities;
- interdependency among actors;
- need and potential for actors to engage in joint learning about their environment; and,
- role of intervention to support social learning.

In taking a constructivist position, the study maintains that while somehow an objective natural world exists, people's understanding of this world is necessarily constructed. Constructivism is particularly relevant in social inquiry where not only the researchers but also the people researched on are actively involved in understanding and interpreting the world around them. In the next section, the knowledge systems perspective is presented as an alternative constructivist perspective for exploring problem situations in natural resource management.

3.2 Knowledge Systems Perspective

In tracing the conceptual progression of technology generation, exchange and utilisation, three important perspectives can be identified. In the first instance, research, extension and utilisation were considered as separate territories with very little need for interaction. The focus was not so much on interface but on how each group could address its own internal issues, priorities and goals.

Later it was thought that these independent concerns could be addressed through better coordination, thus the need to build and enhance linkages. This subsequent emphasis grew out of the realisation that the only way for each of them to improve performance is through a closer working relationship. While there was increasing interest on linkage mechanisms, the institutions and peoples involved were considered as discrete groups.

A third view finally argued that research, extension and utilisation are not only independent blocks that must somehow be linked but in fact are constituent elements of a larger whole, in short a system. This holistic view was envisioned to lead towards a better understanding of how institutions and individuals can work together under a common development mission.

Earlier contributions to the development of *knowledge systems* (Havelock, 1971; Nagel, 1980; Lionberger and Chang, 1981; Swanson and Claar, 1983) served as takeoff point for using the concept in viewing extension from a wider, holistic framework (Röling, 1988). To adopt a knowledge systems perspective means taking farmers and their organisations, extension agents, researchers, policymakers, NGOs, private firms and other relevant individuals and institutions as potentially interlocking elements of a system, capable of fostering innovation over and above what would be possible by the actors' disarticulated actions (Röling, 1992). A recent definition of a *knowledge system* refers to the articulated network of actors (individuals or organisations) expected to work synergically to support innovation in a given domain of human activity (Röling, 1994).

The recognition of the levels of mutual interdependence among actors in the agricultural development scene is the pivotal idea in the knowledge system. It recognises that the interdependent and coordinated activities of the whole of actors are essential to stimulate processes of innovation (Engel et al, 1994). In other words, a knowledge systems perspective can provide a framework for analyzing actors in a particular domain of human activity by viewing them as potential components of an organised whole which can be stimulated or managed to share a common higher-order goal. In such a way, their combined contributions are expected to be more than the sum of their individual contributions. Sustainability, for instance, becomes one emergent property of such soft systems (Bawden and Packam, 1991).

Knowledge systems thinking has undergone rapid theoretical development over the years and many of its basic concepts have been further elaborated on as a result of better acquaintance with other social science perspectives and from empirical research contributions:

- By adopting soft systems thinking (Checkland 1981, 1989 and 1990 with Scholes), a knowledge system is taken as a mental construct used as an analytical and diagnostic tool for

looking at the world. The knowledge systems perspective takes wholes of human activities as soft systems with ill-defined problem situations, contradictory objectives, unspecified constituent elements and fuzzy boundaries. If actors behave synergically, this is the result of collective decisions to follow shared goals by seeing themselves as a system and agreeing to behave as one.

- Actor-oriented theory (Long, 1984; Long and Van der Ploeg, 1989; Long and Long, 1992) enabled the knowledge systems perspective to better take into account human agency by viewing actors as autonomous, intentional beings with divergent realities, goals and interests. Thus, innovation is not seen as a smooth and orderly process but involve negotiation over goals, struggles over boundaries and battles for social and political space to manoeuvre. While accepting that actors do behave according to strategic reasoning, the interventionist orientation that is basic to the knowledge systems perspective seek to see both discontinuities and continuities; it remains open to the potential for accommodation among actors, that they can exert collective agency at a higher level of social aggregation (Röling, 1994).
- By being established within a general framework of constructivism, knowledge systems perspective posits that actors not only exert agency but also actively construct their own realities in politically, socially and normatively defined contexts. By accepting that there are as many realities as actors, knowledge systems perspective seeks to explore actors' uniquely different perspectives on what constitutes a problem as well as an improvement. All knowledge, scientific or otherwise (Knorr-Cetina, 1981), is considered as being socially constructed in the constructivist position.
- Through the work of Habermas (1983 as cited by Brand, 1990), the knowledge systems perspective distinguishes among three types of human rationality by which people deal with their environment. Instrumental rationality involves the science-based capacity of man to control technically the biophysical environment. Meanwhile, there are two types of rationality with which human beings deal with one another -- strategic when individuals try to seek advantage or win over each other, and communicative which emphasises the interpretative efforts of individuals to accommodate their divergent perspectives and intentionalities and coordinate their actions to achieve common, above individual, goals.
- The Wageningen Programme for Comparative Research on Knowledge Systems for Sustainable Agriculture has generated empirical evidence to show that farmers' objectives (intentionalities), sense making (reality construction) and self-perceived capacity to make a difference (agency) are essential elements in natural resource management (Brouwers, 1993). But more importantly, it has also shown the need and potential for such autonomous actors to develop a higher level of social aggregation or collective agency to facilitate learning in improving a problem situation. In the case of natural resource management, stakeholders need to recognise their mutual interdependence through informal interactions which allow them to take integrative positions (Van de Fliert, 1993). In all, the role of intervention is to facilitate such social processes as negotiation, accommodation, conflict resolution, joint learning and consensual approaches.
- Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) (Engel et al, 1994; Engel, 1995) has developed out of the knowledge systems perspective a participatory approach for defining and solving problem situations. Primarily rooted in the soft systems methodology, RAAKS has evolved into an interactive methodology for actors to learn their way through a process of shared problem appreciation and taking collective action to improve it.

- As applied in the study of problem situations in natural resource management, the knowledge systems perspective takes on the notion of a coupled system involving an ecosystem which is seen to require unified management and thus cannot be managed except by the development of a platform for purposive action among diverse stakeholders (Röling, 1993). It then considers the role of intervention as that of facilitating the creation of platforms corresponding to the ecosystem level at which the problem situation is perceived to emerge.

5.3 Fields of Analysis

Adopting a knowledge systems perspective to guide empirical inquiry of problem situations in natural resource management allows for exploring how actors exert agency both at the individual level and higher levels of social aggregation. Among the observations that can be made through a knowledge systems perspective are:

- how actors actively construct reality, through sense-making processes, with respect to natural resource management;
- how actors strategise to pursue their own objectives in managing natural resources;
- how actors converge towards shared problem appreciation of resource degradation;
- how actors establish a social platform for integral decision-making and collective action; and,
- how intervention can facilitate the establishment of such social platform for natural resource management.

In the present research, the knowledge system perspective is used as a framework for empirical inquiry using the following fields of analysis:

- **Actors:** human beings exerting agency over a problem situation in natural resource management at various levels of social aggregation -- from individuals, groups, formal organisations to institutions -- and taking on various roles, e.g., users and intervening agents. The research asks: Which actors influence or are affected by the problem situation? What characteristics of these actors are relevant to the problem situation? What is the nature of their world views with respect to the problem situation that these actors have? What are their respective *projects* in relation to natural resource management and how do they strategise to achieve these?
- **Problem situation** refers to a set of themes of concern expressed by actors with respect to a gap between existing and desired states of a natural resource unit (adapted from Wilson and Morren, 1990). The research asks: How do actors view the problem situation in terms of the definition of the natural resource unit, gaps between the existing and desired states and explanation for such gaps? How do actors develop such perspectives and what factors influence these?
- **Innovation** refers to the process of change by which actors socially (re)construct their knowledge and practices (adapted from Engel et al, 1994). The research asks: How do actors define an improved situation? What do actors consider as changes necessary to lead to such improved situation? What means do actors use to achieve such changes? How do actors assess the extent to which the situation has been improved and the factors which could have influenced it?
- **Intervention** refers to a set of activities which are premeditated, planned, programmed, systematically designed and aimed at reorienting ongoing social processes in directions deemed desirable by an intervening party(ies) (adapted from Röling, 1988). The research asks: Which

actors are intervening agents? What innovation does the intervention seek to support? What is the nature of intervention processes being carried out? How do actors view the nature of intervention and its impact on the improvement of the problem situation?

- **Consequences** refers to the outcomes of the innovation as supported by intervention which are viewed in terms of the improvement in the problem situation. Improvements can be both in the form of biophysical changes in the hard ecosystem and the extent to which relevant social platforms are established and functioning. Consequences can be distinguished as either intended or unintended, direct or indirect, immediate or long-term. The research asks: How do actors assess the extent to which the problem situation has been improved? What indicators do actors use for assessing improvement? What reasons do actors cite for such consequences?

5.4 Case Study Approach

Problem situations in natural resource management have been described in the previous chapters as being generally more complex because of the diverse nature of actors, perspectives, actions and interventions associated with them. The purpose of the field research was to systematically gather empirical evidence to support this general observation.

The method of empirical inquiry is dictated by the kind of research problem being studied. In exploring problem situations in natural resource management, the choice of method was decided on after recognising that the research problem involved the following salient features:

- seeking a richly detailed description and explanation of complex social phenomena;
- phenomena which cannot be delineated from its context;
- holistic investigation of human real-life events and on-going social processes;
- systematic control or manipulation of behavioural events by researchers was not possible;
- focus on groups, organisations, networks and other social aggregations;
- emphasis on qualitative rather than quantitative analysis;
- emphasising subjects' diverse frames of reference (world views); and,
- generating hypotheses for future large-scale research.

The above characteristics indicate the need for a field research approach that requires documentation rather than control of processes and variables, as in experimental research; explanation through *how* and *why* questions instead of merely determining the frequency, representativeness or prevalence of a phenomenon, as in formal survey research; and direct observation and interviewing on contemporary events, in addition to retrospective analysis as usually done in historical/archival research.

The choice of the case study method as the general research approach was thus made since it is a form of empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 1994). Furthermore, the case study inquiry:

- copes with the technically distinctive situation in which there will be many more variables of interests than data points; and as one result,
- relies on multiple sources of evidence, with data needing to converge in a triangulating fashion; and as another result,
- benefits from the prior development of theoretical propositions to guide data collection and analysis (Yin, 1994).

Previous studies dealing with a similar nature of research problem have likewise suggested the usefulness of the case study approach. Casley and Lury (1991) found it useful in project monitoring and evaluation since the approach helps investigate causality, interrelationships among people, current attitudes and beliefs, and the rationale and motivations for certain behaviours. Chambers (1983) specifically suggested its use for collecting longitudinal data to illuminate change processes. Meanwhile, Maxwell (1986) pointed out the suitability of a case study approach in farming systems research by complementing other more conventional methods in improving classification, diagnosis and design of recommendations. Not only does it generate information that would be more cost-effective and difficult to obtain by other means, it also provides the opportunity for longer and closer collaboration among social scientists, natural scientists and farmers. Similar favourable arguments on multidisciplinary and integration of quantitative and qualitative methods were expressed in the application of the case study approach in social agronomic research (Box and van Dusseldorp, 1992) and adaptive agricultural research (Doorman, 1991).

Objectives. The general objective for undertaking case study research was to describe and analyze problem situations in natural resource management. This overall goal was broken down into specific objectives:

- To identify and describe actors relevant to the problem situation associated with a particular natural resource unit;
- To seek out and compare actors' perspectives on the problem situation;
- To determine how actors act to improve the problem situation; and,
- To examine the role of intervention in influencing actors' perspectives and actions, and consequently in improving the problem situation.

Units of analysis. As reflected in the general objective above, the primary unit of analysis of the case study is a problem situation in natural resource management. A problem situation refers to a problem or set of interrelated problems viewed within the context of a particular situation. It is operationally defined in this research in terms of a gap(s) perceived by actors between the existing and desired states with regard to the management of a particular natural resource unit. As a starting point for the inquiry, a natural resource unit was identified and defined based on the physical boundaries of the resource set by an intervening agent. Later though, determining how different actors define the boundaries was part of the inquiry. Meanwhile, while the problem situation was initially described from the perspective of the local community, its details and complexities emerged through the cumulative and varied descriptions provided by various relevant actors as the latter become identified in the research process.

While the primary unit of analysis provides a holistic view of a problem situation, the case study also looks into actors as embedded units. The justification for this is that the general description of a problem situation is arrived at through a composite of the perspectives and actions of the individual actors in relation to the natural resource under scrutiny. This dual-level framework allows looking at the subunits in relation to the main case and vice-versa. Actors may either be individuals, informal and formal groups, and institutions. Whether certain actors are included or excluded in the analysis depends on whether they influence or are affected by the problem situation as perceived by other actors. In other words, rather than take the structure of the problem situation as given, the research considered it as part of the inquiry.

Multiple case design. Given the potential diversity of problem situations in natural resource management, a multiple case study design was used. The purpose was to provide a comparative perspective of the research findings thereby refining and cross-validating the research findings.

Multiple case studies follow a replication rather than a sampling logic (Yin, 1994). The latter is common in surveys where multiple cases are equated with the number of respondents who are assumed to represent a larger pool of respondents. Multiple case studies on the other hand is comparable to multiple experiments wherein an individual case is considered akin to a single experiment, and the analysis must follow cross-experiment rather than within-experiment design and logic. Replication logic, as explained by Yin (1994), implies that the individual cases either produce similar results (a literal replication) or contrasting results for predictable reasons (theoretical replication).

Cases as constructs. A problem situation, the main unit of analysis in the individual case studies, has been described earlier as a multiperspective description of problems in a given situation provided by individual actors. Therefore, while a case forms a *whole* circumscribed in time and space, it is the actors themselves who determine the criteria for cutting this whole unit out of reality (Wieviorka, 1992). As such, a problem situation as an analytical unit is not an empirical case that *exists out there* as realists think, but a construct to delineate a limited view of social life. Exploring the fuzziness in boundaries is part of the inquiry.

By taking cases as constructs rather than as given or empirically discoverable (Walton, 1992; Platt, 1992), a problem situation is considered to take shape in the course of research. Case (sub)categories are not designated prior to the conduct of the research, but they are gradually made or delineated as empirical evidence is gathered. In a way, avoiding the use of conventional empirical, generic units keeps an open-minded approach to the inquiry.

Diagnostic mode of inquiry. Consistent with the problem orientation and constructivist approach in this research, the case studies adopted a diagnostic mode of inquiry. A diagnostic case study is a qualitative, in-depth and participatory research method (Doorman, 1991) to obtain actors' perspectives of problems and constraints in a particular context, to examine adaptations and responses to changing conditions, and to identify opportunities and designing improvements in a situation.

A problem-oriented case study reflects to some extent the problem-in-context approach (de Groot and Stevers, 1993) by starting the inquiry with the problem and, through a process of progressive contextualisation (Vayda, 1983), identifies the relevant actors and factors ultimately defining the problem situation. The application of the above-mentioned research design in the conduct of the field research is discussed in the succeeding sections of this chapter.

5.5 Orientation Phase

Study area. The field research was conducted in Eastern Visayas, one of the 13 regions of the Philippines and located in the central part of the country. Composed mainly of the third and eighth largest islands in the archipelago, the region was chosen based on situational, institutional and personal considerations:

- The region provides a suitable context for studying problem situations in natural resource management because it typifies an area where there is relatively high incidence of poverty, less favourable geophysical and climatic conditions, high level of natural resource degradation and frequent occurrence of serious natural disasters. A detailed description of the region is provided in Chapter VI.
- The researcher has been affiliated with an agricultural state college based in the region whose institutional research mandate is to support among others the development of small farmers in

Eastern Visayas. By choosing the region as study area, the research achieves more institutional relevance and gains official recognition and support.

- The researcher is personally familiar with the region, having spent most of his life living, studying and working there. This personal identification with the local area allowed the researcher to easily integrate and adapt to the socio-cultural context, closely empathise with local people while gaining their trust and confidence, and avoid basic communication problems by being proficient in the local dialects.

Regional and national perspective. The orientation phase was mainly to establish the general profile of the region and the natural resource situation in particular. To achieve this, background information from institutions which could serve as potential sources were sought. The Department of Agriculture (DA) and the Department of Environment and Natural Resources (DENR), in the regional, provincial and district/municipal offices were important sources of such information. Available office records contained secondary data on regional profile while staff interviews yielded a list of recommended case study sites. The Visayas Coordinated Agricultural Research Program (VICARP), a regional consortium of government and private research agencies, supplied data on ongoing and completed research and development projects in the area of agriculture, forestry and natural resources. At the Visayas State College of Agriculture (ViSCA) where the researcher was based throughout most of the field research period, literature review was done at the library while interviews with faculty and staff engaged in field research in the region were likewise conducted.

Since the regional development situation was likely to be influenced by national policies, visits were made to the central offices of the DA and DENR in Manila where country-level information were sought to provide a regional comparative perspective. Additional library work was also done in national and international academic and research/development institutions:

- University of the Philippines at Los Banos (UPLB);
- International Rice Research Institute (IRRI);
- Agricultural Information Bank for Asia (AIBA);
- Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD);
- UPWARD/International Potato Center (CIP) local headquarters; and,
- Philippine Upland Resource Development Center (PURDC).

NGOs also served as relevant sources of information. At the International Institute of Rural Reconstruction (IIRR), the researcher participated in the National Seminar-Workshop on Indigenous Knowledge and Sustainable Development where institutions involved in sustainable development programmes were represented. Meanwhile, two national NGOs -- Agro-Technical Assistance and Livelihood Opportunities in the North (AGTALON) and *Sibol ng Agham at Akmang Teknolohiya* (SIBAT) -- provided additional relevant information through the publication of a registry of Philippine institutions engaged in sustainable agriculture programmes (Garcia-Padilla, 1990), as well as a documentation of sustainable agricultural practices by Filipino farmers (Pelegrina et al, 1992).

Based on the information gathered and recommendations made by the sources mentioned, the decision to focus on soil and forest resources in the region was made. Available data and general observations suggested that:

- these were the most commonly exploited types of natural resources, particularly by resource-poor farmers;
- degradation of these types of resources has reached a critical level in the region and has even brought about large-scale, disastrous consequences; and,

- a number of research and development programmes have been implemented to deal with these problems.

A full description of the status of the forest and soil resources in the region is provided in Chapter VI.

Selection of case study sites. Field visits were done to the areas included in the list of possible case study sites drawn up earlier. Informal interviews were done with local people, government officials and staff of development agencies. Visual inspection of the natural resource unit was done to better understand the problems associated with it as mentioned by the key informants. Selection of the case study sites were made on the basis of the following criteria:

- cases deal with problem situations readily identifiable with particular soil and forest resource units;
- evidence of some form of innovation to improve the problem situation, either externally introduced or through local initiative;
- evidence of external intervening actors (potentially) associated with the problem situation working through various types of intervention approaches;
- diversity across cases in terms of actor mixes;
- willingness of actors to participate in the research;
- permission given by relevant authorities to conduct the research; and,
- favourable peace and order situation in the area.

Table 5b. Overview of the cases.

Location	Type of Problem Situation	Primary Nature of Innovation	Main Type of Approach
Matalom, Leyte	soil degradation	local soil management devised by upland farmers not reached by external intervention	TOT, client-oriented
Matag-ob, Leyte	forest degradation	NGO-led community reforestation	participatory approach
Pinabacdao, Samar	soil degradation	contour farming introduced by a root crop extension project	systems approach

The Matalom case (Chapter VII) was chosen to provide empirical evidence on the limitations of the TOT and client-oriented approaches to reach subsistence farmers and how as a result they have managed to survive by learning to adapt their agriculture to the diverse, complex and risk-prone conditions of the local acid upland ecosystem. It describes how local people have devised mechanisms for managing their inherently inferior soil resource while identifying potential role that external intervention can play to support such local initiative.

The Matag-ob case (Chapter VIII) focuses on an attempt to employ a participatory intervention approach by shift from government-administered to people-oriented forest resource management. It traces the evolution of the nature of management practices with respect to the country's forest resources, from the pre-colonial to the contemporary period. It presents a national perspective to set

the wider policy environment and then proceeds to describe a microcase of a problem situation involving a forest resource unit in Matag-ob, Leyte. It describes how a contract reforestation project has set off a conflict-laden process of negotiation between local people and intervening agents with respect to how the natural resource unit is managed.

Finally, the Pinabacdao case (Chapter IX) deals with soil resource management in the Philippine uplands in relation to an integrated, food systems intervention approach. It describes a problem situation involving the management of the upland soil resource in Pinabacdao, Western Samar. It describes how the field staff of a development project learned to share the perspective of local people with regard to the problem situation in natural resource management, as well as to appreciate the latter's capacity for adaptive experimentation.

Sections 5.6 and 5.7 describe the general procedure followed in each of the case studies.

5.6 Reconnaissance Phase

A reconnaissance phase preceded the main data collection activities in order to get a first approximation of the problem situation. It had a three-fold purpose: to initially explore the nature of the problem situation, to come up with a tentative list of actors, and to identify potential informants representing the different actors.

As part of the formalities involved, courtesy calls were first made on local officials who in turn informed their constituents about the nature and purpose of the research. Meanwhile, official communications were sent to concerned agencies for the management to issue official authorisation for field staff to extend necessary support to the research.

In line with the phase's underlying purpose of gaining a broader perspective of the situation, initial contacts with a cross-section of the community were established. These were done through participant and/or direct observation techniques such as attendance in general assemblies and meetings; participation in community activities; house and farm visits; and striking conversations in places where people normally gather, e.g., marketplace, waiting sheds for public transport, retail stores and chapels. Since many local people were initially hesitant to talk to strangers, on the first visit village leaders (in some cases, project staff) took turns in bringing the researcher around the area and introducing him to people. The researcher's institutional affiliation helped erased whatever suspicions the local people normally may have on the real motives of strangers. Some parts of the region have historically been a stronghold of the communist insurgency movement in the country.

Since problems are a favourite topic among local people especially in the presence of outsiders (perhaps an indirect way of seeking help), efforts to direct the conversation towards the problem situation related to the natural resource unit were made without being noticed. To identify other potential actors, they were asked whom they thought held different views from theirs and who were available and able to articulate those views. In most cases, these led to identifying actors outside the local community, e.g., residents in neighbouring villages, absentee landlords.

The preliminary phase normally took about a week although some of the days in between were also spent visiting offices to cross-check information with relevant agencies. At the end of the phase, people had already become accustomed to the researchers' presence in the area. At the same time, a tentative list of actors and corresponding key informants were already drawn up.

5.7 Main Phase

Primary methodological tool. Semi-structured key informant interviewing was the basic tool for data collection. Based on earlier insights gathered in the reconnaissance phase, an interview guide consisting of broad open-ended questions was developed. Each of the questions had a corresponding list of potential informants and other supplementary sources of information.

The mode of inquiry departed from the routine interview method done in large-scale surveys where a uniform set of answers is elicited from individual respondents. Instead, the emphasis was on the progressive building up of diverse information to achieve a more rounded, multiperspective account of the problem situation. While key informants were already predetermined prior to this phase, new ones were often added as new actors were subsequently identified or in order to seek out more information which previous informants could not provide. A snowballing technique was followed with informants asked to recommend whom to interview next when specific types of information were sought.

The interview process was not a one-shot and well-defined activity. Rather, it usually took place within the wider context of an informal or casual discussion and as such could extend for hours, often matched with a serving of local food and even wine. In some instances, answers to all the guide questions were obtained only after a series of visits, with the interview done by installments. To avoid major disruption in local people's normal routine, interviewing was interspersed with the informants' day-to-day activities. The actual reason for this was the expressed difficulty among local people to take time out from their daily routine in order to sit down for an interview. The naturalistic setting, however, proved to be more appropriate as informants were able to express themselves better. For example, they could describe certain practices more easily when their farms were in full view, in demonstrating the use of various tools or showing certain artifacts.

Visual and audio documentation as complement to note-taking was done without any major problem. Contrary to the researcher's preconceived ideas, local people were more than willing to pose before the camera or talk aloud to the cassette recorder. Their only condition seemed to be that they would be given copies of the photographs (as they say, souvenir of the researcher's visit) or allowed to listen to their recorded voices after the interview.

Research assistants. During the main phase, the researcher decided to conduct data collection without local leaders or field staff accompanying him so that informants could express themselves more openly especially on sensitive topics. Recognising the limits of a one-man research though, assistance was sought by hiring support manpower, whose number ranged from one to five in each case. The assistants were most especially useful in:

- acting as guide in moving around the area;
- taking down field notes for later comparison with those of the researcher;
- operating the camera and tape recorder so the researcher could concentrate with the interview;
- providing supplemental technical knowledge;
- translating concepts and terms peculiar to the area;
- entertaining other members of the household (especially children) or neighbourhood so as to avoid the informant from being distracted in the interview process;
- providing a liaison function between researcher and potential informants who could not be directly interviewed due to certain sociocultural barriers (e.g., a male researcher engaged in conversation with a local woman was often considered as against local social norms); and,
- keeping the researcher physical company in case of unforeseen danger or accident.

Given the above tasks, the ideal research assistant(s) would have been a local resident who is closely familiar with the problem situation but has reached college-level education to be fairly knowledgeable on the subject and method of research. It was quite difficult to locate such type of individuals though and so in all cases, the team of research assistants was composed of local residents already acquainted with the problem situation but with low-level of education mixed with students from ViSCA who had prior technical and social science research background but not directly familiar with the area. The assistants were briefed on the nature of the research prior to actual fieldwork.

Supplementary data collection methods. Given the limitations of key informant interviewing, other qualitative and quantitative means of data collection were used to supplement and validate interview data.

- **Direct observation** - It was deemed necessary to crosscheck verbal responses by observing and documenting activities and physical indicators related to the problem situation. A field diary was a useful tool in addition to the other documentation methods mentioned earlier. Since the problem situation often involved legal or ethical issues, this method had to be done unobtrusively and with respect to people's right to privacy. In many cases, the researcher ran the risk of being accused as a police informer or agent of the government.
- **Group interviewing** - Focus group discussions added a different dimension to interviewing because of the dynamics involved as people collectively discuss, analyse and respond to questions posed to them. However, because of the difficulty of gathering people together primarily for group interview, the method was applied by integrating this with other group-based activities, such as before or after formal meetings or during informal social functions.
- **Use of available records and documents** - The need to conduct quantitative surveys was deemed unnecessary because of the availability of statistical records and other baseline data gathered through previous research and monitoring activities. This method involved retrieving archival materials, i.e., maps, charts and historical documents, as well as photocopying publications, formal and informal reports and communications. These records and documents were provided by actors themselves, e.g., secretaries of community organisations and agricultural technicians, or collected from other agencies, e.g., local libraries, field offices of the Department of Interior and Local Government (DILG) and Department of Agrarian Reform (DAR). In addition, newspaper clippings were collected as another source of documentation.
- **Physical artifacts** - The collection of artifacts served both as hard evidence to supplement the main data and as specimen for further scientific analysis. More systematic examination was achieved for example by sending soil samples for laboratory analysis or submitting planting materials to scientists for species and varietal identification.
- **Review and feedback mechanisms** - To ensure accuracy and validity, data collected were subjected to review by actors themselves and also by technical subject matter specialists. Towards the end of the phase, data were presented to actors whenever possible to ensure that these accurately capture their perspectives and actions, as well as to gather further reactions and comments. On the other hand, discussing the data with scientists from various disciplines, and in some cases bringing them over to the field, helped ensure technical validity and an interdisciplinary perspective of the problem situation.

Data collection cycle. The entire phase was divided into shorter cycles of activities involving an iterative process of data collection and analysis. Two to three days of successive data collection activities were followed by a break of one or two days. During the latter, the researcher and assistants sat down to consolidate data and assess the progress of work by:

- listening to the recorded interviews;
- comparing field notes;
- discussing vague or conflicting responses;
- identifying gaps and additional data requirements;
- establishing a case database;
- setting plans for the succeeding days of fieldwork; and,
- identifying and resolving constraints encountered in the field.

On the overall, the main data collection phase took two to four weeks, the duration of which was highly dependent on several factors often beyond the researcher's control, e.g., availability of informants, physical and climatic conditions of the area, and access to secondary data. In one instance, the researcher returned to the study site months after the data collection phase in order to gather additional data and to observe activities scheduled at a later time beyond the fieldwork period.

Analytical methods. Given the qualitative nature of the research, it was necessary to set a general analytical framework by consolidating and synthesising the data into general themes of discussion which later became the basis for the structure of the individual reports. These themes were:

- description of natural resource unit;
- profile of relevant actors;
- perspectives on the nature and importance of natural resource unit;
- natural resource management practices of actors;
- perspectives on the nature and relevance of problem situation;
- perspectives on innovation to improve problem situation;
- actions done by actors to improve problem situation;
- impact of innovation on improvement of problem situation; and,
- role of intervention in changing perspectives and improving problem situation.

Data were first categorised according to the above themes and then the links between them were explored to establish a unified view of the case. The findings in each case were then compared across cases to determine theoretical replication. Some of the specific case study analytic strategies, as suggested by Yin (1994), that have been found useful in this research were:

- explanation-building - synthesising empirical evidence to describe causal relations such as by showing why actors view or act in certain ways;
- time-series analysis - reconstructing the course of events to trace changes over time in order to analyze causal events in a chronological pattern;
- analyzing embedded units - deaggregating the entire case to show how the embedded units contribute to the nature of the larger case;
- pattern-matching - generating categories to establish patterns within each case and then matching them across cases, such as by means of repeated observations; and,
- graphical and visual presentation - presentation of maps, charts and other graphical/visual materials to support textual data.

Box 5a. Fieldwork afterthoughts.

The field research experience has shown that an empirical inquiry is not a discreet, detached nor completely objective data collection activity. The very nature of social science research indicates that it is a social process itself with the researcher and the researched as actors engaged in some form of social interaction within a particular context, illustrating what Giddens (1984 in Leeuwis, 1993) calls as *double hermeneutics*.

An empirical inquiry cannot be detached from its social context. To undertake field research is to immerse oneself in the local socio-cultural milieu and participate in a wider, on-going social process. Data collection methods have to be adapted and made more sensitive to prevailing norms and values. The empirical inquiry puts the researcher and the researched as participants in a form of social learning process. Moreover, the field research cannot merely be an extractive activity with the researcher drawing information from informants without expecting to give anything in return. Ethical considerations suggest that the researcher must not only know about local people's problems, such awareness should prod him to do something to help solve them, at least as a token of gratitude for local people's cooperation in the conduct of the research. These are perhaps best illustrated through the following vignettes derived from the fieldwork experience in this research:

- In a pilot case study, the frequent visits of a male research assistant to the secretary of a village organisation, supposedly to gather some of the records she kept, had somehow made the husband jealous and often resulting in heated arguments between the couple. Eventually, the wife was forced by her husband to resign from her position and even quit from the organisation. Thus, the conduct of the research was partly blamed by the programme staff for the loss of one of their important members.
 - At the time of fieldwork, the board of directors of the NGO was engaged in a power struggle. The president who lost in his bid for reelection refused to step down and instead used his political influence to prevent field staff from reporting to the project site. Immediately, a warrant of arrest was issued by the local police and served on the staff. When the project staff were being rounded up, the researchers were unfortunately in the area and so the police thought they were also affiliated with the NGO and had to be brought to the police station too. The police finally allowed them to go after the researchers explained who they were and their purpose for coming to the area.
 - One of the case study sites had just went through a severe drought at the time of data collection. When the rains finally came, the foremost problem, as they revealed in the interviews, was the shortage of planting materials for them to immediately recultivate the land and take advantage of the available moisture. Realising the urgency and seriousness of the situation, the researcher thought the best way to reciprocate the local people's cooperation in the conduct of the research was to secure planting materials from a research center and returned to the area where these were distributed to local people.
 - Fieldwork targets had to be continuously modified because interviewing always took longer than expected, largely because of the expectations of local people for researchers to behave according to the norms set for community guests. Instead of ending the interview abruptly and leaving, the researcher had to stay longer and partake of the food or drink offered while local people engaged in a long narrative of their life histories, e.g., war experiences, no matter how irrelevant it may seemed to the research. To do otherwise would be considered a gross act of impoliteness and lack of appreciation for their sincere hospitality.
 - Local people had difficulty answering questions requiring quantitative responses, e.g., farm sizes, when these were structured according to standard scientific measurement systems. The researcher found it easier to elicit responses after paraphrasing the questions according to locally used measures, e.g., thumb width or armstretch, and later converting the responses to standard measurement systems. Obviously, the researcher had to be well-versed or must learn the conversion equivalents between local and scientific measures.
 - Bridging the social distance between researcher and local people was a prerequisite to promote a more relaxed and cordial atmosphere for interviewing. Among the methods done to achieve this were: hiking or taking the public transport instead of taking a private vehicle when going to the area, avoiding the wearing of trendy clothes and accessories, and preparing packed lunch approximating the typical food eaten by local households.
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Chapter VI

EASTERN VISAYAS: A MACROVIEW OF THE RESEARCH AREA

As a background to the case studies, this chapter provides a general description of the research area where the fieldwork was undertaken. Eastern Visayas is officially considered as one of the most depressed regions of the Philippines, characterised by a state of economic underdevelopment and environmental degradation. As such, it provides a suitable context for studying problem situations in natural resource management. The regional profile presented includes geography, socioeconomic characteristics, physical features, climate, agriculture and the status of natural resources. The chapter likewise outlines the institutional framework for natural resource management by describing the structures and activities of relevant development agencies operating in the region. Finally, the policy environment is discussed to highlight the government's two-pronged goal of economic growth and environmental protection.

6.1 Geography

Eastern Visayas is situated in the eastern part of the Philippines. Also known as Region VIII, it is one of the 13 major administrative and geo-political divisions of the country. The region consists of Samar and Leyte, the third and eighth largest islands of the archipelago, together with the surrounding islets. It covers a total area of 2,143,169 hectares or 7.1 percent of the national territory.

The region is divided into six provinces, namely: Leyte, Southern Leyte, Western Samar¹, Northern Samar, Eastern Samar and Biliran. It has 139 municipalities and 4,418 *barangays*², as well as three cities -- Tacloban, Ormoc and Calbayog. Regional transactions concerning government as well as non-government matters especially on trade and commerce are centred at Tacloban City.

Table 6a. Land area distribution by province.

Province	Area (sq km)	Percent
Leyte	5,712.84	27
Western Samar	5,609.38	26
Eastern Samar	4,339.65	20
Northern Samar	3,479.60	16
Southern Leyte	1,734.80	8
Biliran	555.42	3
Total	21,431.69	100

Source: Planning and Monitoring Division, DA 8

¹The official name of the province of Western Samar was changed to Samar in 1969 through Republic Act No. 5650. Since the whole island of which the province forms part is also called Samar, the old name of the latter is used here to avoid confusion when referring to either of the two.

²A municipality is composed of several villages, each of which is officially called a *barangay*.

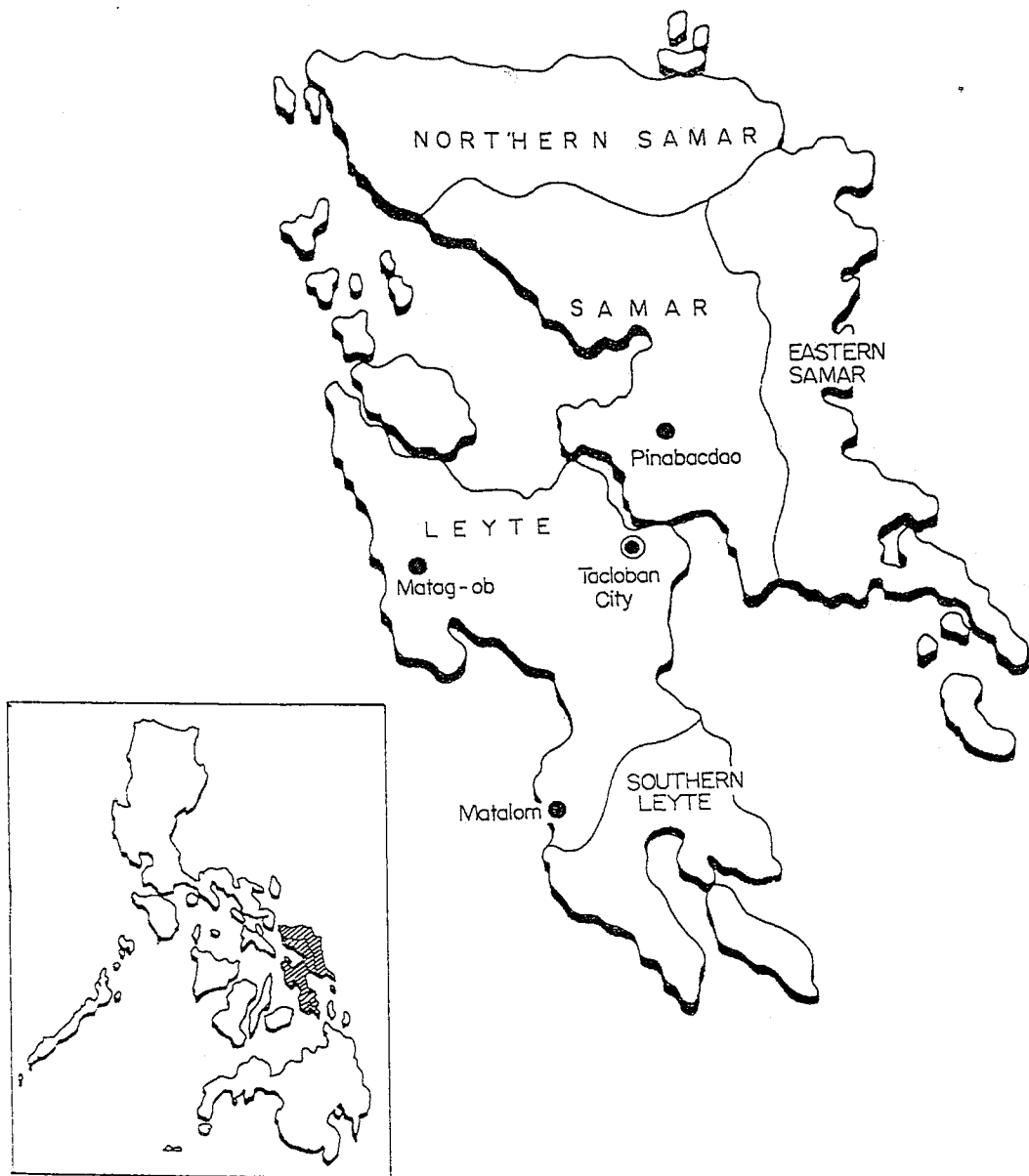


Figure 6a. Map of the Eastern Visayas region.

6.2 Socioeconomic Profile

The latest available census data (DOLE, 1991) revealed that the region had a total population of 3,055,000 with an annual growth rate of 0.88 percent. About two-thirds (2,089,600) of this was farm population. Moreover, only 13.65 percent were engaged in irrigated rice farming. The rest were concentrating on rainfed and/or upland farming cultivating secondary food crops while a few were into other cash crops (Balagapo, 1991). DENR (1991) estimates that in 1989, there were a total of 299,672 forest occupants in the region.

Eastern Visayas is classified as one of the most economically depressed regions in the country. The per capita gross domestic product (GDP) in Eastern Visayas in 1990 was only P956.30³ which was way below the national GDP of P21,750.00⁴. Poverty incidence in 1988 was at a high of 60.5 percent, as compared with 49.5 percent on the national scale. The sharp disparity in terms of development indicators between peripheral regions like Eastern Visayas in comparison to the National Capital Region reflects the lopsided distribution of investments, infrastructures and services in favour of urbanised areas in the country.

Table 6b. Economic indicators of Eastern Visayas compared with other regions.

	Gross Regional Domestic Prod. (1990) in billion pesos	Ave. Annual Income (1988) in pesos ⁵	Poverty Incidence (1988) in %
National Capital Region	345.9	79,314	31.8
1 Ilocos	43.8	34,031	47.5
2 Cagayan Valley	25.5	32,939	48.9
3 Central Luzon	94.2	46,855	39.6
4 Southern Tagalog	147.6	37,978	49.3
5 Bicol	30.9	26,570	65.3
6 Western Visayas	75.4	31,164	61.8
7 Central Visayas	70.3	27,972	54.6
8 Eastern Visayas	28.5	25,345	60.5
9 Western Mindanao	31.6	31,984	52.0
10 Northern Mindanao	55.4	35,801	51.5
11 Southern Mindanao	78.3	37,132	52.2
12 Central Mindanao	38.9	35,092	47.1

Source: DOLE, 1991

The *Waray-waray* dialect is spoken by about two-thirds of the population. The rest, especially those from the central and southern parts of Leyte, speak *Cebuano*. Literacy rate is relatively high at 76 percent.

³approximately US\$ 35

⁴approximately US\$ 806

⁵US\$ 1 is approximately P 27

6.3 Physical Characteristics

The main islands of Eastern Visayas -- Leyte and Samar -- have almost the same physical features: narrow coastal lowlands and mountainous interiors. Much of the region's land area is characterised by a hilly and mountainous topography. Over three-fourths of the land have a slope above 18 percent and approximately the same area with an elevation of 100 metres and above (BSWM, 1990). More than half of the region's land area is classified as forest land, comprising 1,119,454 hectares or 52 percent. Only 1,023,715 hectares are certified alienable and disposable (DENR, 1991). Eastern Visayas is bounded by the Pacific Ocean on the east, Cebu island on the west, San Bernardino Strait on the north and Surigao strait on the south.

Table 6c. Distribution of regional land area by slope groups.

Slope in percentage	Area	
	hectares	percent
0-8.0	528,462	25
8.1-18.0	280,156	13
18.1-30.0	593,537	28
30.1-50.0	626,047	29
50.1 and above	114,967	5
Total	2,143,169	100

Source: Bureau of Soils

6.4 Climate

The prevailing climatic condition in the region is generally characterised by pronounced rainfall favourable to agriculture. Eastern Visayas has an average rainfall of 3,067 millimetres, regarded as the highest among the three Visayan regions in central Philippines (BSWM, 1990). However, severe droughts in recent years have seriously affected agricultural production. Rainfall is occasionally accompanied by trade winds and storms especially during the months of November and December. The region is frequently visited by typhoons or tropical cyclones (velocity = 120 kilometres/hour or more). On the average, the area is hit by 12 major typhoons per year causing serious damage to life, property and crops. Eastern Visayas has three types of climate. These are as follows:

- Type D - This type of climate has a short dry season that last from one month to three months duration. However, this dry season occurs during high sun period which is from the months of April to September. A part of Leyte province including Maasin, Southern Leyte experiences this type of climate.
- Type E - Heavy rainfall occurs especially after autumnal equinox (October-May). Maximum rainfall occurs during the low sun period which is caused by the outblowing monsoon and northeast tradewinds. This type of climate covers 22 percent of the country's area. This is widely experienced in the provinces of Northern Samar, Eastern Samar, Leyte and a part of Southern Leyte.

Type C - This type of climate has an even distribution of rainfall, with no marked seasonality, the temperature ranges are low, the climate is very regular and lacks any seasonal contrast. This type of climate is widely experienced in the province of Samar and a greater part of Leyte.

6.5 Agriculture

The economy of Eastern Visayas is heavily dependent on agriculture, fishery and forestry. These sectors accounted for 43.6 percent of the Gross Regional Domestic Product in 1989. The high contribution of agricultural crops and fishery is indicative of the basically extractive-exploitative nature of the economy. In the case of agriculture, what is not so obvious, but nevertheless very critical, is the fact that the major commercial crops are limited to a few species: coconut, abaca, sugar and rice. Such a narrow range of crop options has been proven to be unstable. The adverse impact of the decline of the copra and sugar international markets on the local economy is still very much in evidence. Had there been a diversification in crop options, the effect on the economy would not have been as worse as it was. Meanwhile rice, corn and sweetpotato remain as the staple food crops in the region.

Table 6d. Agricultural production and land utilisation in Eastern Visayas.

Crops	Area (sq km)	Quantity (metric tonnes)
Coconut	3,365.3	383,291.0
Abaca	2,578.8	8,134.0
Rice	2,072.1	399,410.0
Sugarcane	1,046.3	39,341.1
Corn	264.1	15,805.2
Sweetpotato	167.6	70,219.8
Banana	39.8	21,971,115.0

Source: Bureau of Agricultural Statistics

6.6 Natural Resource Status

Region VIII is endowed with rich fishing grounds. The Samar Sea, Guiuan Sea, Carigara Bay, Maqueda Bay, Sogod Bay, Ormoc Bay and Leyte Gulf are the region's famous grounds for abundant marine and aquatic resources. The island of Samar is known for its rich mineral deposits. On the other hand, fertile lands characterise the lowlands of Leyte island.

The forests in the region are regarded as unique ecological communities. Because of its isolation from the Luzon and Mindanao land masses, the region's forests have unique features, species, and ecological dynamics from that of the mainland forest ecosystems. There are forest tree species which are rare, or not at all found in other parts of the country, e.g., *Mancono* or *Xanthostemon verdugonianus*. The forest are also the habitat of a multitude of wild fauna, including rare and endangered species. Two cases may be mentioned: that of the spotted sambar deer (*Cervus*

alfredi) and tarsier (*Tarsius sp*), already included in the list of endangered species by the International Trade of Endangered Species (CITES).

The extreme poverty in the region and its heavy dependence on agriculture are putting increased pressure on the natural resource, particularly the forest and forestlands, already exceeding sustainable levels. As the DENR warned (Acosta, 1993:34):

Without more viable livelihood opportunities, the population would continue to impinge on the natural resources at an increasing rate of unsustainable (and mainly illegal) extraction of forest. Mineral and marine resources would continue as these are the only economic activities that would require the least capital, and the highest short-term financial returns. The social costs of such activities in the long run, on the other hand, obviously exceed the financial and socioeconomic gains.

The forests of Region VIII are threatened by a high rate of conversion from forest and non-forest cover. The RP-German Forest Resources Inventory Project reported that the rate of forest conversion for the region is about 20,000 hectares per year, or an annual average of -3.4 percent. The figures for Leyte and Southern Leyte are in fact higher, -3.7 percent for Leyte and -4.3 percent for Southern Leyte. If the annual rate of conversion of 20,000 hectares continues, the remaining forest of the region would be gone in five years. The conversion of the forests takes various forms: conversion to kaingin or marginal upland agriculture, conversion to commercial agricultural use (e.g., grazing), conversion to non-forest plantations (e.g., coconut, abaca), and destructive timber harvesting (legal and illegal).

It is estimated that from about 75 percent forest cover in the 1950s, forest cover has been reduced to only 26 percent in 1988 (Canopy International, 1989). A more recent estimate (DENR, 1991) indicates a remaining forest cover of only 16 percent. The projections in the Regional Forestry Master Plan for Eastern Visayas indicate that there would be deficits in the supply of available timber to satisfy domestic (meaning within the region only) demand for construction and public infrastructure. Construction timber deficit will be in the magnitude of about 7,000 cubic metres in 1995, peaking at a deficit of about 23,000 cubic metres in the year 2000 (Acosta, 1993).

Soil degradation is also increasingly becoming a natural resource problem in the region. Erosion is the number one degrading agent. With its slope structure, the accelerated process of eroding surface soil becomes one of the major agricultural problems in the region. Three-fourths of the total land area suffer slight to severe forms of erosion.

Table 6e. Area distribution of erosion classes in Eastern Visayas.

Class	Hectares	Percent of Total
no apparent erosion	507,871	24
slight erosion	825,550	38
moderate erosion	388,481	18
severe erosion	405,619	19
unclassified erosion	28,764	1
Total area	2,156,285	100

Source: BSWM, 1990

Besides increasing population, erosion is also caused by high rainfall of over 1,000 millimetres/year and rugged terrain (Jasmin and Dano, 1990). Soil and water erosion in the region, mainly attributed to forest denudation, have reached catastrophic proportions leading to major disasters, e.g., flashfloods, that have caused huge loss of life and property.

Box 6a. News reports on environmental disasters in Eastern Visayas.

Leyte Killer Floods Blamed on Loggers

A top official of the Department of Environment and Natural Resources (DENR) yesterday blamed rampant illegal logging for the flashfloods and landslides that killed 27 people in Abuyog and Mahaplag, Leyte last Wednesday. The DENR listed Abuyog and Mahaplag as "high-risk areas" in 1991, shortly after flashfloods brought by typhoon Uring killed some 8,000 people and caused damage worth P500 million in Ormoc City and nearby towns. It has either suspended or canceled all timber license agreements in the area.

Environmentalists blamed the wanton destruction of Leyte's forests by loggers for the tragedy. *"But illegal loggers continue to be excused and even protected by local elites,"* Regional DENR Director Augusto Mongmongan said. Local residents revealed that local officials have been protecting illegal loggers. In fact, they said even the mayor and vice-mayor are facing charges for violation of forestry laws before the regional trial court. Four other mayors in nearby towns have also been charged with illegal logging by the DENR, the residents said.

Mongmongan said the two towns were very low-lying areas near the Iligasaan and Hin asig rivers which drain from nearby watersheds. The Office of Civil Defense said the flood waters contaminated the water system and destroyed vast areas of rice and corn fields, as well as fishponds.

Source: Philippine Daily Inquirer, 4 and 5 December 1993

Typhoon Puring Kills 40

Government authorities expect the death toll to rise up to 40 at week's end in the aftermath of the havoc and destruction wrought by Typhoon Puring in the island of Leyte last December 27.

Landslides and flashfloods spared by the wet winds of Puring were indicative of the need to thicken with more and more trees the forest cover of Leyte island. The last appraisal placed the forest cover in Leyte at a dismal 15 percent. The ideal should be at least 50 percent forest cover, accordingly.

Damage to crops was placed at P136,533,172 by Regional Director Cirilo Balagapo Jr. of the Department of Agriculture in his December 29 radio message to Agriculture Secretary Roberto S. Sebastian. In addition, P2,162,910 and P2,777,000 were the worth of damage to livestock and fisheries, respectively, as mentioned in the same radio message. In Southern Leyte alone, the typhoon damage to crops was estimated at P90 million, livestock at P1 million and fisheries P2 million.

In the late 1950s and in 1960s, logging in Leyte made several people wealthy. There was then no restrictions or logging ban to stop their operation. The landslides and floods caused by continuous heavy rains are now the resultant effect and proof that replanting of trees at logged areas were ignored in the 1950s and 1960s. The situation has been compounded by certain individuals illegally cutting down timber trees, unafraid of the consequences they will face once they get caught by forestry operatives.

Source: Leyte-Samar Weekly Express, 25-31 December 1993

6.7 Institutional Framework

This section gives a broad overview of the various institutions, both government and public, that have a direct or indirect influence on natural resource management in Eastern Visayas. Their structures, goals and activities provide an institutional framework for the management of the region's natural resources.

Department of Environment and Natural Resources (DENR). The DENR, then the Ministry of Natural Resources, was originally created in 1974 to meet the increasing demand for the development of the country's natural resources for use of the industries and the growing population in general. The reorganisation of the DENR in 1987, as contained in executive order No. 192, brought about a redefinition of its functions and policies. Under the new set-up, DENR has evolved as its mission the promotion and implementation of sustainability, social equity and economic efficiency in the use of the country's environment and natural resources.

Among others, the new mandate gives DENR the primary responsibility for the conservation, management, development and proper use of the country's forests. The major forest activities being undertaken by the DENR are land classification, reforestation, forest protection, watershed management, timber management, and parks and wildlife management.

The reorganisation of the DENR saw the integration of the bureaus at the field level with the intention that DENR functions are decentralised at the regional, provincial and community levels. With the decentralised set-up, the regional office of the DENR in Eastern Visayas now performs the former line functions of the various department bureaus. It implements field activities through the Community Environment and Natural Resources Office (CENRO), the lowest field-based unit of the department hierarchy. CENROs, of which there are 174 of them all over the country, have been entrusted with the management, development and conservation of the environment and natural resources at the community level.

Over the years, the DENR has shifted from a policy of traditional forestry to people-oriented forestry. The government, which for so long took full responsibility over the forests, has realised its incapacity to effectively manage the resource at the field level. The era of exclusive government management has given way to participatory resource management with greater involvement of the local communities and the private sector. Such a policy shift is best exemplified by the National Forestation Program which contracts reforestation work to private groups.

Department of Agriculture (DA). The DA is the principal government agency responsible for the promotion of the country's agricultural growth and development. In 1987, Executive Order No. 116 renamed the Ministry of Agriculture and Food as Ministry of Agriculture, as well as reorganised its units and integrated all offices and agencies whose functions relate to agriculture and forestry. With the adoption of the new constitution that same year, it was automatically renamed as Department of Agriculture.

The overall vision of the DA is the upliftment of the quality of human lives, particularly those of the small farmers and fishers, and on the sustainability of resource productivity over the long-term. In line with this general vision, the department has set the following objectives:

- to increase the productivity and real incomes of small farming and fishing families with special focus on those in the uplands, coastal and other poverty-stricken areas;
- to help ensure the productivity of the agricultural resource base over the longer term;
- to attain self-sufficiency in rice and corn for food security; and,
- to help attain a favourable balance of trade for the country.

The DA has also articulated the following specific concerns for the sustainability of the resource base:

- to formulate a land use policy consistent with the spirit of agrarian reform as envisioned in the Constitution and conducive to optimum use of agricultural resources;
- to develop and disseminate ecologically sound technologies such as integrated pest management, sloping agriculture land technology, and organic fertiliser use; and,
- to enhance the capability of local communities to assume the principal role of protecting the resources within their localities, particularly with respect to damaged upland and coastal ecosystems.

Box 6b. Structural changes in the government's agricultural extension service.

There is perhaps no other government agency in the Philippines which has undergone so many organisational changes as the Department of Agriculture (DA). The DA started as the Bureau of Agriculture during the Spanish regime but was divided into two bureaus in 1929 – the Bureau of Plant Industry (BPI) and the Bureau of Animal Industry (BAI). In 1936, Commonwealth Act No. 85 created the Provincial Extension Service as the government's arm in agricultural extension.

In 1952, the Bureau of Agricultural Extension (BAEX) was established and placed under the Department of Agriculture and Natural Resources (DANR). It was renamed in 1963 as the Agricultural Productivity Commission (APC) and then changed back to BAEX in 1972. During the Martial Law years, a separate Ministry of Agriculture (MA) was finally created. The MA was renamed into the Ministry of Agriculture and Food (MAF) in 1984 and then three years later, the same agency was called the Department of Agriculture.

In 1991, Republic Act No. 7160, otherwise known as the Local Government Code, was enacted. The law is responsible for the current reorganisation of the entire government machinery. The functions of the DA relative to extension services and on-site research have been devolved to local government units – barangay, municipality and province.

The regional DA office in Eastern Visayas is tasked to oversee agricultural activities in the region. In addition to the provincial and municipal agricultural offices which it supports, the regional office also directly supervises the operations of training centres, research and outreach stations and a marketing assistance center. The DA however is constrained by the inadequate number of field staff relative to the agricultural sector in the region. Available data indicate a ratio of 1 field extension worker for every 1,071 hectares of agricultural land (BSWM, 1990). This situation has even become more complicated with the recent decentralisation process within the DA (see next section).

Local government units. In response to the clamour for greater local autonomy, the Philippine congress passed in 1991 Republic Act No. 7160, otherwise known as the Local Government Code. The code seeks to decentralise the government bureaucracy by requiring the central government to confer power and authority upon local government units (LGUs), i.e., provincial, municipal and barangay, to perform specific functions and responsibilities. In addition to the devolved administrative powers, the LGUs also absorbed the personnel, assets, records and other appurtenances of the affected national agencies. Among the key government agencies covered by the devolution process are the DENR and DA.

In accordance with the code, the DENR has devolved to LGUs the following functions related to forest management:

Table 6f. Estimate of ratio of agricultural area to number of support personnel involved in extension services by province in Eastern Visayas.

Province	No. of Personnel	Agricultural Area (ha)	Ratio
Leyte (including Biliran)	392	350,309	1:984
Southern Leyte	110	113,220	1:1,029
Eastern Samar	103	161,827	1:1,571
Northern Samar	159	151,130	1:951
Western Samar	146	197,741	1:1,354
Total	910	974,227	1:1,071

Source: BSWM, 1990

- implementation of all non-foreign funded community-based forestry projects, such as established and on-going community forest projects;
- management and control of communal forest with an area not exceeding 5,000 hectares;
- monitoring of the development and management activities under the community stewardship agreements;
- management, protection, rehabilitation and maintenance of small watershed areas which are sources of local water supply to be identified by the DENR; and,
- enforcement of forest laws limited to communal forests and community-based forestry projects; i.e., issuance of cutting and other permits, as well as the imposition of appropriate penalties for violation of forestry laws.

Meanwhile, the role of national and regional DA offices has been reduced to programme monitoring and provision of technical assistance. On the other hand, LGUs have assumed agricultural extension and on-site research functions, such as:

- dispersal of livestock and poultry, fingerlings and other seeding materials for aquaculture;
- rice, corn and vegetable seed farms;
- medicinal plant gardens;
- fruit tree, coconut and other kinds of seedling nurseries;
- demonstration farms;
- quality control of copra, and improvement and development of local distribution channels, preferably through cooperatives;
- inter-barangay irrigation system;
- water and soil resource utilisation and conservation projects; and,
- enforcement of fishery laws in municipal waters including the conservation of mangroves.

Non-government organisations. In the Philippines, the term NGO is loosely used as a catch-all phrase for a variety of non-stock and non-profit organisations that do not fall into the categories of

government, educational institutions, business firms and political parties. Constantino- David (1992) reveals that while there are 18,000 registered NGOs in the country, only about 2,000 truly make up the development NGO community. They are found all over the country operating through both salaried and voluntary staff, are largely dependent on donor agencies, and function as intermediaries that service the needs of people's organisations.

While NGOs are not a new phenomenon in Philippine society, their rapid increase over the last few years and the dynamism which they have been displaying reflect ongoing changing in the sociopolitical structure of the country. The wave of NGO formation indicates the masses becoming more politically conscious and assertive of their rights. Extensive NGO networks and coalitions exist in the various sectors of education, agriculture, health, land reform and ecological campaigning and are active at the local, national and international levels (Miclat-Teves and Lewis, 1993). There are nearly 100 NGOs operating from the community to regional level in Eastern Visayas, as estimated by the regional office of the National Economic Development Authority (NEDA). These NGOs are either primary groups (people's organisations), civic and professional organisations and development NGOs.

Agricultural development NGOs have worked with some success in income-generating projects in upland agriculture. In the absence of government services, many NGOs have worked with marginal farmers to develop technologies appropriate to marginal farmer needs and aimed at reversing the increasingly serious environmental degradation brought about by increased population, organised illegal logging and rural poverty.

The government recognises the high credibility of NGOs to local people in comparison to government agencies, as well as their efficiency by being able to operate on limited budgets. The government now realises that NGOs can serve as an extension arm particularly in natural resource management through (DENR, 1990):

- advocacy of the rights of the poor and underrepresented;
- community mobilisation and organisation;
- capacity building and skill development;
- participatory research and extension;
- provision of access to resources; and,
- provision of linkages and communication among NGOs and between NGOs and the government.

Research system. Research and development activities in the field of agriculture and natural resources in the country are coordinated by a national body known as the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD). As a special agency under the Department of Science and Technology (DOST), PCARRD manages and coordinates a network of national and regional institutions involved in research and development in the field of crops, livestock, forestry, and farm resources and systems.

One of the major mandates of PCARRD is to establish, support and maintain and manage the operation of a national research and development network. In 1978, PCARRD instituted the consortium arrangement as a management strategy. Under this setup, regional research coordination rests heavily on institutions within the region particularly the lead agency for the specific consortium.

The Visayas Coordinated Agricultural Research Program (VICARP) is a consortium of agencies and institutions undertaking research and development in agriculture and natural resources in Eastern Visayas. It is mandated to set up a mechanism for coordination and management of research activities in the region in the areas of production, processing, socio-economics and communication

with emphasis on commodities of major importance in the region. The general objectives of VICARP are as follows:

- to make the agricultural and natural resources research and development programme attuned to regional conditions and needs;
- to sharpen the focus on high priority regional problems in agriculture and rural development;
- to decentralise decision-making and expedite implementation of action-oriented research and development projects;
- to promote better cooperation and improved communication among regional units and government line agencies; and,
- to evolve a system of coordination and management.

Being the zonal agricultural university for the Visayas and one of the national multi-commodity research centres, ViSCA serves as the base agency of VICARP. Other members include government agencies, state colleges and universities and an NGO. They are: DA, DENR, DOST, NEDA, Philippine Coconut Authority (PCA), Fiber Industry Development Authority (FIDA), University of Eastern Philippines (UEP), Eastern Samar State College (ESSC) and the Leyte-Samar Rural Development Workers Association, Inc. (LABRADOR).

In PCARRD's R and D framework for priorities in agriculture, forestry and natural resources for 1988-1992, one of the ten major thrusts is the management of natural resources and ecosystems. Specifically for VICARP, among the priority research areas identified were agroforestry and forest management and soil resources.

6.8 Policy Context

Government policies can either provide or prohibit an enabling environment for natural resource management at the local level. Current development policies indicate that the government is pursuing the two-pronged goal of agricultural production and natural resource management as it tries to balance economic growth and environmental protection. The different, often conflicting, nature of these policies result in contradicting priorities and programmes as implemented by the different government agencies.

Emergence of sustainability as a development concern. The earliest form of sustainable development could perhaps be traced to the days of the pioneering farming population prior to the colonial period. The practice of shifting cultivation suggests a concern by these farmers not only to produce food from the soil but to ensure that the productive capacity of the soil is maintained.

In the contemporary period, NGOs have been credited for being among the first to promote the concept of sustainable agriculture in the Philippines although under different labels: organic farming, ecological farming, low external input agriculture, regenerative agriculture, integrated farming, biodynamic farming, biological agriculture and natural farming. The common principle that runs through all of them is to optimise the use of locally available resources and indigenous agricultural practices with critical use of external resources. In a recent national workshop, NGOs attempted to put together a common definition of sustainable agriculture which they consequently referred to as the successful management of resources for agriculture to satisfy changing human needs while maintaining or increasing the quality of the environment and conserving natural resources.

Two of the oldest NGOs advocating sustainable agriculture are the Philippine Rural Reconstruction Movement (PRRM) and the International Institute of Rural Reconstruction (IIRR). Today, there are more than a hundred NGOs in the country advocating sustainable agriculture. A

Sustainable Agriculture Coalition also exists, with more than 50 NGOs under it. Among the practices introduced by these NGOs are the reduction in the use of chemical methods, multi-cropping systems, traditional seed varieties, crop rotation, green manuring, cover cropping, contour farming, agroforestry and botanical pesticides (PFN, 1993).

Sustainable development policy. While there were piecemeal efforts by different government agencies to promote programmes that integrate aspects of sustainable development, it was only during the Aquino administration which began in 1986 when the government took serious steps toward the formulation of a unified national policy on sustainable development.

The Philippine Strategy for Sustainable Development (PSSD) articulates the goal of national development where there is mutual compatibility between environmental protection and economic growth. PSSD is guided by the sustainable development vision of the World Commission on Environment and Development (WCED) which is to meet the needs and aspirations of the people without compromising the ability of future generations to meet theirs. PSSD defines the broad objectives, programmes and courses of action necessary to achieve among others, effective forest management. In pursuit of the goal of sustainable development, forest management efforts have shifted the focus from merely economic gains to more effective conservation through people-oriented programmes.

The bottom line of this policy is the promotion of the well-being of the Filipino people through the DENR thrusts: sustainable resources development with emphasis on the uplands; social equity in the access to opportunities and sharing of the benefits from resource use; efficiency of natural resources-based industries; and effective environmental management and protection.

Although the PSSD represents a landmark policy in as far as the increased priority given by the government to sustainability issues, it maintains a natural resource management framework that goes back to about four centuries ago when the Regalian Doctrine was introduced by the Spanish regime in the Philippines. Such concept contends that the State lawfully owns and controls the management of the country's natural resources. In recent years, a policy shift has been introduced. The State is still deemed capable of efficiently directing the development and exploitation of natural resources but the assistance of private groups is increasingly recognised by giving them temporary management rights. Article XII, Section 2 of the new Philippine constitution adopted since 1987 provides that:

All lands of the public domain, waters, minerals, coal, petroleum, and other mineral oils, all forces of potential energy, fisheries, forests or timber, wildlife, flora and fauna, and other natural resources are owned by the State. With the exception of agricultural lands, all other natural resources shall not be alienated...The exploration, development and utilisation of natural resources shall be under the full control and supervision of the State. The State may directly undertake such activities, or it may enter into co-production, joint venture, or production-sharing arrangements with Filipino citizens, corporations or associations...

Forest management policy. To guide the long-term development of the forestry sector in the Philippines, the DENR has drawn up the Master Plan for Forestry Development as a guiding policy for the identification of priority programmes, investment needs, generating resources and meeting directions for forest management. The 25-year macro-level plan envisions a selective logging policy. Production will center on the 2.4 million hectares of second growth production dipterocarp forests and at least 100,000 hectares of pine forests. On the other hand, logging will be banned in the remaining 940,000 hectares of virgin forests, in marginal hardwood areas, second growth forests on slopes above 50 percent, in areas with elevation above 1,000 metres, in mossy and mangrove forests, national parks and reserves.

To slow down the rate of deforestation, the master plan places forest resource management in the hands of local communities and the private sector. People-oriented forestry seeks to promote upland development through the improvement of the quality of life of upland dwellers and communities under an ecologically sound environment. The specific objectives are:

- To promote the protection of existing forest resources;
- To put every square metre of the uplands under management under appropriate tenurial arrangements;
- o rehabilitate and improve the productivity of upland farms;
- To stabilise upland areas through the adoption of soil conservation techniques;
- To increase income and improve the standard of living of upland dwellers; and,
- To promote local government units and NGOs as leaders and partners for forestry development.

Meanwhile, there is a proposed legislation in Congress which seeks a total log ban in the country for the next 30 years. The bill, however, has faced rough sailing in Congress has been gathering moss since 1988. Senator Orlando Mercado, the primary sponsor of the bill, pointed out that the country has already lost over 600,000 hectares of forest since the first attempt to pass a log ban law in 1988.

Box 6c. The politics of forest management.

FVR axe awaits bill on log ban

Prospects that the 30-year ban on logging would ever become law appeared shaky in light of President Ramos' promise to leaders of the logging industry that he would veto the bill should it reach his table, Senate sources said yesterday.

The sources said Mr. Ramos made the promise during a meeting with big-time loggers at Malacanang, shortly after he announced that he is endorsing the approval of a Forestry Code that would allow continued logging except in virgin forests. The President's family is known to own substantial shares in Greenbelt Wood Products, Inc., a logging firm which operates in Sultan Kudarat, Cotabato, and of which one of the Ramos daughters, Angelita, has been appointed chair of the board. The House of Representatives, dominated by loggers and politicians with close links to the logging industry, made the code its priority shortly after the President's announcement that he is endorsing its approval. Sought for his comment on the President's alleged promise to the logging industry, Sen. Orlando Mercado, chief proponent of the log ban bill, said, *"This is where I will have to part ways with the President."*

But the bill may not even reach the President's table as its chances of even being discussed at the House are allegedly bleak. According to the sources, Mr. Ramos' assurance of a veto emboldened the logging industry to withdraw its lobby against the log ban at the Senate and concentrate instead on the House. They said millions of pesos are now being employed to ensure the death of the bill. Sen. Francisco Tatad, chairman of the Senate committee on environment and sponsor of the log ban bill, said he was facing a virtual *adobe wall* in his effort to win support from members of the House. If and when, this is the second time a bill on a total ban on commercial logging would be killed at the House. The first time was during the tenure of then Speaker Ramon V. Mitra, when the proposed ban reached the bicameral conference committee but was defeated by maneuverings spearheaded by Rep. Jerome Paras.

Source: Philippine Daily Inquirer, 18 May 1993

Box 6c. Continued.

World Bank loan inimical to total log ban

The World Bank is going to great lengths to get the government's environment programmes under way. But will World Bank loans really help reforest the country? The WB's US\$369-million Sectoral Adjustment Loan (SECAL) is intended to support reforms within the framework of the Philippine Strategy for Sustainable Development (PSSD) of the Department of Environment and Natural Resources (DENR). Lirio Abuyan, DENR assistant secretary for foreign-assisted projects, says the SECAL reforms include the legislation of Integrated Protected Areas Systems (IPAS) such as national parks, wildlife sanctuaries and ecological reserves, implementation of soil conservation and watershed management projects; and, financial and monetary reforms that will give the government a *clean bill of health*.

Public investments will also be funded from the loan proceeds, Abuyan said. These include infrastructure and a credit programme to support community livelihood and natural resource management projects in upland areas and in buffer zones around national parks and reserves. The WB and Japan's Overseas Economic Development Fund (OECF), have so far released US\$50 million each.

The World Bank-OECF loan may, however, affect discussions on the total commercial logging ban bill still pending in both chambers of Congress. The loan spells danger. For example, instead of recommending the preservation of the country's last stands of timber the WB is requiring the DENR to begin the implementation of the Timber Production Sharing Agreements (TPSAs). This will kick off the eventual replacement of Timber License Agreements (TLAs). Under the TPSA, commercial loggers are not only allowed access to forest resources, they are also given incentives. Processing plants will be given longer license permits purposely to *give them stability and allow them a longer business horizon*. Commercial logging will thus continue to be a major industry because the new scheme ensures for government bigger profits derived from the ventures...

Abuyan says the DENR is required to test the TPSA in pilot areas. Implementation may be deferred pending the outcome of congressional deliberations on the commercial logging ban. The bill, however, has been gathering moss in Congress since 1988. The WB is not expressly opposed to commercial logging ban. Neither is it supportive. Since the bill failed to get the nod from any of the country's major creditors, it is unlikely it will pass Congress at all...

The Task Force Total Commercial Logging Ban earlier expressed frustration at the failure of Congress to pass the bill. *"If Congress has the political will, it could have been passed,"* said Angelina Galang, coordinator of a Task Force on the Commercial Log Ban.

Source: Philippine Daily Inquirer, 19 April 1992

Agricultural development policy. The assumption to power of the Ramos administration in 1992 signalled the renewed effort of the government to achieve agro-industrial development for the country through the Philippine Medium-Term Development Plan. Popularly called Philippines 2000, the new national development policy envisions a Filipino nation by the turn of the century that will have been politically, economically and socially stable -- with an empowered citizenry enjoying a better quality of life. By year 2000, the following would have been achieved: a per capita gross national product (GNP) of \$1,000, an average annual growth rate of 6-8 percent, and reduced poverty incidence to 30 percent.

Under this national policy framework, the DA has also spelt out its sectoral development policy through the formulation of the Medium-Term Agricultural Development Plan (MTADP). Because the agricultural sector produces nearly one-third of the gross national product and employs half of the

labour force, the MTADP is considered by the government as a key component for achieving the government's vision of Philippines 2000.

Central to the MTADP is the key production area (KPA) development approach. It identifies and focuses government support on certain priority areas whose agroclimatic features and market conditions are favourable for producing, processing and marketing specific products. Under the plan, the priority commodities are grains, livestock, commercial crops and fisheries. The plan has identified Eastern Visayas as among the priority production areas for rice and corn, livestock and poultry, and various cash crops (e.g., vegetables, rootcrops and fruits).

Meanwhile, the government has expressed support for sustainable agriculture in line with PSSD through what it calls institutionalisation of sustainability concerns in the development plans. NGOs however were quick to notice that it is mere lip service given the lack of clear implementing guidelines and support mechanisms. Critics argue that the MTADP is not consistent with sustainable agriculture and in fact encourages the further degradation of the agroecosystem because of its emphasis on production goals. Sustainable agriculture is seen to contradict existing government initiatives with the continued promotion of intensive chemical application for increased yield. The Rice Production Enhancement Program (RPEP), for example, was launched to help farmers cope with the increasing price of fertilisers and pesticides. The government through the agricultural technicians encourages the use of chemical inputs by providing subsidies, credit and other financial incentives (Pelegrina et al, 1992).

Moreover, the emphasis on key production areas puts the well-endowed lowlands as the centrepiece of agricultural development where massive infrastructure and financial support are provided, reminiscent of the Green Revolution. It thus runs counter to the DA's stated vision of giving priority to helping small farmers in less-productive uplands improve their quality of life.

6.9 Summary

Sustainable agriculture is a critical issue in Eastern Visayas just as it is in the entire country, with the interlocking problems of poverty and resource degradation that the region increasingly suffers from. Eastern Visayas ranks third among the 13 regions in the country in terms of level of poverty incidence. While its economy is heavily dependent on agriculture, the hilly and mountainous topography plus the typhoon-prone location severely limit potentials for increased production.

Extreme poverty and agri-based livelihoods are putting heavy pressure on the region's natural resources, once known for its vast forest ecosystems and rich biodiversity. With a remaining forest cover of only 16 percent, deficit in regional timber supply is imminent. Meanwhile, three-fourths of the total land area already suffer from slight to severe forms of erosion. The negative impact of all of these is being felt not only within the agricultural sector and upland communities; the general population has fallen prey to an increasing frequency and severity of flashfloods, landslides and similar disasters which are attributed to unabated resource degradation.

Current development policies show the government's two-pronged development approach of economic growth and environmental protection. These result in contradicting priorities and programmes as implemented by the different government agencies. On the whole, the regional policy context appears to offer strong support to such development themes as sustainable agriculture, people empowerment, participatory forest management and small-farmer development. As to how these policies are actually translated into field-level action in the region by various intervening actors -- which range from private NGOs to research and academic institutions -- will be revealed in the succeeding chapters where the case studies are presented.

Chapter VII

LOCAL INNOVATION BY DEFAULT: THE MATALOM CASE

This chapter presents a case study of a problem situation in soil resource management in an upland area in the municipality of Matalom. Continuous cultivation of the acid Calumpang hillylands led to increasing degradation of its soil resource, as evidenced by the occurrence of erosion and fertility decline. A community of subsistence farming households continued to survive in the area despite the difficult agroecological niche in which their agriculture operated. Added to this was the very limited external intervention to help improve the problem situation, since intervening actors were mainly targeting progressive farmers in nearby communities and introducing crop-based technological innovation.

Left to cope with the situation on their own, the hillyland farmers learned to manage their limited resources, particularly the soil supporting food production to meet household consumption needs. The chapter describes how local people demonstrated their independent capacity to innovate in relation to designing improvement in the problem situation. At the same time, it identifies the potential role of intervention in complementing local initiative for soil resource management.

7.1 Background

During the orientation and reconnaissance phases of fieldwork, the degradation of the soil resource in the region consistently emerged as a serious concern among development organisations and local communities alike. Available technical data not only confirmed this general observation but in addition identified Leyte province as being the area in the region whose soil was in a most seriously degraded status.

Thus, the municipality of Matalom was an immediate choice for the researcher as case study site. Aside from meeting the general criteria set in the research, it had distinct characteristics making it a suitable site for studying a problem situation in soil resource management in Eastern Visayas, such as:

- The twin problems of upland poverty and resource degradation are evident in Matalom, one of the least economically developed municipalities of Leyte. It is located in the southernmost and mountainous area along the boundaries of the adjacent province of Southern Leyte.
- Results of previous technical research done in Matalom validated the severity of the soil degradation problem, particularly erosion and fertility decline. The availability of these secondary data provided the researcher with *hard* evidence on which the fieldwork was based.
- Through word-of-mouth and actual research, Matalom is renowned as an area where local people have actively developed indigenous measures to cope with soil degradation. Such innovative practices were even reported to have been replicated by other farming communities elsewhere (see Chapter IX for example).

7.2 Highlights of Fieldwork

The selection of the soil resource of the Calumpang hillylands as focus of the case study was made during the reconnaissance phase of fieldwork where it became apparent that key informants representing different local and external actors generally agreed that the soil in the area formed a distinct natural resource unit. Among the perceived salient features that distinguished the Calumpang hillylands from its surrounding areas were its:

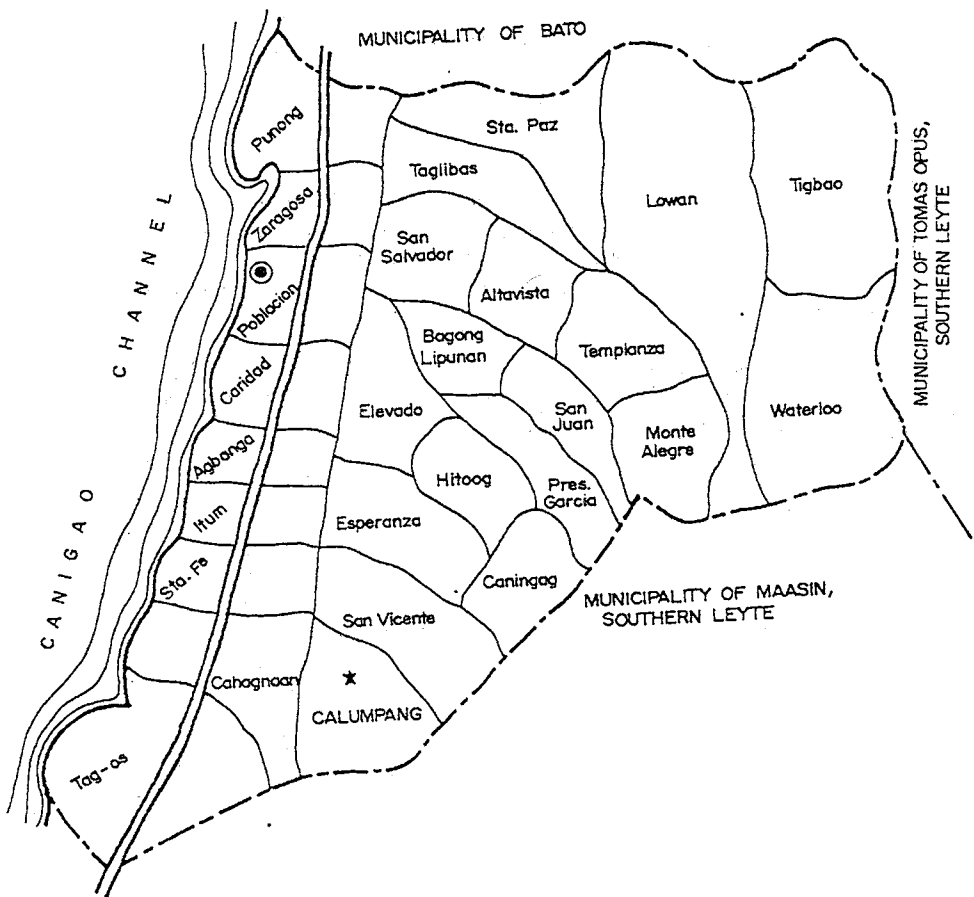


Figure 7a. Map of the municipality of Matalom.

- interior, remote location in the uplands;
- extremely hilly and mountainous topography;
- inherently more inferior soil quality; and,
- use for growing mainly subsistence food crops.

In general, fieldwork went off to a good start as the researcher found no difficulty in seeking permission from local authorities to conduct the research and gain entry in the area¹. Nevertheless, the researcher took note that the fieldwork was conducted under the following special circumstances:

- The fieldwork commenced barely a month after the election day for local government officials. Thus, campaign issues remained a controversial topic in casual conversations and the researcher had to avoid being perceived as partial to any particular group in the community. Calumpang stood out as the only barangay in the entire municipality where the incumbent mayor lost to the opposition candidate. As such, there was a general feeling of apprehension among local people, fearing that such election result may jeopardise the development plans of the municipal government for the barangay.
- The Local Government Code took effect in 1992 setting forth a massive reorganisation of the entire government bureaucracy. The fieldwork was caught in the transition period which was characterised by widespread confusion among government personnel arising from the lack of clear guidelines for the decentralisation process. Unresolved budgetary, manpower and logistical constraints led to the temporary suspension of many field activities of government agencies. With the devolution of power to local government units, the agricultural staff in Matalom were particularly concerned of the municipal officials' newly acquired authority over them. Some of the staff were perceived to be supporting candidates running against those newly elected.
- Also at the time of fieldwork, the area was in its seventh month of drought forcing agriculture in the area to be practically at a standstill. Farms were idle and bare, save for a few patches of surviving sweetpotato plants and homegardens. As a consequence, farmers decided to seek temporary off-farm income opportunities elsewhere, e.g., fishing and carpentry. Even some housewives chose to leave their families and work as household helpers in the *poblacion* of Matalom and nearby municipalities. It took several visits before the researcher finally caught up with potential key respondents in their houses and/or farms.
- The remote location of the area as well as the far distances between households slowed down the data collection process. Since travelling in the hillylands was mainly on foot, far fewer interviews and field visits were done in a single day. To cope with this limiting factors, the researcher later opted for group interviews and decided to meet with local people on Sundays when they were most likely to congregate in the central part of the barangay for such regular activities as the open market, church service and public assembly meetings.

In addition to farming households in the Calumpang hillylands, key informant interviewing was also done with people in neighbouring communities, such as those in the main sitio² of Calumpang and neighbouring barangays like Cahagnaan and San Vicente. These additional interviews generated

¹A week later, two other researchers from ViSCA doing survey work in a nearby barangay were reportedly subjected to interrogation by military men; they were mistakenly tagged as informants for communist rebels.

²A *barangay* (village) is composed of several *sitios* (clusters of households).

data on inter-community interactions and a comparison of perspectives of different local groups with respect to the problem situation.

Among the external actors interviewed were the various municipal and barangay officials, representatives of local government agencies such as the Department of Agriculture (DA) and the Department of Agrarian Reform (DAR), and employees of a local credit cooperative. ViSCA staff involved in previous research projects in Matalom were likewise interviewed. The researcher also brought to them artifacts collected from the field, i.e., plant and soil samples, for systematic identification and analysis.

Documentary data were obtained from various sources. Firstly, the records available from the respective secretaries of the barangay council and the farmers' cooperative in Calumpang provided census and related statistics. Secondly, files and documents available in the different government agencies holding office in the Matalom municipal hall were an important source of baseline data, particularly in relation to the municipal development plan. Thirdly, research reports and publications prepared by ViSCA staff served as key references for the technical aspects of the problem situation.

Table 7a. Sources of data for the case study.

Actors	Key Informant Interviewing	Direct Observation	Documentary Data
-farming households in Calumpang hillylands	X	X	
-farming households in neighbouring communities	X	X	
-community leaders	X	X	X
-traders	X	X	
-farmers' cooperative	X	X	X
-municipal agricultural staff	X	X	X
-staff of other government agencies	X		X
-municipal credit cooperative	X		
-local government officials	X		
-ViSCA researchers	X		X

7.3 Profile of the Natural Resource Unit

Acid soils are a major production constraint in the humid tropics. They are heavily weathered, leaching is intense and the major pool of plant nutrients is in the living biomass. This type of soils is characterised by low nutrient storage capability, micronutrient deficiencies, subsoil toxicities, rapid organic matter decomposition, low waterholding capacity and the general climatic conditions are favourable to the year-round survival of pests (IBSRAM, 1990).

Table 7b. Distribution of acid upland areas in Matalom according to slopes.

Soil Type	Slope (%)	Area (ha)	Percent of Total
Maasin clay	5-8	798.0	9
	8-15	3534.0	41
	15-25	1779.2	20
	25-40	1936.0	22
	40 and above	684.0	8
Total		8731.2	100

Source: DA Region 8

Such soil type typifies much of Matalom, the southernmost municipality on the west coast of Leyte province, with 73 percent of its 12,000-hectare area under the acid upland ecosystem³. The province as a whole is characterised by wide upland areas. About two-thirds of Leyte range from warm-cool upland to cool highland pedo-ecological zones (BSWM, 1990). The acid uplands of Matalom mainly consist of Maasin clay soil which is strongly acidic, low in available phosphorus and moderate in organic matter. This soil type has macronutrient deficiency, being critically low in exchangeable phosphorus and potassium.

Table 7c. Chemical analysis of Matalom acid soil.*

Content	Value
Ph	4.72
OM	4.42
Available P ppm	7.43
K ⁺⁺	0.12
Na ⁺⁺	0.40
Ca ⁺⁺	3.06
Mg ⁺⁺	1.50
Al ⁺⁺⁺	0.16
CEC	11.68

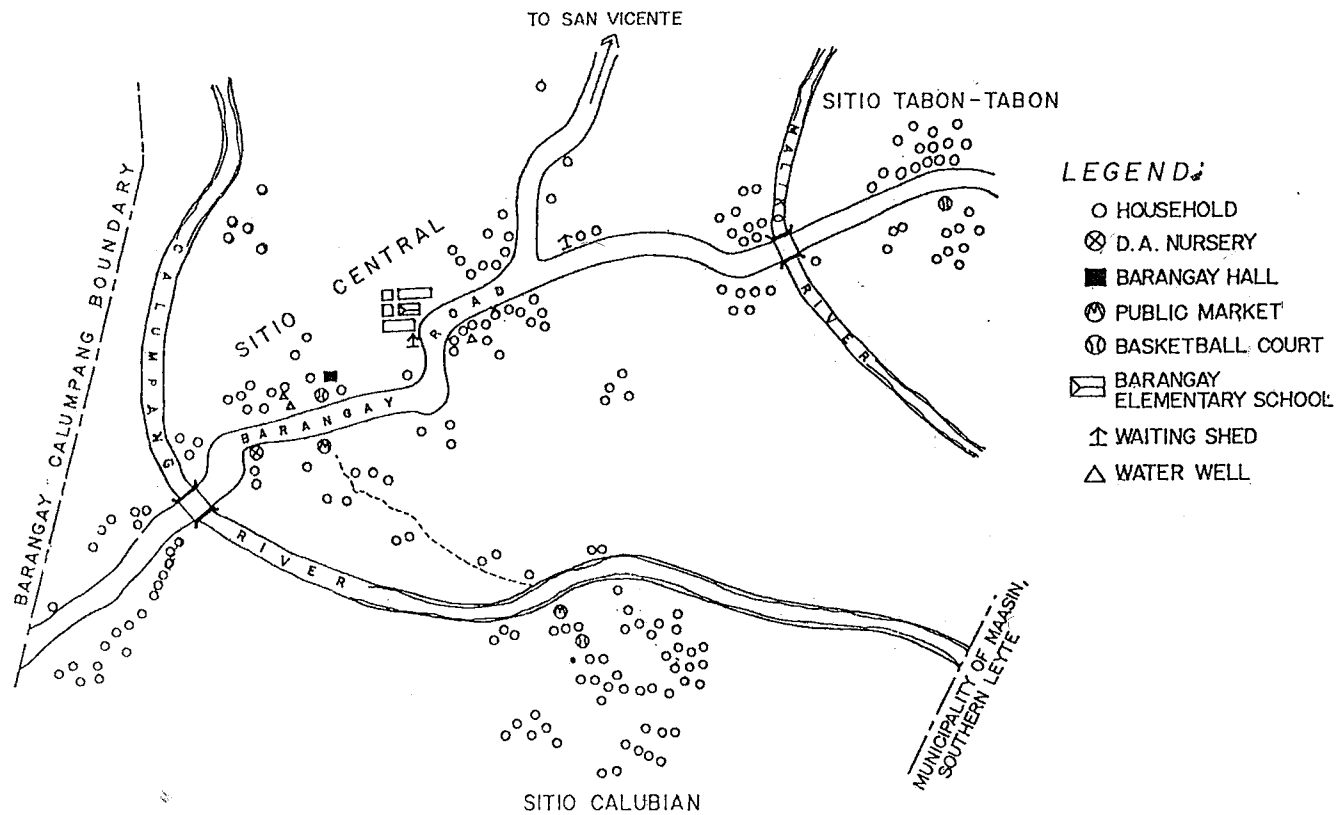
*Based on soil samples from six barangays

**Exchangeable cations, me/100 g

Source: Carandang et al, 1987 as cited by FARMI, 1991

³Secondary soil data were obtained from documentation made by the Farm Resource Management Institute (FARMI) of ViSCA, a research institute which evolved from a farming systems project in Matalom.

Figure 7b. Map of the case study site.



The particular natural resource unit on which this case study focused is the acid upland ecosystem covering the hilly and mountainous areas of barangay Calumpang, located in the southern section of the municipality of Matalom. According to available technical data, the acid uplands of Calumpang⁴ cover 245 hectares or 45 percent of the barangay's total area of 545 hectares. The soil slopes range from 5 to 60 percent but a large portion are within the range of 8 to 15 percent. It has an approximate elevation of 300 metres above sea level. As characterised by the municipal agricultural staff, its acid soil creates an agroecological microniche distinct from the adjoining plains, as well as from lowlying areas of Calumpang and the neighbouring lowland barangay of Cahagna-an. This distinction ties up with local people's classification, by referring to the swidden farms in this area as *baol* in contrast to the *daro* or farms in the plains.

Soil analysis of the Calumpang hillylands as done by the Department of Agriculture revealed that the soil has a pH of 4.6 and is generally infertile, having low amounts of organic matter (2.84 percent), phosphorus (5.39 percent) and potassium (7.6 percent). The predominant soil type in the area is Maasin clay, a red Ultisol formed from acid shale. It is a poorly drained heavy clay, sticky when wet and friable when dry. In steeper slopes, this type of soil merges with black Mollisol of the Faraon clay series. It is formed from uplifted coralline limestone and thus its pH can be higher, up to about 5.6. The high erodability of the Calumpang hillylands reflects the general state of soil resource in the entire Leyte province. Data indicate that three-fifths of the total provincial land area suffers from slight to severe erosion (BSWM, 1990).

Table 7d. Area and percentage distribution of erosion in Leyte province.

Erosion class	Area (ha)	Percentage
no apparent erosion	209,697	37
slight erosion	124,779	22
moderate erosion	109,177	19
severe erosion	113,400	20
unclassified erosion	14,227	2
Total	571,280	100

Source: BSWM, 1990

The area falls under type B of the modified climatic classification. Rain is evenly distributed throughout the year with three dry months at the most. The area has two distinct seasons – dry and wet. The wet season starts in July or August, marking the beginning of the planting period. The dry months start in March. Based on available data from 1983 to 1990, the average monthly rainfall in the area reached its peak in October while its lowest was in April with less than 50 millimetres. In the last 20 years, however, dry spells running for several months have been experienced almost annually.

⁴Acid uplands of Calumpang is synonymous and used interchangeably here with Calumpang hillylands and sitios Tabon-Tabon and Calubian.

The area is officially classified as A&D (alienable and disposable) land but most owners are absentee landlords, thus the farmers occupying the land are left almost entirely to themselves in exercising control and management of agricultural activities in the area. A community of about 90 households is found in the Calumpang hillylands, forming the sitios of Calubian and Tabon-tabon, two of the three sitios of barangay Calumpang. The third sitio, Calumpang Central, covers about 300 hectares of plains and serves as the centre of community activities in the barangay.

Box 7a. Calumpang: a barangay profile.

Calumpang was formally established in 1962 as one of the 30 barangays comprising the municipality of Matalom. It has a total area of 545 hectares subdivided into its three main sitios – Calumpang Central, Calubian and Tabon-tabon. Calumpang is located in one of the most remote sections of the municipality, about 12 kilometres from the poblacion. The central sitio of the barangay is connected to the provincial highway through a three-kilometre access dirt road which becomes impassable to all forms of transport during the rainy days. Transportation to the interior sitios are much more difficult and thus can be reached only on foot.

In the 1993 census, the barangay had a population of 1,068 with 543 males and 525 females. There were 220 households in the community but it was common in many households for some of their members to migrate to urban areas in search of work – generally as labourers or domestic helpers. The majority considered themselves native to the place, having been born and raised there. However, their ancestors were believed to have come from nearby provinces and islands who migrated to Calumpang after learning of its vast, fertile land along a big river.

Eighty percent of the households relied solely on farming as a means of livelihood. The rest derived additional income from non-farm sources like fishing, small-scale business enterprises and employment in various offices or business firms in the poblacion. The average annual income was estimated at P1000⁵ a month, sending 75 percent of Calumpang residents below the poverty line.

Social stratification among households was evident in what otherwise would be considered a homogenous upland farming community. This was easily discerned by the researcher from the responses of local people, especially when referring to, or comparing themselves with, others in the community. In general, Calumpang households viewed themselves as forming a two-tiered community largely based on the location of their dwellings and farms.

The upper socioeconomic group was mainly composed of residents in the central sitio located in the lower and flatter portions of the barangay which is considered to be the centre of the village. These households, comprising about two-fifths of the community, were generally economically better off. Most of them were landowners, the lands they tilled were considered as relatively more productive, and they were primarily engaged in market-oriented production.

On the other hand, residents of the peripheral sitios – Calubian and Tabon-tabon – considered themselves as belonging to the lower socioeconomic group. These households were generally landless, cultivating farms on the steeper portions of the village characterised by acid upland soil, and were mainly producing for household consumption.

The perceived existence of a lower social class for the interior sitios suggests that the acid uplands of Calumpang form not only an agroecological but also a socioeconomic niche. Such feeling of marginalisation has grown over the years that in the early 1990s, Calubian residents once waged a campaign and submitted a petition to the municipal government for the creation of a separate barangay. Comments like the following were common:

"Look at what we eat – corn mixed with sweetpotato. We cannot afford to eat rice all the time like those in the central sitio."

⁵approximately US\$ 37

Box 7a. Continued.

"We're always behind the latest news here. If we want to update ourselves, we need to go down to the central sitio and listen to conversations in the market place or during cockfights."

"Why did you come to visit and interview us? We are ashamed for you because our poor homes are not worth visiting. You should instead go to the central sitio where people can lead you to their nice homes and offer you good food."

"Community matters are usually discussed and decided upon by people in the central sitio. What we're expected to do is simply follow what they think is best for the entire barangay."

"Like the road leading to our barangay, development stops in the central sitio. We only get the morsels while they get the big chunks."

7.4 Historical Background

Reconstructing the area's historical background was both a complicated but enlightening task for the researcher. Such a topic was a common source of debate in informal group discussions facilitated by the researcher as each of the local folks seemed to offer his or her own version of historical events. In the end though, the community elders' stories were considered most believable since as most people would say "*nauna na sila sa duyan*" (literally meaning, they were the first to sleep in the hammock), referring to the fact that the older people were born ahead of anybody else.

Based on oral accounts given by their ancestors, the elders explained that the area reportedly used to be a thick virgin forest of *lumbang* (*Aleurites moluccana*) trees, a huge indigenous tree species popularly used for lumber. The name Calumpang was believed to have been derived from *Calumbangan*, meaning a place where *lumbang* forest could be found. The first settlers reportedly arrived in the area by as early as the 14th century, preceding the Spanish regime in the Philippines. They established a community near the banks of a big river, now called Calumpang river, and started clearing the forest for agriculture. The river was an important resource for survival by the pioneers; it provided them with water for household use and irrigation, as well as a supplemental means of livelihood through fishing. According to some other sources, the community established near the river came to be known as Calumpang in honour of its famous chieftain named *Ompang*.

At first agricultural activities were limited to the plains because of the area's strategic location - the fertile character of the soil which was attributed to the cleared *lumbang* forest, access to the river as source of irrigation and proximity to their dwellings. Food crops such as rice, corn and root crops were commonly grown. Although most of these were for household consumption, there were those who brought part of the harvest in the lowlands where these were bartered with fish, clothes and other products.

In the beginning, an open access arrangement prevailed in the area. Anybody who wished to engage in farming could simply select an idle piece of land where the person wanted to grow crops. The area may be newly opened or one abandoned by another farmer after harvesting. The concept of private ownership reportedly came only during the Spanish regime when the colonial government granted ownership rights to privileged individuals. The general belief was that clearing of the once forested hillylands occurred decades latter. Local people gave various reasons for the expansion of

agriculture to the hillylands, although in general it seemed to have come about as a confluence of factors, such as:

- rise of shifting cultivation when the original productivity of the soil in the plains declined after years of continuous cropping, thus the need to open new land;
- dislocation of pioneering settlers who were driven away from their farms after the colonial government awarded ownership rights to large tracts of land to *encomienderos* as a form of reward for meritorious service or acts of loyalty to the Spanish crown;
- transfer of households from the plains victimised by a series of landgrabbing incidents in the 50s and 60s (which led to an armed conflict); and,
- arrival of new migrants and the formation of additional households by newly married couples.

Most of the hillyland households interviewed had total farm sizes as large as two hectares, usually under informal tenancy arrangements. At first the researcher thought that this seemed to be a fairly large farm size. However, further probing revealed that only 0.2 to 1.0 hectare of this was actually cultivated at one time because of the shifting cultivation scheme followed by farmers. The usual practice was either to cultivate the parcels alternately or move from one section to another within the same parcel.

Box 7b. On the local concept of farm.

Asking local people to describe their farms was not as simple as initially thought by the researcher. The concept of *farm* was a complex one, at least in the Calumpang hillylands, where local people's responses to interview questions on farm size may be:

- based on the actual area under cultivation instead of the total area over which a farmer claims tenurial rights;
- estimated not in terms of hectares but in terms of local measurement units such as seeding rate of corn or area covered by a day's ploughing with a carabao; and,
- based only on the main farm parcel while excluding smaller plots such as swidden farms and homegardens.

Availability of family labour was another primary determinant of farm size. "*Of what use is a large farm area without the manpower to cultivate it,*" asked one farmer who claimed he had a total farm area of more than three hectares. Some hillyland farmers revealed they wanted to cultivate a bigger farm but were constrained by the limited labour provided by family members and/or the lack of a working animal. This was one reason why many husband and wives expressed preference for more children. Working as hired labourers in larger farmers was also considered an important source of income, which took the form of cash or as a share in the rice harvest.

Given the small cultivated farm size and the land's inherently poor productivity, farm output was almost entirely geared towards household consumption. Crops were sold only in rare instances such as when there is a good harvest, a trader comes to the farm or when the household is in need of cash. Hillyland farming households considered corn and sweetpotato as staple food, usually boiled together and served as a porridge-like dish. According to farmers, growing upland rice has become very risky because of the erratic climatic patterns, as well as the declining yields vis-a-vis the increasing production inputs required. Because of its limited supply, rice was a valuable commodity reserved for special occasions and during peak periods of farm activities when people wanted to have *extra energy*.

Box 7c. Crops grown in the Calumpang hillylands.

Corn is a popular cereal crop because it thrives even during the dry months and is early maturing. The local variety *mimis* is commonly grown and averages a yield of 1.17 tonnes per hectare. On the other hand, upland rice particularly the *lubang* variety matures in at least five months and yields only about 1.07 tonnes per hectare. The risk of crop failure is also high for rice with the frequent occurrence of drought in recent years.

With the limited and unstable supply of cereal crops, sweetpotato has become an important staple food. It is likewise preferred for its stress-tolerant character and ability to grow over long periods thus providing an extended supply of food. Farmers plant different cultivars but *manobo* is highly preferred for its yield and taste.

Farming has slightly changed towards market orientation with the establishment of contract growing arrangements for peanut⁶ between local traders and farmers in Calumpang. It commands a farmgate price of P300 to P400⁷ per sack. Production inputs are provided by local traders to whom farmers agree to sell their produce. The input cost is then deducted from the gross sales of the peanut harvest. Coconut used to be a commercial crop in the area but with the fluctuating copra prices coupled with damage caused by strong typhoons, it has not been relied upon as a primary source of income. Farmers also cultivated several others primarily as food supplement – cassava, taro, banana, and vegetables – usually in small patches and along the borders of the farm or in homegardens.

Farming was basically low-input in nature, with the crops almost entirely left to survive on their own. The only input seemed to be family labour which was provided only during planting and harvesting. In general, the farming system in the Calumpang hillylands typified a crop-fallow rotation system which is highly common in Eastern Visayas. It involved a long fallow period of about 4-10 years combined with a cultivation period of 3-6 years. The cultivation cycle consisted of a relay and rotation cropping of various food crops. The sequence and planting time depended on both the stage of the cultivation cycle and the particular season of the year.

7.5 Problem Situation

In the informal interviews and group discussions, the researcher at first tried to explore local people's understanding and perception of the soil resource. Their knowledge of the soil was demonstrated through their description and classification of different soil types in the area. Exploring first the soil-related concepts used by local people helped the researcher understand the framework through which they viewed their problem situation.

Farmers' concept of fertility was generally expressed by viewing soil nutrients as food for the plants that need to be continuously replenished. Hoping to make themselves better understood by the researcher, they usually explained in terms of analogies such as by comparing the soil to a kitchen that must provide sufficient and quality food for the family, otherwise the members would get sick and die. Some spoke about nutrients as being eaten up by the crops and therefore had to be replaced for the succeeding crops to consume. A fertile land was thus referred to as *tambok* (fat) while a depleted soil *ban-ok* (worn out). With the help of local people's descriptions, the researcher tried to

⁶Processing of peanuts into various native delicacies is a thriving business in the nearby municipality of Bato thus offering a ready market.

⁷Approximately US\$ 11 to 15

systematise indigenous knowledge of soil fertility according to their own classification scheme which were largely based on visual indicators.

Table 7e. Local people's soil classification according to level of fertility.

Criterion	Fertile Soil	Infertile Soil
Colour	blackish brown	yellowish/reddish brown
Texture	coarse	hard and sticky
Vegetation (fallow)	alagasi (<i>Leucosyke carytellata</i>) kayumyum (<i>Calopogonium sp</i>)	cogon (<i>Imperata cylindrica</i>)
Yield	relatively high	relatively low

Aside from soil fertility, slope was another frequently mentioned concept. This was expected since farms were generally hilly and mountainous. With technical assistance, it was possible for the researcher to approximate local people's description of the steepness of the land and compare this to scientific standards for slope measurement.

Table 7f. Local people's land slope classification.*

Local Term	English Equivalent	Percent Slope
<i>datag</i>	undulating	5-10
<i>hanayhay</i>	rolling	15-25
<i>bakilid</i>	hilly	30-45
<i>titip</i>	steeply hilly	> 45

*Based on earlier FARMi data

Given the sloping character of the area, soil erosion was common. As in previous concepts, visual indicators were mainly used by local people to describe the erosion process. Soil erosion was thus said to have taken place based on the:

- appearance of rock outcrops on the soil surface;
- exposure of (parts of) the root system of trees and crops;
- formation of mounds at the foot of hills/mountains; and,
- marked difference in yield between crops planted on the upper and lower portions of hillyland.

Traditional beliefs and rituals to ensure a good harvest continued to be adhered to and practised in the community, although the men insisted these were generally done by women. In response to

being tagged as *tuo-tuohon* or superstitious, one such woman retorted, "*What's wrong with it? Anyway there's no harm in trying, if it works then good, if not well just fine.*" Among the cited examples of practices done at planting time to promote high yield were: planting during low tide or full moon, bringing along a pregnant woman to the field, and putting eggshells and certain weed species together with the seeds in the soil.

The researcher found no difficulty in prodding local people to talk about their problems. "*Oh, you want to know our problems, that's good because we have lots of them*", was the common reply. Men however were inclined to focus on agricultural and political problems. The women on the other hand mentioned a wider range of problems; in addition to the above two, they also expressed concerns such as poor sanitation, rising prices of basic commodities, children's education, social relations and many others.

The general theme running through their mentioned problems was local people's perceived extreme state of poverty made worse by the declining farm production. The falling crop yield was considered to have brought about the other problems faced by them and as such was their main concern. "*If the crop refuses to yield anymore, what will we eat?*", a worried young farmer asked. However, when the researcher tried to probe further by asking the informants to elaborate on their understanding of the general nature of declining farm production, almost all of the themes of concern expressed by them revolved around constraints in the management of the soil resource. A synthesis of local people's responses indicated the following aspects of the problem situation:

- Local people recognised the inherently inferior soil quality in the acid uplands of Calumpang. As they explained, the soil in the flatlands became degraded only through continued use while that of the hillylands was already poor almost from the time they started cultivation. They considered the soil as infertile, or in their words *aslom* (sour) and *pula-pula* (reddish), which they thought explained poor crop growth and yield. In addition, the *bakilid* (sloping) character of the land made it highly prone to erosion.
- Local people said they were forced to progressively shorten the fallow-crop cycle. Due to the rapid decline of soil fertility, cultivation period had to be terminated earlier than in the previous cycles so that the land could be left to fallow again. Based on estimates given, the cultivation period dropped from as long as six years to often less than two years. Conversely, a previously fallowed area, even if perceived to have not sufficiently regained fertility, was reopened for cultivation (after 3-6 years) to replace the one just fallowed.
- Continuous cultivation led to exhaustion of soil nutrients which even fallowing could not sufficiently make up for. The general understanding was that the plants could no longer grow well because there was no more food to eat from the soil. Farmers stressed the need to replenish lost nutrients through some other means to supplement the soil's natural ability to recover its fertility. "*I think the soil really needs our help now just as it helped us in the past,*" one farmer opined.
- Valuable topsoil materials were being eroded down the slopes, further contributing to the degradation of the hillyland. As a result, the sloping areas were left with a hard, rocky soil surface. Tillage, heavy rainfall and the lack of soil surface cover were among those cited by farmers as responsible for erosion. Even from a distance, rock outcrops were highly visible dotting the hillsides. Also during the interviews, farmers often brought the researcher to their farms where they showed him the mounds of eroded soil formed at the foot of mountains.
- Insufficient moisture prevented farmers from planting following the usual cropping calendar. Most of the farms visited by the researcher had cracks and clods formed on the soil surface. At

the time of fieldwork, a drought already in its seventh month hit the area and the lack of sufficient moisture prevented local people from cultivating their farms. Erratic climatic patterns, particularly long droughts, have occurred almost annually in recent times.

The growth of cogon grass (*Imperata cylindrica*) was becoming a menace on fallowed land. Community elders noted that cogon infestation seemed to have progressed as the general soil condition in the area deteriorated. As local people told the researcher, cogon-infested areas became harder to clear and plough, making the task more labour-intensive. The weed was also believed to further deplete soil nutrients and retard the soil's ability to regain fertility. Some farmers reported to have tried burning cogon but they gave up after finding out that the weed immediately grew back only a few days after being temporarily eradicated.

By further exploring the farmers' general problem statement of declining crop yield, it became clear that what initially appeared to be a production problem was only part of a wider and complex problem situation involving soil resource management in the Calumpang hillylands. Although different people articulated different perspectives, their interwoven themes of concern helped expose the multidimensional character of the problem situation.

7.6 External Actors and Interventions

After having examined the local community and their perspective of the problem situation, the researcher then sought to do the same for external actors with direct or indirect influence on the problem situation and its improvement. Many of these actors were identified in the course of interviewing key informants from among the local people. In this section, these actors are described together with their perspectives and actions in relation to the management of the soil resource in the Calumpang hillylands.

Community in sitio Central. The core area of barangay Calumpang called sitio Central provided an important link -- physically and socio-economically -- between the Calumpang hillylands and the wider community of Matalom and beyond. Barangay Calumpang is connected to the provincial highway through a dirt road stretching up to sitio Central. However, the interior hillyland sitios of Tabon-tabon and Calubian could only be reached through a foot trail from sitio Central. Thus, residents from the former pass through the latter in travelling in and out of the barangay.

The presence of basic public infrastructures and services add to the strategic importance of sitio Central. These include a public elementary school, water wells, marketplace, recreational facilities, parking area for public motorcycles and source of electrical power. Government agencies, such as for health and agricultural extension, have established field offices in the main sitio. Barangay activities such as general assemblies and fiesta celebrations are also held in Central. In other words, those from the interior sitios have to go to Central in order to avail of public services and to participate in community activities.

Farmers in sitio Central echoed the concern of hillyland farmers regarding soil degradation, because of its similar impact on crop yield in the plains. While fewer cases of erosion were reported in the plains, loss of soil fertility was considered as a more serious problem by Central farmers because of their more intensive cultivation practice. The striking difference in perspective was that unlike hillyland farmers, those in the plains did not view soil degradation as a problem per se, having apparently come to accept it as an inevitable consequence of agricultural activities. What they considered as the foremost problem was their limited financial capacity to purchase and use commercial fertiliser in their farms. Such external chemical input was deemed necessary by them to compensate for the already infertile state of the soil, at least for the duration of each cropping season.

In spite of the marked difference in status between them, hillyland residents looked to their counterparts in Central as an important connection to the outside world. Barangay activities were considered by them as opportunities to seek out news and information, including those pertaining to agriculture.

Box 7d. Informal linkage mechanisms between the communities in the hillylands and plains of Calumpang.

Although conscious of their socioeconomic and agroecological disparities, hillyland residents looked forward to activities that provide instances for them to interact with those in sitio Central. These activities included:

- *tuba* (coconut wine) drinking session which is a favourite pastime among men, and sometimes even among women;
 - buying from the local *sari-sari* or retail store;
 - local Sunday *tabo* (open market) where people:
 - a) sell farm products,
 - b) buy fish and other household needs from traders coming from neighbouring places,
 - c) participate in cockfighting, and
 - d) join other gambling activities like playing cards and *hantak* (tossing the coin);
 - Sunday church services of the various religious denominations in the barangay;
 - community dances and other social functions, e.g., wedding banquets;
 - *ayon-ayon*, a system of labour pooling for different farmwork and community activities;
 - meetings of the:
 - a) barangay council held every third Sunday of the month,
 - b) barangay assembly held at least twice a year, and
 - c) parent-teachers association held at least once in four months;
 - travelling to and from the town proper (poblacion) either by:
 - a) public motor transport, and
 - b) hiking in groups;
 - doing laundry work by women along the riverbanks or beside the artesian wells; and,
 - lining up to gather and carry water from the artesian wells, usually by children and women.
-

Farmers in Central formed a multipurpose cooperative which was mainly intended as a mechanism for facilitating the procurement of farm inputs. One of its specific objectives was to gain greater access to commercial fertiliser for farmers to overcome the constraint of low soil fertility. To expand membership, the organisation tried to recruit hillyland farmers; however, there seemed to be lack of interest since nobody among the latter decided to join the group. The organisation's president related, "*We wanted them (hillyland farmers) to join the cooperative since they are even in greater need of assistance for securing farm input. However, they did not seem to be convinced of the benefits. Instead, we decided to accept other farmers from San Vicente (neighbouring barangay) who were interested in the cooperative. Thus we named our organisation the Calumpang-San Vicente Multipurpose Cooperative, Inc. (CASAVIMCI).*"

Hillyland farmers had a ready answer when the researcher queried them for their supposedly lukewarm response to what could have been a good opportunity to solve their soil-related problems. As they stressed, joining the cooperative was not the exact way to improve the problem situation in natural resource management and would even create more problems. As pointed out by them:

- they were not financially capable of paying the required monthly contribution (P10¹) to the organisation, the interest rate on loan (12 percent annually) and the cost of commercial fertiliser even at subsidised prices;
- commercial fertiliser could not arrest the process of soil erosion which was a more serious concern for them than farmers in the plains; and,
- unlike those in the plains who grew rice on a commercial scale, they did not see the economic advantage of applying commercial fertiliser for subsistence food crops, e.g. sweetpotato.

Municipal agricultural office (MAO). Agricultural development activities in Matalom were spearheaded by the municipal agricultural office (MAO) manned by a staff of six -- one municipal agricultural officer and five agricultural technicians. The limited agricultural extension manpower in the locality illustrates the high extension worker to agricultural area (hectare) ratio in the entire province, which is 1:984 (BSWM, 1990).

One of the technicians was assigned to cover Calumpang and four other neighbouring barangays. Since it was an interior barangay, Calumpang (together with San Vicente) was officially classified only as a radiation barangay. In the MAO's terms of reference, this meant that Calumpang was merely of secondary priority as compared to three other lowland barangays lying along the highway which were considered as the technician's primary service area. Given the wide coverage area of the technician and the lesser priority accorded to Calumpang, the barangay was visited by the technician only about twice a week. With these work limitations, the technician admitted that it was difficult for him to serve all farmers in the barangay while at the same time show concrete impact of his work to his superiors. As such, he decided to concentrate his work on the farmers who were members of the cooperative. While aware of the narrow scope of his clientele, he reasoned out that this was the only possible way to achieve the target outputs set by the MAO. *"Before I save farmers, I have to save myself first,"* was the technician's quick justification.

Box 7e. On the choice of progressive farmers.

The technician admitted that the choice of progressive farmers -- who were primarily commercial flatland farmers and members of the cooperative -- as primary target clientele was also prompted by work pressures, specifically the need to achieve accomplishment targets set by the MAO. As explained by him, dealing with progressive farmers made his work a lot easier because they:

- were more receptive to new ideas such as by readily trying out introduced technologies in their own farms (14 farmers agreed to act as cooperators for demonstration farms);
 - were more active in the organisation through more frequent attendance in meetings and trainings; they were more willing to sacrifice farmwork (or hire somebody else to do the task) while devoting time to the organisation; and,
 - were more willing and capable of meeting the required financial contributions and obligations to the organisation.
-

By using the farmers' cooperative as entry point for agricultural extension in Calumpang, the technician said he was well aware of limiting himself primarily to the 22 farmer-members of CASAVIMCI in Calumpang. This clientele size was only a fraction of the more than 200 farming

¹approximately US\$ 0.37

households in the barangay and by doing so, hillyland farmers were systematically excluded from the scope of agricultural extension service. This seemed ironical considering that in the national policy statement of the DA, the primary beneficiaries of agricultural development programmes were identified as the *disadvantaged and unorganised small Filipino farmers*.

Such lack of direct linkage between the agricultural technician and hillyland farmers was confirmed by the latter who revealed they seldom saw the former visit the interior sitios, while some even confessed to not having known the identity of the agricultural technician assigned in Calumpang.

The agricultural services offered by the MAO through the farmers' cooperative in Calumpang included the distribution of certified seeds of new rice and corn varieties, dispersal scheme for swine raising and assistance to the organisation in processing papers for registration and loan application. The technician likewise reported to have addressed the problem situation in soil resource management through the introduction of a number of soil conservation practices. One was encouraging tree planting in farms by making available seedlings of fruit trees in the barangay plant nursery. In the farmers' classes conducted by the technician, the important role of trees in the environment, particularly in soil conservation, was also stressed by him.

Farmers, on the other hand, thought that tree planting only provide unnecessary shade thus preventing crop growth, aside from the long waiting period before economic benefits could be derived. Hillyland farmers were even less motivated to plant perennial crops owing to lack of tenurial security over their farms. Even if they wished to and with the available seedlings, they reportedly would not still be able to plant trees. According to them, landowners had warned them against planting trees in their farms for fear that these may be used by tenants as supporting evidence for claiming tenurial rights in land disputes. When the researcher checked this information with the Department of Agrarian Reform (DAR), it was learned that under the Comprehensive Agrarian Reform Program (CARP), trees and other perennial crops are considered as permanent farm improvements and thus a contributory factor for effecting transfer of ownership rights from landlord to tenant in lands covered by the programme.

As a soil erosion measure, the contour hedgerow technology was also introduced by the technician through the demonstration farms of farmer cooperators. The technician admitted though that the practice was never sustained. Firstly, it involved the use of exotic hedgerow species which were difficult and expensive to procure, i.e., *Gmelina arborea*, *Albizia falcata* and *Leucaena leucocephala*. Secondly, contour farming was generally perceived as a laborious and time consuming practice. In other barangays of Matalom, a labour pooling system locally called *ayon-ayon* was tried by other development agencies but their field staff were instead suspected of being communists for promoting a communal system of work.

The technician reported that the only soil-related technology that seemed to have gained wide acceptance, at least among the commercial farmers in Calumpang, is the application of commercial inorganic fertiliser. Historically, the use of commercial fertiliser was first introduced in the 70s during the launching of the *Masagana 99* rice production programme. The government extended full support in the form of price subsidies and loan packages which provided farmers easy access to commercial fertiliser. According to those who were among the programme beneficiaries, the practice of fertiliser application was readily adopted by Calumpang rice farmers because: 1) it was convenient to use; 2) standardised technical instructions on its use was provided by technicians; and, 3) it showed concrete effects in terms of markedly high yields. Cost and supply were not a concern then because of massive government support for the programme.

The boom in agriculture did not last though. Rice farmers recalled that the early 80s was a difficult period for them. They were already starting to notice that in order to maintain yield levels,

increasing amounts of commercial fertiliser had to be applied. At the same time, fertiliser prices soared high as it was the time when the country was in the midst of a serious economic crisis. What made things worse was that there was no more programme like *Masagana 99* to subsidise input costs. Faced with all these, many farmers were forced to discontinue the use of commercial fertiliser. Others who took risk incurred big debts with usurers and financial institutions.

The implementation of grains production programmes in recent years partly alleviated the situation. Through the Rice Action Program (RAP) and the Grains Production Enhancement Program (GPEP), the technician was able to readily access funds and other logistical support. This availability of support resources encouraged him to concentrate his work on promoting rice production technology. Through the technician's assistance, for example, the farmers cooperative was able to avail of the government's *buy-one-take-one* fertiliser subsidy scheme.

The technician in the end admitted that the choice of extension offering depended mainly on the resources that the MAO or DA could provide. *"It's easier on my part to promote rice-related technologies because there are support funds available from the government. In other cases, I had to spend my own money."*

Municipal government of Matalom. The Matalom mayor expressed strong support for the implementation of the Local Government Code which effected the decentralisation of the government bureaucracy. He recalled that in the past, planning and decision making regarding agricultural development programmes were done at the regional or national level. In comparison, the mayor pointed out, the devolution process empowers the municipal government to determine agricultural development programmes directly relevant to the needs of Matalom farmers.

The only constraint as perceived by the mayor was the limited funds available to them. Being a fourth class municipality, the revenues generated by the local government unit would not be sufficient to cover both the operating expenses and salaries of devolved personnel. Faced with such budgetary limitations, the mayor revealed his plan of reducing the number of agricultural technicians by two. As expected, the agricultural staff expressed opposition to the plan. *"We are already overburdened with work and now our number will be reduced, how can we be expected to be effective?"*, said the agricultural technicians.

In general, the agricultural staff expressed ambivalent feelings towards the Local Government Code. On one hand, they felt liberated from the dictates of officials in the upper level of the DA bureaucracy, i.e., provincial, regional and national. In the past, agricultural programmes were planned at the top of the department hierarchy and all that they reportedly did was implement them in the field. As the municipal agricultural officer pointed out, it was the answer to the longstanding need for a more decentralised organisational set-up with development programmes more attuned to local needs and circumstances.

On the other hand, the staff were worried over the emergence of political leaders as key influences in agricultural development. The new law empowers local government executives to decide among others on such matters as budget, staffing and priority projects. Considering that the MAO is directly under the mayor's supervision, they are obliged to support the latter's decisions and plans. In one meeting, the mayor announced to the agricultural staff that the priority programme under his administration would be cottage industries, particularly ceramics-making and not agricultural production. He then called on the MAO to realign its activities to support the development agenda of the municipal government.

Moreover, the staff felt the danger that even agricultural activities may become politicised. Another case in point was the hog dispersal project under the agrarian reform programme. The

municipal agricultural officer revealed that at one time she prepared a list of recipients based on the criteria set by the MAO. This was reportedly disapproved by the mayor and instead he recommended farmers who were not qualified to participate in the project because they were not agrarian reform beneficiaries. The staff, however, noted that these farmers were the mayor's political supporters.

The Calumpang technician also expressed concern over the new political influence over agricultural projects. In the last elections, Calumpang was the only barangay in the entire municipality where the mayor lost. As such, he said it would not be a surprise if Calumpang would not be a priority barangay for development programmes. The barangay captain himself admitted that since then, he had been too ashamed to approach the mayor to ask for support to barangay projects.

Traders. Calumpang farmers deal with two types of traders -- local residents and those operating in nearby marketing centres. Traders influence agricultural production in Calumpang primarily because they assist farmers in gaining access to farm inputs and in the marketing of the produce. Since these traders also run small retail stores, they become common sources of credit and farmers usually choose to pay these in terms of their rice or corn harvest. However, traders normally avoid extending financial assistance to farmers with poor credit records, thus the latter are sometimes prevented from cultivating the land for a certain cropping season.

At least three local traders were mentioned, all of whom were mainly engaged in peanut contract growing arrangements with farmers. Because of the high market demand for peanut processing in nearby places, traders decided to establish contract growing arrangements with local farmers. Such scheme encouraged the spread of peanut production and unwittingly may have contributed to soil rehabilitation through the crop's nitrogen-fixing effect.

When the harvest of sweetpotato is likewise good or when in need of cash, some farmers sell the excess produce to traders in the neighbouring municipalities of Maasin and Bato. These traders were usually market vendors and stall owners. The traders' influence extends over to farmers' decisions on varietal choices. Farmers were more likely to grow crop varieties which traders revealed to be most preferred by consumers. For instance, farmers continued planting the local *manobo* sweet potato cultivar even with the introduction of newer varieties. Customers have grown accustomed to the taste of *manobo* and so market demand remained consistently high. This market demand further reinforced farmers' decision to choose the local cultivar, which was earlier prompted by the potential use of the crop in soil resource management. *Manobo* is a creeping and late-maturing variety and therefore ideal for cover cropping.

PRCRTC. The Philippine Root Crop Research and Training Center (PRCRTC) is a national center created in 1976 under Presidential Decree No. 1147 to spearhead in the development of the root crop industry in the country. It is based in ViSCA in Baybay, Leyte, only 75 kilometres north of Calumpang. One of the research-generated technologies strongly pushed by PRCRTC was the package of new sweetpotato varieties (ViSCA Sweet Potato or VSP) and the corresponding cultural management practices. As part of its extension programme, PRCRTC conducted training activities on sweetpotato production designed for farmers.

One of these trainings was held in Matalom in 1991 in response to a request from the DA. The agricultural staff selected 28 sweetpotato-growing farmers from the different barangays in the municipality as training participants. Three of these were from Calumpang.

After the training, cuttings of the VSP varieties were distributed to the participants so they could try planting them in their farms. In addition, the Calumpang technician secured additional cuttings for propagation in the barangay nursery.

The VSP plants grown in the farms of farmer-trainees caught the curiosity of most other farmers because these were bushy, unlike the creeping nature of native varieties common in the area. Interest grew especially at harvest because besides the short maturity period and high yield, the root flesh was attractive in colour, ranging from golden yellow to orange. Soon everyone else wanted to try the new varieties, thus even the nursery ran out of planting materials. The VSP *craze* even spread to the hillylands with farmers able to secure planting materials through the informal seed distribution scheme called *paliwat-liwat*. This initial fascination with VSPs, however, fizzled out as they began to discover that it could not compare with native varieties on a number of important criteria.

Farmers realised that the VSPs' bushy character² proved to be a disadvantage. Unlike native creeping varieties which grew secondary vines and produce additional storage roots, the yield of VSPs was limited to the primary roots. Farmers realised that on the overall, more could be harvested from native varieties. Being bushy, areas surrounding the VSP sweetpotato plant remained exposed to rain and sunlight. Thus, these varieties were found inappropriate to meet the cover cropping and erosion control functions which many farmers also intended the crop to perform.

The short maturity period was also discovered by farmers to be actually more of a disadvantage. In the traditional cropping calendar, sweetpotato was intentionally allowed a longer growing period for a number of reasons. Being a subsistence crop, staggered harvesting was normally done, with the amount of roots harvested intended only to meet daily food requirements. This did not seem applicable for VSPs, as those who tried the varieties later found out. The VSPs simply had to be harvested at one time, i.e., uprooting the plants, because these rarely produced additional storage roots beyond the first harvesting, unlike the native cultivars. On top of all these, the eating quality of native varieties could not be surpassed by VSPs. The latter were considered as being too wet and too sweet, traits which were ideal only when the roots were prepared as delicacies or desserts but not suited for table use.

After the long drought in 1992, there was a shortage of planting materials in Calumpang, with even the VSPs practically wiped out. A few farmers however were able to cope with the calamity by establishing mini-nurseries, watering sweetpotato plants that remained growing on the ground, and propagating by means of sprouts from leftover storage roots. Interestingly, most farmers chose to save *manobo* and one or two other native varieties. This was indicative of their preference for these varieties because of their perceived relative value. In contrast none of the farmers reported to have maintained VSPs.

7.7 Local People's Response to the Problem Situation

As gleaned from the preceding section, none of the external actors demonstrated a direct interest in helping the hillyland farming community improve the problem situation in soil resource management. Their foremost concern, as it turned out, was to achieve their individual goals and those of their respective organisations. The external actors' perspectives and actions as described above were incongruent with local people's perceived constraints and actual conditions in the acid uplands of Calumpang.

This lack of relevant external intervention no longer surprised anyone in the Calumpang hillylands. As expressed by one barangay councilman representing Calubian, *"We already gave up hope a long time ago of being benefitted by external assistance. Somehow, we have managed to*

²A characteristic common to the earlier developed VSP varieties.

survive on our own." Such expression of resignation coupled with the drive for self-reliance were not uncommon in the community.

Local people's concept of survival usually referred to independent ways of learning how to make sense of their immediate environment, to cope with their changing situation and to achieve certain goals under such situation. In other words, they were learning to manage their scarce resources to meet targets for survival. In order to understand the broad concept of survival through local learning, community folks were asked by the researcher to recollect the different knowledge processes that they underwent from the time they recognised the problem situation until they acted to improve it.

Concept building. Through local people's experience, a set of local concepts and terminologies evolved which they used to make sense – describe, categorise or establish patterns and relationships – of their environment. These included, for example, local soil classification and measurement systems. These concepts not only helped systematise local people's understanding of their biophysical world but it also promoted better communication among them, facilitating learning as a social process. As experienced during the fieldwork, local people were able to understand each other through the use of mutually accepted concepts pertaining to the soil while the researcher was groping for their meanings. For an outsider like the researcher to understand local learning, he needed to acquire a good grasp of such local concepts which he could then use, instead of his own science-based framework, in exploring how local people deal with problem situations.

Problem awareness raising. Different tangible and visible signs sensitised local people to the existence of a problem situation. Many of the local concepts were based largely on these visual indicators. These were either in general terms such as the declining crop yield noted by farmers, or more specific such as smaller sweetpotato roots observed by housewives who cooked them. They were able to recognise these changes by relying mainly on their various physical senses, particularly sight (e.g., colour, size, quantity), touch (e.g., texture, size) and taste (e.g., eating quality).

Practical experience. Local people attributed much of their agricultural knowledge not to formal education or training but simply to their lifelong experience in farming. In rural Philippines, farming was considered the only alternative for dull students. Those who were mentally slow were often told by their teachers, "*You better go home and plant camote (sweetpotato)*".

Parents were generally considered as a major influence, being one of their earliest sources of agricultural knowledge. While contributing to the family's farm labour pool, the children were in the process being initiated into farming as a way of life – taught by their parents on practices that have been handed down from one generation to the next. As they grew up and established their own farming enterprise, they accumulated additional knowledge through their own practical experiences which they referred to as *taghap-taghap* or serendipity. They revealed to having discovered and developed certain practices quite by chance rather than through a deliberate and conscious attempt to learn.

Storage and retrieval of relevant knowledge. Local norms dictate giving respect and high regard to the words of elders, based on the premise that they have accumulated a vast stock of knowledge over time stored largely in their own memory banks. As the means of storage was almost entirely mental, local people had to rely mainly on recall ability when certain situations called for the retrieval of part of this knowledge. There were no claims of having recorded knowledge in permanent forms, i.e., written or drawn. Nevertheless, there were concrete and tangible proof of the existence of this knowledge such as artifacts, e.g., indigenous farm implements, and the appearance of the farm itself, e.g., formation of soil terraces.

Local experimentation. Community folks admitted to doing various forms of *experiments*, crude as they may be, in the course of their farming activities. The need to develop appropriate soil conservation measures was no exception. Ideas for experimentation were generated through their own practical experience or shared by others, coupled with the need to overcome certain perceived constraints. Probable solutions underwent testing by trying them, this time in a more deliberate and systematic manner. Examples of these were:

- A portion of the farm was set aside where the experiment was to be done. Rather than applying directly any innovation to the whole farm, it was first tried on a small section while continuing the normal practice for the rest of the farm. In this manner, risk was minimised especially if the experiment produced negative results.
- The progress of the activity was closely monitored, e.g., farmers did not just forget the ongoing *experiment* until harvest time. Instead, they eagerly visited the farm frequently to take note of even the smallest changes that have occurred, for instance leaf colour or vine length.
- Farmers compared the results with other portions of the farm, as if between control and treatment plots, or with those of previous cropping seasons. This was mainly through visual approximation.
- The experiment was repeated a few more times, making modifications when necessary. It was sort of an adaptive, replication or verification trial in formal research.
- Joint experiments, through informal agreements, were undertaken by a group of farmers (usually those cultivating adjacent farms) who performed similar *trials* or one of its *treatments*. This enabled them to compare results and verify if they had made the same observations or reached similar conclusion.

Peer Group Discussion. Local people did not only generate farming knowledge, as illustrated in the preceding processes described, they also actively engaged in knowledge exchange through social contacts with each other. When asked about the people with whom they associate most frequently, it became obvious that these were through local informal networks formed by:

- neighbourhood or households clustered into sitios;
- kinship ties since many families in the barangay were related by blood or marriage; and,
- community organisations such as the parents-teachers association and religious groups.

These interactions were basically informal and spontaneous, largely casual conversations, since rarely did they have opportunities to attend meetings or trainings organised specifically to discuss agriculture. These discussions were closely interwoven in various social activities such as those mentioned in Box 7c. As one farmer observed, *"It is not unusual for two people who meet along the road to stop and talk for a while. It may start as a social greeting and comments about the weather, but later could end up as a heated debate as to who had the bigger harvest."* There seemed to be high credibility placed on these informal sources, based on the popular local saying *"to see is to believe"*. One farmer explained, *"There is no way for them to lie because I can directly observe what's happening in their own farms, or if not me at least the other neighbours. Besides I would never believe it until I have tried the practice myself."*

Those who had opportunities to travel to other places acted as cosmopolites who brought external knowledge into the local network. This was the case of the *manobo* cultivar, for example, which somebody who came from the island Mindanao brought to Calumpang. Visits to relatives and friends in other barangays of Matalom where contour farming was already practised or introduced through formal extension were also cited as opportunities to acquire new knowledge and later shared with others upon their return to Calumpang.

Adoption Options. All the previous knowledge processes did not actually lead to a dichotomous choice between adoption and non-adoption. From the examples given by farmers, adoption decisions may be classified to form a four-point scale:

- continuous adoption - after further verification, those practices already with proven *track record* were continuously adopted;
- adaptation - some practices were modified and/or adapted to suit changing conditions;
- rejection - in extreme cases, introduced practices were totally rejected; and,
- re-adoption - cases of re-adoption where farmers decided to resume indigenous practices after the introduced practices were perceived as less satisfactory.

7.8 Innovation for Soil Resource Management

Through indigenous soil resource management, hillyland farmers in Calumpang demonstrated that local people were capable of devising pragmatic solutions to serious constraints facing them in their day-to-day farm activities, in the absence of any formal external intervention. This section describes aspects of the innovations developed by the local community, based largely on the accounts given by key informants and the observations made by the research during actual field visits.

Enriched fallow. Infestation of cogon grass, a fast-growing weed species adapted to acidic soils, was a common problem when cultivate land was left to fallow. With its deep root system and natural ability to propagate through rhizomes, cogon became difficult to eradicate once a fallowed area was reopened. However, in fallowed areas where the viny leguminous kudzu (*Pueraria phaseoloides*) predominated, farmers noticed that:

- cogon was less likely to compete;
- soil fertility seemed to be restored faster thus it was possible to reopen the land after a shorter fallow period; and,
- soil covered with kudzu was easier to recultivate than with tall grasses and shrubs whose roots are difficult to eradicate.

With its viny character, kudzu acted as cover crop and prevented the growth and proliferation of cogon. It was generally believed that kudzu was *laa* (allelopathic). Farmers believed that the crop possibly produced a substance toxic to cogon. Besides, the creeping vines of kudzu strangle the cogon plants to death.

While many years ago, the common fallow period was only about a year, farmers disclosed that lately a longer fallow period was necessary, sometimes up to 10 years, in order for the soil to regain fertility. However, they noticed that in areas where kudzu, and not cogon, was the predominant vegetation, soil fertility seemed to have been restored in a much shorter time. The resulting shorter fallow period was generally attributed to the elimination of cogon which was considered a soil-depleting crop, as well as the soil-enhancing effects of kudzu since research has shown that leguminous plants such as kudzu help in nitrogen fixation in the soil.

Farmers identified two additional leguminous plants with similar effects as kudzu. Asiang (*Mikania micrantha*) and kayumyum (*Calopogonium mucunoides*) which were generally found growing under coconut were observed to have the same effect on cogon, thus eliminating the need for frequent weeding. Although very few farmers reported to have deliberately planted these three leguminous species in fallowed land, conscious effort was made that whenever they were found growing naturally, the plants were left to grow and cover the fallowed area.

Guano. Calumpang has a natural cave which serves as shelter for birds and bats. Over the years, the dung excreted by these animals accumulated and became guano. Farmers first noticed that the vegetation within the cave's immediate surroundings was unusually dense and healthy. On closer inspection, they found the soil to fit their concept of fertility – dark-coloured and fine-textured. Initially they brought samples of the soil to their individual farms. They used these as medium for seedling production and poured them into the holes where the seedling were to be transplanted. The vigorous growth of crops plants confirmed the farmers' suspicion that guano could be used to fertilise the soil.

As the use of guano fertiliser spread throughout the area, some enterprising individuals started gathering and selling them at about fifty centavos³ per sack. Some parents also sent out their children to gather guano for use as farm fertiliser. In recent years though, guano gathering declined since the passage to the cave has become too steep and dangerous.

Intercropping. With the declining crop yield, farmers had to cultivate a larger area in order to produce at least the same amount of food for the household. However, the increasing population meant lesser land available for cultivation by individual households. One possible option which farmers thought of was to optimise production in the same area grown before through intercropping. By planting a second crop along the spaces between the rows of the main crop, farmers thought that their combined harvests would yield enough food. True enough, the total yield of both crops was high. In addition, farmers also noted that by intercropping corn with sweetpotato or peanut, the yield of the main crop was even higher than when corn was monocropped.

Intercropping though had a much longer history since it was reported to be part of traditional agriculture in the area even before people became seriously concerned with the problem situation in soil resource management. Planting different crops in the same area evolved originally in response to the households' desire for diverse food sources. The practice was only later adapted as a coping mechanism for soil degradation, illustrating a case of knowledge retrieval.

Crop rotation. Opening a fallowed land normally occurred just before the onset of the rainy season. Sweetpotato was normally grown in a newly opened land supposedly to condition the soil for subsequent crops. Up to the second year, corn and rice were intensively grown. The shift from cereals back to sweetpotato usually took place during the third and subsequent years as soil fertility declined. At the end of the cultivation cycle, the land was again returned to natural fallow to regenerate soil fertility.

The discovery of the soil enhancing effect of sweetpotato was an example of knowledge retrieval. Farmers were looking for food crops that would thrive under the already poor soil conditions and result in adequate yield. Even before this time, however, they were already aware of the hardy character of sweetpotato since, as per their experience, the crop managed to yield satisfactorily even when rice and corn harvests were already at their lowest.

From being a supplementary food, it became a substitute staple crop grown in areas previously planted only to cereals. With the favourable yield outcome of sweetpotato after one or two cropping seasons, farmers thought that the soil may have already recovered its fertility. To test this, they decided to plant rice and corn again after sweetpotato was harvested. This time, yields were considerably higher than those prior to the planting of sweetpotato. With these, farmers began to appreciate the soil enhancing effect of sweetpotato.

³approximately 2 US cents

With the rise of peanut as a cash crop in recent years, a legume was added to the cropping pattern. Farmers noted that this further improved the soil enhancing benefits of crop rotation. Quite interestingly, local people generally attributed the improvement in soil condition more to sweetpotato than peanut. Researchers confirmed the crop's unique nutrient pump function. With its relatively deep root system, sweetpotato helps recover nutrients leached to the subsoil and brings these back to the topsoil where they are made available to the succeeding crops.

Although the crops' soil enhancing properties had been widely recognised, monocropping of sweetpotato was likewise found to be undesirable. The root yield of sweetpotato was observed by farmers to decline when planted repeatedly in the same area. Research at PRCRTC examined this unusual phenomenon and found preliminary evidence on the allelopathic effects of sweetpotato, or its tendency to produce substances in the soil where its grown that limits the growth and yield of sweetpotato in the next cropping season.

Box 7f. Perceived effects of crops on the soil: sweetpotato vs peanut.

When asked to compare the contribution of various crops in maintaining soil fertility, farmers ranked sweetpotato highest followed by corn. Surprisingly, peanut ranked third even though research indicated otherwise, because of the presence of nitrogen-fixing bacteria in its root nodules.

When the researcher tried to argue, farmers explained that sweetpotato vines were left to decay on the soil surface while peanut plants were wholly uprooted and brought to a shaded area where the roots were harvested. Therefore, unless brought back and spread on the field or ploughed under, something that was rarely practised, the potential contribution of peanut's herbage yield to soil enhancement remained under-utilised.

Unwittingly, crop rotation was discovered by farmers to contribute towards pest control. In the monocropping system, incidence of pest infestation was noted to be severe and difficult to control, usually causing major damage to the crop. In crop rotation, farmers noted that the pest problem seemed to decline or at least become short-lived. Weevil infestation in sweetpotato, for instance, was found to be partially controlled by shifting to another crop in the next season. As researchers explained, this was due to the temporary elimination of the host plant which prevented the pest from further spreading.

Like intercropping, crop rotation had its origins in the need for households' intention to vary the types of food consumed by growing different crops alternately. The incidental discovery of the practice's positive effect on the soil made it a relevant knowledge for retrieval as soil degradation was increasingly felt locally.

Cover cropping. Soil degradation was considered by farmers to be also caused by excessive exposure to rainfall and sunlight, resulting in surface erosion and moisture loss, respectively. However, damage was noted to be relatively less when the land was planted to sweetpotato. Farmers attributed this to the protective value of the crops' creeping vines. These vegetative cover in a way served as a form of barrier to direct exposure to rainfall and sunlight. Because of this, farmers explained, sweetpotato was able to thrive under extreme climatic conditions which other crops could not tolerate.

Cover cropping seemed to fit perfectly with the existing sweetpotato production system. To take advantage of available moisture, the crop was normally planted at the onset of the rainy season.

This scheme proved to be doubly beneficial as it enabled the crop to grow enough vines to cover the soil just in time for the heavy rains.

At the same time, staggered harvesting of sweetpotato not only assured farming households of a steady root supply for most parts of the year. By allowing sweetpotato to stay on the ground even until the dry months, the vines were able to cover the soil and to help prevent moisture loss. Moreover, farmers' preference for creeping varieties of sweetpotato seemed to have a dual purpose. Aside from increasing cumulative yield with the additional storage roots produced by the secondary vines, creeping varieties were noted to be provide greater cover in terms of area and density.

Mulching. Since subsistence households depended largely on family labour, the available manpower was devoted to priority tasks such as land preparation, planting and harvesting. Because of the limited labour for harvesting, vegetative wastes were normally left in the field, rather than gathered and systematically disposed of. These cut vegetative parts were simply allowed to decay on the ground or incorporated into the soil during ploughing in the next planting season.

Others preferred to burn vegetative wastes, thinking that these were unsightly and merely hindered efficient land preparation. Farmers though had been able to compare the differential effects of these two practices on the soil. Aside from eliminating the need for additional labour to collect farm wastes, mulching had been shown to improve crop yield in the next cropping season. One possible explanation offered by researchers was that the sweetpotato vines left on the ground to decay contribute to a lower soil temperature which in turn promoted microbial activity and soil mineralogy.

Sweetpotato had been considered as particularly effective as mulching material. Researchers attributed this to two main factors. First, sweetpotato cultivation results in a relatively higher amount of biomass compared with other crops. Second, the common method for harvesting sweetpotato is by simply cutting the storage roots right in the field without uprooting the entire plant, thus leaving the vegetative parts on the ground.

Rock walls. Hillside farmers realised that erosion was a real threat to household survival when they noticed the fast declining soil productivity. They know they had to find a way to control the erosion rate in order to save the soil from further degradation.

In the beginning, farmers perceived erosion as a simple problem that needed a simple solution. To block the downward flow of soil particles down the slopes and into the plains, wall-like structures had to be constructed near the base of hillylands to block erosion. Since fragmented limestone rocks were prevalent in the area, these became the immediate choice as construction material for the walls. The rocks were put together to form a belt-like structure, about a foot in height, around the hillside. A few farmers cultivating steeper slopes added a second or third strip equally distanced between the base and top of hillsides.

After several cropping seasons, the rock walls influenced the formation of eroded soil into terrace-like structures. In fact, there were speculations that the practice was partly inspired by the centuries-old, world-famous Ifugao rice terraces in northern Philippines. The greatest drawback though with rock walls, according to hillyland farmers, was the high labour requirements for collecting the rocks and arranging them on the hillsides. These were tasks which many women and children claimed to have participated in. Besides, these rocks were easily washed away during heavy rains which meant these had to be constantly repaired during the wet season.

Grass strips. In addition to rainfall, hillside cultivation was considered as another contributing factor to erosion. Ploughing during land preparation was reported as a principal cause for the downward movement of soil particles, especially when coupled with rainfall.

To illustrate the point, farmers compared the rate of erosion of cultivated hillylands with that of areas under fallow. In the latter, the soil remained compact and less vulnerable to the impact of raindrops. This was more widely noted by farmers with fallowed land under cogonal vegetation. According to them, the dense roots of cogon held the soil firmly which even made it difficult to uproot the weed during land clearing. It was this difficult experience with cogon that gave farmers the idea of putting the weed to good use. Rather than be bothered by the difficulty of eradicating cogon, they thought of allowing the grasses to remain in the field so that these would form a natural fence to block soil movement.

The technique was essentially the same as that of rock walls, only that in this case, natural vegetation was used as construction material. Farmers tried this out by ploughing the farm as usual except for strips of cogonal land serving as live fences. Crops were then planted between these strips. Just like the rock walls, the structure controlled soil particles from completely being eroded downwards. Instead, these were collected to form soil terraces.

Of those who responded to the erosion problem, many preferred cogon grass strips over rock walls. Its distinct advantage was that while additional labour was needed to construct the rock walls, cogon grass strips in fact reduced labour requirements during land preparation. More significantly, farmers expressed delight after finally finding a good use for what was once considered as nothing but as a weed. *"Afterall,"* commented some, *"each creature was placed by God on earth for a certain purpose. We just have to find out what it is."*

Mura grass. Vetiver (*Vetiveria zizanoides*), a tall, wiry and perennial grass is indigenous to tropical Asia including the Philippines. The plant's natural habitat are low-lying, swampy areas. *Mura* grass, as locally called, thrived abundantly in the low-lying, swampy areas of Matalom. In Cahagna-an, a lowland community adjacent to Calumpang, *mura* was once a weed problem in many ricefields. Later, farmers allowed the grass to grow along the dikes since its deep curtain of dense roots helped hold the soil and prevented the structure from damage.

Meanwhile, hillyland farmers in Calumpang were beginning to discover certain weaknesses of grass strips and rock walls. Both structures were easily damaged by heavy rains. Cogon was discovered to be a favourite habitat for pests and with no other supplementary uses other than its hedgerow function. In addition, grass strips were perceived to reduce the available cultivation area.

Through frequent visits to Cahagna-an, hillyland farmers in Calumpang learned of the novel use of *mura* in the dikes of ricefields. Prompted by a desire to look for an alternative means of erosion control, these farmers thought about trying to substitute *mura* for cogon as material for constructing erosion control structures. After trying the technique for several cropping seasons, farmers discovered the following comparative advantages:

- a strong odour from its roots repels pests;
- it could withstand both long droughts and heavy rainfall;
- it requires very little maintenance (e.g. pruning);
- planting materials could be easily procured; and,
- it reproduces easily.

7.9 Consequences

While local people acknowledged that their indigenous innovation did not completely rehabilitate the soil condition, they insisted that it contributed significantly towards improving the problem situation by hastening the recovery of soil fertility while reducing the rate of soil erosion.

Their positive assessment of the impact of their indigenous innovation was based on a number of concrete and visible effects, such as:

- improved soil fertility with soil darker in colour, having finer and granular texture, and moist but easily pulverised;
- soil fertility is regained in a shorter time thus cutting down the fallow period by about one to three years;
- soil fertility declines less rapidly thus extending the cultivation period by one to two years;
- levelling off of sloping land and formation of terrace-like soil structures;
- fewer mounds of eroded soil at foot of hillsides;
- increased volume and quality of yield such as more sweetpotato roots produced and usually bigger in size; and,
- less incidence of weeds and pests, particularly cogon.

ViSCA researchers who learned of these practices recognised the ingenuity displayed by local people and their capacity to innovate independent of external assistance. Consequently, the various practices in soil resource management developed by local people provided useful cues and ideas for further scientific investigation which some of them learned in the process of providing technical advice to the researcher. For example, at PRCRTC new research projects were conducted on sustainable root-crop based production systems and on allelopathy in sweetpotato.

From a technical point of view, however, the soil resource management practices evolving from local people's own initiative remained inadequate for dealing with the problem situation. Proof of this, according to ViSCA researchers, was the continuing soil degradation in the Calumpang hillylands. Local people and researchers agreed though that while the innovation introduced by the former helped improve the problem situation, there remained a need for external intervention to support local initiative. As recognised by them, the innovation was more of a palliative rather than a rehabilitative approach. Among the needs for intervention identified by local people were:

- the need for more effective erosion control measures that could withstand stronger water pressure caused by floods and heavy rainfall;
- more effective rehabilitative practices to restore fertility in already highly degraded soil;
- systematically validating the reported soil enhancing effects of sweetpotato;
- exploring the potential complementary use of organic and chemical fertilisers; and,
- a detailed soil analysis to assess the physico-chemical characteristics of acid soil in Calumpang.

In the researcher's discussion with both local people and intervening actors, there was also an emerging consensus that the consequences of the innovation were not limited to improvement of the problem situation in the biophysical sense, i.e., controlling soil degradation. More importantly, the experience taught them how to learn to survive under different agroecological circumstances even with minimal external support. It also built more confidence in their own capacity to face problems squarely. This was best summed up by one community leader who remarked, *"Who else will help ourselves except us? With a lot of work complemented by a little prayer, everything will be alright."*

7.10 Summary

The case study explored a problem situation involving the management of the soil resource in the acid uplands of Matalom. It dealt with how local people learned on their own to introduce innovation by developing ways of coping with soil degradation, especially in the absence of relevant external intervention. As a whole, the case study provided empirical evidence suggesting the need to

reexamine prevailing intervention approaches for these to effectively complement local initiative in responding to problem situations in natural resource management.

Actors. The case study revealed that soil resource management in the Calumpang hillylands involved several different actors within the local community, as well as intervening agents. The findings highlighted the central role of subsistence farming household in natural resource management, considering its being a primary unit for food production and consumption. In addition, the concept of *farmer* was found to be equally applicable not only to the male household head but, as this case suggested, also to housewives, elders and children given their direct involvement in the farming enterprise.

However, a farmer-oriented framework was found inadequate in the case study since other types of actors within the local community were identified to play important roles in natural resource management. Traders and community leaders, for instance, were a major influence, albeit indirectly, in local farming practices. Similarly, it was important to take note of local people in adjacent communities with whom hillyland farmers in Calumpang engaged in some form of social learning. For this reason, it was noted that soil resource management not only involved actors as individuals and households but likewise at higher levels of social aggregation like informal networks, groups formed by neighbourhood and kinship ties, and intra/inter-community organisations. At the same time, these findings revealed the heterogeneity even within the upland population in relation to soil resource management.

The case study also identified a number of intervening actors either through their direct or indirect influence on the innovation, and in some cases by their deliberate inaction with respect to the problem situation. For example, by excluding hillyland farmers from the government's agricultural extension service, the municipal agricultural staff were unwittingly creating the enabling conditions for local innovation, being the only option available to subsistence farmers in the face of a worsening problem situation. Meanwhile, local government officials and those at the top of the DA hierarchy only served to limit the capacity of field staff to respond to the problem situation faced by hillyland farmers. In all, the case study illustrated how power relations — both at the institutional and field levels — can be a determinant for designing intervention that is responsive to local needs.

Problem situation. The recognition of a problem situation concerning soil degradation was not shared by all actors. As expected, subsistence farmers expressed the greatest concern since as they realised, the consequent decreasing production was not only a matter affecting their farming livelihood but posed as a threat to general household food security. Local people's direct interest in soil resource management was reflected in their detailed knowledge with respect to soil resource management, such as concepts used to assess soil erosion and fertility decline.

This lack of shared problem appreciation was indicative of the different goals and circumstances of the different actors. To the market-oriented farmers in the flatlands, the problem situation was not so much about soil degradation itself but the lack of access to commercial fertilisers. A similar view was taken by traders and intervening agents like the municipal agricultural staff who saw themselves as mainly responsible for facilitating input delivery. Meanwhile, PRCRTC being a commodity-oriented agency viewed the problem situation not in terms of soil-related concerns but as being the consequence of the lack of access to new crop varieties and production technologies.

While it was apparent that the actors' perspectives were influenced by their individual goals, these goals in turn appeared to be indicative of the particular world view through which actors' perspectives were shaped. To subsistence farmers, the soil was one of their very few resources and therefore any change resulting to the loss of its productive capacity was taken by them as a threat to their own survival. On the other hand, the market orientation of flatland farmers together with their

perceived close link to external sources of farm input suggested why their concern was not soil degradation per se but the limited access to commercial fertiliser. The world views of intervening actors were even more obvious. As the case study showed, the municipal agricultural staff's primary consideration was meeting work targets set by their superiors, local government officials were preoccupied with the political ramifications of their actions, traders always looking for every opportunity to make profit, and PRCRTC displaying its narrow concern with root crops.

Innovation. While intervening actors did introduce various forms of innovation, in general these were not directly aimed at hillyland farmers nor addressed to the problem situation in soil resource management faced by the latter.

PRCRTC, for instance, sought to introduce technological innovation in the form of new sweetpotato varieties but this was perceived by hillyland farmers as not meeting the added purpose of planting the crop as a soil management agent. Similarly, the use of commercial fertiliser as followed by flatland farmers and encouraged by municipal agricultural staff was considered by subsistence farmers as incompatible with their economic circumstances.

Thus in the case study, the innovation identified as having a direct bearing on soil degradation was the hillyland farmers' own initiative to design improvement in the problem situation. The specific soil management practices involved low external input and were developed primarily out of their own experiences and those of others which were shared with them.

The innovation was a product of local people's conscious attempt to learn about their biophysical environment and to subsequently devise ways to cope with perceived changes. It was noted however that such local innovation in response to soil degradation was facilitated not only by hillyland farmers' own technical knowledge but also of the social environment which promoted lateral learning through informal networking.

Intervention. The case study illustrated the inadequacy of the TOT intervention approach for soil resource management. The intervention by the municipal agricultural staff was characterised by a progressive farmer bias and top-down planning. PRCRTC's intervention, on the other hand, exemplified the transfer of research-generated technologies and crop-based innovation to target clients, i.e., sweetpotato farmers. In short, there was a general lack of relevant intervention to help improve the problem situation in soil resource management in the Calumpang hillylands.

Meanwhile, the limitations of local innovation were also acknowledged by various actors thus suggesting that intervention remained to be perceived as important. One potential role that intervention could have played to support local people's initiative for soil resource management was to provide access to science-generated knowledge and assisting hillyland farmers in combining this with their own locally generated knowledge in designing innovation which is more effective in counteracting soil degradation. An example is for intervention to introduce a more systematic method of identifying contour lines where *mura* hedgerows should be planted. But beyond knowledge alone, intervention could have played a role in strengthening local people's innovative capacity with respect to knowledge generation by complementing their own methods with those of science. A possible approach is the conduct of joint on-farm experiments.

This indicates the need to overcome the inherent limitations of the TOT as an intervention approach. However, as the case study also revealed, effectively supporting innovation against soil degradation in the Calumpang hillylands requires not only redirecting field-level intervention. In addition, the higher-level intervening actors, i.e., local government units and DA policymaking bodies, need to provide an enabling environment that allows for field-level intervening agents to assume the roles as mentioned above.

Consequences. As a whole, improvement in the problem situation was limited, with the actors themselves realising the inability of local innovation to fully arrest the soil degradation process in the Calumpang hillylands. The improvement achieved through locally developed soil management practices was primarily in terms of slowing down the degradation process, e.g., reducing the rate of erosion and the fallow period by hastening the natural recovery of the soil's productive capacity.

It is important to note though that whatever limited impact the innovation had on the natural resource unit was almost exclusively a product of local people's own resolve to cope with the problem situation. As the case study described, the innovation was not a collective effort of the different actors in managing the soil resource. On the contrary, some of external actors even worked against instead of supporting local initiative, e.g. absentee landowners who disallowed tree planting on tenanted land.

In turn, the lack of an effective innovation to improve the problem situation stemmed from the actors' contrasting perspective of the nature of the problem situation itself – its perceived importance and relevance, as well as its possible consequences for individual actors. Except for subsistence farmers, the goals and motivations of other actors barely reflected any concern for maintaining the soil resource of the Calumpang hillylands. This was so because, as the case study suggested, the actors' were preoccupied with strategising to achieve their individual *projects*, rather than to:

- realise the wider, longer term impact of soil degradation in the Calumpang hillylands;
- recognise their interdependency as a result of their interests and actions with respect to the management of the soil; and,
- engage in and facilitate social learning processes for them to take a unified, holistic view of the problem situation by accommodating their conflicting perspectives.

In sum, the minimal improvement of the problem situation in soil resource management in the Calumpang hillylands was an inevitable consequence of the actors' lack of common recognition of the problem situation and the need to jointly work towards its improvement.

Chapter VIII

MANAGING PEOPLE, NOT JUST TREES: THE MATAG-OB CASE

This chapter presents a case study of a problem situation in forest resource management in the uplands of Matag-ob. A combination of logging and agricultural activities had turned a public forestland into an almost entirely open and denuded area on which an increasing number of occupants depend for livelihood through shifting cultivation. Alarmed by the rapid disappearance of the country's forest resources, the government later targeted the area as among those to be subjected to reforestation.

Through what it called as a policy of people-oriented forest management, the government contracted a local NGO to undertake a community-based reforestation project which aimed to rehabilitate the forest resource and later turn over the responsibility for long-term management to the local community. The implementation of the project however only fuelled a longstanding conflict of various stakeholders' competing ownership claims over the forestland. With the different actors bent on continuously pursuing their own individual interests and goals, the case study sought to examine whether the introduced innovation did contribute to an improved problem situation or only led to further forest degradation.

8.1 Background

While forest degradation is already recognised as a national concern, Eastern Visayas is one of those regions in the country where the rate has reached an alarming, even catastrophic, level. The researcher found that this public perception was supported by available statistics and confirmed by key informants representing agencies involved in forest research and development in the region. Moreover, the series of deforestation-related disasters, e.g., landslides and floods, which occurred in the region just before and during the fieldwork further stressed the severity of the problem situation.

Matag-ob was chosen as the case study area for a problem situation in forest resource management on the basis of the general selection criteria, together with the following additional factors:

- The Bulak forestland in Matag-ob provides an example of the transformation of a once virgin forest into an open land, a process replicated in many other areas not only in the region but throughout the country;
- Matag-ob is located in northwestern Leyte, almost adjacent to Ormoc City, the site of a major flashflood only months before the fieldwork which killed thousands of people and believed to have been caused by the denudation of its surrounding forestland; and,
- The reforestation project in the area gave the research an opportunity to examine how external intervention seeks to introduce forest resource management especially under the so-called people-oriented approach, and in particular through a contractual scheme between the government and an NGO.

8.2 Highlights of Fieldwork

The reconnaissance phase of the fieldwork started with the researcher seeking official permission to conduct the research from the Leyte Rural Advancement Programme, Inc. (LRAP), an NGO operating in the region. Under the reforestation contract, LRAP was given the authority by the DENR to supervise rehabilitation efforts of the Bulak forestland during the three-year project period.

The researcher visited the main office of LRAP in the regional capital of Tacloban City where he met with the management and field staff, as well as collected available documentary data. Besides

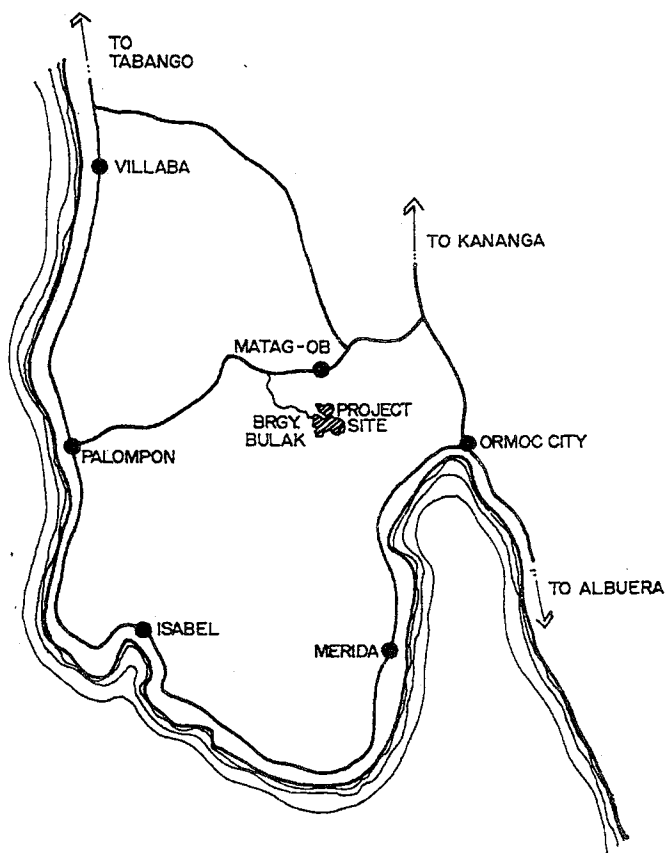


Figure 8a. Map of the municipality of Matag-ob.

being granted permission, the programme director also instructed the project staff to provide whatever support was necessary in the conduct of the fieldwork. Also visited by the researcher was the Community Environment and Natural Resources Office (CENRO) in Ormoc City since it was the field-level unit of the DENR which had jurisdiction over the project site. Unfortunately, the staff-in-charge for project monitoring was on training at that time and thus he was interviewed only after the fieldwork. Publications and research reports available at the ViSCA library, as well as technical consultations with forestry staff of the College were important additional sources of information.

The project site is located 6.7 kilometres from the poblacion of Matag-ob and requires a 2.5 kilometre walk from the centre of barangay Bulak. Since the houses of most forestland occupants were spread throughout the 100-hectare area, it became necessary to hire research assistants to help in interviewing individual households. The interview task was divided among them after the reconnaissance phase when the researcher already had an initial idea of different types of local households, e.g., *de facto* landowners and tenants, occupants and settlers, members and non-members of community organisation. The perspectives of local government officials and informal community leaders with respect to the problem situation were also ascertained.

Table 8a. Sources of data for the case study.

Actors	Key Informant Interview	Direct Observation	Documentary Data	Secondary Data
Local people (various types of forestland occupants)	X	X		
Formal and informal local leaders	X	X	X	
Project field staff	X		X	
LRAP management	X		X	
DENR	X		X	
ViSCA	X		X	X

In general, the conduct of the fieldwork was influenced by the following factors:

- The project was starting its third year of implementation when the fieldwork was conducted. Since at this stage the project required only minimal maintenance activities, there were fewer opportunities for local people to work as hired labourers and earn cash income. Many of them were thus seeking alternative sources of income elsewhere. At the same time, the planted trees had grown tall enough to already cause some shading to agricultural crops. Farmers were starting to move their farms to new areas outside the project site. This outmigration pattern presented the additional difficulty for the researcher to locate key informants.

- The fieldwork was conducted only days after the general assembly of LRAP elected a new set of board of directors for the NGO. The research was caught in the midst of an intra-organisational conflict resulting from the management transition. At one time during the fieldwork, a court order was issued which prevented the field staff from reporting to the project site thus temporarily suspending their work. Fortunately, the researcher was allowed to continue with the fieldwork. The conflict was later settled and project activities again normalised.

8.3 Forest Resource Management in the Philippines

The evolution of forest resource management in the Philippines is closely interwoven with the country's general history and thus it becomes necessary to examine how forest management practice has shaped and been shaped by historical events.¹

Evolution of forest resource management. In the first millennium AD, much of southeast Asia's population was believed to be located in scattered settlements of swidden cultivations and hunters and gatherers in upland forests. It is estimated that until the 16th century, 90 percent of the Philippines was forested.

Anthropologists have found that communal management was common, especially for less intensively used lands such as uncleared forests used for hunting and gathering, lakes and streams for fishing, and quarries for mining. Forestlands cleared for swiddens were often held in common by residential or kin-based groups. Cultivators were given temporary use rights extending through the agricultural rotation cycle or cycles. As wet rice cultivation and intensified dryland farming spread, requiring a great deal of labour to build such permanent structures as walls, terraces, and irrigation systems, the concept of individual ownership and land sales became more common (Poffenberger, 1990). It is commonly assumed that, as upland population grew, the use of swidden cultivation began the gradual reduction of dense forest, creating open pine and grassland cover.

In the beginning of the Spanish colonial era in 1521, virtually all of the uplands were forested and inhabited by scattered tribal communities. Magellan claimed the entire Philippine chain for the Spanish crown under what came to be known as the Regalian Doctrine. According to Lynch (1982), the legal effect of Magellan's gesture was to convert all of the indigenous forest occupants of the still unexplored archipelago into squatters. Under colonial land laws during the 300-year long Spanish rule in the country, unless the natives acquired documentation from the colonial government which recognised their ancestral property rights, their land was presumed to be owned by the Spanish sovereign.

The clearing of forestlands and the commercialisation of agriculture were closely related. To increase agricultural production and make the local population sedentary, Spanish friars were given administrative power over large tracts of land and supervised the cultivation of rice and exotic crops, e.g., potatoes, coffee and mint. Estate cultivation was pushed into the well-drained, sandy soils of the forested uplands resulting in the conversion of forestland to permanent agriculture. Forest areas were also burned to create pasturage and allow the establishment of newly introduced fruit trees and crops. Demand for forestland and products increased rapidly throughout the 19th century to support expanding colonial agribusiness -- firewood for sugarcane refineries, charcoal for iron foundries, timber for shipbuilding, mining and tobacco drying.

¹Among the useful historical accounts are by Poffenberger (1990), Gibbs et al (1990) and Fellizar (1993).

The first recorded effort by the colonial government to undertake forest management was the creation in 1863 of a forestry bureau known as Inspeccion General Montes. In the succeeding years though, it became apparent that the bureau was established not primarily in response to rapid deforestation but to increase profitable control over the trade of forest products under state monopoly laws, as well as to dispossess persons and punish those escaping from Spanish tyranny. The bureau was granted power to issue certificates to private companies for forestland exploitation. It also assessed land title claims which alienated small rural farmers who rarely could bring a claim to court or contest it with the educated, wealthy elite. These colonial forms of forest management were met with strong resistance by local people, partly fuelling the revolutionary movement to gain national independence. Agrarian revolts erupted in various parts of the archipelago. This resulted in even more lowlanders driven to the uplands as people sought refuge in the forest and from there launched an insurgency against the government.

When the Americans took over the country in 1898, the Forestry Bureau created by virtue of a military general order officially continued the exploitative and anti-insurgency function of the Inspeccion General Montes. This was inevitable considering that during its early years, the US regime was faced with the challenge of winning the Philippine-American war. At the same time, there was a need to justify the economic value of the Philippine economy since at that time the US congress was debating on whether to retain the Philippine colony or not.

Given such political pressures, the bureau accelerated forest exploitation and generation of revenues to justify its own existence. It granted logging licenses free of charge and allowed applicants to obtain as large as tract as they could conveniently exploit. Two American policies had significant effects on the Philippine forestlands – the Public Act of 1905, which declared as public land all land not registered under the Land Registration Act of 1902; and the Mining Law of 1905 which declared all public lands in the Philippines to be free and open for exploration, occupation and purchase by citizens of either the United States or the Philippines.

The Forestry Bureau was nevertheless credited for initiating the professionalisation of forestry in the country by conducting botanical studies and mapping activities, and later the first to officially question the unsustainability of the government's commercial logging policy. In spite of the latter though, American interests in expanding Asia-Pacific trade prevailed.

The establishment of the School of Forestry in 1910² became a starting point for reforestation activities in the country. In addition to the Makiling Project (1910), several other reforestation projects were implemented in Cebu (1916), Arayat (1919), Ilocos (1919), Zambales (1919) and in other areas until 1931. Reforestation became a priority programme of the government as evidenced by the creation of a special reforestation office under the Forestry Bureau and the allocation of project funds and qualified personnel.

The war added considerably to forest destruction. Military operations drove people to upland areas where they sought refuge and means of subsistence. When the conflict finally ended, only an estimated 4,000 hectares of prewar forest plantations survived. Reforestation efforts were renewed after the country gained independence in 1946. To generate reforestation funds, Congress passed in 1947 Republic Act No. 115 which imposed a levy on forest concessionaires. The year 1960 saw the creation of a Reforestation Administration (RA) by virtue of Republic Act No. 2706. Its specific mandate was to undertake reforestation and maintain reforested areas as permanent forest reserves.

²presently, the University of the Philippines at Los Banos (UPLB)

Still, these reforestation accomplishments did not adequately cope with the simultaneous deforestation process occurring. The postwar period was the time when forest exploitation and deforestation took new heights as a result of the introduction of mechanised logging, strong log export to the USA and Japan, liberal policy on forest management and regulation, low forest charges and agricultural expansion (Fellizar, 1993). Forest exploitation remained a more important government policy than reforestation.

The expansion of logged over forestland paved the way for the spread of shifting cultivation and the consequent growth in upland population. Although the uplanders were merely taking advantage of the area cleared by logging concessionaires, they were most often blamed for deforestation because of their continued presence in the area. The state was portrayed as fighting a losing battle against an expanding population of slash-and-burn farmers, known as *kaingineros*. Deforestation was rarely discussed in terms of the mismanagement of timber concessionaires, and although illegal logging was acknowledged, its scope and impact were not well understood (Gibbs et al, 1990). The punitive measures taken by the government through a series of legislative acts merely contributed to increased discontent among upland settlers and contributed to the growing threat of insurgency. Land disputes over tenurial claims of local people frequently resulted in armed conflict and stimulated anti-government separatist movements.

Technical and regulatory issues received greater attention largely because the problem was perceived by the government to be one of deforestation and the solution to be a responsibility of forestry. Reforestation was likewise taken as a professional fulfillment and purely a government activity (Balague, 1993). At the same time, statistics on the extent of forest cover in the Philippines have long been regarded as unreliable due to the lack of a periodic national inventory, the high rate of illegal logging, and the vested interest of officials who saw the size of the public domain and the public forest as a primary source of their power (Gibbs et al, 1990).

Contemporary era. The early history of the country illustrated that reforestation and forest protection efforts of the government were being couched in punitive measures without clear provisions for direct participation of forest occupants. But having failed thus, the government finally recognised that forest destruction is a socioeconomic problem and that any move to rehabilitate destroyed forest must involve socioeconomic solutions. Further, the government realised that to succeed in reforestation, forest occupants as part of the upland ecosystem must be encouraged to participate in planned change. Thus began the era of Participatory Development in forest resource management in the Philippines.

With the declaration of martial law rule in the Philippines in 1972, a massive government reorganisation was implemented. The RA and the Parks and Wildlife Office were merged to form the Bureau of Forest Development (BFD). The creation of the BFD signalled the turnaround of the government's policy as it sought for a more people-oriented reforestation approach through a partnership between public and private sectors. These conciliatory policies were operationalised through reforestation programmes designed to promote greater involvement of the once considered culprits of deforestation -- the upland communities. Notable among these programmes were the:

- Forest Occupancy Management (FOM), which authorised forest occupancy through the issuance of certificate of stewardship contracts to farmers and the regulation of their forestland-use practices. Forest occupants were required either to be relocated where continued cultivation would not adversely affect the public forest, or to remain in place and not expand their clearings while undertaking forest protection activities.
- Communal Tree Farming (CTF), which sought to establish tree farms and plantations by awarding community forest leases to local groups. Under this programme, a huge area is set

aside for a community where together, they can plant trees and do agroforestry under the technical supervision of the Forest Management Bureau (FMB).

- Family Approach to Reforestation (FAR), in which FMB entered into short-term paid contracts with families to establish tree plantations on public land. These families were allowed to interplant the same land with agricultural crops until the trees were well-established, then they would move on to new sites and repeat the process.

Unfortunately, none of these programmes performed especially well and by 1981, the total area covered by all three was only 33,000 hectares. FOM, in particular, was able to issue use certificates on only 0.2 percent of the public forestland (Poffenberger, 1990). The failure of the FMB to demonstrate a people-oriented approach to reforestation was attributed to the staff's inadequate professional skills. They generally had training and experience on technical and regulatory functions but had limited knowledge on social, economic and institutional aspects. As Gibbs et al (1990:255) described:

While forest protection had improved foresters' skills in policing, exploitation had developed their skills in engineering and silviculture. As a result, foresters' first proposals for solving the problems posed by kaingineros involved terracing or agroforestry, limiting forest occupants freedom of action, or resettlement to areas where actual forest was exhausted.

By the end of the 1970s, agricultural productivity and self-sufficiency in rice, the major staple food, had increase tremendously. However, food production increases were concentrated in the irrigated lowlands, where technical and credit support were accessible and market infrastructure was highly developed. In more marginal areas, including the rainfed uplands, "green revolution" technologies were not applicable. Although the experience to improve production was lacking, the need to develop uplands agricultural systems was recognised, and the Ministry of Natural Resources realised that its continued jurisdiction over public forestland depended on expanding its programmes to include the livelihood activities of forest occupants which could reasonably be described as upland farmers: if it failed to do so, it might be forced to share control of the public forest with other agencies. At the same time, the environmental consequences of deforestation and inappropriate agricultural systems in the uplands became more widely recognised. Foresters once preoccupied with trees had to acknowledge the effects of deforestation, hydrology and soil erosion.

By 1980, the Philippine uplands and the upland population were significant issues in national development policy. The political pressure on government for a high-profile approach to upland development was considerable. There were public demands from environmentalists for sustainable management of the public forest, from social workers for improved standards of living for upland people, from indigenous people seeking political autonomy, and from military analysts concerned about communist insurgency in the uplands among the most economically disadvantaged provinces. In 1982, a Social Forestry Division was established within the FMB to implement an Integrated Social Forestry (ISF) programme. The ISF sought to achieve the creation of new land-tenure options designed to increase the tenure security of forest occupants, expansion of public land areas eligible for settled occupancy, the development of *bottom-up* approaches to agroforestry farm planning, and the development of an active research and programme-support group.

ISF parcellary survey teams began demarcating public lands for the issuance of lease agreements and by 1985 had surveyed over 270,000 families. However, only 50,000 had actually received tenure leases. The reforestation efforts were apparently beset by such problems as low survival rate in plantations, poor care and maintenance, ineffective forest protection strategies, and more importantly public apathy on reforestation/forest conservation, graft and corruption, budgetary as well as administrative problems (Mangaoang, 1993). The Upland Working Group of the

Philippines, which advised the programme, concluded in 1987 that to accelerate and improve its effectiveness, it would be necessary to:

- make tenurial arrangements more compatible with the diverse local traditions and agricultural practices in the uplands;
- decentralise and empower local institutions; and,
- focus the social forestry strategy more closely on the needs of upland people.

National Forestation Program (NFP). One of the important lessons learned by the FMB from reforestation experience is the need to create an effective system of decentralised community forest management in order to cope with the vast land area involved and adapt to the diversity of cultural groups and land-use practices in the country.

Theoretically, government forest guards and forestry entrepreneurs as a whole are supposed to stop illegal forest inhabitants. On paper this is fine; on the practical level this has no way of succeeding. There is an estimated 500,000 kaingineros in the uplands. Even if the entire Armed Forces were enlisted to help the Bureau of Forest Development in this task, one would have to be an incurable optimist to think that they could succeed (Dugan, pers comm as cited by Fernandez, 1984).

Such a realisation took place at a time when the participatory approach to forest management, in which communities in or near the forests extract timber and/or non-timber products under attempted sustainable yield management regimes, was also coming to be seen in many countries as one of the more promising alternatives to private logging concessions, state forest management and attempts to prevent access to forest through legal means and forest guards (Richard's, 1993).

The first step towards decentralisation took place with the change of government in 1986 resulting from the People Power revolution which ended the Marcos regime. As part of the government reorganisation, the DENR devolved the line functions of its bureaus, including FMB, to the regional offices. The regional DENR directors thus assumed the role of a regional department secretary. Efforts toward a decentralised management was pushed a step further as the government decided to turn over the task of reforestation to the private sector, and in the process freeing itself from the burden and administrative difficulty of undertaking the task itself. The drive towards participatory forest resource management was partly in line with the FAO's (1985) Tropical Forestry Action Plan whose basic principles include promoting active, organised and self-governed involvement of local groups and communities in forestry activities.

The policy shift from the conventional government-administered reforestation to a more participatory scheme of contracting private groups is embodied in the National Forestation Program (NFP) launched in 1986. NFP has a three-fold goal of restoring and maintaining forest cover, ensuring sustained production of wood and other wood products, and providing upland communities with livelihood to improve their socioeconomic condition. The ultimate target of NFP is to rehabilitate 1.4 million of denuded forestland by the year 2000, implying an annual reforestation goal of 100,000 to 150,000 hectares.

Contract reforestation, the main implementing strategy, involves an official transaction between the government and a private entity in which the latter will do reforestation on a specific locality, and will be paid an amount by the government for the job done as agreed upon by the two parties (Bucad and Donoso, 1985). NFP can enter into a three-year contract with various types of private groups -- families, community organisations, non-government organisations, local government units and private corporations -- and each project area contracted can range from 1 to several hundreds of hectares although most are around 100 hectares.

From 1987 to 1991, a total of 7.23 billion pesos³ had been spent for NFP. To provide funds for the programme, the Philippine government obtained loans from the Asian Development Bank (ADB) and the Overseas Economic Cooperation and Development (OECD) amounting to US\$ 121.878 million and US\$ 120 million, respectively.⁴

In the period of 1986 to 1992, a total of 2,075 contracts were awarded and an aggregate reported area of 195,130 hectares were reforested. This cost the government an obligated amount of P3.165 billion⁵. Based on these data, the average cost of reforesting a hectare of land was P16,092⁶. By comparison, reforestation through the conventional government-led scheme averaged about P5,000⁷ per hectare at the rate of 16,000 hectares per year between 1976 and 1986. Therefore, while it cost three times as much to reforest through the contracting scheme of NFP, the area reforested annually was 2.71 times larger than the yearly average of reforesting by the conventional method (Umali, 1993).

While figures are readily available and give a macroperspective of programme performance, these statistics do not provide a dynamic view of how a supposedly decentralised, participatory and private-led forest management scheme deals with specific problem situations at the local level. Thus the succeeding sections present a microview of contract reforestation in the context of a problem situation with respect to a particular forest resource unit.

Box 8a. Contract reforestation in Eastern Visayas.

Momongan Bares 16,000 Ha Planted to Trees This Year

Some 16,000 hectares of denuded forestlands in Eastern Visayas were replanted this year with forest trees under the contract reforestation programme thus carrying out successfully DENR's forest resource development initiative in 1993, in support of the governments vision of Philippines 2000, Augustin Mongmongan, DENR regional director, disclosed this week.

This was made possible through the implementation of the contract reforestation programme with technically and financially capable NGOs and families as well as other reforestation undertakings with various private groups and other government institutions. In a report by regional technical director Vicente S. Paragas of the Forest Management Service, the contract reforestation programme benefitted 900 families, 200 community-based and 3 corporate contractors in terms of increased income derived from employment and income enhancement activities in undertaking contract reforestation projects.

Source: Leyte-Samar Weekly Express, 25-31, December 1993

³Approximately US\$ 268 million

⁴A second Forestry Sector loan had already been successfully negotiated with donors.

⁵approximately US\$ 117 million

⁶approximately US\$ 596

⁷approximately US\$ 185

8.4 Natural Resource Unit

The natural resource unit which the problem situation in this case study is anchored upon is a 100-hectare denuded public timberland located 2.5 kilometres from the center of barangay Bulak, an upland community in the northwestern part of Leyte island. The project site is part of a vast forestland that extends from the municipality of Matag-ob to as far as Ormoc City in the east. The area was originally a molave forest dominated by trees belonging to the Caesalpinaceae, Euphorbiaceae, Meliaceae and Leguminosae families. The molave tree (*Vitex parviflora*), a member of the teak family was the dominant species. Other common species were narra (*Pterocarpus indicus*), alagasi (*Leukosyke capitellata*) and tibig (*Combretodendron quadratum*). Historical accounts provided by documentary records of the municipal government revealed that the extensive forestland was a popular hunting ground at the turn of the 20th century.

The terrain is moderately rolling with 42 hectares having a slope of 16-30 percent and 58 hectares sloping by 15 percent or less. The elevation of the area is from 160 to 320 metres. The central portion of the area, about 24 hectares, forms part of a watershed which is a critical hydro resource of the municipality of Matag-ob as it provides for irrigation in the lowlands as well as for the domestic water needs of the local population. In the 1990 census, the municipality had a total population of 15,474 grouped into 3,131 households (NSO, 1992). The area is located 2.5 kilometres from the centre of the barangay, and 6.7 kilometres from the town proper, or *poblacion*, of Matag-ob. The area is accessible only through a foot trail which becomes muddy and difficult to walk on during heavy rains. Only a little over a hundred kilometres farther east of the timberland is Ormoc City, site of a 1991 major flashflood considered as one of the worst disasters in the country's history.

Surface soil to a depth of 20 to 25 centimetres is usually clay with fine granules structures, friable when just moist, slightly hard when dry, and slightly sticky to plastic when moist. The major soil types found in the area are Guimbaloan clay, Luisiana clay and Palompon clay. The soil is generally acidic, dark reddish brown to purplish red in colour but becomes darker when wet.

The area falls under the type D climate which is characterised by a wet period that extends almost throughout the entire year. The rainy season becomes very pronounced from December to March. Rainfall ranges from 2,265 to 2,522 centimetres annually while the average temperature is 26.8°C.

8.5 Historical Background

Since the area was said to have been transformed from a primary forest to a denuded open land devoted to shifting cultivation, the researcher first wanted to reconstruct the historical background of forest resource management in the area. The researcher thus sought for first-hand descriptions from those who were already long-time settlers in the area.

According to them, until the end of the second World War in the mid-40s, the area remained virtually a virgin forest except for minor destruction associated with the war. According to one veteran soldier, the dense forest cover provided a safe refuge for both Filipino civilians and guerilla fighters, particular from military air raids conducted by foreign forces. When the Philippines achieved independence just right after the war in 1946, the country immediately sought for economy recovery by reviving trade relations with the US and the Asia-Pacific region. This period was marked by an export boom in the wood industry, encouraging the government to pursue a policy of forest exploitation. Subsequently, logging concessions were granted to commercial companies. An Ormoc-based concessionaire was issued a permit covering the forestland of Matag-ob. Commercial logging commenced in the early 50s and ran from three to five years. Intensive clearcutting nearly wiped out

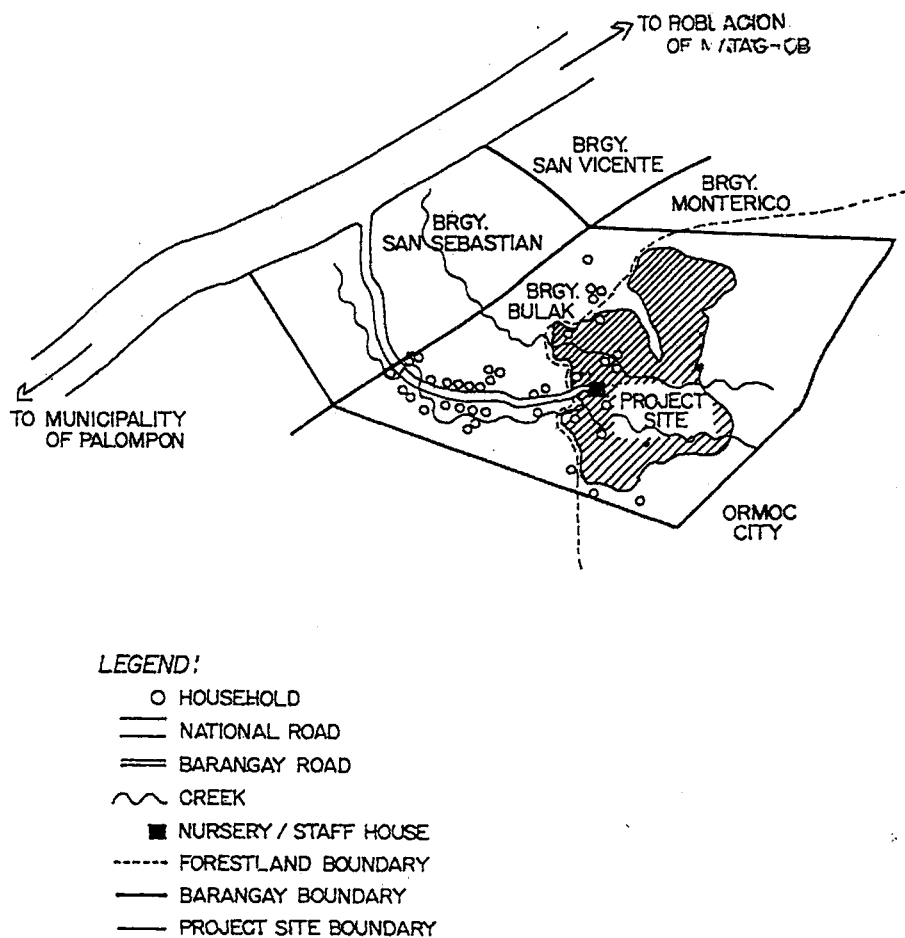


Figure 8b. Map of the case study site.

the forest such that by the time the logging operations ceased, the area was practically bare and denuded. "It was already like a bald head," some old people jokingly commented.

Until the late 50s, the area remained relatively undisturbed giving it an opportunity to recover from the initial ecological stress brought about by commercial logging. The resource showed certain signs of recovery with the growth of secondary forest in some patches thus providing renewed forest cover. In general though, cogon had invaded the open land. As a result, the new forest growth frequently succumbed to forest fires because of the highly inflammable character of the cogon vegetation. In addition, tree cutting activities were on the rise due to the increasing demand for housing construction materials and fuelwood by an expanding local population.

Agricultural activities in the area were reported to have surged in the 60s. The pioneering cultivators were farmers in the adjoining lowlands who wanted to expand farm size. With the clearing of land through slash-and-burn cultivation, the first *kaingin* farms were established. Since these farms were meant to supplement lowland production, they were generally devoted to the cultivation of subsistence crops such as corn, vegetables, root crops and banana. As soil productivity declined after years of cultivation, farmers would shift to another plot and establish new farms. While the previous plot was left idle, farmers did not give up their perceived ownership rights which they thought they acquired by being the first one to open the land for agriculture. This concept of private land ownership, explained the farmers, was mainly an extension of the prevailing practice of privatisation in the lowlands from where most of the settlers originated.

To gain *de facto* ownership of public forestland, farmers made their claims quasi-legal by obtaining tax declarations from the municipal assessors' office through payment of land taxes and using them as proof of their title⁸. While not legally valid, it was nevertheless frequently used as a basis for handing down ownership of the land to one's heirs or even as collateral for loan.

A fallow-rotation type of farming systems was common among forestland occupants, with the fallow and cultivation periods ranging from 3 to 6 years each. Burning was the usual way of initially clearing the land especially those infested with cogon. From their point of view, the practice was fast and economical, eliminating the need for additional labour to do manual land preparation. At the beginning of the cultivation cycle right after land clearing, sweetpotato was normally planted since it was observed to condition the soil in preparation for the series of cropping seasons ahead. According to them, the practice served to enhance soil quality and extend the cultivation period. On the other hand, immediately planting corn or cassava, the two crops considered most soil depleting, was believed to hasten nutrient depletion because yields would decline sharply in the succeeding cropping seasons, making it necessary to fallow the land earlier.

Up until the 70s, none of the farming households reportedly took interest in replanting trees. Replied one farmer, "Why should we plant trees at that time when we were even trying hard to clear the land for farming. We used to think trees only create unnecessary shade for our food crops." According to others, the popular view then was that the fewer trees, the easier to transform the land for agriculture. Farmers generally admitted that the other ecological functions of trees were only being appreciated in later years. Given such general perspective, it was thus not surprising at all that the first attempt to reforest the land was met with a lukewarm response by the local people. Sometime in the late 70s, the first attempt to rehabilitate the forestland was made through a government-administered reforestation project. It did not last long though and barely a year after was

⁸Under Philippine laws, a land title is the only legal basis for private ownership of land. A tax declaration though can support a person's claim of ownership when a piece of public land becomes classified as alienable and disposable (A&D land).

halted. It never got to cover a significant portion of the forestland although a few hectares of yemane (*Gmelina arborea*) managed to survive until the present.

Box 8b. The first reforestation project in the area.

In the late 70s, a government-administered reforestation project was launched in the area. A few of the Bulak residents claimed that on a few occasions they were even hired to perform tasks such as transplanting or weeding. However, they never knew what happened to it; they just noticed that project activities ceased after more than a year since it started, and nobody took over to maintain the trees planted.

In the course of planning for the second reforestation project in 1991, LRAP discovered that the official records in DENR indicated that 23 hectares were reported as being completely reforested. Actual survey work done later by the NGO revealed that the actual area covered was only 3 hectares. Local people suspected that the project failed due to misuse of funds by some staff thus the target activities were never fully carried out. Verification from the DENR district office indicated that among the reasons cited for not accomplishing the project targets were forest fires and destruction to the plantation caused by stray animals and local people who cut down the trees illegally.

Agricultural activities took a breather in the early 80s as the public protest over the continued martial law rule⁹ further fanned the communist uprising. The insurgency movement spread throughout the country and the Matag-ob forestland was generally suspected as its base of operations. Many farmers were left with no choice but to abandon their farms since they were caught in the midst of the armed conflict. As claimed by some, the New People's Army (NPA), the military arm of the outlawed Communist Party of the Philippines, was collecting *people's taxes* in the form of shares in harvest and subjecting them to propaganda to win their support. Those who chose to remain in the uplands were usually suspected by rebels as government informants, while on the other hand tagged as communist sympathisers by the military. In a way, the armed conflict unwittingly helped slow down the process of converting the forestland for agriculture.

The improved peace and order situation in the mid-80s again brought renewed agricultural interest in the area which for some time remained generally idle. It ushered in new migrant households who decided to establish residence and generate livelihood. These new settlers were generally of three types:

- newly married couples in nearby lowland villages who had to separate from their parents to establish their own households;
- landless families in neighbouring provinces and islands, e.g., Cebu and Panay, who migrated to the area after hearing stories of its vast open land;
- residents of Bulak who migrated to Manila where they married and had families; however, unable to bear socioeconomic difficulties of urban life they decided to return home but could not find a place to settle in the lowlands.

While the forestland remained idle, *de facto* owners maintained their ownership claims over the area. According to DENR, 98 percent of the 100-hectare area was covered by quasi-legal

⁹President Ferdinand Marcos declared martial law on September 21, 1972 based on a perceived threat to national security from communist insurgents. Authoritarian rule was lifted 11 years later in 1983.

ownership rights through tax declarations. However, most *de facto* owners already had minimal interest to continue directly cultivating the area since they had either:

- moved to urban centres to pursue non-agricultural livelihood;
- realised that concentrating on the cultivation of their lowland farms brought higher returns; and/or,
- continued to fear the resumption of the insurgency problem.

Thus, tenurial arrangements evolved between *de facto* landowners and migrant settlers. The purpose of such agreements though were mainly for the purpose of establishing tenurial security. The landowners merely wanted to reaffirm their ownership rights while on the other hand the tenants wanted to secure prior permission before occupying the land. The tenanted parcels were used mainly for cultivating subsistence crops; whatever was sold was minimal and irregular. Based on Philippine tradition, landlords get a share of the harvest only for rice, corn and coconut. Only the last two crops applied in this case but because of the low production volume, landowners did not expect so much from it. The common sharecropping arrangement was a three-fourth share for the tenants who provided all the inputs except the land. Occasionally though, tenants would give certain amounts of the other harvested crops, e.g., banana, root crops, fruits, vegetables, as a form of gift primarily to strengthen social bonds.

Box 8c. Barangay Bulak: a village profile.

The municipality of Matag-ob is located on the northwestern part of Leyte island. It is one of the smallest of the 41 municipalities in the province with a population of only 15,474. Matag-ob has a total land area of 10,729 hectares, 810 hectares of which are irrigated rice fields. It is mainly dependent on agriculture and its slow economic growth contrasts with the fast-paced commercial and industrial development of its neighbouring communities – Ormoc city and Isabel town. One primary reason could be its relative remote location coupled with the poor condition of the road that connects the municipality to the main highway (fortunately, road improvement work was already in progress in 1993).

Barangay Bulak is an interior, upland village located 6.7 kilometres to the east of the poblacion of Matag-ob. It has a total land area of 145 hectares but most of these are public forestland subsequently covered by reforestation project. It is accessible via a dirt road but impassable to motor vehicles during rainy days. While there are now public motorcycles plying the route, people prefer to hike or transport their farm products to the market using a carabao-driven cart.

In the 1991 census, the barangay had 400 residents – 204 males and 196 females. Of its 60 households, only 27 or less than half had their houses built in the main village area. These are usually the relatively better-off families who owned (or in some instances, served as tenants) and cultivated rice farms in the flatter and lower areas. Farm sizes ranged from 0.5 to 4.0 hectares. The other landless households on the other hand, had to seek for areas to be cultivated in the open forestland, and as such their houses are scattered all over the upper parts of the barangay. The farm sizes reported were surprisingly large, a few reaching 4 hectares. However, it must be noted that with the shifting cultivation system, only a small portion of this was cultivated at any one time.

Those cultivating areas near the lowlands mainly grow rice and coconut. Many are also engaged in animal raising, particularly poultry and swine, to supplement their incomes. The forest settlers, on the other hand, grow food crops, e.g., corn, sweetpotato, cassava, taro, vegetables and banana, mainly for direct home consumption. Both groups however reportedly derive seasonal employment as hired labourers in sugarcane plantations in Ormoc City.

Public services available in the community are very limited. There is a primary school offering education from Grades 1 to 4 but higher education is available only in the *poblacion*. Occasionally, a staff from the rural

Box 8c. Continued.

health center comes to weigh children or conduct women's classes, but people complain they are rarely given free medicines.

The remote and interior location of the barangay partly explained why the presence of the Department of Agriculture (DA) is almost not felt by local people. In DA's classification, Bulak is only a radiation barangay (or secondary service area) compared with highway barangays like San Sebastian and San Vicente. Moreover, since a reforestation project is found in the barangay, the area is considered a domain of the DENR rather than the DA.

Barangay records showed that as of 1991, 33 households were scattered throughout the project site. However, the actual number of households directly dependent on the area reached 45. The additional 17 households also cultivated farms within the same area but chose to establish residence either in the main village center of Bulak or in the neighbouring barangays of San Vicente and Monterico. Of the 45 household-cultivators, 35 were tenants while 10 were landowners. These landowners were either among the pioneering farming households who gained *de facto* ownership or their married children who inherited the land. About half of them were doubling as tenants by cultivating plots of absentee landowners.

As in the past, a fallow-rotation system was followed by the new occupants. Unlike the pioneering cultivators who looked upon the forestland as a site for secondary farms, locally called *baol* and merely to supplement lowland crop production, the newer occupants generally had only their upland swidden farms to depend on for household subsistence. They had limited access to rice, which they got either by purchasing in the market, bartering with other farmers or as payment in kind for working as hired labourers. Thus in most households, the common practice was to mix boiled rice with root crops or banana to extend the rice supply.

Table 8b. Number of household occupants in the forestland.

Type of Occupancy	<u>Land Tenure</u>		Total
	tenant	landowner	
cultivator	10	2	12
cultivator-settler	25	8	33
Total	35	10	45

Source: LRAP records and estimates by local people

8.6 Problem Situation

The preceding section discussed how human activities associated with the forest resource such as logging and farming transformed the area from a virgin forestland to an open, denuded area.

While forest degradation was mentioned to have occurred, interviews with various relevant actors revealed contrasting perspectives of the existence and nature of the problem situation.

Through its launching of the reforestation project, the government clearly manifested its direct concern on the degraded state of the Bulak forestland. As one DENR staff explained, it was not only because the forestland belonged to the public domain but because of the wider impact of the problem situation on the general populace. Especially after the Ormoc tragedy, the staff said that DENR had vigorously pursued the reforestation of denuded areas. He pointed out, *"In Eastern Visayas, many forestlands are only in name because there is really no forest to speak of. Since these are declared as forest reservations, then the forest resource must be rehabilitated and maintained."*

Residents of lowlying areas adjacent to the Bulak forestland were in general supportive of the government's response to deforestation and even added that this was long overdue. Rice farmers in barangay San Sebastian and San Vicente, for example, realised the forest's role in supporting their farm irrigation system. As they observed, supply of irrigation water was declining and became erratic just as the forest also gradually disappeared. In the last three years for example, only few farmers were said to have risked planting a second crop in the dry season. One farmer said he was one of those who did and later experienced crop failure because of insufficient water to support rice plants. *"Trees are like magnet that hold water. Without trees, there is flood when there's too much water, and drought when there's no rain,"* he explained.

The general population in Matag-ob seemed to recognise the important role of the forest as well. Almost all of those whom the researcher informally talked to cited the prevailing problem of the municipal water system to provide adequate water supply for household use. Some housewives revealed, *"Very little water comes out of the faucet and there is even none at certain hours of the day. That's why it's common for households here to stock up on water in tanks and other containers"*. This is a problem which the local government of Matag-ob also recognised. An official document produced by the municipal planning and development council (MPDC) stated:

The Bulak water supply system is the only source of water supply in the entire poblacion...Presently, this water system can no longer supply sufficiently to meet the demand of the general public. However, proposals have been made to develop a supplemental water system.

Table 8c. Kinds of fuel used for cooking used by Matag-ob households.

Fuel	Number of Households	Percent of Total
wood	2442	78
kerosene	619	19
liquified petroleum gas	26	1
electricity	25	1
charcoal	19	1
Total	3131	100

Source: NSO, 1992

Very few of local informants mentioned the use of the forest as a source of fuelwood, since it seemed each of them thought their respective households only took small amounts. However, census data revealed that almost four-fifths of households in Matag-ob were dependent on fuelwood as source of fuel for domestic use.

The observations made by residents of local communities regarding the link between deforestation and water shortage seemed to be supported by technical data. Prior to the implementation of the reforestation project, LRAP conducted survey, mapping and planning activities which showed that there is a 24-hectare watershed area in the central part of the Bulak forestland. The DENR revealed that more reliable and updated data were made available in 1988 through a forest resource inventory done by a Philippine-German team of scientists. DENR officials acknowledged that the results of the National Forest Resource Inventory (FRI) project have been influential in government policymaking for sustainable forest management. The data formed the basis for the identification of denuded forestlands later covered by the contract reforestation scheme under the NFP. The Bulak forestland was among those identified in the region as being in a critical state.

Local political leaders must have sensed public clamour for the government to act on deforestation since as community residents noted, reforestation was a popular election issue. The DENR and LRAP staff likewise confirmed that the municipal government of Matag-ob recognised the urgency of responding to forest degradation as it demonstrated by giving allout support to the reforestation project.

As it turned out, most of the relevant actors recognised the existence of a problem situation in forest degradation and saw it in terms of the denudation of the Bulak forestland. As the researcher found out, the only dissenting opinion came from those who were the ones actually occupying the area. While they agreed that the forest was indeed disappearing, forestland occupants said that was somehow necessary since they had to clear parts of the area where they could have their farms. Their description of the problem situation did not focus on deforestation itself but rather on the degradation of the soil resource arising from continuous cultivation. They noted that the soil was no longer productive as it used to be when they first arrived in the area. Among the indicators for this, as the forestland occupants identified were:

- decline in crop yield, e.g., root size of cassava;
- stunted crop growth; e.g., thin stalks and yellowish leaves of corn;
- change in soil colour, e.g., from dark to light brown; and,
- eroded slopes and formation of soil mounds at the base.

Since to them the problem situation mainly involved soil degradation through erosion and loss of soil fertility, what they perceived as needed to be done was find ways of rehabilitating the soil with the end in view of being able to sustain their farming activities. As the forestland occupants pointed out, completely restoring the forest to its original state was not acceptable because it would deprive them of being able to grow agricultural crops. It is for this reason, they stressed, that shifting cultivation evolved as a coping strategy that allowed the dual purpose of cultivating certain sections of the forestland while leaving others to regain fertility through fallow. There was consensus among them that while they had to leave the land idle for a long time, opening a new area was not a problem because of the vast forestland in Bulak. One farmer said that even with twice the number of existing occupants, there would still be sufficient area for everyone. As they pointed out, the forestland was so extensive and the site covered by the reforestation project was only a portion of it.

8.7 Innovation

Since the Bulak forestland is legally part of the public domain, its management rests primarily in the hands of the government through the DENR. The Ormoc CENRO revealed that it has jurisdiction over Bulak and other forestlands in the western part of Leyte province. CENROs are the field-level units of the DENR responsible for performing department-related functions. The DENR viewed the CENRO as performing three vital roles (Gomez, 1991):

- local level planning for environment and natural resource management;
- implementation, monitoring and evaluation of DENR programmes and projects; and,
- law enforcement and regulatory function.

Box 8d. The Community Environment and Natural Resources Office (CENRO).

The Matag-ob contract reforestation project, together with other projects within the western part of Leyte province, is under the jurisdiction of the CENRO based in Ormoc City. The Ormoc CENRO is one of the 174 CENROs which serve as district offices of the DENR throughout the country.

The CENRO is considered as the government caretaker of the environment and natural resources at the community level. Its general functions, as provided for in DENR Administrative Orders No. 1 series of 1988 and No. 38 series of 1990, are as follows:

- To undertake and/or implement projects for the development and conservation of natural resources at the community level;
- To implement/enforce laws, rules and regulations for the protection of the environment and conservation of natural resources;
- To conduct measurements, assessments and grading of timber and other forest products;
- To maintain updated data on environment and natural resource conditions;
- To file in court criminal cases against violators of environment and natural resource laws;
- To undertake survey of areas covered by applications for lease and permit;
- To collect and account for fees due to the government from users of natural resources;
- To initiate the settlement of conflicts between and among users of natural resources; and,
- To implement other activities relative to DENR programmes assigned from time to time.

The specific sectors covered by its functions are forestry, land, mines, environment and protected areas, wildlife and general ecosystems. Contract reforestation projects are directly under the responsibility of the Forest Management Section of CENRO.

The CENRO plays a strategic level of the DENR hierarchy since it provides the principal link between the department and its target client groups. The planning body both at the regional and national levels are highly dependent on information provided by the CENRO in the preparation of plans and programmes, as well as in the formulation of policies and decision-making, the impact of which would then trickle down back to the CENRO. CENRO maintains two types of external linkages with other government and non-government organisations. The first type is joint programme/project implementation, particularly in contracting private organisations to undertake reforestation work or coordinating with other agencies in performing regulatory functions. The second type is information exchange, particularly by sharing available statistics with user organisations.

According to the Ormoc CENRO staff, the problem situation in the Bulak forestland had long been recognised by their office. However, they were unable to respond to it through reforestation activities for various reasons, such as:

- lack of funds to support rehabilitation work;
- inadequate field manpower to oversee forest resource management;
- difficulty of dealing with forestland occupants; and,
- natural causes, e.g., forest fire.

The staff likewise pointed out that these were primarily the same reasons why the government-administered reforestation project in the 70s failed to achieve its set targets. Thus, the launching of the contract reforestation scheme under the NFP was considered by them as an opportunity to respond to the problem situation since it offered ways to overcome the earlier mentioned constraints, considering that:

- funds were made available for undertaking reforestation;
- reforestation work was contracted to private and local groups;
- forestland occupants were hired to provide project manpower; and,
- long-term management was envisioned to be given to local communities.

The ultimate target of the project was the transformation of the natural resource unit from a denuded and brushland area into a production and protection forest after three years. The set target density was 400 trees per hectare or a planting distance of 25 x 10 metres. The selected timber species were mangium (*Acacia mangium*), Gmelina (*Gmelina arborea*), mahogany (*Sweitenia macrophylla*) and narra (*Pterocarpus indicus*). These species were jointly identified by both LRPA and DENR staff based on site suitability, species diversification, financial viability and market potential. In addition, double rows of nurse trees were designed to be planted both to protect and enhance the growth of the main or climax trees. The nurse trees consist of leguminous species, i.e., kakawate (*Gliricidia sepium*) and ipil-ipil (*Leucaena leucocephala*), and intended to:

- act as *live tree guards* to prevent destruction by humans and animals;
- improve soil fertility; and,
- serve as hedgerow to control erosion in sloping areas.

The planting density of nurse trees was 1,200 per hectare or a distance of 1.5 x 1.5 metres. While this technique helped increase the survival rate of the climax trees, the additional nurse trees further reduced the space left where farmers may continue cultivating food crops. The only agroforestry scheme possible was to introduce shade-tolerant crops that could thrive under the tree canopies.

As set forth in project guidelines issued by the DENR, there were two criteria for assessing the success of contract reforestation. At the end of the three-year implementation period, the project needed to attain the targeted 80 percent survival rate of the planted trees and minimum average tree height of 1.5 metres. A contract reforestation project meeting the above criteria may then turn over the area to the DENR and is then paid the full amount specified in the contract.

8.8 External Intervention

Under the implementing guidelines, NGOs are among the private entities qualified to enter into a contract with the DENR to implement a reforestation project. The Ormoc CENRO explained that the LRAP was chosen to undertake the Bulak community-based reforestation project because of the NGO's established record in upland development project, its geographic coverage which focused on northwestern Leyte where Matag-ob is located, and the generally acknowledged technical and community organising capability among NGOs.

Box 8e. Leyte Rural Advancement Programme, Inc. (LRAP).

LRAP started in 1988 as the implementing arm of the Manila-based Appropriate Technology Center for Rural Development. Its acronym originally stood for Leyte Rural Assistance Programme. It was first conceived to facilitate the establishment of a self-reliant peasantry and economically stable rural communities through increased agricultural productivity in the short run, and cooperative development in the long run. Its major thrusts then were appropriate science and technology, upland development and environmental protection.

LRAP's initial projects covered the northern towns of Leyte, namely: Burauen, MacArthur, Tabango and Villaba. Many times, its operations had to be temporarily suspended at the height of the insurgency problem in the aforementioned areas. The NGO itself had many times been suspected of being affiliated with being a communist front because of its collaborative work with militant groups.

After its first three years of development work experience, LRAP decided to broaden its thrust – from being mainly concerned with the uplands, its priorities development activities now include the lowlands and water resources. LRAP underwent structural change in 1991 and registered itself with the Securities and Exchange Commission (SEC) under its present name, although still bearing its original acronym. This time, it has adopted as its mission the promotion of human development in rural communities through people's participation in an integrated and holistic programme of sustainable development. The Bulak contract reforestation project, which was started only in 1991, is the latest addition to its string of projects.

LRAP's main headquarters is located in Tacloban City and also has field offices in areas where its projects are implemented. A board of directors sets the general policies of the organisation while its programme director acts as the chief executive officer. It has 14 fulltime staff assigned under its four major service desks, namely: 1) peasant community organising; 2) participatory research and integrated socio-economic project desk; 3) development education, trainings and public affairs desk; and, 4) finance and administrative desk.

The approved budget for the three-year contract was P1,781,150¹⁰ or a cost of P17,811.50¹¹ for every hectare of land reforested. This excluded the P67,500¹² paid to the LRAP for undertaking the surveying, mapping and planning activities preceding the project's implementation.

As contained in the development plan prepared and submitted by LRAP and approved by the DENR, the project had the overall objective of immediately rehabilitating the watershed and open/denuded areas in Matag-ob, Leyte into a long-term production/protection forest. Its specific objectives were:

- To develop 100 hectares of open and denuded forestland into a production/protection forest;
- To provide employment opportunities and additional source of income for local residents through an intercropping scheme of planting with forest species; and,
- To develop and strengthen community organisation as an effective tool in forest protection and rehabilitation.

¹⁰approximately US\$ 65,969

¹¹approximately US 660

¹²approximately US\$ 2,500

Table 8d. Approved financial plan of the reforestation project.

Activity	Cost/Hectare*	Total Cost*
Year 1 (1991)		
Nursery operations	P 1,560.00	P 156,000.00
Site preparation	7,112.00	711,200.00
Plantation establishment	1,050.00	105,000.00
Plantation maintenance/protection	1,240.50	124,050.00
Infrastructure	875.00	87,500.00
Project administration/supervision	960.00	96,000.00
	12,797.50	1,279,750.00
Year 2 (1992)		
Plantation maintenance/protection	1,618.00	161,800.00
Project administration/supervision	960.00	96,000.00
	2,578.00	257,800.00
Year 3 (1993)		
Plantation maintenance/protection	1,476.00	147,600.00
Project administration/supervision	960.00	96,000.00
	2,436.00	243,600.00
Total Contract Price	P 17,811.50	P 1,781,150.00

*US\$1 is approximately P27

Based on the official implementing guidelines, contract reforestation could only be done in a forestland with no existing occupants as of December 1991. Since the DENR acknowledged that 98 percent of the 100-hectare area was occupied, the implementation of the Bulak project only showed that the intervening agents chose to ignore the existence of farmer-occupants, possibly in order to qualify for funding under the contract scheme.

A surveying, mapping and planning (SMP) activity was first conducted by LRAP prior to project implementation. Through a perimeter/reconnaissance survey, the 100-hectare area was divided into 10 blocks of 10 hectares each. Contour mapping was also done to classify the area into two slope categories. Fifty eight hectares were classified as having a slope of 15 percent or less while 42 hectares as having a slope of 16-30 percent. A nursery with an area of about 9,000 square metres was constructed to house the required planting stocks. The nursery consisted of a bunkhouse/office/storage room, potting shed, seedbeds and hardening beds. In all, it had a capacity of 200,000 seedlings. Besides the nursery, other necessary infrastructures were also constructed, such as: look-out tower, firelines, access trail and foot trails.

Entry stage. When word about the project first spread around Matag-ob, there were mixed reactions from different sectors of the community. The municipal government lauded the project and the mayor in particular promised to offer whatever support was necessary. The general public was likewise said to be enthusiastic about the project, especially because they believe that the erratic service by the municipal water system was caused by the denudation of the watershed area. Even more pleased were the lowland farming communities surrounding barangay Bulak who were plagued by inadequate water supply in their ricefields. They thought that reforestation could help increase the availability of water for irrigation.

But as expected, farming households occupying the proposed site for reforestation voiced their strong opposition to the project. As *de facto* landowners and tenants, they insisted that LRAP could not drive them out of the area because they had established ownership/tenurial rights over the land which they depend on to produce food for their families. According to the LRAP staff, some farmers were so angry they said they would rather die than leave the area.

Several times, LRAP called a meeting for all affected households to explain the nature and purpose of the project but only a handful came. The staff also personally visited the individual households but the latter's attitude remained unchanged. According to the LRAP programme director, that was the most difficult phase of the project. *"Planting trees was a lot easier because it can become routinary but getting people's cooperation is tough because they are not robots that you can command,"* he explained.

A major breakthrough came when LRAP finally sought the support of local community leaders. LRAP set another meeting with the affected households, this time attended by the municipal mayor and parish priest. In Philippine society, political and religious leaders are normally called to play a mediatory role in community conflicts. Attendance was unusually high, probably because they knew that local leaders would be present to serve as arbitrators. The meeting ended with the farmers finally consenting to the project after it was agreed that they would be:

- permitted to continue staying in the area;
- allowed to cultivate the space between rows of trees;
- hired as sub-contractors to undertake the different work activities of the project;
- given a share of the trees once harvested; and,
- taught appropriate agroforestry practices.

While the project officially started in September 1991, the formal entry of the LRAP staff took place only after three months of negotiation. The field staff consisted of a community organiser, an agronomist and two foresters -- all of whom were under the direct supervision of a project manager. The project staff coordinated with the DENR through the Ormoc CENRO. The latter assigned one of its staff as liaison officer to monitor project implementation, to guide in the preparation of reports and processing of papers, and to provide technical assistance to the project.

When the farmers eventually consented to have their farms subjected to reforestation, the staff took this as a sign that the former were already fully convinced about the project's objectives. Yet it was clear that the resulting terms of programme implementation emerged not by consensus, but through a process of negotiation with external actors eventually imposing their goals on upland farmers while using monetary incentives to convince the latter. Since the reforestation objectives were not fully shared by all concerned actors, conflicts and problems were thus inescapable during the implementation. Farmers themselves revealed that their decision to cooperate with LRAP in the implementation of the project was actually because they simply had no other recourse. As they explained further, it was futile to continue opposing since:

- all other sectors of Matag-ob, including their local leaders, were rallying behind the project;
- LRAP made it clear that reforestation would be done with or without their consent;
- in case they refused to be hired as project labourers, LRAP would hire other people to reforest their farms;
- if they would destroy the trees planted in their farms, LRAP would require them to pay P5,000¹ per tree; and,
- tenants lost the support of *de facto* landowners because the latter agreed to give up their land in exchange for a one-third share of the amount that will be paid to tenants during the initial phase of project work (equivalent to P400² per hectare).

Working arrangements. Eight major work phases during the three-year duration of the project were planned to be subcontracted to local people. To facilitate the work, the 100-hectare area was divided among the farmers based on existing boundaries of *de facto* ownership. In short, each farmer was assigned to work on the area corresponding to one's farm.

Table 8e. Major work activities during the three-year project period.

Phase	Activity	Status
1	Seedling production	accomplished
2	Trail/bunkhouse construction	accomplished
3	Site preparation (ploughing)	accomplished
4	Site preparation (cultivation)	accomplished
5	Site preparation (staking/holing)	accomplished
6	Planting	accomplished
7	Fertiliser application/replanting/weeding	in progress
8	Patrol work	in progress

The area subcontracted by individual farmers ranged from 1 to 6 hectares. Since it was impossible for one farmer to work alone on his assigned area, different labour management strategies were devised by farmers to meet the labour requirement, such as:

- organising a labour pooling system, locally called *tiklos*, whereby 5 to 10 farmers formed a group and helped in each other's area of assignment;
- hiring other farmers to work on their farm and pay them on a per tree basis (rate ranges from P0.50³ to P1.00⁴ per tree); and,
- utilising every available manpower in the household (e.g., wife, children).

¹approximately US\$ 186

²approximately US\$ 15

³approximately 2 US cents

⁴approximately 4 US cents

Community organising. LRAP envisioned to establish not just an employer-employee relationship with local people. The staff wanted to encourage them to participate more actively in the project and not merely provide the labour requirement. As the field staff stressed, they would like the local people to see the project as *theirs* not LRAP's or the *government's*. LRAP included a community organising component of the project as a way of encouraging people's collective participation in the project, particularly to be represented by a common voice as regards project planning and management. The staff explained that the organisation was intended to serve as a:

- framework for building people's capacity for collective resource management since the reforested area would be turned over to them after project termination;
- channel through which the NGO disseminates appropriate agroforestry practices; and a,
- single body which the LRAP can deal with in matters related to the subcontracting of project work activities.

LRAP initiated moves to organise the farmers immediately upon the start of project implementation. The idea was first brought up during the series of meetings between farmer-contractors and the LRAP staff regarding the subcontracting job. It was originally suggested by the staff to the people as a way to facilitate decision-making and problem-solving with regards to the subcontracting job.

The task of community organising initially proved to be a difficult task for LRAP since the people were suspicious of the field staff's hidden agenda. Many years before, the area used to be infiltrated by communist rebels who actively campaigned for the people to join their organisation. This was coupled with the popular notion that NGOs like LRAP are simply fronts for communists. The community also had another unfortunate experience with organisations. A swindler who posed as a government official once came to the barangay and initiated the formation of a cooperative. According to the victims, he promised to help the people to obtain a bank loan. However, after collecting P100⁵ as individual membership fee from would-be members, he suddenly disappeared from the barangay.

In early 1992, an organisation was formed with 54 members. It was called *Mga Nagkahiusang Mag-uuma sa Bulak* (MANAGBU). To raise funds for the organisation, the members agreed to make a monthly contribution of P5⁶. They also established a communal farm as an income-generating project. Soon however, internal conflicts emerged over the finances of the organisation. This led to the immediate break-up of the organisation.

The organisation was revived in August 1992 after a new set of officers were elected. Only 33 or just a little over half of the original members chose to rejoin the group. The organisation met every Saturday afternoon, either to hold a meeting or undertake *tiklos*. Members described their organisational meetings as an occasion for:

- farmers to share experiences and problems related to farming or the project;
- farmers to seek technical assistance from LRAP staff;
- LRAP staff to conduct trainings and lectures on various aspects of agroforestry and ecology;
- LRAP to update farmers on the status of the project; and,
- farmers to plan and discuss activities of the organisation.

⁵Approximately US\$ 3.7

⁶approximately 19 US cents

LRAP allocated three hectares to the organisation as a demonstration and communal farm. The farm enabled farmers to jointly try or experiment agricultural practices introduced by the LRAP staff. LRAP initially introduced the following practices:

- contour hedgerows;
- new sweetpotato varieties;
- intercropping/rotation cropping with legumes;
- vegetable production;
- watermelon production; and,
- application of guano fertiliser.

The farm also served as an income-generating project since the sales from the harvest of the farm was added to the organisation's standing fund. With the money that the organisation saves, farmers could apply for small amounts of loan in case of emergency financial needs.

Members worked together in the communal farm by means of *tiklos*. The secretary however noted that attendance was always very low, many times with more than half of the members absent. As a policy of the organisation, members who were absent from a scheduled *tiklos* were either fined P20⁷ or had to send a substitute (e.g., wife/child) to work in one's behalf. However, this was not strictly implemented because members always had a valid excuse for being absent. On the overall, farmer-members thought it was worthwhile joining the organisation because this:

- increased their knowledge both on farming and on the need to protect the environment;
- motivated them to experiment with new farm practices by trying them out first in the communal farm before applying these in their individual farms;
- enabled them to interact more frequently with fellow farmers;
- established a close link between them and the LRAP staff, making the latter easily accessible for assistance; and,
- helped them understand better the goals of the project.

In contrast, non-members and those who had become inactive said that nothing good came out of being a member of the organisation. Specifically, they expressed disagreement with the following:

- the required monthly contribution of P5⁸ to the organisation's standing fund
"Why do you give money to the organisation and yet get nothing in return?"
- working for free in the *tiklos*
"Isn't it that the LRAP staff are communists because they ask you to work in the communal farm without paying you any wages?"
- attending meetings and participating in activities
"Aren't those just a waste of time because you could have spent that more productively such as working in your farm?"
- bias of LRAP staff towards members
"Isn't it that members are highly favoured by LRAP since they are the ones more frequently hired to work in the project?"

⁷approximately 74 US cents

⁸approximately 19 US cents

Box 8f. A closer look at forestland occupants.

- Belen is the MANAGBU secretary, a position she does not want in the first place. *"I was just forced to assume this because nobody else would. Besides, I just wanted to help the organisation from totally breaking up,"* she explained. Her husband cultivates about half a hectare of corn farm in a forestland just outside the project boundaries. She said they inherited the land from their parents. They had already given up another parcel covered by the reforestation project. She considers herself more fortunate than other farmers who did not know where to transfer to. *"That is why I cannot blame other farmers if they do not want to join our group. We cannot eat trees, our empty stomachs cannot wait until many years after when we can cut and sell them,"* she added.
 - Jesus is often tagged the *great oppositionist* because he is one of the few farmers who never fear to voice out their opinions, especially in front of the LRAP and DENR staff. He said, *"We're totally at the mercy of the government. Whether we like it or not, they would take over our land. Look, there were many points agreed during the negotiation phase which are not being followed now. I'm staying in this place until the end of the project because of the money paid to us as sub-contractors. But after that, I don't give a damn as to what would happen to the trees."*
 - Artemio is one of the few members who remained active in the organisation. Up until the start of the project, he was occupying a 1.5 hectare tenanted land. While admitting that many of the promises made by the DENR and LRAP were never fulfilled, he said that he began to see the problem from a wider perspective after attending ecology seminars organised by LRAP. He is now into animal raising, hoping to earn an alternative income. *"I don't want to plant those crops they suggested. I don't know where to sell them and besides I cannot feed my family with black pepper!"*
-

8.9 Consequences

Since the fieldwork was conducted prior to the completion of the three-year project period, it was too early to make final conclusions on project success, particularly its effectiveness as an intervention seeking to introduce innovation in forest resource management. Nevertheless, after only two years of implementation, there were already a number of issues arising from the reforestation project.

Increased income. One of the objectives of contract reforestation was to provide additional income to subsistence forestland dwellers. In fact, the opportunity of earning fast cash income was the most frequently mentioned, if not the only, motivation for farmers' participation in the project. Based on the activities subcontracted by the project in 1992, a farming household working on a one-hectare area earned a total of P2,848⁹ for the entire year.

Income as hired labourers of the project would, however, be temporary and to last only during the three-year project operation. Moreover, the amount decreased over time with less and less work to do in the project. For example, in 1993 the scheduled brushing activity was subcontracted only for P300/hectare¹⁰. It was also at this time that farmers began to notice the decreasing yield of their food crops as a result of shading by the trees which were already about one metre or taller.

⁹Approximately US\$ 105

¹⁰approximately US\$ 11

The real impact of the project on income may even become more evident after the third year when the project expires. At this time, there will be no more funds for hiring labourers nor will the farmers be able to cultivate their traditional food crops (which are sun-loving) productively under trees. In short, unless alternative sources of income or means of food production is introduced after the third year, farmers may even be worse off than before the project was implemented.

Table 8f. Cash income derived from the reforestation project by farmer-subcontractors.

Activity	Amount (P per ha)*
clearing/planting	1,200.00
replanting/weeding	824.00
replanting/weeding	824.00
Total	2,848.00

*US\$1 is approximately P27

Food production vs reforestation. As in many natural resource management programmes, it was often difficult to undertake environmental rehabilitation and conservation without impinging on the agricultural system. When the contract reforestation scheme was first implemented by the DENR in 1988, the emphasis was mainly on tree planting without much attention given to its possible effect on subsistence farmers' capacity for food production. This was so because while the contract allowed crop cultivation between trees, it also stipulated a planting distance of 2 x 2 metres, leaving barely any space in-between.

Realising this constraint, the DENR issued in 1991 the Department Administrative Order (DAO) No. 31 which among others allow for a much wider planting distance -- 2.5 x 10 metres for climax trees. This new planting scheme, which the reforestation project in Bulak adopted, is expected to provide ample space where farmers can raise food crops. However as the Bulak farmers pointed out, with the addition of nurse trees between rows of climax trees, the space for food crops is even further reduced.

During the first two years of the project, farmers were still able to plant crops alongside trees. However, after the trees grew taller than one metre, shading started to become a problem. Corn and sweetpotato, the two major food crops in the area, were highly sensitive to shading as shown by their decreasing yields in the past months. By the end of the third year when the trees would already be much taller, farmers expect that it may be totally impossible to continue planting food crops under trees. Farmers thought that under these circumstances only two options were left for them -- to shift to other crops or to move elsewhere where they could continue planting their traditional food crops.

Shift to cash crops. In view of the problem of shading, LRAP strongly encouraged farmers to plant shade-tolerant crops such as black pepper, yam and gourd. These cash crops, the LRAP staff told farmers, would enable them to earn higher cash income even after the project ends. However, farmers did not appear to be receptive to the idea and even at the time of fieldwork nobody had started to try planting these recommended crops. There seemed to be three major reasons why farmers wanted to stick to the traditional crops.

Firstly, farmers perceived that shifting to cash crops involves a high risk especially because there was no ready market for these crops. Besides, their immediate concern was to raise crops that could be directly consumed as food. Secondly, farmers in the area stressed that they had spent almost their entire life in corn and sweetpotato cultivation. To them, shifting to new crops would mean putting away what they learned from years of farming experience and then having to acquire new knowledge and a different set of skills for these new crops.

Thirdly, corn and sweetpotato were more than just staple food to farming households. These crops also became part of the lifestyle and local culture of the people in this particular upland community. For instance, sweetpotato had long been a symbol of security to them because of its availability yearround. As they pointed out, for as long as there is an ample stock of sweetpotato, households feel reassured of their continued survival. Meanwhile, corn gave these households a sense of common identity and belongingness because it set them apart from rice-eating communities in the lowlands. For them, rice is usually associated with affluence while corn is a mark of poverty. Shifting to other crops therefore meant more than just a change in cropping system for these people, it signified basic modifications in food habits, work patterns, group cohesiveness and social values.

Box 8g. Farmers' perception of the role of corn and sweetpotato in the household and community.

- Crops as indicator of socioeconomic homogeneity
"We feel there is equality in this community because we are all poor...look we all eat corn and sweetpotato here."
 - Crops as symbol of household security
"We will never exchange sweetpotato with any other crop because it has saved us in times of famine – from wars to droughts."
 - Crops as part of gastronomic tradition
"Why do we have to yearn for rice when our stomachs are already accustomed to corn?"
 - Crops as symbol of survival
"Farmers here are much like the lowly sweetpotato – we crawl on the ground to survive but deep underground you will see the fruits of our labour."
-

Outmigration. For LRAP, the only option left for farmers who wished to remain in the area was to shift to shade-tolerant cash crops. For most farmers, however, they would rather leave the project site in search of another area where they could plant their traditional food crops. In the past year, six households have transferred to other places, although just outside the boundaries of the project site where they reestablished their homes and farms. These migrants returned to the site only at times whenever there was a scheduled work activity in the project, thus an opportunity to earn fast income. A few other farmers had revealed that they were planning to move out of the area within the next months. Others would chose to continue residing but move their farms outside by opening another area in the nearby forestland. Many however remained undecided saying, *"We'll just wait and see what happens next, anyway we have been used to a life full of uncertainties."*

Farmers' decision to leave the area may appear to be favourable to the project as it would mean their *voluntary* departure from the area, and the government finally getting rid of *illegal* dwellers. However, while they may do no more harm to the reforested area, farmers who decided to

leave were also transferring to other parts of the wider Bulak forestland not covered by the reforestation project. In short, driving them out of the reforestation site, directly or indirectly, only pushed them to resume deforestation activities in another area.

Turnover of project to the community. The contract reforestation project had a fixed duration of three years after which the reforested area would be turned over to the DENR which in turn would offer MANAGBU the responsibility for the project's continued maintenance and protection. After project termination, MANAGBU would become eligible for a 25-year lease for stewardship of the reforested area, a scheme called the Forest Land Management Agreement (FLMA). The contract grants the leasee the sole and exclusive privilege to develop, protect, manage, harvest and utilise the planted trees upon maturity. The government requires 30 percent of the gross sales.

However, the DENR would no longer provide any financial support during the FLMA phase. The FLMA holder, in this case MANAGBU, would have to protect and maintain the trees at its own expense from the time the project expires starting on the 4th year until such time that the trees become harvestable on the 10th year.

Unfortunately, MANAGBU members felt this new arrangement was unacceptable for many reasons. Firstly, they were used to receiving payment in exchange for the labour they have supplied to the project. Secondly, it would take many years before they are able to enjoy the benefits of reforestation while they face the pressing need to provide for their own subsistence in the interim period. Thirdly, many of them already lost the motivation to continue staying in the area especially that food production under trees was no longer possible. Fourthly, officers of the organisation were reluctant to assume the responsibility of leading in the collective management of the forest. The observed that members have begun to lose interest in participating in the project.

The uneven growth of trees even posed an additional problem. The LRAP staff themselves admitted that some of the trees were too small and weak to survive on their own after the third year. *"Where would we get the money to buy fertiliser or additional seedlings?"*, stressed the farmers.

DENR's concept of project success. At the end of the three years, the project will be subjected to a terminal evaluation to determine the accomplishment of targeted outputs as bases for accepting the turnover of the project from LRAP. As indicated in the contract, DENR uses only two technical criteria for assessing project success: 1) tree survival rate of at least 80 percent; and, 2) an average tree height of at least 1.5 metres. It does not include in its criteria the socioeconomic effects of the project to the people nor its long-term impact on the entire community.

Thus, while LRAP, as is common to most NGOs, had expressed its strong commitment to helping improve the socioeconomic conditions of the affected households, it was in actual practice more concerned with achieving the technical requirements set by the DENR. According to the LRAP staff, this was inevitable because if they failed in the terminal evaluation, they would have to continue maintaining the reforested area at their own expense until such time that the project meets the minimum standards set by the DENR. Only after the reforested area is turned over and officially accepted by DENR would LRAP be paid the remaining balance of the contracted amount. *"We also have to make sure that we get the money. Otherwise, the staff would have no salary to receive,"* explained the project manager.

8.10 Summary

The case study focused on the problem situation in natural resource management in the Bulak forestland of Matag-ob. It described how an intervention approach conceived as participatory and people-oriented tried to introduce an innovation for reforestation.

Actors. The case study identified several actors who were making competing claims for managing the forestland or were indirectly affected by the emerging problem situation. In the first category were the different categories of forestland occupants, *de facto* landowners, LRAP and the DENR. In the second category were the lowland rice farmers, local community leaders and the general population of Matag-ob.

The conflicting goals of actors with respect to forest resource management was illustrated by the forest occupants' perspective on utilising the area for agriculture while other actors insisted on the need to reforest the denuded area. These management goals were directly related to the particular world views held by various actors. To the forestland occupants, their continued cultivation of the area represented their continuing struggle to survive by ensuring household food security. On the other hand, since the area was declared as part of the public domain, the DENR considered itself as legally responsible for managing the forestland while the LRAP justified its intention of assuming the task of undertaking the reforestation project on the basis of the contract it entered with the government.

Problem situation. As the case study showed, the declining forest cover in Fulak was a direct consequence of the conflicting management goals and perspectives of the different stakeholders. Deforestation was started by logging concessionaires who were interested in exploiting the commercial value of the forest resource. Shifting cultivators followed through and transformed the area for agricultural use. Meanwhile, while the government assumed state ownership of the forestland, the DENR acknowledged its limited capacity due to the lack of financial and manpower resources in directly managing the natural resource unit.

Moreover, there was no shared perception among actors of the existence and nature of the problem situation. While most actors described it in terms of forest degradation, forestland occupants did not see it as such since to them clearing the land was necessary for growing food crops. To the latter, the main concern was not the loss of forest cover but the declining soil productivity arising from continued cultivation. Thus, while the biophysical degradation of the forest resource was the concrete indication of the existence of the problem situation, the case study suggested that it emerged as a consequence of the divergent perspectives and goals of actors, particularly the trade-offs between macro- and micro-benefits of forest resource management.

Innovation. Since the local community of forestland occupants did not fully recognise the existence of a problem situation with respect to the forest resource, there was consequently no perceived need to respond to forest degradation. The case study revealed that the impetus for introducing innovation to rehabilitate the Bulak forestland came from external actors, particularly the government. An improved problem situation, from the point of view of all actors save for the forestland occupants, was the regrowth of the forest in the already denuded area.

Thus the innovation introduced through contract reforestation was the replanting of trees and subsequently the responsibility of managing the rehabilitated forestland given to the local community. While a community organising component was added, both the DENR and LRAP were primarily preoccupied with ensuring that the trees grew to the desired height and density as stipulated in the terms of reference of the contract drawn between them.

It was clear that while there was a general agreement among actors on the need to grow trees and agricultural crops in the same area, as to which of the two would take precedence was the source of conflict in perspectives. LRAP pointed out that it did not intend to avoid depriving forestland occupants of their means of livelihood, however local farming practices need to be adapted to the ultimate interest of reforesting the area. The latter, on the other hand, considered that food production was a far more important management goal than forest rehabilitation and therefore the trees need to be planted in a way that would not prevent them from continuously growing food crops.

In sum, the innovation described in the case study was essentially a negotiation process whereby two groups of actors tried to exert influence over the direction in which forest resource management should proceed. At first glance and given the power relations among actors, it would seem that the intervening agents were able to successfully impose their own agenda on local people. Yet, a closer examination would reveal that the latter did manage to strategise their way towards ensuring their continued survival. This they did by first taking advantage of the short-term cash incentive offered by the project while gradually resettling their farms in other parts of the Bulak forestland just outside the project boundaries.

Intervention. The contract reforestation scheme described in the case study combined features of the client-oriented and participatory approaches. The community-based approach to reforestation identified the forestland occupants as the target of innovation and aimed to turn over to them the long-term management of the forest resource.

As implemented however, the Bulak contract reforestation project did not exhibit an intervention approach that introduces an innovation designed based on local people's circumstances and which allows their full participation in planning and carrying out the innovation. Instead, the contract reforestation scheme focused on the introduction of an externally determined innovation that involved local people only by seeking their labour inputs and mobilising them through short-term monetary incentives.

The contract reforestation scheme does not seem to qualify as a genuine participatory approach to forest resource management according to accepted definitions (Richards, 1993; Rodriguez, 1990) which require at least a collegiate level of participation by local communities in decision-making and implementation, and the ownership and control of the forest resource directly conferred on them.

The case study showed that the contract reforestation was far from being people-oriented, as the DENR claimed, since it was mainly concerned with imposing the government's interest in reforesting the area without at the same time considering the repercussions on subsistence farming households occupying the area. Rather than engage in a learning process of sharing goals, the intervention approach capitalised on monetary incentives and the perceived regulatory powers of external actors. Local people's participation was merely under a contractual mode, by providing specific services to the project.

While the project's ultimate goal was for the local community to assume the long-term management of the forest resource, the intervention approach used did not actually build people's management capacity since with their limited participation in the project, forestland occupants did not develop a shared ownership of the problem situation nor willing to accept direct responsibility for the long-term management of the forest resource.

Consequences. Since actors had contrasting definitions on what constitutes an improved problem situation, there were also varied assessments made by them on the consequences of innovation introduced through contract reforestation.

From a technical point of view, the results of project monitoring activities done by the DENR indicated that the planted trees were exhibiting acceptable growth rates after two years of project implementation. The liaison officer from the local CENRO indicated that the project had a strong chance of succeeding in meeting the minimum planting density and plant height targeted at the end of the three-year period. Similarly, while the LRAP observed that there was uneven growth among the various tree species, on the overall they expected the project to be able to comply with the required outputs as specified in the contract. The forestland occupants themselves noted this positive growth performance since they were already complaining that the trees were increasingly shading their food crops. Residents of lowland communities who could see the project site from a distance commonly remarked that *"the mountains were no longer as bald as before"*.

However, there was disagreement over the socioeconomic consequences of reforesting the Bulak forestland. Both the DENR and LRAP emphasised that the households affected by the project were at the same time directly benefiting in terms of the cash income they derived as hired labourers. On the other hand, the forestland occupants pointed out that the supplemental income provided by the project involved only small amounts and was shortlived since project demand for hired labour was drastically reduced starting in the second year when only maintenance tasks were required. On the prospects of getting a share of the harvest from the cut timber in about ten years, they were not too enthusiastic, saying that would still be too far away while their immediate concern was their day-to-day needs.

The intervening actors' view of the participatory nature of the community-based reforestation approach centred on local people's direct involvement through providing labour inputs to the project and on the proposed turnover of managing the forestland after project termination. On the other hand, forestland occupants did not see themselves as part of the project nor of participating since to them the contract reforestation scheme was only an alternative source of livelihood with the DENR and LRAP as their *employers*. As such, there was general reluctance on their part to assume responsibility for long-term management of the project in the absence of the immediate cash incentive they would derive and the lack of external financial support to provide for additional inputs to ensure the trees' continued growth.

Thus, whether the introduced innovation of reforestation did improve the problem situation by reversing the process of forest degradation would depend on whose criteria were used. Judged on the basis of the terms of reference in the project contract, the regrowth of trees was one concrete indication of the rehabilitation of the forest resource within the boundaries of the 100-hectare reforestation site. However, from a wider perspective, there may not be any improvement in the problem situation as a consequence of undertaking the reforestation project. As the case study found, the introduced innovation merely shifted the problem situation to another area within the larger forestland in which the project was but a part of. To cope with their inability to continue cultivating their farms covered by reforestation, the affected households were again clearing portions of the forestland adjacent to the project site where they resumed their agricultural activities.

In sum, the contract reforestation scheme as a participatory, client-oriented approach was shown in the case study to deal effectively with the biophysical dimension of forest degradation, but only within a fixed area as defined by DENR and LRAP. It proved inadequate in addressing its social causes, particularly the human intentionalities and behaviours that brought about the problem situation in forest resource management.

Chapter IX

WHEN INTERVENTION LEARNS TO TAKE THE VIEW FROM BELOW: THE PINABACDAO CASE

This chapter presents a case study of a problem situation in soil resource management in an upland area in Pinabacdao. A combination of social, economic and political factors led to changes in local soil resource management from a traditional shifting cultivation to an intensive, short fallow system. A problem situation involving soil degradation thus emerged with an increased number of stakeholders all seeking to utilise a reduced area of soil resource. Intervention by the government's regular extension service was minimal since the office was beset by its own internal organisational problems.

The first major external intervention in agricultural development implemented in the Pinabacdao uplands was the Integrated Root Crops Program (IRCP). While it started as a commodity-focused intervention, the early period of programme implementation saw the poor performance of the supposedly improved high-yielding root crop varieties. This convinced the field staff that in order to effectively introduce production technologies, appropriate measures had to be taken first to address soil degradation. Through a redefinition of IRCP's objectives, the programme eventually sought towards supporting innovation in root crop-based farming system which jointly introduced root crop varieties and contour hedgerows. In moving from a technology transfer to a facilitative type of intervention, the IRCP experience demonstrated the importance of supporting local capacity for adaptive experimentation and social learning to devise innovation specific to diverse needs and circumstances.

9.1 Background

During the reconnaissance phase of the fieldwork when the researcher sought to identify potential case study sites, a deliberate effort was made to include a case in Samar island. Aside from ensuring geographic spread of the case study sites within the entire region, the researcher recognised the importance of Samar island considering that it comprises 64 percent of the total land area of Eastern Visayas and with over half of it typifying an upland agroecology.

The task of identifying a site in Samar however turned out to be far more complicated than what the researcher expected. It had to be undertaken under the following circumstances:

- It was difficult to study intervention, i.e., how external agents introduce/support innovation, in an area with very few development projects from which to select for the case study, especially when compared to Leyte island. Key informants attributed the low presence of intervening agents in Samar to its distance from the regional capital of Tacloban city, poor accessibility of interior communities, less favourable agroecological conditions, and most importantly the perceived unstable peace and order situation making development organisations hesitant to operate in the area.
- Conducting field visits for a preliminary assessment of the projects was seriously constrained by inadequate transportation infrastructures and facilities. Most of the peripheral areas were accessible from the national/provincial highway only by means of dirt roads that became impassable to motor vehicles during rainy season. Interior uplands were linked to the main roads through footpaths stretching several kilometres. The entire province of Eastern Samar often used to be cut off from the rest of the island because of the poor condition of the main road connecting the province to the national highway. Travelling by sea in small motorised boats was a preferred option for many even though the stormy seas posed a high risk.
- For an area like Samar long known to be a stronghold of the communist insurgency movement, fieldwork had to be under precarious circumstances. Local people and development agencies like cautioned the researcher on how one should conduct himself in the field. As he was told,

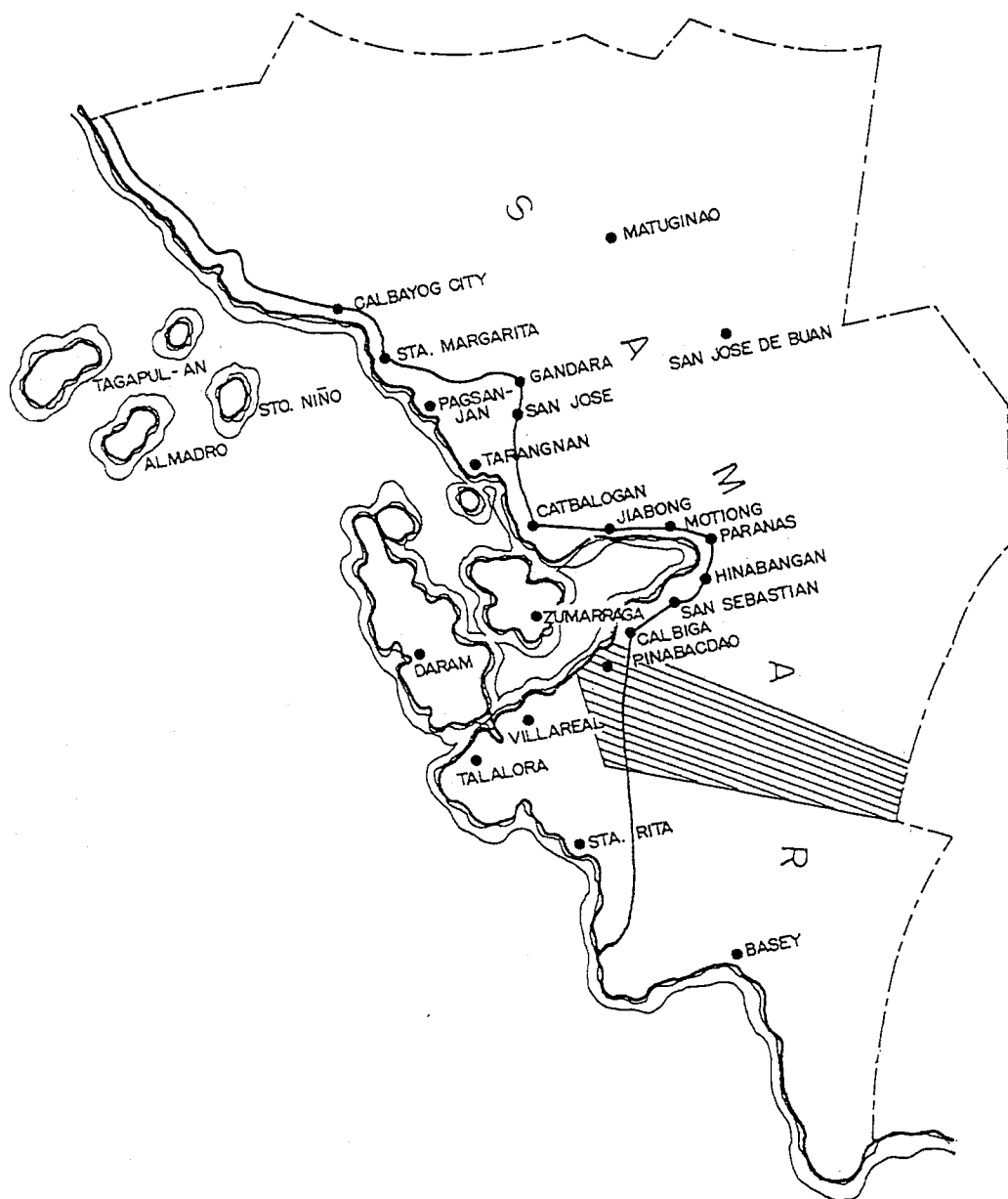


Figure 9a. Map of the municipality of Pinabacdao.

the investigative nature of the fieldwork was bound to raise suspicions from groups on opposite sides of the armed conflict -- the military and people sympathising with the rebel movement.

Nevertheless, the municipality of Pinabacdao on the southwestern part of the island was found as a suitable area for research, meeting the general criteria set in site selection while also taking into consideration the aforementioned constraints. Pinabacdao typified the rest of Samar in terms of having limited plains and an extensive rugged and mountainous terrain. Most of the households have no private land but are instead engaged in shifting cultivation of areas owned by absentee landlords or declared as part of the public domain. The existence of a problem situation in soil resource management was widely acknowledged by local people and the identified intervening agents. Taking the Pinabacdao case meant examining not only the conventional extension service of the DA but also an external intervention in the form of a foreign-funded extension research project, the Integrated Root Crops Program (IRCP), implemented by ViSCA.

9. 2 Highlights of Fieldwork

The researcher's affiliation with ViSCA and previous involvement with IRCP provided him adequate background on the project and familiarity with the problem situation. The logistical support extended by the IRCP management and field staff expedited the conduct of fieldwork. They not only provided valuable secondary data, but more importantly facilitated his entry and social acceptance by the local community, thus erasing whatever doubts the latter may have about the researcher's possible ulterior motive.

Unfortunately at the time of fieldwork, a diarrhoeal epidemic hit the area and even the field staff were not spared. Living conditions were thus difficult and the researcher had to take extra precautionary measures as regards food, water and accommodation while in the field. Also at that time, the field staff were pressured by deadlines for reports and target activities as the project was up for evaluation. The staff were apologetic for not being able to accompany the researcher on most data collection tasks. Looking back, however, the researcher considered such circumstances as even favourable to the research since these allowed local people to openly express their opinions. Since they had to attend to urgent work assignments, the researcher had the opportunity to directly observe field activities while freely engaging in informal interviews with local people, in the absence of field staff.

Documentary data were obtained from two main sources. The provincial and municipal agricultural offices in Catbalogan and Pinabacdao, respectively, provided relevant statistical and qualitative descriptions of the case study site. The second source of documentary data was the IRCP coordination office where project reports on file served as reference for documenting the experience in project implementation. Secondary research data, particular baseline information and technical description, were obtained from progress reports and technical papers prepared by IRCP research leaders.

Key informant interviewing was done with three main groups of actors -- local people, IRCP field staff and other external intervening agents. Within the local community, interviews were done with key informants representing different groups or sectors. Community leaders, both formal (i.e., barangay officials) and informal (i.e., elders) were sought to describe the historical background and general profile of the area. Focus group discussion with farmers offered a richer and fuller description of the farming system and problem situation. By intentionally interviewing together two or more informants with opposite perspectives on the problem situation, the researcher was able to directly compare the contrasting realities, goals and interests among local people. Husbands and

wives were also interviewed together to get a glimpse of household survival strategies in the face of the problem situation.

To better understand innovation in soil resource management, interviews were done across various categories of farmers based on their differential response to the introduction of contour farming. These ranged from farmers who totally rejected the innovation outright to farmers in nearby barangays outside the scope of IRCP who took the initiative of learning about contour farming. The researcher's interest was also to explore the diversity in experiences with respect to the innovation, e.g., communal and individual contour farming, various adaptive experiments undertaken. IRCP field staff provided an in-depth account of project implementation, particularly the nature of intervention used to introduce innovation for soil resource management. They were also asked regarding their perspectives of the problem situation and how the project sought to improve it. Former field staff who already moved to new jobs were also interviewed since they were most knowledgeable of the project's early days of implementation.

Interviews with staff of the municipal agricultural office in Pinabacdao was carried out to ascertain their views about the problem situation in natural resource management and how they have responded to it, including perceived constraints that affected their work performance. Some agricultural technicians who tried introducing contour farming prior to IRCP were asked to relate their experiences and the reasons why the innovation was never sustained. In ViSCA, the project management, as well as the research and extension staff backstopping field activities, were also interviewed. They offered a technical perspective of the problem situation, explaining soil resource management from a scientific viewpoint. Since physical and financial constraints made it impractical to interview the donor agency directly, its perspective was extracted from communications and other documents sent to IRCP, as well as from minutes of meetings and evaluation reports.

Table 9a. Sources of data for the case study.

Actors	Key Informant Interview	Direct Observation	Documentary Data	Secondary Data
Local people				
- community leaders/residents	x	x		
- elders/youths	x	x		
- landowners/landless	x	x		
- husbands/wives	x	x		
- members/non-members of IRCP-supported organisations	x	x		
- contour/non-contour farmers	x	x		
IRCP field staff	x	x	x	x
IRCP management/technical staff	x	x	x	x
Department of Agriculture	x	x	x	
Local government units	x		x	
Donor/funding agency			x	

9.3 Natural Resource Unit

The natural resource unit on which this case study focused on was the soil resource of an upland section of Pinabacdao, comprising the six southernmost barangays in the municipality and covering an area of approximately 2,000 hectares. The boundaries of the soil resource unit were defined based on the coverage area of IRCP.

Pinabacdao is located on the southwestern tip of Samar island. It is found midway between the provincial capital of Catbalogan 55 kilometres to the north, and the regional capital of Tacloban 54 kilometres to the south. Pinabacdao is classified as a sixth class municipality based on the new income classification under Executive Order No. 249. The municipality is part of the province of Western Samar, one of the three provinces of Samar island. Like the rest of the island, Western Samar is hilly and mountainous. About 65 percent of its total land area of 559,100 hectares has an elevation of at least 100 metres and a slope of 8 percent and above.

Table 9b. Area and percentage distribution of pedo-ecological zones in Western Samar.

Pedo-ecological zone	Area (hectare)	Percentage
warm lowland	109,359	33
warm-cool upland	192,953	26
warm-cool hillyland	237,778	30
cool highland	16,142	9
miscellaneous	2,868	2
Total	559,100	100

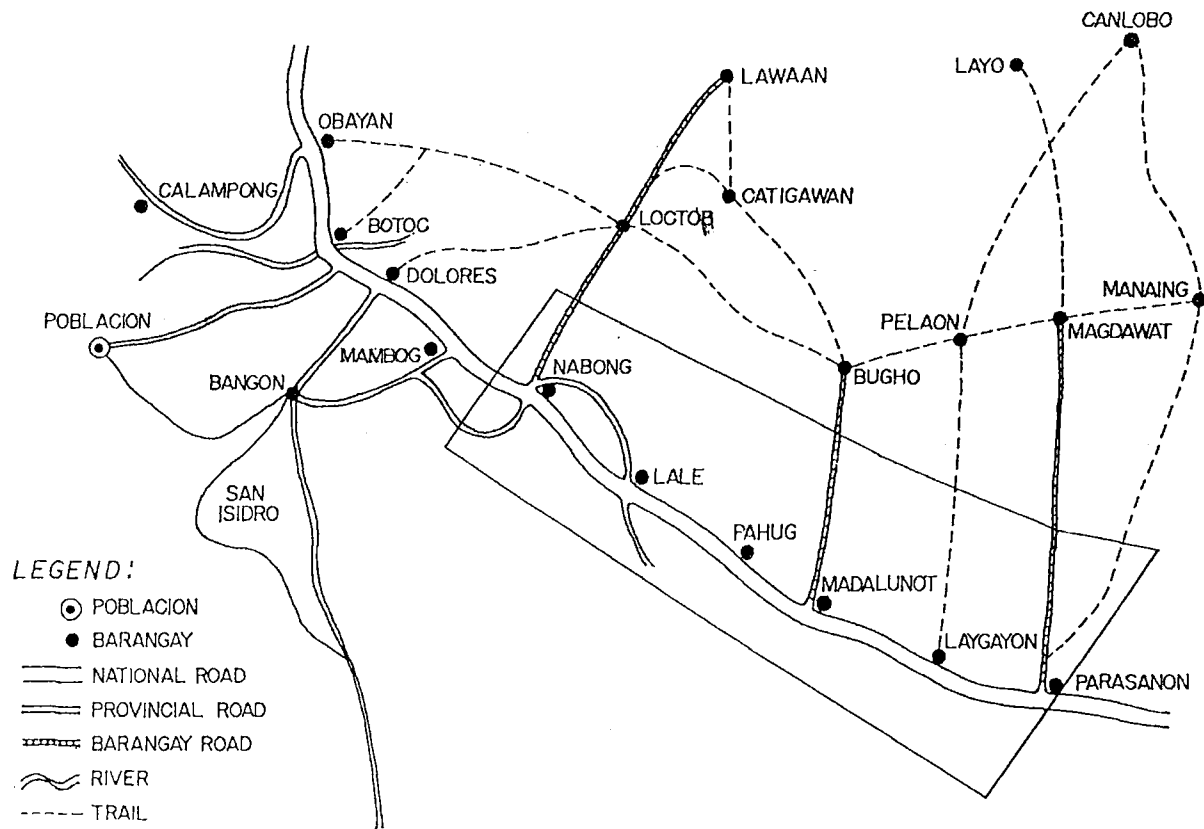
Source: BSWM, 1990

The municipality of Pinabacdao is relatively small, covering a total area of 20,000 hectares, stretching from the coastline of Maquida bay on the western side of the island to the interior section on the east. Pinabacdao is mainly an upland area; except for 5 coastal barangays, the rest of the municipality's 24 barangays are hilly and mountainous.

The six southernmost barangays of Pinabacdao -- Parasanon, Laygayon, Madalunot, Pahug, Lale and Nabong -- form a distinct section of the municipality due to a number of shared physical and agroecological features. They have an entirely sloping terrain, predominantly rugged and steep, except for patches of plains in Parasanon and Nabong. Those portions not currently cultivated were generally covered by cogon (*Imperata cylindrica*) and bugang (*Sacharum spontaneum*). In all, they occupy 2,134 hectares or almost one-tenth (8.6 percent) of the municipality's total land area.

Soil type in the area is mainly Santa Margarita clay, classified under the soil order Ultisol and derived from shale sandstone parent material. The soil is dark brown to black, plastic when wet and hard when dry. Permeability was generally low and rate of surface runoff usually high. It is generally acidic, with a pH of 4.9 to 5.2, and generally less fertile compared to soils originating from limestone. Laboratory analysis done at PRCRTC showed that Pinabacdao soil has 2.95 to 3.35

Figure 9b. Map of the case study site.



percent organic matter, 7.12 ppm available phosphorus and 84.43 ppm exchangeable potassium (Evangelio, 1994).

Table 9c. Land area of the six upland barangays in southern Pinabacdao.

Barangay	Area (hectare)
Pahug	598
Laygayon	583
Lale	373
Madalunot	300
Nabong	148
Parasanon	132
Total	2,134

Source: IRCP, 1994

The inherent high degree of erodability of the soil is further aggravated by the rainfall pattern in the area. Pinabacdao has a pronounced wet season, with heavy rains especially from October to December. In addition, it is frequently visited by typhoons or tropical cyclones, which according to weather bureau records averaged 12 in a year. Such poor climatic context further limits agricultural production in the area. The extent of soil degradation in Pinabacdao is typical of the entire province. Western Leyte is the most severely eroded province in the entire region of Eastern Visayas. About 41 percent of its agricultural areas are subject to moderate and severe erosion hazards.

Table 9d. Area and percentage of erosion in Western Samar.

Erosion class	Area (hectare)	Percentage
no apparent erosion	98,886	18
slight erosion	262,402	47
moderate erosion	65,223	11
severe erosion	129,721	23
unclassified erosion	2,868	1
Total	559,100	100

Source: BSWM, 1990

9.4 Historical Background on Soil Resource Management

In inquiring who among the local people would be in the best position to provide a comprehensive account of the area's historical background, the researcher was usually referred to people who lived to see the second World War. The war years, 1942-45, appeared to be a convenient reference point used among local people when contrasting *una nga panahon* (past) and *yana* (present). The war experience was also a useful takeoff point for engaging in informal interviews because menfolks, usually veteran soldiers, would eagerly recount their exploits as they fought side by side with the Americans against the Japanese invasion force. *Lolas* (grandmothers) on the other hand would proudly relate how they used to escape from bombing attacks by running and hiding in the forest, carrying their children and few material belongings. From the informal interviews, it appeared that local people's recollection of the agricultural history of the area was closely interwoven with general socioeconomic and political events. While such enthusiasm among local people helped the researcher strike a conversation and create a relaxed atmosphere for interview, on the other hand he had to sift through the war-related stories in order to closely examine how soil resource management evolved and changed over time.

One of them was Luciano who was among the first few settlers in barangay Nabong. He grew up, got married and raised his children in barangay. All of his children however had already migrated to urban centres leaving him and his wife to attend to their farm. He characterised Pinabacdao in the 50s as being similar to a jungle seen in Tarzan movies. To illustrate how sparse the population was, his wife recounted that houses were so far apart and so one had to hike across mountains for about an hour just to borrow salt from a *neighbouring* household.

Traditional shifting cultivation was the earliest form of farming system known in the community. This was generally described as involving the clearing of virgin forests and cultivating the area for up to ten years, after which the area was abandoned temporarily and another piece of land cultivated. This natural resource management practice was based on farmers' recognition that continuous cultivation leads to soil degradation through nutrient depletion. The usual explanation was, *"After several cropping seasons, the food left in the soil gets less and less since previous crops had already eaten them up. As a result, crops planted after two or three years become malnourished since they no longer get sufficient food. By allowing the soil to rest through fallow, it is able to manufacture enough food the next time the area is cultivated."*

The farming system was elaborate and highly complex; Lightfoot et al (1988) listed 44 discrete activities in the process of shifting cultivation in Samar. For example, opening the land for a *kaingin* farm had to be preceded by clearing about a metre wide boundary around the area to be opened. This served at least three purposes:

- to make public farmers' ownership claim over an area, at least for the entire cultivation cycle;
- to perform a ritual for asking permission to cultivate the land from mountain spirits; and,
- to inform members of *tiklos* (local workgroups) on the location and size of the area to be cleared.

The cropping pattern was based on both the annual climatic calendar and the stages of the cultivation cycle. The planting sequence was decided upon with reference to the crop's ability to grow in the dry or wet season, as well as their yield response to declining soil productivity. Corn was almost always the first crop planted after the area was cleared. The reason for this was to stock up on corn supply by taking advantage of the relatively fertile soil to which the crop was observed to respond well. In some cases though, taro was intercropped to make use of the space in between rows of corn. The succeeding cropping seasons then involved rotating corn and upland rice, both intercropped with taro. However, as the yield of cereal crops was noticed to decline, the cropping

pattern would gradually shift to root crops, e.g., taro, cassava and sweetpotato, until the farmers decided to leave the land.

Selecting an area to open for cultivation was based on an approximation of the extent to which the soil had regained fertility by using vegetative cover and soil characteristics as visual indicators. An area was considered fit for reopening when certain fern and tree species became the dominant vegetation. Samples of these plant species given by farmers to the researcher were later identified by scientists in ViSCA as *Pteridium aquilinum* and *Leucosyke catytellata*. In terms of soil characteristics, fertility was said to have been restored when the soil was *mati-itom* (dark brown to black) and *gabhok* (coarse and granular).

On the other hand, when only root crops would continue to thrive in an area, farmers knew that soon they had to close the land and relocate the farm elsewhere. Aside from the observed declining crop yield, a degraded soil was considered to be one which turned lighter in colour (e.g., brownish, reddish or yellowish) and became hard and sticky when ploughed. Weeds, particularly cogon, would also start to take over. When farmers calculated that more labour input was required while the yield was fast declining, they took it as a signal to start exploring for new areas to open. A fallowed land though may not be entirely left idle. When it already grew sufficient vegetation, usually grass species, the area may be converted to a grazing plot for livestock, e.g., goats and cattle.

Shifting cultivation prevailed for decades in the Pinabacdao uplands and similarly in other parts of Samar since historically, usufructuary rights over land were the locally accepted norm while the concept of permanent ownership was uncommon. A farmer may clear and cultivate an idle or fallowed area and continued to enjoy its full use as *de facto* owner until the end of the cultivation cycle. Closing the land for fallow was taken to mean giving up the farmer's exclusive rights and leaving it for others to reopen when the soil was thought to have sufficiently regained fertility to support crop production. In other words, the land was thought to be collectively managed by the entire community.

From out of the various descriptions given by key informants, the researcher got the impression that when farmers cultivated a certain portion of land, they considered themselves as having assumed more of a stewardship rather than an ownership role.

9.5 Impact of Population Pressure

The post-war years marked the influx of migrants to the area, leading to an accelerated rise in population. Although no official census figures for the past decades were available, local estimates indicated that the number of households doubled in a span of about 30 years. The general migration pattern appeared to be brought about by social, economic and political events in the course of local history.

After the second World War, those who fled the area to seek refuge elsewhere started to return and settle down again. Other post-war settlers were migrants from other places in Samar or its neighbouring islands who decided to move in for various reasons, e.g., had relatives in the community, nearness to Tacloban City, and availability of land to till. When barangay officials briefed the researcher on the location of certain households which he wanted to visit, he noted that houses of migrant families usually formed small clusters depending on area of origin, year of arrival and blood relations.

In the 70s, the construction of the Philippine-Japan Friendship highway which traverses the upland barangays of Pinabacdao, as well as the 2.2-kilometre San Juanico bridge linking Samar and

Leyte islands, again brought another wave of migrants. Because of the improved transportation facilities, houses started to be relocated or built along the highways to take advantage of the strategic location. Thus, since the highway cut across the six upland barangays, local household population was said to have increased. One woman who was keeping watch over her roadside retail store commented, *"Oh, the highway was like a magnet, suddenly houses started sprouting on both sides like mushrooms."* Road maintenance often caused problems for the Department of Public Works and Highways since many of these houses were erected right on the road shoulders. According to the maintenance crew, this narrowed down road width and often created blind curves. Oftentimes, even the concrete roads themselves were converted into drying areas for harvested crops or as playing areas for children.

The third batch of migrants arrived at the height of the armed conflict during the first half of the 1980s. For fear of being caught in the crossfire between military and rebel forces, residents of remote mountain areas in Pinabacdao, e.g., Catigawan, Lawaan, Layo and Canlobo, sought refuge in the highway barangays since it was thought that there was less danger in the latter. It was also at that time when the Philippine Army set up a field camp/headquarters in barangay Parasanon thus offering local residents a sense of protection. As revealed by army soldiers, rebel activities were generally concentrated in the more remote upland areas where they could easily take cover in the forest. At the time of fieldwork, a military operation was taking place and so army helicopters were hovering above while the researcher was moving around to interview people. Interestingly, some of the soldiers had married local women, leading to the formation of new additional households. One of those who took up a soldier as husband remarked, *"When the army first came, oh the girls got married one after another. It seemed like getting a soldier as husband became a local fad."*

As of the 1990 census, the entire province had a population of 533,733 inhabitants, posting an annual growth rate of 0.63 percent. As noted by Pascual (1994), this figure is deceptively below the national average of 2.3 percent due to a high outmigration rate.

Table 9e. Change in household population in Pinabacdao.

Barangay	Number of households	
	early 60s, approximately less than ¹	early 90s, 1991 census ²
Pahug	40	95
Lale	20	54
Nabong	40	90
Parasanon	60	120
Madalunot	20	46
Laygayon	25	49

¹Local estimates

²Municipal office records

Population pressure generally had a negative impact on soil resource management in the area. Agricultural activities became more intensified as the arrival of migrant households meant increased food production requirement. Farmlands near the highway were most preferred since these were

generally less sloping and thus easier to cultivate. Besides, as those who had farms there pointed out, their being closer to dwellings meant:

- less time and effort for walking to and from the farm;
- easier transport of farm products; and,
- standing crops easier to watch against theft and destruction caused by human beings and stray animals alike.

Consequently, a gradual competition for land closer to the highway ensued while those in the interior uplands were generally left idle. With more farmers cultivating the areas at any one time, there were fewer options to which farmers could shift to after leaving a previously cultivated farm. The general tendency was to reopen a fallowed area even when it was perceived not to have sufficiently recovered its fertility, as well as for cultivated farm areas to be smaller.

In the face of competing interests for the right to cultivate the land, ownership claims became more privatised. Some local residents were able to secure land titles to small land parcels, ranging from 1 to 5 hectares. However, more influential people – businessmen and politicians – used their connections in the government bureaucracy, as the landless alleged, to secure private ownership rights to as many as 20 to 50 hectares of land. Among those identified as landlords were an owner of a local transport company, a former mayor and a business entrepreneur in Tacloban city.

Surprisingly, there seemed to be only a moderate interest among local people to gain private land ownership. According to officials from the DENR, although much of Pinabacdao and other areas in Samar were already reclassified from being public domain to alienable and disposable (A&D), these remained untitled since few local people took concrete steps to file legal claims for private ownership. This could have been because the local tradition of *de facto* ownership still prevailed even with the emergence of private or state claims. Farmers were able to exercise temporary ownership rights on land without the intervention of government or absentee landlords. As one of the occupants said, *"I was told that somebody from Catbalogan owns this land but I've been tilling this land for years now and I have not even seen him come here to inspect or demand payments or shares."*

The DENR suggested that it is possible that the absentee landlords' lack of interest was their perception of the low value of the land considering the location and poor soil quality. Meanwhile, he added, farmers saw no need to formalise their claim of untitled land because besides the complex process involved, they were free to exercise *de facto* ownership without government intervention. Data from the Department of Agrarian Reform (DAR) provided a general idea of the land tenure situation in the area. Using commonly used classification schemes, local people were classified as:

- landowners, or those with land titles on 0.5 to 5 hectares of land but mostly within the range of 1 to 2 hectares;
- tenants, or those entering into formal/informal tenancy agreements with landowners to cultivate the latter's land, ranging from 1 to 10 hectares, subject to certain sharing arrangements for the produce; and,
- landless cultivators, all others not belonging to the above categories but cultivated small parcels of land, usually less than a hectare, which were part of the public domain or owned by absentee landlords.

Table 9f. Land tenure status of farming households in the upland barangays of Pinabacdao.

Barangay	Landowner	Tenant	Landless cultivators	Total
Pahug	19	14	62	95
Lale	11	30	13	54
Nabong	37	12	41	90
Parasanon	22	20	78	120
Madalunot	5	11	30	46
Laygayon	8	14	27	49
Total	102	101	251	454

Source: Department of Agrarian Reform; Dagoy et al, 1993

However, the researcher found that it was not accurate to come up with discreet categories of farming households according to tenurial status. The interviews revealed that the majority of them had tenurial status considered a mix of the above categories. The statistics only considered the main farm cultivated by each household. The researcher discovered that the concept of a farm as being a single land unit in a permanent location did not fit the case of the Pinabacdao uplands. When speaking of farms, it had to be qualified whether it referred to the individual parcels or as a collective unit, whether referring to the total area or only of the portion/s cultivated at any one time, or at which particular cultivation cycle.

In addition, using household income as an indicator of socioeconomic status of households did not seem appropriate since their subsistence-oriented production indicated that cash income was negligible and erratic, thus difficult to calculate. Farm produce were generally sold when households were in immediate need of cash, e.g., selling a few heads of swine to acquire enough money to cover travel expenses for a son or daughter migrating to Manila. In some other instances, farm produce were marketed when traders or middlemen would come to purchase them in the farm. Farmers were usually discouraged from selling crops like taro, sweetpotato or banana directly in Tacloban because these were bulky and heavy while commanding a low price barely enough to cover transportation costs.

Table 9g. Major crops in the Pinabacdao uplands according to area planted.

Crop	Area Planted (hectares)
root crops	529
rice	365
corn	319

Source: Department of Agriculture

The major alternative source of income was seasonal hired labour. The prevailing rate for clearing and weeding was P25¹ per person/day including lunch. Meanwhile, a labourer who ploughed with his own draft animal normally charged from P70 to P100² per person/day. Young people who migrated to Manila and other urban centres and took up menial jobs were also increasingly dependent upon by their families left behind in Pinabacdao. They would usually send part of their monthly salary to their parents and occasionally came home bringing presents, from cans of cookies to major appliances.

9.6 Problem Situation

As discussed in the preceding section, a combination of social, economic and political pressures led to changes in local people's management of the soil resource. Over the years, land use in the Pinabacdao uplands underwent a transformation from a generally traditional shifting cultivation system characterised by long fallow periods, to a more intensive and short-fallow agriculture in areas situated near the highway. After having outlined the historical background of the Pinabacdao uplands, the researcher then sought to explore the prevailing problem situation in soil resource management from the perspectives of different actors in the local community. This was initially done by asking them to comment on their perception of the changing situation of the uplands in Pinabacdao.

Box 9a. Local people's perspective of the changing situation in the Pinabacdao uplands.

"Obviously, there are more people that you can see here now. Before we knew every person in this community but now there are new faces around, because of the arrival of many migrants." (Alodia, barangay council member)

"Just take a look at those houses, they're now so close to each other now, arranged along the edge of the highway like a line of ants. Many years before, you could only see one nipa hut perched atop each mountain." (Esperanza, housewife)

"We moved to this area about six years ago thinking that it's a lot safer here for my family than in Catigawan. But see, we are indeed alive but what a difficult life, too. We don't own any land here and the only little farm that I have is also producing less and less." (Sejito, migrant)

"I used to have a small swidden farm up there in the mountain to supplement what I harvest from the land I own which is just a stone's throw from here. But it's too dangerous to go up there so I'm limited to making use of the farm nearby. It means less land to cultivate and what's more, the soil is not so good anymore." (Arsenio, landowner)

The problem situation appeared to be a consequence of two main but opposite direction of change. On one hand, there was a decreasing area in the uplands within which shifting cultivators could move around. As the more remote areas were perceived to seriously pose both physical constraints and safety concerns, farming activities became increasingly concentrated in areas closer to the highway. On the other hand, population grew mainly due to the accelerated migration rate, both

¹approximately 90 US cents

²approximately US\$ 2.60 to 3.70

from the nearby interior upland barangays and from farther places in the island and region. In other words, there was an increasing number of stakeholders competing with a decreasing area for agricultural land use.

To arrive at a more concrete description of the problem situation, the researcher drew farmers to take a closer perspective of the problem situation for them to articulate their specific themes of concern. There appeared to be a consensus among different individuals and groups in the area that the problem situation was essentially associated with the management of the soil resource, pointing to the link between the declining levels of crop production and soil condition. Most of the discussions centred on the extent and nature of soil degradation, with the following themes of concern commonly expressed:

- Shorter fallow period - One thing that anybody would immediately notice in the Pinabacdao uplands was that areas adjacent near the highway showed signs of intensive cultivation while those in farther distances were idle areas, either denuded or mainly brushland. As there were more and more farmers wanting to cultivate less and less of land, areas near the highway were either under cultivation or had just been fallowed. Thus, the traditionally long fallow periods had to be cut short in many instances by farmers who were finding it hard to look for available areas to reopen. From the various estimates given, fallow periods of as long as ten years were shortened to less than five years. There were even those who revealed to have reopened certain areas after only about two years. In a visit to a newly cleared farm, a farmer in Laygayon explained, *"See, this farm has been fallowed for only about three years but I decided to reopen it again since there was no other alternative area. I knew the soil is not yet fertile enough to support the crops because cogon grasses were still dominant at that time and the soil still a bit lighter in colour."*
- Shorter cultivation cycle - Not only were the fallow periods reduced but the cultivation cycle as well. It was generally reported that crop production had to be terminated earlier than usual because soil productivity was fast declining. One farmer in Madalunot said, *"In the past, we could plant even for more than five years but now it's lucky if the soil can sustain just two or three years of continuous cropping."* Interestingly, nobody among those interviewed expressed any surprise for such outcome, saying that this was to be expected since they were already forcing the soil to support the plants beyond its normal capacity. While they admitted to being aware of its consequences, they also emphasised that they only did so out of their desire to ensure that their families have something to it. But when the researcher asked for how long this would go on, the usual answer was, *"Only God knows."* One woman who joined the discussion suggested that reopening a fallowed land earlier than usual was like *forcing a baby to walk even before he learns how to crawl.*
- Smaller farm size - Given the increasing local population vis-a-vis the land area, farming households realised that the total farm area that they were cultivating was getting smaller over the years. Notably, decreasing farm size was reported not only by landless farmers who had to look for unclaimed portions but also by tenants and especially landowners. This was so, because as the researcher realised, even the latter did not solely depend on their tenanted or privately owned land. They additionally cultivated swidden farms in the interior uplands. One landowner cited his case: *"Before, I used to have a 0.75 hectare farm farther up the mountains in addition to the 1.5 hectare area nearby. But with the NPA³ problem, I have been forced to abandon the swidden farm so now I am doing shifting cultivation by rotating cultivated portions within the land I own nearby."* In some families, as in the case of one in Laygayon, the area

³NPA (New People's Army), the military arm of the communist movement

cultivated by parents had to be subdivided further into smaller farms so that their children who already got married had an area to cultivate.

- Limited cropping system - *"As the soil gets depleted, fewer crops can also survive. If you only saw the stunted growth of my corn plants in the previous years, I'm sure you would have laughed,"* one farmer in Nabong tried to explain why he had to shift from planting cereals to root crops. Root crop based-farming system was becoming popular in the area as cassava, sweetpotato, taro and other root crops were the only ones which could manage to thrive and provide adequate yield under poor soil conditions. To stress the point, one mother asked her 10-year old kid to tell the researcher what their family usually ate and the latter sheepishly replied, *"Sometimes boiled cassava, other times sweetpotato, then also taro. Oh, but I liked putting grated coconut or sugar on top of them. Rarely do we have rice or corn but even these are mixed with root crops."* Fortunately though, according to local traders, market demand for taro rose dramatically because the local cultivar called *iniito* was a much sought-after kind of taro by consumers. With a sack of corms commanding a price between P100 and P150⁴, taro had overshadowed corn and upland rice as cash crop. Another local aroid species called *italian* (*Dioscorea* sp.) was reportedly bringing additional cash income because it was a main ingredient for *binagol*, a famous commercial delicacy of which the region is famous for.
- Increased erosion - Local people had long attributed soil degradation to the occurrence of erosion on sloping land which characterised much of Pinabacdao uplands. When the subject was brought up by the researcher in a focus group discussion in Pahug, the people immediately replied almost in unison, *"Well, that's nothing new here!"* However, some were quick to add, *"But yes, it's getting a lot worse now because sloping areas are even more frequently cultivated and ploughing makes erosion even faster."* The researcher himself noted several visual indicators to support this claim – gullies along the slopes, mounds of eroded topsoil at the foot of mountains and rock outcroppings emerging from hilly soil surface. It even seemed that erosion was becoming not only an agricultural but a transportation problem as well. Since the highway was generally caught between mountains, heavy rains often caused landslides thus blocking passage of vehicles and sometimes damaging the concrete road. One such landslide occurred a week prior to fieldwork when there was a continuous downpour for about a week.
- Cogon infestation - Cogon had also been long considered by shifting cultivators in Pinabacdao as a major weed problem. In travelling along the highway, one would immediately notice the extensive cogon fields growing along the roadsides. According to ViSCA scientists, the acid nature of the soil in the area partly favoured its growth. When the researcher inquired why cogon infestation was an important concern for them, he was told that clearing fallowed land was made even more labourious because of the difficulty of eradicating the weed. *"You do the weeding today but when you return a few days after, the weeds are back in the field,"* complained some farmers. Thus, as a result they had to work for additional days in the field. In addition, they were increasingly worried because cogon was generally considered as a main culprit in soil degradation. As one of them explained, *"The already degraded soil is even made worse by cogon because it further depletes fertility. It competes with crops for available nutrients in the soil."*
- Insufficient labour supply - Everybody seemed to agree that shifting cultivation by nature required high labour input especially in clearing and preparing the land. However, they thought that with the changing situation, need for labour input all the more increased. With the shortened fallow-cultivation cycle, land clearing and preparation tasks became more frequent,

⁴approximately US\$ 3.70 to 5.60

the soil increasingly difficult to plough and cogon infestation harder to contain. On the other hand, farming households had less and less available labour supply. The situation was described by one old farmer in Nabong, *"You know, I'm already too old and my rheumatism now prevents me to work as hard as before. Even if my wife helps me, I think it's about time that we retired from farmwork. But who else will do it for us? Like many other young people here, all of our children have gone to Manila in search of better life. And what about hiring others to work in the farm? Forget it, the harvest wouldn't even be enough to pay for their wages."* In almost all of the focus group discussions, the desire of owning a carabao was expressed by many since, as they explained, with a draft animal they could cultivate more land and finish work in a shorter period of time. As the researcher was told, those who had larger farms were the ones owning a carabao. In addition, they emphasised that they would get a higher wage rate when working as hired labourer with a draft animal. Those who did own a carabao estimated that an animal of working age for sale cost from P7,000⁵ to P8,000⁶. During the fieldwork, the researcher was even frequently asked whether he knew of any government agency which could help them acquire the draft animal.

From the aforementioned descriptions as drawn from the perspectives of local people, it can be discerned that essentially the problem situation concerning the biophysical degradation of the soil resource was in large part a consequence of the breakdown of traditional shifting cultivation which was primarily anchored on both the collective type of natural resource management and on biophysical principles of utilising the soil by working with natural cycles. Through social, economic and political pressures, such form of natural resource management had been altered leading to a problem situation characterised: 1) socially, as a more individualistic and competitive mode of resource management; and, 2) biophysically, as the adoption of agricultural practices disrupting basic ecological processes.

9.7 Local People's Response to Problem Situation

Aside from gaining a local perspective of the problem situation, the researcher was equally interested to learn how people responded to soil degradation. The informal interviews were thus also directed towards eliciting the specific ways in which the local community coped with the situation.

The emerging practice of short fallow period deviated from the former type of soil resource management wherein one would reopen a fallowed land only after making sure that the soil had been adequately rehabilitated through locally accepted visual indicators, and by being the first to publicly make known his intention to cultivate the area by performing initial clearing activities. There seemed to be a consensus that the privilege of a person to cultivate an area to which he/she had made the first claim still remained to have been locally recognised. Thus, rare incidents of conflicts over land reportedly occurred.

But on the other hand, the short fallow period emerged as more people become more tolerant to the practice of not conforming with the traditional norm of opening the land only when assessed to be sufficiently restored to its productive state. In the past, this unwritten law was generally enforced through social pressure. *"Many years before, nobody dared to violate this long-accepted but informal community rule for fear of becoming the center of gossip in the community and the possible negative consequences on the person's social relations with others,"* explained a farmer. Lately, however, a more liberal attitude seemed to have prevailed. Landowners who were less affected by the problem

⁵approximately US\$ 259

⁶approximately US\$ 296

appeared to be more tolerant of this practice, which was generally done by landless cultivators, saying *"We have to be considerate. Even if I were in their shoes, I would also do the same. What is more important – maintaining a good name in the community or feeding the hungry stomach of my family?"* This attitude seemed reflective of the Philippine social value of *pakikisama* which means empathising with other members of a group, especially with the less privileged.

In addition to a more socially tolerant environment for the short fallow system, there were other coping mechanisms mentioned which all reflected a tendency to avoid social conflict. Firstly, instead of directly competing with others for available land, some people decided to cultivate farms in the remote upland areas which have been left generally idle. The researcher tried to understand why they decided to do so in spite of the general perception that it was more labourious in going to and from the farms, still dangerous to go to these areas because of the continued presence of the NPAs, and that the soil in the area was more degraded. The reply was in a sense pragmatic: *"Why join the scramble for land near the highway when there is much available up there in the mountains? If you will not sow, you will not reap. Those who said it takes more time and effort, they are just being lazy. On those who fear the NPAs, they are just being coward. Life is always a risk, right? Just share with them whatever you have and everything will be okay. And contrary to what most people think, the soil there is even better after not having been cultivated for such a long time."*

Secondly, some others decided to seek alternative income from non-farm sources. *"With the present situation, we can no longer depend solely on farming. We have to seek somewhere else for income to support our family,"* said a couple who expressed pessimism on the future of farming in the area. Working as hired labourer in others' farm was common. Generally, they were paid in cash but those who could not afford bargained to share the harvest with the hired labourers. Opportunities for hired farm labour though was considered infrequent since only very few were capable of paying. Thus, local people seemed to have taken almost any other conceivable means of earning money, e.g., peddling bread and fish, carpentry, providing manual labour when needed by local traders, joining the military and para-military forces, and running for public office in the barangay level. The women were especially looked on to as significantly contributing to household income. Grown-up daughters were encouraged to work as household helpers, sometimes as near as in the poblacion of Pinabacdao or as far as in urban centres like Manila. Most teenage sons also went or aspired to go to the cities in search of menial jobs. The researcher met one of them who had just newly arrived from Manila and was recounting his experiences while conversing with a group of other teenage boys. As he said, *"Well, working there is not easy but at least I got to experience citylife. That's why I'm going back."*

Thirdly, the additional labour requirement was being met by maximising the contribution from individual family members. The wives claimed to have become increasingly assumed most of the tasks except ploughing which remained to be considered a heavy task and only fit for men. Since most of the grown-up children had left to work elsewhere, only the young ones were available to assist their parents. Even pre-school kids were already brought along to the farm not only because nobody would watch over them in the house, but so they could also perform some of the simple tasks, e.g., carrying small farm implements, watching over the field. Those already in school would even be asked by their parents to skip a few days of class when there was so much work to do in the farm. As the teachers in the local elementary schools noted, the rate of absences would be unusually high during the peak planting and harvesting seasons.

In all, local people's response to the problem situation, as seen from the above-mentioned examples, was characterised by attempts to merely cope or avoid having to deal with the problem situation, rather than of addressing it head-on to seek its improvement.

9.8 Intervention by the Government's Agricultural Extension Service

The municipal office of the DA was the primary government agency tasked at the field level to undertake intervention for agricultural development in Pinabacdao. The researcher sought information on the general background of the office and its specific field programmes and activities, as well as a historical perspective of intervention in local soil resource management in the Pinabacdao uplands. The information were obtained from the agricultural staff themselves and cross-checked with local people.

In the 80s, the municipal DA office had been staffed by a municipal agricultural officer and six agricultural technicians. The actual number of technicians in service though varied from one time to another because of the frequent reorganisations and turnover of field staff. Also, Western Samar has been characterised by a low presence of the government's agricultural extension service. Available data from the DA indicated an estimated ratio of 1 field extension worker per 1,354 hectares of agricultural land in the province.

In the staff interviews, the researcher discovered that the upland barangays of Pinabacdao were in the past generally excluded from the DA's official area of coverage. Prior to 1989, the main focus of agriculture extension in Pinabacdao were the rice farmers in the plains. Of the southernmost upland barangays, only Nabong, Lale and Parasanon had a technician officially assigned by the DA since these barangays had small portions of plains on which rainfed rice was grown.

It was only towards the beginning of 1990 when the DA began to expand its geographic coverage to include other upland barangays in Pinabacdao. The technicians' areas of assignments were modified such that each of them worked in about four contiguous barangays which were a mix of plain and hilly areas. A typical area of assignment then was one highway barangay plus three adjacent but interior barangays. While this effort was notable since it finally recognised the need to reach out to upland farmers, still a distinction was made by the DA between the priority and radiation barangays, indicating the different degrees of importance attached to the two types. Under this new set-up, four technicians were assigned to serve the southern part of the municipality, including all six upland barangays covered later by IRCP.

However, the implementation of the Local Government Code in 1991 again brought major changes in the field activities of the DA. In the new decentralised set-up, the local DA office was devolved to the municipal government, thus it was renamed as municipal agricultural office (MAO). As recalled by the staff, field activities were almost at a standstill during the transition period in 1992 immediately after the code took effect, since as they said, *"We felt like being caught in a tug-of-war between the regional DA office and the local government units"*. According to them, there was a lot of confusion due to the lack of clear implementing guidelines in the government reorganisation. As one technician revealed, *"We were not properly briefed on our new duties and from whom we should take orders."* Rumours of staff retrenchment and budgetary cuts all the more made the staff seriously concerned about the possibility of losing their jobs and thus discouraged them from continuing field activities because of their uncertain employment status.

Even before the ongoing government reorganisation, the government extension service had already been frequently disrupted. A local barangay official described this, *"One time, somebody came and introduced herself as the newly assigned technician, but after only a few visits she just stopped coming. Then a few months later, another one came saying she was the replacement of the technician who resigned. But just like the former, it took only weeks before she also disappeared like a bubble."*

The staff blamed this on the frequent reorganisation within the department which led to the transfer of field personnel from one area of assignment to another. Others just simply resigned after only weeks or months in service. According to them, those who quit work did so for many different reasons, such as the:

- low salary (less than P5,000⁷) and usually released several months late;
- heavy workload arising from the work targets set by the higher DA offices; and,
- difficult working environment in Pinabacdao because of the physical distance, mountainous terrain, poor accessibility and constant security threats.

Bureaucratic constraints in the hiring of new personnel resulted in delayed replacements for the vacant posts. With this frequent suspension of DA extension services due to the lack of agricultural technicians, there seemed to be a general dissatisfaction with DA's performance among local people, as well as distrust for agricultural technicians. The researcher even noticed that local people openly expressed such opinions even in the presence of the agricultural staff. The technicians though admitted awareness of this negative public perception but as they also said, those at the top of the bureaucracy should be blamed saying, *"Who are we in this government to effect change? We're just ordinary employees to follow instructions from above."* In a private conversation, one of them even confessed that she stayed on the job simply because she could not find another one. But should there be a better one, she would not have second thoughts of leaving.

Box 9b. Local people's response to the DA extension service.

The farmers' negative attitude towards the DA is most evident when a newly assigned technician comes to the barangay and recruits farmers to participate in an activity or join an organisation. DA staff would complain that farmers are apathetic to such initiatives. Farmers however point out that it is useless to join such DA-sponsored activities because they know that just like in the past, these would die a natural death once the technician resigns or is transferred. This tendency is locally called *ningas-cogon* referring to its similarity with dried cogon grass which when burned, easily develops into a big fire but is also extinguished only in a matter of seconds after being ignited.

At the time of fieldwork, the researcher met only two technicians in the field. They were also the ones identified by local people to have continued conducting occasional farm visits in the area, usually once in two weeks. According to the technicians, another one was supposed to be assigned in the area but the vacant position had not been filled yet because of both budgetary and administrative problems. Farmers described these visits as being mainly in the form of courtesy calls to the barangay officials and other community leaders, or incidental conversations along the road. Moreover, they only met those with farms or houses near the highway since they rarely take time to visit those in the interior, mountainous portions. Such quality of extension service was confirmed by IRCP staff who were in the area long enough to take note of the technicians' field activities. As alleged by different key farmer informants, the technicians' visits become more frequently only when it was time for them to be evaluated by their superiors or when visitors were expected to come to the area. In such cases, technicians would approach in advance farmers whose farms had healthy crops and ask them to prepare because the visitors or evaluators would be taken to their farms.

⁷approximately US\$ 185

Box 9c. The agricultural technician cum businesswoman.

Agricultural technicians often complain that their salary does not compensate for the work expected of them. This must be the reason why some of them have reportedly been moonlighting.

Farmers related the story of one technician who combined extension work with business. Because the nature of the job required her to make frequent house visits, this technician thought of a bright business opportunity, and that is peddling all sorts of goods as she went around the community. After discussing with the farmer or his wife about farm-related topics, she would start taking out from her bag various items for sale like jeans, blouses, kitchenware and many others.

The technician sold her goods mostly on credit. As such, some farmers reportedly often hid when the technician came to the barangay to collect the payments. Commented one farmer, *"I think she was already becoming more interested in following up farmers' debts rather than helping us with our farm problems."*

In spite of the agricultural staff's perceived shortcomings, farmers acknowledged their role in the introduction of at least two technologies -- swine raising and contour farming. At least 10 farmers in the six barangays claimed they were beneficiaries of a DA-sponsored swine dispersal programme. The scheme involved the distribution of sows to individual farmers who agreed to raise the animal until it started to produce offsprings. As a form of repayment, one of the offsprings was returned by the farmer to the DA and was in turn passed on to another farmer under the same repayment scheme.

Contour farming was first introduced by the DA in 1989 in Laygayon, Pahug and Lale. The technicians established a demonstration farm in each barangay to showcase the technology. They also selected farmer-cooperators whom they trained and assisted in establishing contour farms. The DA recommended various contour hedgerow species. These include nitrogen-fixing trees like ipil-ipil (*Leucaena leucocephala*) and kakawate (*Glericidia sepium*), cash/food crops like pineapple and multipurpose species like *setarya* which was also used as animal feeds. At first, free seedlings and planting materials were distributed by the DA to interested farmers. Later, to provide a continuous source of planting materials, the demonstration farm was likewise used as a propagation plot. The main problem, however, as recalled by those living near the demonstration farm, was that since the technician rarely came to visit the barangay, the hedgerow crops were not maintained. Some farmers initially volunteered to water the plants and do weeding but later nobody continued doing take care of them. As the demonstration farm ran out of supply of planting materials, nobody cared to replant. Much later, the technicians were either transferred or resigned; without somebody taking over to provide extension service, the already initiated effort to introduce contour farming failed to be sustained.

The DA's introduction of contour farming seemed to have created minimal impact since many of those the researcher interviewed even claimed not to have known of such innovation or even noticed the demonstration farm. The practice thus did not achieve the multiplier effect intended by the DA staff. As recounted by those who remembered the project, contour farming did not spread beyond the two or three farmer cooperators in each barangay. When the technicians stopped visiting them, even the farmer cooperators admitted that they simply lost interest to continue. Two of the farmer-cooperators with whom the researcher spoke cited the following reasons why the innovation was not successfully introduced:

- lack of planting materials since nobody took the initiative of maintaining the communal propagation plots, especially after the technicians ceased working in the area;

- lack of motivation to sustain the practice since without the technician, they had nobody to ask for assistance or advice, especially that contour farming was perceived as an entirely new and rather complicated practice for them; and,
- misperceptions of fellow farmers about contour farming and their lack of appreciation of the benefits that may be derived from it.

From the interviews with various groups of local people in the barangays where contour farming was introduced, it seemed that there was already a general awareness of the practice but very few were able to describe it in detail nor identify the steps involved. The general reply was, *"All we remember were those rows of ipil-ipil planted like belts around the mountains."* In the other barangays where contour farming was not introduced by the DA, even fewer individuals heard of it nor of any other practice deliberately adopted to control erosion or restore fertility.

9.9 Intervention by IRCP

The upland barangays of Pinabacdao had very minimal experience with external intervention. None of those interviewed could recall any other government or private agency conducting activities to promote agricultural development in the area. Not until the implementation of the Integrated Root Crops Program (IRCP) in 1990. As a prelude to the succeeding sections, a brief historical sketch of the programme is first presented below.

The establishment of the national root crop research and development programme in the Philippines was made possible primarily through the funding support by the International Development Research Centre (IDRC) of Canada. IDRC played a key role in the institutional development of the Philippine Root Crop Research and Training Center (PRCRTC), a national research center based in ViSCA and established in 1976. According to the PRCRTC director, IDRC was one of the centre's major donors, providing massive support to the root crop R&D programme through grants for infrastructure development, manpower training and programme implementation. In the director's words, *"Without IDRC, PRCRTC couldn't have accomplished as much as what you can see now"*. IDRC is a public corporation created by the Parliament of Canada in 1970, and is guided by an international Board of Governors. Through support for research, IDRC assists developing countries in creating their own long-term solutions to pressing development problems. It has seven regional offices throughout the world, with its Southeast Asian Office located in Singapore.

In 1981, IDRC approved its first major research grant to ViSCA and PRCRTC, the Sweet Potato Improvement Program. Its general objective was to produce and release sweetpotato varieties possessing the characteristics desired by Filipino farmers and consumers. The programme was undertaken by a multidisciplinary team of researchers including a plant breeder, geneticist, agronomist, plant pathologist, postharvest physiologist and home economist. Additional funds were provided by IDRC in 1983 for the second phase of the programme, this time incorporating a component on marketing and economic feasibility studies.

By 1988, the programme had developed six varieties, named VSP (ViSCA Sweet Potato) 1 to 6, and approved by the Philippine Seedboard for release. It was at that time hailed as one of the most successful research programmes in the Philippines. Although IDRC was delighted with the results, it realised that the real impact of the breeding programme is the consequent adoption of the developed varieties. IDRC echoed Javier's (1981) earlier idea that *the ultimate measure of the success of a breeding programme is not the number of varieties approved and released by the Philippine Seedboard but rather the hectareage devoted to the released varieties and the incremental benefits arising out of their usage by farmers.*

Box 9d. Breeding for improved sweetpotato varieties in the Philippines.

The Sweet Potato Improvement Program in the Philippines was launched in 1981 with the official objective of producing and releasing for cultivation new sweetpotato varieties possessing most, if not all, the characteristics preferred by farmers and consumers. Through a specialised polycross hybridisation technique, the research programme produced 82,000 plant genotypes. The promising crosses were entered into regional trials in various agroclimatic locations in the Philippines, resulting in the approval by the Philippine Seedboard of the first set of VSP (ViSCA Sweet Potato) varieties.

One of the initial constraints encountered by the research team was on defining the breeding objectives. The researchers found out that this preliminary phase in variety development was rather complicated given the diverse and contrasting preferences of technology users. Saladaga (1989), who headed the research programme, described the dilemma in deciding on breeding objectives:

The first issue was on the breeding objectives. Farmers and consumers differed in preferences from province to province and even from one locality to another. There were two large groups with almost opposite needs, i.e., the farmers who grow sweetpotato for the market need varieties whose characteristics are markedly different from those required by farmers who plant sweetpotato mostly for home consumptions in situations of highly sloping land in subsistence agriculture systems.

Then there were variations in preferences for taste, skin colour, flesh colour and root shape from locality to locality. One could therefore list more than fifty different breeding objectives even after classifying the target groups.

Inspired by the earlier success of the breeding programme, as measured by the number of new varieties produced, IDRC offered additional funding support for a third phase, this time emphasising technology transfer to achieve wider dissemination and adoption of the developed varieties. In the planning workshop attended by ViSCA researchers, IDRC programme officers impressed upon them that the success of the third phase was considered crucial for IDRC to demonstrate to the international community its contribution as a donor agency to the upliftment of the lives of people in the Third World, and in particular to the development of the root crop industry in the Philippines.

Thus, the Integrated Root Crops Program (IRCP) was born in July 1989 with a total funding of P21 million⁸. Its overall objective over a three-year period was *to improve the income and consequently the standard of living of subsistence rural households in the Philippines through the adoption of improved technologies in root crop production and processing.*

To start the programme, a pilot site had to be selected which was intended to showcase the socioeconomic feasibility of the root crop technologies and to serve as a site for further adaptive studies. The selection criteria for the pilot site set by IRCP included: 1) root crops should be predominant in the farming system; 2) the community is composed of small, subsistence farming households; 3) located in extremely depressed areas of the Eastern Visayas region; and, 4) must not have been a recipient of any previous major agricultural development programme. Through a series of reconnaissance surveys, Pinabacdao was finally selected. Besides fulfilling the set criteria, its other plus factors include its accessibility to transport, since the national highway cuts across the municipality, and its relatively close distance to ViSCA, about 140 kilometres to the north.

⁸approximately US\$ 777,778

As a basis for intervention planning, a rapid rural appraisal (RRA) was first conducted by an interdisciplinary team composed of biophysical and social scientists in late 1989. As the RRA report (Dagoy et al, 1990) indicated, *it was conducted to provide an adequate and speedy understanding of the project site, especially the root crop farmers and their practices as input in decision-making, project planning, implementation and evaluation.* Given the commodity orientation of the project, the RRA specifically focused on farming problems related to root crop production, processing and utilisation. The results indicated that low production and income were the dual concerns underlying the specific problems expressed by local people. The RRA report presented to IRCP a set of major problems identified and the corresponding recommended types of innovation.

Box 9e. RRA results and recommendations (Dagoy et al, 1990).

<u>Problem</u>	<u>Recommendation</u>
<ul style="list-style-type: none"> • lack of working animals thus limiting the production efficiency of farmers • lack of access to planting materials of recommended root crop varieties • lack of technical knowledge due to poor coverage by agricultural extension services • declining soil fertility brought about by intensive cropping system, climatic pattern and lack of soil conservation practices • low income derived from root crop farming because of marketing constraints • frequent typhoons posing risk to the cultivation of other cash and perennial crops • tenurial insecurity given that majority of farmers were landless 	<ul style="list-style-type: none"> • provision of access to sources of financial support for acquiring draft animals • establishment of a mechanism for the multiplication of planting materials of improved varieties • improving access to extension and other agricultural support services • adoption of proper soil management measures • introduction of alternative uses of root crops • conduct of verification and adaptation research on root crop technologies

While the project was limited to root crops, the RRA team emphasised the importance of integrating soil resource management in the innovation that IRCP would introduce. Quoting from the report (Dagoy et al, 1990): *"Considering that root crop farming was also crucially affected by soil fertility, soil conservation practices should be an integral part of the technologies that should be disseminated. Soil conserving technologies include planting of hedgerows, cover crops and legumes, and strip and contour farming."* The plant breeders in the IRCP research team were particularly concerned on this since they knew that while the VSP sweetpotato varieties produced high yield in research stations where they were developed and in lowland farms where they were initially introduced, these varieties have not been shown to perform just as well under marginal upland soil conditions such as those in Pinabacdao.

9.10 From an Innovation in Root Crop-Based Food Systems to Soil Resource Management

The chapter has so far introduced IRCP as a development intervention applying an integrated approach to introduce innovation in root crop-based food systems. This section describes the changing nature of innovation introduced by examining how the field staff learned to view the problem situation from the perspective of local people. It describes the IRCP's shift in focus from root crop-based food systems to soil resource management.

Although the RRA results clearly indicated the complex problem situation in the Pinabacdao uplands, IRCP remained sharply focused on achieving its *raison d'être* which the project management defined as *to transfer mature root crop technologies developed by PRCRTC/VISCA to subsistence farmers in the Pinabacdao uplands*. In deciding on which technologies to introduce, as one IRCP research leader revealed, the usual key question raised in project meetings was, *"Was this technology developed through IDRC-funded research?"* which indicated the priority given by IRCP to promote the interest of the donor agency.

The nature of innovation which the IRCP initially decided to introduce in Pinabacdao took a food systems approach in the sense that it consisted of a set of technologies spanning the entire production-processing-utilisation chain, specifically:

- new varieties of root crops, i.e., sweetpotato, cassava, taro, yam;
- cultural management practices, i.e., land preparation to harvesting;
- processing of root crops into food products; i.e., flour and bakery products; and,
- processing of root crops into animal feeds; i.e., for poultry and swine.

Among the above, however, the new varieties composed the first root crop technology introduced immediately after the field staff was deployed to the project site. As recalled by the technical staff, the decision at that time to prioritise the introduction of the newly developed root crop varieties was based on the following assumptions:

- it would solve the shortage of planting materials in the area;
- planting the high-yielding root crop varieties would lead to increased production and consequently more income;
- high and regular supply of root crops needed to be attained first prior to introducing processing technologies; and,
- the sweetpotato varieties were ranked first by IRCP in terms of the *mature* technologies developed through IDRC-funded research and ready for dissemination.

The introduction of new root crop varieties was done through three interrelated approaches. Firstly, the establishment of a demonstration farm adjacent to the staff house and strategically located near the highway for easy visibility by passersby. Various varieties of sweetpotato, cassava, taro and yam were grown on small plots to demonstrate their high-yielding character in comparison with local cultivars. Secondly, the conduct of farmers' trainings to teach farmers on the features of the varieties and their recommended cultural management practices. The trainings were supplemented by field trips to PRCRTC/VISCA and other root crop growing areas. The purpose was for farmers to see first-hand pilot production and processing projects already in operation. Thirdly, the selection of farmer-cooperators to serve as model root crop farmers in their respective barangays. They were given free planting materials and assisted by the field staff in following the recommended cultural management practices.

The end of the first cropping season was supposed to be the opportune time for the IRCP to finally convince the local people on the merits of the new varieties through concrete proof from the yield obtained in both the demonstration farm and in the farmer-cooperators' fields. On the contrary, the results proved the IRCP wrong. The plants grown in the demonstration farm had stunted growth and many even failed to survive. Those plants which managed to last until the harvest period yielded so low and produced roots so small they would not meet market standards.

The researcher tried to obtain actual yield results but no such secondary data were available. Instead, one of the former field staff related the experience, *"It was difficult to gather significant data since there was barely any yield at all. That was really unfortunate because farmers were already very eager to know the outcome. Everybody was frustrated -- the staff because of all the efforts we exerted and the local people who thought that an answer to their production problem was finally in store."* The poor results were even more obvious in the case of farmer-cooperators who chose to plant the new varieties and the native cultivars side by side. The scheme allowed them to compare the yield between the cultivars, e.g., *kaangi*, *inanahaw*, *karingkit*, and *kinampay*, and the supposedly high-yielding VSP varieties. One of the farmer-cooperators recalled, *"While it's true that the yield of the native varieties were low, at least we were able to harvest something and provide food on the table for weeks. But in the case of the VSPs, the roots were only a little bigger than my thumb."*

The result was a severe blow to the project's goal of encouraging farmers to adopt the new sweetpotato varieties to substitute for the native cultivars. The demonstration farm, which was supposed to be a showcase for growing root crops productively instead turned out to be a living (or perhaps more appropriately, dying) testimony of the insistence of intervening agents to impose their view of the problem situation while giving limited value to the perspective of local people concerning the primary importance of the soil degradation problem, as made clear in the RRA.

Nevertheless, such initial failure did not totally discourage the IRCP from continuing project implementation. As one of the project leaders pointed, *"This is an extension research and so we are supposed to evolve an effective intervention mechanism in the course of project implementation. Experiencing failure is part of the learning process."* Instead, a thorough review of the experience was made with both the field staff and technical researchers trying to identify what went wrong. The assistant overall coordinator of IRCP recalled that three factors were identified as having contributed to the poor performance and yield of the new root crop varieties.

Firstly, the high-yielding character of improved root crop varieties was mainly demonstrated under favourable growing conditions but no sufficient research has been done yet to prove that the same results would be obtainable in upland conditions. On the other hand, the native cultivars grown in Pinabacdao may not be high-yielding but these were already adapted to the local agroecological situation. Secondly, a drought period extending for several months hit Pinabacdao during the cropping season in which the new root crop varieties were planted. The poor timing was unfortunate although the IRCP staff recognised that such climatic variations were not rare in the uplands and therefore should be taken into serious consideration in the context of Pinabacdao;

Thirdly, the stated potential yield of the new varieties were calculated on the assumption that all corresponding inputs and recommended cultural management practices followed. The research leader of the sweetpotato breeding team in particular acknowledged that the varieties were bred with a commercial production system in mind. However, as the field staff observed, farmer-cooperators decided not to follow the recommended practices because these required more inputs than what they were willing to invest in root crops. Without commercial fertiliser application, as what many of the farmers did, the new varieties could not be expected to realise their potential yield, the field staff explained.

The significant impact of the experience then was not so much on the farmers but on the IRCP staff themselves as this led to a reassessment of the project. As deliberated in the subsequent project meetings, it illustrated the limitations of a commodity-focused intervention because it had promoted a narrow perspective of the problem situation by only looking at the root crop-based food system without paying as much attention to the natural resource context in which it operated. Secondly, as the programme coordinator pointed out, the experience taught them the importance of having to balance donor interests and actual field conditions. IRCP was bound to follow the terms of reference as set in the project document drawn by both IDRC and ViSCA. Yet, IRCP was seeking for space to manoeuvre in order to adapt the innovation to actual field circumstances. This meant having to do more than just the transfer of root crop technologies but also to address natural resource concerns, as these put major constraints in the introduction of the innovation which IRCP was ultimately envisioned to introduce.

There were major issues that had to be tackled though. From the IRCP management perspective, addressing the problem situation in soil resource management had budgetary repercussions since no funds were originally allocated for this. This meant having to realign the existing overall budget in order to accommodate the corresponding changes in funding requirements for staffing, supplies and field support. From the field staff's perspective, dealing first with improving soil management before introducing root crop technologies not only meant additional tasks but also a greater challenge to accomplish the target outputs of the IRCP within the specified project duration of three years.

However, in the end the IRCP finally opted for a radical redefinition of the project's objectives and priorities. As the team leader of the field staff emphasised, there was no choice but to tackle first soil degradation since without it, introducing the improved varieties would be bound to fail. This change in project outlook was evident in the project documents and reports which revealed a shift in focus:

- from approaching the identified farmers' problems *individually or sequentially* based on the priorities set by the IRCP, to devising solutions in an *integrated and coordinated* manner;
- from a preoccupation with *specific root crop technologies*, to *root-crop based farming system* which indicated a more holistic view of innovation; and,
- from viewing root crop production merely as a function of *new varieties and recommended cultural management practices*, to a natural resource management perspective that integrated concerns for *soil rehabilitation*.

The most concrete step as regards the reshaping of the innovation was the integration of soil management as an essential component of the root crop-based farming system. Given the generally lack of existing measures done by local people to directly confront soil degradation, the IRCP decided to introduce an innovation that not only promoted enhanced root crop production but also the maintenance of the productive capacity of the soil resource. For the first time, a soil science specialist was recruited to join the technical research staff to help guide in improving the problem situation in soil resource management. The field staff were also sent for training and field visits in other projects and agencies which were involved in addressing similar problem situations.

Finally, the IRCP decided on introducing contour farming patterned after the Sloping Land Agricultural Technology (SALT) developed by an NGO working in southern Philippines called the Mindanao Baptist Rural Life Center (MBRLC). SALT was originally developed in response to a need expressed by upland farmers in Mindanao island who were alarmed by failing production and deteriorating soil conditions. The choice of SALT was made by the IRCP after considering its successful replication and adaptation in other areas in the Philippines. The field staff were encouraged to do so after personally visiting other projects which demonstrated how contour farming made

visible improvements in upland areas with soil conditions much worse than those in Pinabacdao. Such an observation supported MBRLC's own records (Watson and Laquihon, 1992) showing that between 1980 and 1990, a total of 10,660 people in 440 groups, both locally and internationally, were trained on SALT. In the Philippines alone, a total of 31 organisations nationwide were reported to have successfully adopted and promoted the contour farming innovation.

Box 9f. Basic principles and steps involved in SALT.

As a land-use system, SALT has four objectives (Tacio, 1992):

- to minimise soil erosion;
- to restore soil fertility;
- to produce sustainable food; and,
- to generate income for the upland families.

SALT involves a set of ten general steps, such as (MBRLC, 1988):

- Make an A-frame.
- Locate the contour line.
- Prepare the contour line.
- Plant seeds of nitrogen-fixing trees.
- Plant permanent crops.
- Cultivate alternate strips.
- Plant short term crops.
- Trim nitrogen-fixing trees.
- Practice crop-rotation.
- Build green terraces.

Replicated trials have shown that SALT can be more productive than traditional cropping systems. At the same time, it dramatically reduces soil loss. Studies conducted at MBRLC showed that traditional farming has a soil erosion rate of 194.3 tonnes/year over six years in contrast to only 3.4 tonnes/year on a SALT farm (Tacio, 1992).

9.11 Adapting the Intervention to the Changing Nature of Innovation

After having described the changing nature of innovation, this section examines how IRCP realised the need to redesign its intervention approach to effectively support innovation for soil resource management.

The IRCP field staff was originally composed of a team of four community organisers with academic training in plant breeding, agronomy, animal science and agricultural economics. They were backstopped by an interdisciplinary panel of about 40 senior scientists of ViSCA representing different agricultural disciplines in both technical and social sciences.

IRCP stressed integration as its key project approach. Its integrated nature refers to the various disciplines involved (ranging from biological to social sciences), the package of technologies introduced (from production to utilisation), the household perspective (participation of different family members), and the complementary forms of intervention used (from working with individual farmers to community organising).

In the initial months of the programme, the IRCP intervention was characterised by the following general approaches:

- **Demonstration farm** - A 4.5-hectare area surrounding the field staff house was used as a demonstration farm where various root crop technologies were showcased. It included the various new root crop varieties, cultural management practices and animal production using root crop-based feeds. The demonstration farm was maintained by the field staff.
- **Training** - Upon request from the field staff, an IRCP training support team conducted trainings on various topics related to root crop production, processing and utilisation. The trainings were conducted either on-site or in VISCA. The trainings were supplemented by field trips and cross-visits to other root crop pilot projects. Each training normally had about 20 participants.
- **Model farmers** - From among those trained, the field staff arranged with some interested participants for the latter to serve as model farmers to try out in their individual farms the root crop technologies they learned. These model farmers may also be volunteers or selected by a group of participants to represent them. IRCP field staff provided these farmers more intensive support in terms of technical assistance in following the recommendations and. Since these generally dealt with new root crop varieties, model farmers were given priority in the distribution of planting materials.
- **On-farm research (OFR) cooperators** - A variant of IRCP's model farmer approach was on-farm research. While the former emphasised mature technologies, the latter focused on adaptive and field research to verify the suitability and make modifications in technologies developed on-station. Thus, OFR cooperators were expected not only to try out technologies for themselves but assist in the collection of data in monitoring and evaluation for research use. The cooperators provided the labour input; IRCP supplied them with material inputs on condition that these were paid at harvest.
- **Community organising** - Since root crop processing and utilisation technologies, e.g., flour and feeds processing, were designed mainly for village-level rather than household application, it was necessary for IRCP to organise local people into groups through which such technologies were introduced. Since most of the pilot barangays already had existing community organisations usually formed by the DA, the IRCP staff decided to work through them rather than establish new ones. Two active organisations were strengthened while three were revived. In one barangay with no previous organisation, a new one was established. These organisations were assisted by IRCP in establishing root crop-based processing livelihood enterprises.
- **Communal farming** - One of the income-generating activities of the community organisations was communal farming. The term is loosely used in IRCP to refer to the practice whereby a group of farmers decided to form small groups and pool their labour and other input resources and jointly cultivate a common piece of land planted to root crops. The area may be owned/tenanted by one or few of the members, but were generally left idle by absentee landlords. After the harvest was sold, the net profit was then divided by the members. The number of members in each communal farm ranged from 3 to 12.

However, in line with IRCP's decision to integrate soil resource management in root crop production, the purpose of the demonstration farm was converted from showcasing new root crop varieties to demonstrating a root crop-based farming system characterised by an intercropping/crop rotation of root crops, legumes and other crops, as well as the establishment of contour hedgerows. The transformation of the demonstration farm must have caught the attention of local people since, as

the field staff reported, many passersby stopped and inquired from them what the unusual farm appearance was all about.

Meanwhile, two batches of farmers were trained on contour farming. The training module centred on the steps involved in SALT. According to the training staff, post-training evaluation results revealed a high memory recall of the learning content among trainees. And yet even with the positive training results, only about 10 of the 62 farmer-trainees signified immediate and serious interest to follow contour farming.

In addition to the demonstration farm and training approaches, the field staff sought to identify model farmers for contour farming. According to the team leader of the field staff, it was difficult to recruit farmers who were interested and willing to do so. Most of the former model farmers who had been discouraged by the initial failure of the root crop varieties were already hesitant to try again. Those who attended the training said that they would like others to try first and only then would they follow after seeing the results. After the field staff personally convinced and followed up some farmers, finally 15 of them agreed to serve as model farmers for contour farming.

Table 9h. Number of initial contour farming cooperators.

Barangay	Number
Parasanon	2
Laygayon	3
Madalunot	3
Pahug	2
Lale	2
Nabong	3
Total	15

Source: Field staff, pers comm

The initial lukewarm response of local people to contour farming seemed to disappoint the field staff. *"Convincing them became more difficult especially after their unpleasant initial experience with the VSPs."* As they observed, a lot of people were curious and interested in contour farming as shown by the number of those who inquired from them, however they were hesitant to actually try it. In succeeding months, instead of increasing, the number of contour farmers further reduced since one became too ill to work while another went on an extended trip to Manila.

According to the staff, at that time they did not fully understand why the rate of adoption of contour farming was low when they thought that firstly, the innovation involved only 10 simple steps already learned during the training and personal discussion with the field staff; and secondly, the farmers themselves openly expressed serious concern regarding the problem of soil degradation. *"We realised that something was wrong with our strategy and we wanted to know what it was,"* a former field staff said.

It was in the beginning of 1992 when the field staff began to discover the reasons for what they feared could be another failure in project implementation. Based on their informal discussions with both model farmers and the rest in the local community, they realised that:

- Contour farming was perceived to involve high risk since it required major modifications in the entire farm. Unlike new varieties or cultural management practices which as component technologies could be easily integrated into their existing farming systems, contour farming meant changing the cropping pattern, cultivation schedule, labour requirements and other inputs. Farmers were apprehensive that should the innovation fail, it would have serious impact on their livelihood.
- There was a lack of appreciation of the benefits derived from contour farming. It was perceived as only adding unnecessary work while making the farm look cluttered. The field staff were persistently asked, *"Why grow those weeds?"* in obvious reference to the hedgerows. In addition, many farmers did not see how contour farming may help improve farm productivity when as they pointed out, no immediate significant improvement had occurred in farms already adopting contour hedgerows.
- Those who served as model farmers tended to have a more general perspective of agriculture, expressing greater and frequent concerns about the environmental consequences of their farming activities. They also voiced out their worries about the future of their children unless something was done with soil degradation, in a way reflecting a longer-term view of their livelihood. As the model farmers themselves recalled, they used to engage in heated discussions with other farmers, especially during wine drinking sessions, where the latter would insist that nature could take care of itself or that they should worry first about their present problems rather than face those which are still in the future.
- As the team leader of the field staff recalled, that realisation was another turning point in project implementation. *"It seemed that the more we worked with local people, the more we learned from them,"* he said. Thus began the task of redesigning IRCP's intervention approach, in line with the emphasis on managing natural resources for sustainable root crop production.

They realised that to introduce contour farming as an innovation, they need to do more than just transfer a technology. One staff recalled how hard it was to promote a practice like contour farming because there was no concrete and immediate proof of the benefits that farmers may derived. According to her, it was much easier to introduce sweetpotato varieties because the results were more tangible and therefore easily appreciated by local people. *"We soon found ourselves talking like environmentalists, conscientising people and even having to argue with them at times. Besides we were no longer talking in terms of a particular crop, we were trying to make people change their entire perspective on farming and its relation to the natural ecosystem."*

Other aspects of the IRCP intervention also took place. To reduce the perceived high risk of contour farming, the field staff thought that it might be better to introduce the innovation through communal farming which was already used as an income-generating strategy by IRCP. Previous experience already showed that most farmers considered communal farming as a good way to minimise risk especially for those who were reluctant to immediately try an introduced technology directly in their own individual farms. Other farmers had told the IRCP staff that communal farming not only served to augment their income. In addition, it also served as mechanisms through which the members adopted an innovation through joint learning and shared-risk arrangement.

Box 9g. Common views expressed by model farmers on soil resource management.

Model farmers, according to the field staff, tended to be more seriously concerned with the need to act in response to the problem situation in soil resource management. Typical examples of views expressed by them were:

"I'm afraid that there will come a time when there will be no more land to transfer to because they are all degraded."

"We cannot just continue on receiving and receiving from nature. We must also give back something in return like taking care of the soil."

"By transferring from one area to another, it is like escaping from our obligation to restore the damage we have caused to the environment."

The researcher noted that most members of contour farming groups were women. When some of them were asked why, *"Because we enjoy working together. Women are known to be talkative and the communal farm is proof of that. Look at those women, they're busy both working and talking. Besides our husbands have no time because they are working in the field."* Given the active participation of women in communal farming, they were in a way providing a linking role between the larger community group and their individual households. One female leader of a communal farming group mentioned that several women reported of not only helping their husbands earn additional income from the harvest of the communal farm, they frequently relayed to the latter what they learned from participating in communal farming. The frequently cited examples of these were on trying new varieties or crops especially because the communal farm became an accessible source of planting materials for them.

Since most of the contour farms were on sloping areas, these became suited for the field staff to suggest that contour hedgerows be established. After two or three cropping seasons when the members were already somewhat convinced of the benefits of contour farming, some of them decided to do the same in their own farms. Others even decided to quit and concentrate in their individual farms, thus often leading to the break-up of the group. However, the field staff immediately pointed out that it was an indication that individual farmers were already ready to independently engage in contour farming.

Box 9h. Communal contour farming.

Pedro of Laygayon works as a tenant of a one-hectare plot owned by a Tacloban-based businessman. However, for lack of a working animal, he is only able to cultivate one-fourth of the total area in one season. As a shifting cultivator, this is just fine with him since it also allows him to move from section of the plot to another during fallow periods. He grows corn, sweetpotato, cassava, banana and taro in his farm.

Pedro first heard about contour farming from a DA technician but it was only when he attended an IRCP training that he fully understood what it was all about. He thought that contour farming could be the answer to soil erosion which plagued his sloping farm. Although he seriously considered trying the practice, he was not really sure if it would work in his farm. Besides, he needed additional manpower in establishing the contour farm.

Box 9h. Continued.

Thus, he decided to venture into communal farming by forming a group composed of himself, his father and three neighbours. The group chose a one-eighth hectare idle land located just across his house. Since it was newly opened, clearing work took about almost one week. One of the IRCP staff came to assist them in locating the contour lines and putting of the stakes. After two weeks, they started to plant *madre de cacao* (*Glercidia sepium*) and pineapple in double hedgerows. Meanwhile, the contour strips were planted to sweetpotato, cassava, corn and peanut. In the succeeding weeks, each of them took turns in the maintenance work of the farm, like weeding and replanting. That same year, IRCP launched a best contour farm contest throughout the six pilot barangays. Pedro's contour farm won the first place. The cash prize of P1,000¹ was equally divided among the five of them.

After the first cropping season, three of the members decided to separate and establish their own contour farms. At the moment, only Pedro and his father are left in continuing to cultivate the communal contour farm. He also plans of completely turning it over to his father so he could establish contour hedgerows in his own farm. Pedro says that the communal farming experience not only provided him with additional income but also enabled him to try the practice on a small-scale and trial basis.

Also at that time, there were already visible effects in the farms of the model farmers who established the contour hedgerows months before. Other farmers were slowly being convinced as they saw the levelling off of the soil on the contour strips thus forming mini-terraces, as well as the better growth and yield of crops. As to why it took them so long to be convinced, they immediately cited a common local expression, "*Well as they said, to see is to believe!*"

Realising that local people were already interested in the immediate benefits they would derive from contour farming, the field staff decided to suggest a wider range of hedgerow species especially those which not only functioned for soil management but also provided direct economic uses. Prior to this, the standard species recommended by the field staff were flamingia (*Flemingia microphylla*) and rensonii (*Desmodium rensonii*). To these were added ipil-ipil (*Leucaena leucocephala*) and pineapple because of the immediate benefits farmers may derive from them.

As more and more farmers were beginning to take interest in contour farming, IRCP soon faced a shortage of planting materials for contour hedgerows. The demonstration farm which doubled as propagation plant could no longer cope with the volume of requests from farmers. The exotic leguminous species had to be purchased from other areas, even as far as the southern island of Mindanao. As many other development projects were into contour farming, the demand for planting materials sent the prices skyrocketing. As one staff recalled, "*just as people were already coming to us begging for us to help them in contour farming, we were also experiencing a shortage of planting materials. As such, they often heard farmers saying, 'We just wasted our time. After all the effort preparing the land, now we're simply told that there are no planting materials available.'*"

The field staff, who described themselves as already in panic, ran to seek advice from the IRCP technical staff in ViSCA. At that time, the IRCP management was already calling the attention of the field staff for the huge amount already spent in purchasing planting materials of the hedgerow species. They were cautioned not to make it into a doleout scheme. Fortunately, another farming systems project implemented by ViSCA in Matalom (see Chapter VII) was also dealing with soil resource management in an upland area in southwestern Leyte. That project successfully adapted the

¹Approximately US\$

SALT technology to local conditions by using an indigenous grass species called *mura* (*Vetiver zizanoides*) which farmers in the area were known to have long used along the dikes of lowland rice fields for the purpose of holding the soil.

The technical staff suggested that IRCP could learn from the experience of that project by replicating the practice developed by Leyte farmers in a similar problem situation in Samar. The field staff took the suggestion enthusiastically especially after considering that *mura* grass did not have to be purchased since it abounds in many lowland, swampy areas and were observed to propagate easily. An initial test in the IRCP demonstration farm showed that *mura* grew well in spite of a dry spell, thus indicating the species' adaptability to the local conditions in the Pinabacdao uplands.

With the addition of *mura* grass, there came an even wider range of hedgerow species from which those interested to do contour farming could choose from. Even though the field staff were still called upon for help in contour farming, they soon discovered their standard recommendations, e.g., double hedgerow layout, specific species mix, were no longer dutifully followed by farmers. With more contour farmers to attend to, they were not able to closely supervise each one to check whether their recommendations were followed. In the end, they finally decided to let the farmers do what they liked, not only because it made work lighter for them but also because they realised the adaptations made were working just as well. Whenever additional farmers came for advice, they then told them, "*It's up to you, just take a look at the demonstration farm and pick the species which you like. You can also go and inquire from other farmers regarding their own experiences.*"

Box 9i. *Mura* grass as contour hedgerow.

Vetiver is a tall, wiry and perennial grass which is indigenous to tropical Asia. The plant's natural habitat are low-lying, swampy areas. *Mura* grass, as locally called in Matalom (the municipality described in the case study of Chapter VI), has long thrived along the dikes of lowland rice fields. Farmers allowed the grass to proliferate since it was observed to help prevent dike damage by holding the soil with its dense curtain of deep roots.

In the uplands, farmers have long been practising terracing to control soil erosion. Farmers however noticed that such a structural measure was not able to effectively control erosion especially during heavy rains. Having learned about the use of *mura* grass in lowland ricefields, farmers realised it would be a good idea to try planting them along the contour lines to act as barrier to the downward flow of eroded soil. Soon after farmers noticed the visible effects of the vegetative soil control measure, the practice spread throughout the upland area in Matalom.

In 1991, ViSCA researchers conducted field trials on *mura* contour hedgerows in Matalom as part of a farming systems project. With the promising results, the project staff decided to promote the practice while teaching farmers a more systematised way of establishing contour lines, which was in turn adapted from the Sloping Agricultural Land Technology (SALT) developed by the Mindanao Baptist Rural Life Center (MBRLC) based in southern Philippines.

In the introduction of contour farming, the innovation proceeded under three distinct conditions:

- inadequate external input of exotic leguminous species for use as contour hedgerows;
- a wider range of alternative hedgerow species identified and made available; and,
- IRCP allowing local people to make decisions and choices with regard to contour farming based on shared knowledge and experiences.

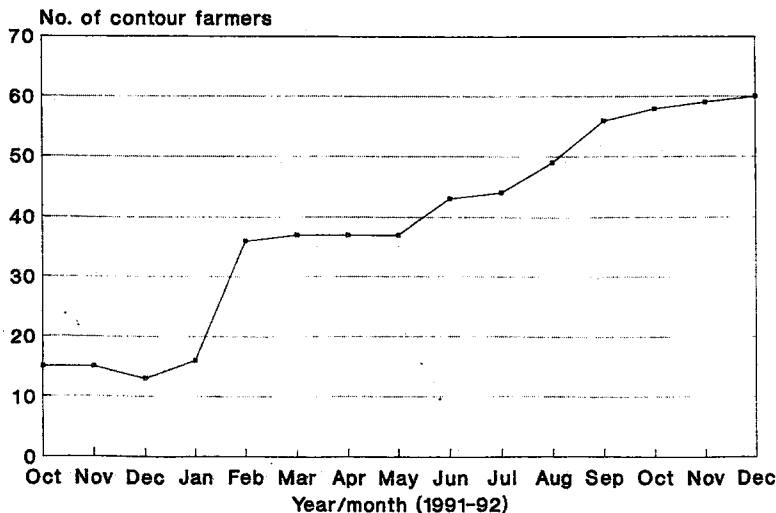
Thus farmers started experimenting with other types of hedgerows, and not only those already recommended by IRCP but also locally available species and other indigenous materials. The researcher for example was wondering why some cassava plants were left unharvested and instead allowed to stay on the ground for a longer time, thus making them inedible. He was told that cassava was almost equally effective as a hedgerow crop once it matures. When planted at closer spacing, the tubers helped hold the soil together. Others plant bananas as hedgerows while others put cut banana trunks or piles of cut weeds/grasses along the contour lines. A most convenient technique used by them is simply leaving the contour land unploughed so that strips of grasses, even including cogon, could grow and form a natural hedgerow.

Farmers also developed preference for certain species. In terms of effectiveness as soil erosion control agent, there seemed to be no common choice as farmers had their own favourites. Often, the choice was influenced by the individual farmers' own criteria. For example, madre de cacao (*Glericidia sepium*) was considered by some as doubly beneficial because aside from controlling erosion, this leguminous species helped promote soil fertility through leaf fall. Others liked *mura* grass because it was observed to be fast growing although some farmers feared it may serve as hiding place for snakes or rats. Although less effective, pineapple and ipil-ipil were also preferred by some because in addition to their hedgerow function, they also provide other uses, e.g., food and feeds.

Even the double hedgerow technique itself was not followed by all contour farmers. Some said that one row was enough in certain cases, depending on the planting distance and species used. Similarly, the distance between contour strips were adjusted by farmers according to the land slope.

Box 9j. Increase in number of contour farmers in IRCP barangays.

When contour farming was first introduced in the Pinabacdao uplands, IRCP had difficulty convincing farmers to try the practice. However, with the modified intervention approach used by IRCP starting in 1992, a steady increase in the number of countour farmers was noted.



Available secondary data showed that during the first few months of introducing contour farming, local people's response remained low. However, as the intervention approach of IRCP was changed, the number of contour farmers suddenly increased. The data available even excluded those who decided to follow contour farming but were from barangays outside the IRCP pilot area. Additionally, while the data referred to contour farming as *an* innovation, what was originally taught and recommended by IRCP had been modified and adapted by farmers into various forms to suit specific purposes. Thus, it was actually no longer relevant to talk of a single contour farming stereotype.

9.12 Consequences of the Innovation

As a whole, the IRCP was already able to enlist the participation of local people in the project. At the time of fieldwork in early 1992, a significant fraction of total households in the area were already identified with IRCP through various types of involvement.

Table 9i. Types of participation by local people in IRCP.

Participating Households	Number*	Percentage
members of organisations	102	22
OFR cooperators	48	11
model farmers	26	6
communal farmers	105	23
Total households	454	

*some households participate in more than one category

Sources: Dagoy et al, 1993; Laguna and Angelio, 1993

Although at the time of fieldwork, it was barely 20 months since contour farming was introduced, the different actors already attributed several consequences -- both direct and indirect -- arising from the innovation. These are presented and categorised below according to the different actors involved.

Contour farmers. This broad group covered farmers responding positively to contour farming although their responses were of diverse nature. On the whole though, the markedly improved soil condition -- less erosion and nutrient depletion -- noticed by contour farmers themselves led them to reconsider their original plan of closing the land and moving to another area. In other words, the innovation in a way facilitated a transition from shifting cultivation to a more permanent system.

Farmers explained that there seemed to be no need to leave their existing farms since crop yield had more or less stabilised, making it available for cultivation season after season. Moreover, visible results such as the levelling off of the soil on the contour strips and the darkening of the soil colour seemed to reinforced farmers' decision to sustain the practice. In addition, they revealed that while contour farming may be labour intensive during the establishment stage, such as clearing and identification of contour lines, it turned out to be labour-efficient in the long term. Explained one

farmer, *"In shifting cultivation, hired labour is needed everytime a newly opened area is cleared in order to loosen the soil and remove the weeds. With contour farming, very minimal cultivation is necessary prior to planting because there are less weeds and the soil is not compact."*

Some farmers though foresaw that by continuously cultivating contour farms, it may still be necessary to use supplementary commercial fertiliser. Especially those cultivating badly eroded farms, farmers said that contour farming was more effective as a preventive than as a rehabilitative measure. The IRCP was well aware of this and, in response, had started to conduct fertiliser trials as part of on-farm research. With permanent cultivation may also come the planting of perennial crops like trees. *"Fruits are expensive in the market so I'm thinking of planting more fruit trees around the farm,"* said one farmer.

The researcher tried to point out to landless cultivators and tenants that their lack of legal ownership over their contour farms may serve as a disincentive to make permanent or long-term investments. Farmers however did not see it as a serious problem, at least for them in the Pinabacdao uplands. *"Although becoming a landowner would be a dream come true for us, we are beginning to realise that in our case it's not that important afterall,"* pointed out one farmer who added *"eversince, we have always been like landowners here since we are free to utilise the land, without the intervention of the government or absentee landlords."* For how long therefore contour farming may be sustained will ultimately depend on whatever subsequent actions that may or may not be taken by the legal claimants. It is possible that with the improved soil productivity brought about by contour farming, landowners might take renewed interest in the area.

Since contour farming was designed for a multicropping scheme, and with the generally improved soil condition, the researcher noted that a greater variety of crops other than root crops were increasingly grown in the area. Thus while contour farming was originally introduced to support root crop production as envisioned by IRCP, it may on the other hand contribute to the shift from a root crop-based farming system to a more diversified one involving the cultivation of other cereal and cash crops.

Non-contour farmers. Despite the increasing number of *converts* to contour farming, still many others continued to be hesitant to try out the innovation. When asked by the researcher why, they insisted that contour farming would reduce farm production because the hedgerows:

- occupy large strips of farm area thus reducing the area where crops could be planted;
- provide a dense vegetation which serves as hiding place for pests, snakes and other dangerous animals;
- create unnecessary shade for other crops as they grow tall and spread their foliage;
- require more labour in upland preparation by having to establish the hedgerows;
- make weeding become more difficult because of the obstructions they create; and,
- make the farm look cluttered because of all the *extra* plants mixing with the crops.

When these remarks were referred by the researcher to the contour farmers, they were quick to counter all of these by offering their opposing views. As one of the first model farmers said, *"It's hard to convince those who are hard headed. Let them try and see for themselves whether contour farming is good or bad."* Another one made an interesting response to the remark on contour farms as having a cluttered appearance, *"What cluttered look? The contour strips are even nice to see because they actually look like stairways to heaven."*

Box 9k. Contrasting perspectives of contour and non-contour farmers.

Non-contour farmers

The contour hedgerows...

- reduce area for crop production
- provide hiding place for pests
- cause unnecessary shade
- more labourious
- make weeding more difficult
- make farm look cluttered

Contour farmers

That's not true because...

- compensated by increase in yield
 - some species are repellant to pests
 - regular pruning can be done
 - in the long term, minimises clearing and cultivation tasks
 - vegetative cover supplants weed growth
 - they're beautiful!
-

Farmers in non-IRCP barangays. The researcher was rather surprised to notice that there were also contour farms in adjacent barangays like Botoc, Bogho and Catigawan when these were not part of the IRCP pilot site. Upon inquiring from farmers in the area, the researcher discovered that IRCP was identified as the source of the innovation although it spread to their barangays through various means.

There were those who said that they went directly to the IRCP staff house and asked for assistance from the staff. Others however were too ashamed, saying they were not part of the project. Instead, they inquired from friends in IRCP barangays who were contour farmers and requested to be taught by them. Still, a few other farmers reported that they were able to establish their contour farms without any external assistance. What they did was simply to closely examine existing contour farms and to observe other farmers while working in the farm. Through trial-and-error, they were able to roughly copy the innovation. This explained why in some of these farms, the contour lines were not accurately set according to the slope of the land. One farmer said that since he did not know how to use an A-frame, the primary tool in contour farming, he just approximated the distance between contour lines.

The field staff expressed enthusiasm for this unexpected response from farmers in barangays not covered by IRCP. As a result, the IRCP management decided to expand project coverage to include those barangays whose residents were noted to have demonstrated strong interest to participate.

Box 9l. Farmer-to-farmer knowledge sharing.

Sejito is a 35-year old farmer in barangay Nabong. He was among the very first contour farming cooperators of IRCP. He cultivates a one-fourth hectare land owned by an absentee landlord. Sejito uses double hedgerows of *mura* grass and ipil-ipil, and plants sweetpotato, cassava, corn and peanuts on the contour strips. A former shifting cultivator, he said that through contour farming he gets higher yield and no longer has to worry where to transfer once the soil becomes degraded.

Sejito's official residence is in nearby barangay Catigawan, a non-IRCP area, where he serves as barangay councilman. A former communist rebel, he and his family has migrated to Nabong since his surrender about three

Box 91. Continued.

years ago. Right now, Sejito divides his time between his farm in Nabong and his responsibility as public official in Catigawan. Because of his dual residence, he often acts as information gatekeeper for the people of Catigawan which is a very remote upland community. It is he who usually links Catigawan with the outside world by bringing news to the local people. He jokingly revealed that he has indeed put to good use his experience as member of the propaganda committee of the communist organisation by disseminating information about IRCP and contour farming to local farmers.

The people of Catigawan are interested in contour farming but unfortunately the area is not covered by IRCP. This is the reason why he has assumed the function of the IRCP staff because he feels it is his responsibility as a community leader to share the innovation with his constituents.

He has assisted at least ten farmers in Catigawan establish their own contour farms. This is in addition to about 50 farmers which he claimed to have taught about contour farming during formal village meetings and daily conversations. Lately, however, he has refrained from teaching more farmers because of the unavailability of planting materials. He said many farmers got disappointed when after they eagerly prepared their farms, they were told that IRCP ran out of seeds. He plans to become active again in promoting contour farming once IRCP has enough supply of planting materials again.

Intervening agents. IRCP seemed to have created a differential impact on other intervening agents. The provincial government had recognised the contribution of IRCP to the development of the Pinabacdao uplands. To show its support, the provincial government approved through *Sangguniang Panlalawigan* Resolution No. 21, the memorandum of agreement allowing IRCP the free and indefinite use of a five-hectare provincial lot on which the demonstration farm and staff house were located.

In comparison, the municipal government seemed to have a different view of IRCP. The field staff were regularly invited to attend the sessions of the municipal council for them to participate in deliberations affecting the IRCP barangays. However, the municipal mayor allegedly also wanted to exert an even greater influence on decision-making with respect to IRCP field activities. One of the field staff cited an example, *"IRCP leased an oven to one community organisation engaged in a root crop processing enterprise. The mayor however got angry upon learning that it was given to that particular barangay since the people there were not his political supporters. During the council session, he made clear that he should be consulted whenever IRCP makes decision such as in the case of the oven."*

The municipal agricultural staff on the other hand generally appreciated the effort of IRCP to invite them as participants for the trainings conducted. The technicians said this helped them update their technical knowledge. However, in actual field activities, IRCP staff complained that the technicians were less willing to cooperate. One field staff recalled that one time he wanted a technician to go with him to an interior barangay to help a farmer in establishing contour hedgerows; instead the technician refused saying it was too tiring to hike that far. On the other hand, the agricultural technicians pointed out that it was but natural that IRCP staff would accomplish project-related tasks since they were hired primarily for that purpose. In their case, said one technician, they had their own work targets to meet and root crops were unfortunately not part of their office's priorities.

IRCP. While the work of IRCP to introduce innovation in the Pinabacdao uplands produced favourable consequences for various actors, the researcher also wanted to examine the impact of the

innovation upon IRCP itself. The responses given by the field staff, senior technical staff and project management generally focused on two major issues.

On one hand, the experience taught then the value of viewing the problem situation from below and to exercise flexibility so that the project could respond effectively to local needs and circumstances. Many of them pointed out, for example, that while IRCP was originally a root crop-focused project, it had decided to undergo a difficult learning process in order to change its priorities and consider soil resource management as equally important as root crop technologies themselves. One field staff pointed out that while they may not be able to accomplish the original target outputs at the end of the three-year project life, still they considered IRCP to have achieved some level of success because it was able to respond to the urgent and more pressing needs of local people. The IRCP coordinator added that fortunately, IDRC also extended support and consideration by granting IRCP official approval to realign its priorities and resources in view of constraints faced in project implementation.

On the other hand, like many other special projects, the issue of sustainability was raised. It was envisioned that IRCP would be institutionalised by converting the project into a field site for on-farm research and extension of PRCRTC. The provincial government already approved the continuous use of the land occupied by the IRCP demonstration farm and staff house. However, with IDRC support coming to an end, funding problems for staff and field operations were already foreseen by the staff. According to the PRCRTC director, with the budgetary constraints faced by the centre, it was unlikely that PRCRTC would be able to shoulder the cost of sustaining whatever accomplishments were already made through IRCP intervention.

9.13 Summary

The case study in this chapter described a problem situation in soil resource management in the Pinabacdao uplands and how the interaction between local and external actors shaped the type of intervention approach necessary to support the changing nature of innovation introduced.

Actors. The central actor associated with the problem situation in soil resource management was the local upland farming community engaged in shifting cultivation of subsistence crops. However, the case study showed that there were many other actors whose actions had direct and indirect influence on the emergence of the problem situation, ranging from migrant households and community organisations to rebel groups and military forces. Several intervening actors were also linked, both positively and negatively, to the improvement of the problem situation such as the IRCP, DA, traders and local government units. There were also actors behind other actors, who in spite of their physical or social distance, had made their influence felt locally such as market consumers and donor agency. Even the non-action by absentee landlords and the state, who opted not to exercise their legal property rights over the land, contributed to the particular nature of management of the local soil resource.

Moreover, the case study not only showed diversity in terms of the types of actors involved but also of their respective views in relation to the problem situation. Local farming households were found to possess detailed soil-related knowledge which they capitalised on for evolving a communal approach to soil resource management. Landless households meanwhile assumed *de facto* ownership rights over publicly or privately owned land since they perceived the state or absentee landlords as demonstrating no interest to lay claim on it.

The involvement of such unlikely actors as communist rebels and military men in the problem situation only proved that natural resource management was situated within a wider socio-political

environment. While both groups were pursuing non-agricultural goals, the armed conflict greatly altered local demographic and agricultural patterns, one consequence of which was increased pressure on the soil resource in safer areas. Meanwhile, the demand by traders and consumers for root crops largely stemmed from the crops' locally popular multiple uses. This served as added incentive to farmers who cultivated root crops primarily because these were the only ones adapted to the poor growing conditions of the Pinabacdao uplands.

Similarly, the case study revealed the underlying interests of intervening actors as they sought to help local people improve the problem situation. Both IDRC and IRCP explicitly worked towards successfully introducing root crop technologies, in line with their institutional mandates. The agricultural extension staff were on the other hand mainly concerned with their insecure work status in the face of frequent organisational changes. With the decentralised government set-up, the political context of agricultural development became increasingly significant as local politicians sought to exert their own influence over development programmes affecting their constituencies.

Problem situation. The case study began by outlining the biophysical nature of soil degradation in the Pinabacdao uplands and later related this to the wider, social dimension of the problem situation. As the Pinabacdao uplands were subjected to a more intensive form of cultivation, the soil resource was increasingly degraded as observed by actors through the declining fertility and increased erosion rate. This consequently brought about serious production constraints such as shorter cultivation cycles, reduced area for cultivation, limited choices of cultivable crops and ultimately an overall drop in yield.

However, after further exploring the problem situation, it became evident that the biophysical manifestations of soil degradation were primarily the outcomes of social processes and factors. Local farming households caught in the midst of demographic, economic and sociopolitical forces found themselves in a situation whereby an increasing number of people cultivated a decreasing available land area.

Meanwhile, the individual interests and predetermined goals of intervening agents influenced them to take a rather narrow perspective of the problem situation thus they failed to effectively address soil degradation and recognise its social underpinnings. Their fixed and preset mental frameworks only served to blind rather than enable them to take the view from below.

As the case study showed, the initial lack of a shared definition of the problem situation constituted the fundamental barrier for actors to effectively work towards its improvement.

Innovation. Rather than try to reverse the soil degradation process, local people's own response to the problem situation was to directly compete with others for whatever productive land was left available while an increasing number were seeking alternative, off-farm sources of livelihood elsewhere. The general view was that the problem situation was far from improved and their long-term survival was highly uncertain. While there was an initial attempt by the DA to improve soil resource management in the Pinabacdao uplands, the intervention was shortlived and the introduced innovation never sustained.

IRCP undertook the first known major development intervention especially focused on the Pinabacdao uplands. However, in spite of local people's articulation of the primary need for assistance in the soil resource, IRCP went on to introduce root crop technologies consistent with its preset project goal. The nature and direction of the innovation shifted only after IRCP realised that effectively introducing improvements in food systems required a corresponding change in the management of the resource base.

The case study showed that an innovation in soil resource management entailed not only a set of new practices but a change in the general outlook of the farming enterprise. It was not only a matter of integrating contour farming into the prevailing farming system but suggested a reorientation of local people's view of their biophysical environment. Moreover, as IRCP later recognised contour farming could not be introduced as a package of standard technical recommendations but as general management principles allowing individual farmers to combine and apply these suited to their own goals and circumstances. As such, innovation in natural resource management saw farmers as actively engaged in making use of knowledge from multiple sources to design their own version of *the* innovation.

Intervention. The case study showed that the problem situation in soil resource management required IRCP not only to shift the nature of innovation but likewise the intervention intended to support it.

The intervention approach initially used by IRCP combined elements of being client-oriented (by targeting root crop farming households), participatory (with its emphasis on local involvement in technology design) and systems-focused (through integrating concerns in the entire food chain). However, the intervention was shown to remain inadequate for addressing soil degradation since the focus on specific crops limited its view of the wider problem situation, the emphasis on technology led to overlooking the social dimension of innovation, and the food system orientation led to a neglect of the equally important concern of maintaining the productive capacity of the resource base.

As later realised, an innovation for soil resource management needed to be supported by an intervention approach providing a menu of technological options based on knowledge derived from scientific and local experimentation, both externally and locally. Moreover, such an intervention approach needed to put greater emphasis not on knowledge transfer per se but on building local people's capacity to generate, acquire and share their own knowledge through the facilitation of social learning processes.

Consequences. On the whole, there was general agreement among actors that the innovation based on contour farming was making notable improvement in the problem situation in soil resource management. Although being at such an early stage when the fieldwork was undertaken, the innovation's longer-term impact still needed to be fully ascertained. As actors observed, the rate of erosion slowed down while soil fertility was sustained over a longer cultivation period. On the other hand, the need for supplementary commercial inorganic fertiliser was still felt especially for already severely degraded soil.

Overall, there were signs that the generally positive results were bringing about broader changes in local agriculture such as the shift towards a more permanent cultivation system, a more diversified cropping system, and increased interest for integrating perennial crops. The spread of the innovation was however uneven across the Pinabacdao uplands. On one hand, there were local farmers who remained unconvinced of contour farming and still unwilling to try it. On the other hand, contour farming was fast spreading beyond the six barangays covered by IRCP. Farmers in adjacent areas were already following the practice, either with the assistance of IRCP field staff and other contour farmers or just by themselves largely on a trial-and-error basis.

However, far from merely biophysical improvements, the case study showed that the more significant changes were demonstrated by actors themselves. For local people, it meant an enhanced capacity to address head-on the problem situation in soil resource management. For intervening actors, it meant learning how to genuinely take the view from below. The only remaining concern was how the intervention approach could be sustained and institutionalised with the time-bound character of special development projects like IRCP.

Chapter X

SYNTHESIS OF CASE STUDIES

This chapter is a synthesis of the main findings of the empirical case studies earlier presented. The sections are organised according to the fields of analysis outlined in Chapter V. It starts with a description of the different types of actors identified in the case studies together with their contrasting perspectives on the problem situation, its improvement and the means to achieve this. Later sections describe the various intervention approaches designed to introduce innovation in natural resource management. As the findings however reveal, there was only limited improvement in the problem situation perceived by actors. On the whole, the chapter stresses the inadequacy of prevailing external intervention for dealing with the biophysical and social constraints associated with managing natural resources for sustainable agriculture.

10.1 Review of Case Studies

The preceding three chapters presented empirical case studies of problem situations in natural resource management in the Eastern Visayas uplands of the Philippines. To recapitulate:

- The first case dealt with soil degradation in the acid uplands of Matalom, describing a problem situation inadequately dealt with by the TOT and client-oriented approaches of intervening agents. In the absence of appropriate external intervention, local people somehow managed to improve the problem situation on their own by devising coping mechanisms for the declining quality of the soil resource.
- The second case meanwhile focused on the degradation of a public forest land in Matag-ob and the subsequent introduction of what was the government considered as a participatory approach to forest resource management. Local people's continued agricultural use of the area was being curbed by a government reforestation project implemented in collaboration with a non-government organisation. The project's ultimate goal of establishing community-based forest resource management was hindered by the conflicting interests between local people and intervening agents.
- Finally, the third case examined a problem situation in soil degradation in a root crop-growing area of the Pinabacdao uplands. The experience of an extension project in the area showed that successfully introducing new root crop varieties in the uplands need to be accompanied by soil resource management measures adapted to local conditions. Furthermore, it highlighted that contour farming could be more effectively introduced by adapting IRCP's integrated, food systems intervention approach to the different nature of innovation.

This chapter compares and synthesises the findings of the three case studies in order to arrive at a broader perspective for examining the role of intervention in supporting innovation to improve problem situations in natural resource management.

10.2 Types of Actors

One of the major interests in this research was to identify the different actors relevant to the problem situation. The case studies clearly indicated the wide range of actors involved and their various types of influences on the emergence and/or improvement of the problem situation. The multiplicity of actors was a primary contributing factor to the complexity of social processes involved in managing natural resources.

To distinguish and characterise these actors, the research has drawn up the following categories:

- **Level of aggregation** - Actors ranged from individuals, informal/formal groups and institutions. Thus, actors linked to the problem situations included for example, farmers independently pursuing resource use, social networks acting as channels for knowledge exchange, as well as government departments imposing legal measures and policies. Individual actors may also at the same time be part of a higher level of aggregation. For example, a farmer may both be working on his individual farm while simultaneously participating in a communal farm.
- **Sectoral identity** - Actors represented three general sectoral types. One was the public sector, as typified by government officials and agencies; another was private as in the case of local traders and non-government organisations; third, was the community sector with local people's organisations as example. Through the actors' sectoral identity, their interests and goals with respect to natural resource management were more easily distinguished.
- **Influence on problem situation** - The degree to which actors have an interest in the management of the resource may be used to distinguish between direct and indirect actors. The former refers to stakeholders who consciously exercise influence over the problem situation, examples of which are shifting cultivators and the DENR. On the other hand, the latter are those whose actions produce unintended or secondary effect on the problem situation. The communist rebel's occupation in the Pinabacdao uplands unwittingly contributed to increased migration to safer areas and the consequently more intensified land use in the latter.
- **Proximity to natural resource unit** - Of the actors considered above as having direct influence on the problem situation, two subtypes were identifiable. Local actors referred to those with immediate interest on resource utilisation, e.g., farmers cultivating the land or households gathering fuelwood. Intervening actors were those mainly concerned with changing or influencing local actors' management of the natural resource, such as agricultural technicians.

One major observation made with respect to actors in each case was that there was no evidence of them effectively, or at least attempting to, exert agency at a higher level over the management of the natural resource unit. They did not consciously form a collective management body corresponding to the level of the natural ecosystem at which the problem situation was perceived to emerge. This lack of integration in the midst of actor diversity indicates that the independent actions of strategising actors, can have cumulative negative biophysical consequences.

Table 10a. Examples of types of actor in the three case studies.

Type	Matalom	Matag-ob	Pinabacdao
<i>Aggregation</i>			
- individual	- hillyland farmer	- forest land occupant	- shifting cultivator
- group	- CAsAVIMCI	- field team	- communal farm group
- institution	- DA	- LRAP	- provincial government

Table 10a. Continued.

Type	Matalom	Matag-ob	Pinabacdao
<i>Sectoral identity</i>			
- public	- DA	- Matag-ob mayor	- ViSCA
- private	- market traders	- LRAP	- absentee landowners
- community	- CASAVIMCI	- MANAGBU	- PRPC
<i>Influence</i>			
- direct	- sweetpotato farmers	- <i>de facto</i> landowners	- contour farmers
- indirect	- SJPC	- Ormoc sugarcane plantations	- NPA
<i>Proximity</i>			
- local	- hillyland farming household	- hired project laborer	- migrant households
- intervening	- PRCRC	- parish priest	- IDRC

From the case studies, the following observations were made with regard to the actors identified, as illustrated in Table 10a:

- In each case, a diverse set of actors was identified as being relevant to the problem situation, either as contributing to its emergence or improvement. To use physical presence in the natural resource unit as the only criterion for considering individuals and groups as actors was misleading. While the local community closest to the natural resource unit was the most obvious actor, it was discovered that there were several other stakeholders and interest groups associated with its management.

For example, absentee landlords continued to influence soil resource management by exerting pressure on local people (e.g., by prohibiting Matalom farmers from planting trees on tenanted land) or by choosing not to exercise their property right (e.g., Pinabacdao farmers' continued occupation on titled land whose landowners showed no interest in its utilisation). The same was true for other identified actors whose actions, whether intended or unintended, had major influence on the problem situation. With the DA concentrating its extension efforts among progressive farmers, hillyland households in Matalom were left to survive with minimal external intervention as they coped with soil degradation. In the case of Pinabacdao, the NPA's occupation of interior uplands to further their political agenda drove shifting cultivators to safer areas leading to more intensive land use near the highway.

- The actors were not only manifold but at the same time also highly diverse. Such diversity was observed even within a local community. As the Matag-ob case showed, forestland settlers did not form a homogenous category of actors since in order to view the problem situation more clearly, a distinction had to be made between *de facto* landowners and tenants, in-migrants and out-migrants, those working as project laborers and those who were not, active and inactive members of the project-initiated farmers' organisation, and so forth.

Even among the contour farmers of Pinabacdao, the various ways in which the technical innovation was modified to suit specific needs showed the different types of farmers involved. This observed diversity remained true for actors beyond the boundaries of the local community. As the list of identified actors indicated, the problem situation was influenced, directly or indirectly, not only by development-oriented intervention agents but also by traders and consumers (Matalom), religious and political leaders (Matag-ob), and even military groups (Pinabacdao).

- The diversity of actors was evident in their goals and interests with respect to natural resource management, given the different and often conflicting ways in which they dealt with the natural resource in each of the case studies. It was found that subsistence cultivation was only one of the different systems of agriculture in operation for each case. There were many others which were found as located between the continuum of subsistence and market-oriented farming. Similarly, there were different forms and variants of shifting and permanent cultivation in upland agriculture. Furthermore, agriculture was only one of the many types of livelihood activities associated with the natural resource units. Logging for instance, either legal or illegal and commercial or small-scale, was another competing type of livelihood found to exist.

Meanwhile, livelihood was just one of the many forms of resource utilisation. As revealed in the case studies, the uplands also served as a haven for migrants in search of new place for dwelling and for the outlawed communist insurgency movement. Finally, direct utilisation was only one of the many modes of natural resource management. The government, for instance, sought to restore and preserve the forest resource in its original state. Absentee landlords, on the other hand, opted for non-management by opting not to exercise their private property rights.

10.3 Problem Situation

The problem situation described in the case studies focused on the biophysical degradation of particular natural resource units. The Matalom and Pinabacdao cases drew attention to the degradation of soil resources, which in both instances took the form of erosion and fertility decline. On the other hand, the Matag-ob case dealt with the degradation of a forest resource which was perceived in terms of the denudation of forest land.

In general, actors conceived of the problem situation based on the biophysical indicators of resource degradation, e.g., physical movement of soil particles, nutrient depletion and loss of forest cover. However, the research found out that these destructive biophysical processes were induced by changes in the nature and extent of human activities with respect to the natural resource unit. Intensification of resource utilisation by different actors led to an accelerated rate of resource degradation. Rapid fertility decline, for instance, was attributed to households increasing the frequency of cultivation and shortening of fallow period. Deforestation in Matag-ob was also seen as being brought about by the expansion of agriculture through forest clearing done by additional migrants to the area.

Another important observation made in the research was that while biophysical processes of soil degradation were traced to the changing instrumental relationship between human beings and nature, the latter in turn emerged from processes of social change or the relationship among human beings. In Matalom and Pinabacdao, the increased local population meant a corresponding increase in food needs thus driving farmers to put more pressure on the soil resource in meeting higher production requirements. As more people settled in the forestland of Matag-ob, more trees had to be cut in order to make way for housing and farms.

Biophysical resource degradation may thus be viewed as an outcome of *social degradation*, to mean the breakdown of social structures and processes supporting natural resource management together with their inability to adapt or cope with the rate of change in the wider biophysical and social conditions. Prior to the emergence of the problem situation, natural resource management was characterised by local people's systemic view of the relationship among themselves and in relation to their natural environment. In the Pinabacdao case, for instance, traditional shifting cultivation was based on a view of the soil resource as part of a larger natural ecosystem, and of its management as one component of interrelated natural cycles. The practice of fallowing was a concrete example of this systemic approach to managing the soil resource. This holistic perspective was likewise reflected in traditional social norms of shared utilisation of the soil resource by shifting cultivators through commonly agreed sequential and spatial cultivation patterns. A single farmer's decisions and actions were made with due consideration to how such relate to those of other farmers.

Social change, however, such as population pressure, led to the *erosion* of accepted social norms governing the management of natural resources. Soil resource management turned to a more competitive mode, resulting in a more individualistic rather than collective approach. Household security became a far more important consideration than having to follow socially set standards of behavior. This in turn transformed the once systemic view of the soil resource unit to one narrowly focused on meeting immediate needs. This was exemplified by those farmers opening a fallowed land even before it is able to complete the process of soil rehabilitation.

One specific theme of inquiry of the research was to explore the nature of problem situation from the perspective of the various actors. The goal was to compare and contrast the various perspectives and examine how their differences and/or similarities had influenced the improvement of the problem situation. Among the general observations were:

- There was broad consensus on the existence of a problem situation but there were major differences in its perceived nature and importance. Local people in Matalom and Matag-ob both recognised the importance of soil degradation as it had direct consequences on their own farming activities. Intervening agencies on the other hand were as less concerned since the agricultural staff in Matalom saw the need to address the production problem of flatland farmers as a more important goal in line with the DA's primary thrust of cereal production, while the crop-based IRCP was primarily interested in substituting native root crop cultivars with newly developed varieties in the local cropping system of Pinabacdao. On the other hand, the intervening actors in Matag-ob -- DENR and LRAP -- were the ones expressing greater concern for degradation of forestlands while the occupants even saw deforestation as partly beneficial since it provided more open area for agriculture.
- The boundaries of the problem situation drawn by actors were generally inconsistent. In Matalom, soil degradation was both recognised by farmers in the hillylands and plains but the DA's main concern was limited to the latter. In Matag-ob, both the DENR and LRAP concentrated on the 100-hectare area under contract while forestland occupants had a broader view of the problem situation as they also considered the areas surrounding the project site to which they even relocated their farms. In Pinabacdao, IRCP choose to cover only the six root crop-growing barangays along the highway while migrants, for example, recognised that the problem situation was a consequence of changes in the wider socio-economic and political setting.
- A similar conflict in perspectives was noted in terms of the nature of the problem situation. Both the DA and the flatland farmers defined soil degradation mainly in terms of fertility decline and viewed the problem situation as being not so much of nutrient depletion per se but rather of the farmers' lack of access to commercially available fertiliser. Hillyland farmers on

the other hand considered soil degradation as also having an added dimension of erosion, given the sloping character of their farmlands.

- The different view on the extent of resource degradation was illustrated in the Matag-ob case. The DENR, for instance, considered the area as highly degraded relative to its ideal state of being a forestland. On the other hand, upland farmers admitted that forest cover was indeed reduced, but not yet to an alarming level since they considered the cleared area as also necessary for agriculture.
- In general, local people had a wider view on the factors leading to the emergence of the problem situation. In contrast to intervening actors who mainly saw it as a consequence of the instrumental relationship between people and the natural resource (e.g., more intensive and extensive agriculture), local people also recognised that this was so because of different social factors, e.g., increased competition due to population growth, continued survival of households. In Pinabacdao for instance, IRCP and the DA blamed soil degradation on the rise of short-fallow cultivation in the area. Yet shifting cultivators pointed out that it was socioeconomic and population pressure that led them to turn to such survival strategy, and consequently to the emergence of soil degradation. In Matag-ob, the DENR and LRAP considered local people as responsible for deforestation and yet the latter explained that commercial loggers were the first to cut down the trees and they simply took over the logged over area.
- As regards the perceived effects of the problem situation, local people seemed to have an inward-looking perspective while that of intervening agents was outward-looking. Both types of actors considered declining production as the immediate consequence of the problem situation. However, subsistence households emphasised that soil degradation meant not only drop in yield but also a threat to their own household's survival. Meanwhile, intervening agents such as those in Matalom and Matag-ob also cited the wider impact of the problem situation such as on the adjoining lowland areas.

The research was able to examine such differences in actors' perspectives when viewed against the particular frameworks, or world views, through which actors perceived and acted on the problem situation. The case studies revealed that certain values, experiences and concepts were directly relevant and had significant influence on actors' perspectives on the problem situation.

As perhaps could be expected, subsistence upland farmers tended to adopt a livelihood-oriented world view in relation to the problem situation. Their responses to both the nature, importance and effects of resource degradation were closely interwoven with their concern to eke out a living to support their households. On the other hand, the various intervening actors' perspectives reflected a world view based on their respective work or career. Thus the problem situation was generally seen in terms of how it related to the tasks assigned to the field staff by their employing organisation. The low importance given to soil degradation, and to upland development in general, by the agricultural technicians reflected the DA's greater priority attached to progressive farmers in the lowlands. The crop-oriented framework through which IRCP viewed the problem situation was in line with the commodity focus of the programme and the agencies behind it. The DENR's forestry orientation was also evident in its interest to see trees rather than agricultural crops growing in the uplands.

Natural resource management also seemed to take a uniquely Philippine character, being shaped by the cultural milieu in which it operated. Traditional social values were frequently cited to

rationalise actors' views and actions with respect to the problem situation. One example is *bahala na*¹, often misconstrued as a form of fatalism but which appeared in the research as reflective of the Filipino character to rely on improvisation to cope and adapt in situations of high uncertainty and stress. Other similar Philippine values found to be linked with natural resource management are *pakikisama* and *pakikibagay*² suggesting a non-confrontative approach to dealing with social conflict, variants of *bayanihan*³ to promote concerted action through cooperation, and *ningas cogon*⁴ as a major barrier to sustaining development initiatives.

Past experiences were a frequent basis for actors' perspectives. For example, the negative attitude towards collective action, as in Matag-ob, was traced to its being an approach associated with communism because of local people's experience with the leftist movement. A similar negative attitude towards government agencies prevailed among upland farmers who looked upon them as overly bureaucratic to be of immediate or direct assistance. Those in Matalom, for instance, had little expectation of assistance from the government and were already resigned to their fate as being almost totally forgotten by the government. In areas fortunate to have sampled government extension service, as in Pinabacdao, local people responded to government development initiatives not with anticipation but with hesitation, having stereotyped extension staff as people who disappear as fast as they appear.

Table 10b. Contrasting conceptual bases of actors' perspectives.

Conceptual knowledge	Example	Local People	Intervening Actors
Criteria	varietal preference	taste, long maturity, high biomass output	yield, early maturity
Measurement	size	seeding rate of corn, palmstretch	hectares
Schedule	cropping calendar	annual and fallow-cultivation cycle	annual
Indicator	soil fertility	colour, texture	pH, chemical composition
Classification	land ownership	state, private	<i>de facto</i> , communal, state, private

In spite of the declaration of intervening agents to adopt a participatory approach, their concept of *local people* still remained largely as that of individuals who were non-innovative when they chose not to adopt an introduced technology, passive targets of external manipulation such as monetary incentives and regulatory measures, and lacking in knowledge for failing to appreciate the value of an externally introduced technological innovation. The DA in Matalom thus considered hillyland farmers

¹Roughly translated as *determinism*.

²Both roughly translated as *maintaining smooth interpersonal relationship*.

³Roughly translated as *working together*.

⁴Roughly translated as *the tendency to lose one's interest as quickly as the cogon grass burns itself*.

as resistant to change for opting not to join the farmers' cooperative. The DENR in Matag-ob meanwhile reinforced the widely accepted image of upland farmers by blaming them as the enemies of the environment, for allegedly being mainly responsible for deforestation. In Pinabacdao, IRCP initially thought of local people as needing standardised technical fixes to be followed strictly as instructed in their respective farms.

On top of the above, the different world views adopted by actors represented different sets of concepts used as a framework for viewing the problem situation. The sectors' perspectives reflected the use of contrasting criteria, indicators, measures, classifications and related aspects of stock of knowledge. It appeared that the divergent perspectives was not so much on the different levels of knowledge each actor had, but on the different bases on which their knowledge was founded.

10.4 Innovation

In this research, innovation was examined not only as a specific technology or practice but as an entire process of technical and social change leading to improvement in the problem situation. The case studies described innovation in terms of the nature of response to the problem situation by the various actors, either individually or jointly.

There were contrasting perspectives among actors on the need to act on the problem situation. In Matalom, both local people and the DA recognised the need to respond to soil degradation because of its concrete impact on crop yield. However, in the Matag-ob case, it was the DENR and LRAP which saw the need to address forest degradation; meanwhile, upland dwellers expressed lesser concern as they considered the conversion of some portion of the forest land for agriculture as being necessary. The opposite was true in Pinabacdao where it was the local people who desired to directly act on soil degradation while IRCP was more preoccupied with root crop production.

The findings indicated that innovation was not a single, unified process of change given the different directions that actors wanted the change process to lead to and how it should be carried out. In each case, there were different definitions provided by actors of what constituted an improvement of the problem situation. Members of the farmers' cooperative in Matalom, who were generally commercial-scale cultivators, talked of a sustained supply of inorganic fertiliser in each planting season. In the meantime, subsistence hillyland farmers desired not only a season-long improvement but sustaining the productive capacity of the soil resource to extend the cultivation period, through low-external input measures sensitive to their marginalised situation. The Matag-ob case illustrated the sharp contrast in perspective on the desired innovation. While all actors recognised the need to balance agriculture and forestry in the same land area, forestland occupants viewed that cultivation of food crops should take precedence over tree growing, while the DENR and LRAP thought of the exact opposite. In the case of Pinabacdao, farmers thought of an innovation in soil resource management attuned to their shifting cultivation system, and as such were mainly interested in terms of extending the cultivation cycle as in Matalom. On the other hand, IRCP conceived of improving crop yield mainly through the introduction of root crop varieties.

The actions taken by the actors in relation to the improved situation were thus shown to be consistent with their perspectives. In Matalom, since the DA was mainly interested in providing flatland farmers direct access to commercial fertilisers and directed largely towards flatland farmers, the subsistence hillyland farmers sought to employ their own strategies for managing the soil resource to cope with the degradation process. In Matag-ob, while DENR and LRAP hired forestland occupants to plant trees, the latter's interest in the reforestation project was as temporary as the wages they received, and thus they continued clearing new forest land for farming. The established employer-employee relationship somehow created a misleading impression of intervention

successfully mobilising the local community for forest resource management. In Pinabacdao, IRCP thus began with the introduction of root crop technologies and only when it failed to demonstrate the adaptability of these technologies to local conditions that the project shifted towards an innovation in soil resource management through contour farming. While many farmers took interest in contour farming, the IRCP recommendation was modified by them to suit their individual needs and preferences.

These contrasting perspectives on the nature of innovation highlighted the varying degrees to which actors attributed the importance of the technical and social aspects of innovation. Given their limited resources, Calumpang hillyland farmers developed an innovation characterised as being knowledge-intensive and requiring low-external input. In contrast, the flatland farmers and the DA conceived of one which focused on hardware-based technology, i.e., application of commercial inorganic fertiliser. The Matag-ob case illustrated an example of intervening agents designing innovation involving technical (i.e., reforestation) and social (i.e., community organising) components, and how failure to introduce the latter hindered the desired community-based system of forest resource management. Meanwhile, the Pinabacdao case provided an example of an innovation focusing not just on introduced knowledge products but likewise knowledge processes, that is by supporting local capacity for technology development and adaptation.

10.5 Intervention

One of the main interests in the research was to explore the role of intervention in improving problem situations in natural resource management. The case studies identified and characterised the types of intervention approaches and processes in introducing and/or supporting innovation, as well as their contribution to making improvement in the problem situations.

From a general viewpoint, the types of interventions identified in the case studies ranged from the conventional TOT to the increasingly popular participatory approaches. In the Matalom case, the DA's extension service was typical of the linear model of transferring technologies from outside to the local community while PRCRTC's introduction of technologies to sweetpotato farmers suggested increased client orientation. Meanwhile, the other two case studies generally reflected attempts to employ post-TOT approaches. The intervening agents in Matag-ob characterised the reforestation project as involving client-oriented, participatory approaches through its long-term view of establishing a community-based forest management. Similarly, the IRCP sought to demonstrate a client-oriented and systems approach through its specific focus on root crop farming households and its integrated view of the production-processing-utilisation chain.

However, in addition to the main intervention in each case, there were also other several secondary forms of intervention by other actors either independently, jointly or hierarchically. In Matalom, the main form of external intervention provided by the DA took the form of organising progressive farmers, conducting training/classes on rice and corn production technologies, and facilitating access to inputs such as certified seeds, fertilisers, pesticides and credit. Several other intervening actors extended support to the DA's intervention. A local credit cooperative also offered loans to farmers while the construction of an irrigation system and improvement of barangay road was undertaken by the DAR. Other intervening actors identified to indirectly influence the problem situation were the traders whose marketing criteria for root crops influenced the farmers' varietal choices, absentee landlords who prohibited tree planting on tenanted land, and the municipal government who assumed direct authority over the agricultural staff and redirected the general development priorities.

In Matag-ob, the DENR and LRAP were the main intervening actors, aiming to involve local people in the task of reforesting the public forestland. The nature of local people's participation though was almost exclusively limited to providing hired labor in project implementation. Financial incentives were the major instrument used to achieve intervention goals. Local political and religious leaders were also key influences in convincing *de facto* landowners and tenants to turn over their occupied land for reforestation. The intervention was designed in such a way that after the three-year project life, the responsibility of continuously managing the rehabilitated forest would be transferred to local people themselves. However, there were indications that such was unlikely to occur since the intervention barely lived up to its *participatory* label.

Intervention in Pinabacdao was primarily undertaken by IRCP although the DA also played an important role by initially introducing innovation for natural resource management. IRCP intervention was originally designed for transferring root crop technologies to farming households. The intervention strategies included community organising, training, demonstration farms and on-farm research. However, with the integration of soil resource management, the nature of intervention shifted towards facilitating local capacity for experimentation and lateral learning. What started as a crop-based, food systems approach evolved towards one centred on facilitating social processes for local people to design improvements of the problem situation through greater access to multiple sources of knowledge. Meanwhile, efforts to collaborate with the DA did not materialise because of the latter's internal problems. The LGUs, on the other hand, had extended official support, but at the same time demonstrate underlying interest to exercise political control over the direction taken by intervention.

10.6 Consequences

The final aspect of the field inquiry was to determine how actors assessed the extent to which the problem situation was improved, arising from the innovation introduced and/or supported by intervention. In the case studies, these consequences covered both the biophysical and social dimensions of the problem situation and were either direct or indirect, intended or unintended.

On the overall, different actors had different assessment of the improvement made in the problem situation as a result of the innovation. Within each case study, actors' perspectives ranged from being extremely negative to highly positive. Least variance was noted in the Matalom case with most actors suggesting that there was only a moderate improvement in the problem situation. Flatland farmers and the DA pointed out that while hillyland farmers were able to devise coping mechanisms with minimal external support, these did not completely halt soil degradation but only served to temporarily alleviate the situation. Hillyland farmers explained that the overall improvement made through their own soil management strategies was not so much on rehabilitating the soil but in slowing down the degradation process and preventing its further degeneration. They likewise admitted that given the limited impact of their internally induced innovation, there remained room for external intervention, such as science-based knowledge, to assist them in improving the problem situation.

Meanwhile, actors in the Matag-ob case expressed opposite views on the consequences of the reforestation project. The DENR rated the intervention as meeting the minimum project targets in terms of the growth and performance of the planted trees. The LRAP took a rather cautious stance by supporting the DENR's view while at the same time recognising the unresolved issues surrounding the innovation's impact on local people's farming livelihood. Forestland occupants in general had a negative assessment of the project, realising that the instant cash income derived from hired labor was temporary. They were beginning to worry over their long-term survival given the reconversion of their occupied land from agricultural to forest use.

A more favorable assessment was made by actors in the Pinabacdao case with regard to the improvement of the problem situation. IRCP acknowledged that it fell short of the project's original target of root crop technology transfer but that this was compensated by their effort to simultaneously address soil degradation. Local people in general appraised the problem situation as having markedly improved, with the noticeable increase in both yield and duration of cultivation period. Still, they admitted that it was too early to make final judgement since it would take time for contour farming to make its concrete effects felt. Besides, they realised that there was a need to continuously improve the innovation in order to adequately and sustainably rehabilitate the soil resource.

The three case studies, however, showed that the extent to which the problem situation had been improved not only covered biophysical changes in the natural resource unit but also led to social consequences for the actors involved, with the latter also contributing to the innovation's impact on natural resource management. One indirect consequence of the Matag-ob contract reforestation was the degradation of the forestland adjacent to the project site. Having been deprived of continuous agricultural use of the Bulak forest land, the former occupants decided to move to nearby areas which they again cleared of its forest cover to make farming possible. The Pinabacdao case, on the other hand, provided a positive yet unintended consequence of contour farming. Due to the inadequate supply of planting materials for contour hedgerows, local people were forced by circumstances to exercise their resourcefulness and ingenuity to independently innovate by exploring locally available materials as alternative forms of hedgerows.

In short, the research showed that aside from the biophysical improvement in the natural resource unit as a direct consequence of the innovation, there were also relevant consequences for the social interrelations among actors, some of which were indirect and unintended, that ultimately contributed to the overall impact on natural resource management. Indeed, as Bromley and Cernea (1988) hypothesised, resource management and local institutional development are mutually reinforcing.

10.7 Looking Beyond the Case Studies

The empirical case studies allowed for a microview of concrete examples of problem situations in managing natural resources. They portrayed the how prevailing intervention approaches have inadequately dealt with the technical and social complexities of these problem situations. More importantly, the results suggested the need to redefine the role of intervention in introducing innovation for sustainable agriculture.

These findings lead back the discussion to the main research question formulated at the start: *How can intervention be designed to effectively support natural resource management for sustainable agriculture?* The next and final chapter attempts to provide the answers by drawing conclusions and implications from the results just presented.

Chapter XI

RETHINKING INTERVENTION FOR SUSTAINABLE AGRICULTURE: CONCLUSIONS AND IMPLICATIONS

Based on the preceding synthesis of findings, this chapter presents the major conclusions drawn in answer to the research questions earlier formulated. Overall, the chapter concludes that client-oriented, participatory and systems approaches inadequately deal with the complex issues associated with problem situations in natural resource management. This implies that in seeking to address the sustainability question, there is a need to amplify post-TOT intervention approaches. The general recommendation is to rethink intervention in terms of an expanded repertoire of roles, an improved design of theory-informed practice and an alternative post-positivist epistemology.

Having already synthesised the main findings of the empirical case studies, this chapter revisits the research objectives and questions presented in Chapter IV. As stated, the general objective of the research is to examine the nature of development intervention necessary to support innovation for improving problem situations in natural resource management. Prior to addressing this overall goal, the specific objectives are first discussed in light of the research findings presented earlier.

11.1 Objective Number 1

To empirically explore and describe problem situations in natural resource management. The research sought to take a broader picture of natural resource management as well as the emerging problem situation based on the various feelings of unease and themes of concern expressed by relevant actors.

In order to arrive at a holistic view of the problem situation, natural resource management was taken as a human activity system. Through such a framework, the research found that shifting cultivation was only one of several types of agricultural land use, that agriculture was only one of several types of livelihood associated with the natural resource, that livelihood was only one of the several modes of resource utilisation, that utilisation was only one of several dimensions of natural resource management, and that management was only one option for actors while non-management was another.

In other words, from an initial focus on subsistence farming, the field inquiry uncovered a whole range of human activities which were all aimed directly or indirectly at managing particular natural resource units. Therefore, based on the findings regarding the nature of problem situations in natural resource management, it is concluded that:

- While sustainable agriculture generally emphasises the temporal dimension by looking at the long-term consequences of natural resource management, it needs to additionally consider other relevant dimensions where choices among conflicting priorities have to be made by actors in the drive towards sustainability. Much of the debate focuses on the difficult decision with respect to meeting immediate human needs against maintaining resource productivity for future generations. But as this research suggests, trade-offs do not just occur with respect to time perspectives; not to be overlooked is the conflict in prioritising various groups within the agricultural sphere. Indeed, it is crucial to ask if it is possible to sustain one group without making others unsustainable. The dilemma faced by the agricultural technician in prioritising flatland farmers over hillyland farmers of Matalom is a good case in point.

It thus becomes important to recognise the need for compromise between disparate but highly interactive elements that comprise agriculture. This is akin to what Allen et al (1991) advocate that sustainability must move beyond farm-level practices and microeconomic profitability to that of the entire agricultural system and its total clientele. It also links to Conway and Barbier's (1990) plea that the focus of sustainability must go beyond the time dimension and into the wider context of agricultural development so that it could be analyzed vis-a-vis other measures of agricultural performance: productivity, stability and equitability.

These indicators occur equally for farmers in their day-to-day decision and for nations determining agricultural strategies and policies. While all of them are generally considered to be desirable, pursuing sustainability involves certain trade-offs with the other criteria. In looking at these as components of the overall social value of an agroecosystem, Conway (1994) sees the need to introduce innovation that can potentially help reduce the trade-offs between them, otherwise it may be necessary to trade a degree of sustainability for higher levels of productivity and equitability, for example. These decisions were inescapable for Pinabacdao farmers as they set criteria for choosing among different hedgerow species.

- While on the subject of trade-offs, it is important to realise that the need to balance priorities is inevitable not just within the agricultural domain but among the various sectors of society in general. This was the case in Matag-ob where a question of whose priorities should prevail -- the agricultural interests of forestland occupants or the ecological interests of the wider community. Since agriculture is inextricably linked to the wider social arena, working towards sustainable agriculture would require a compromise with other human activity systems associated with the same natural resource unit. This raises the question on the important repercussions of promoting the sustainability of agricultural systems or other non-agricultural components of the Philippine uplands, or even of other sectors in the lowlands. It seems necessary then to locate sustainable agriculture within the broader framework of sustainable development.

Moreover, trade-offs are not only apparent across different components of a higher-level human activity system but also across the different levels of the hierarchy, which in the case of agroecosystems may stretch from a single plant to entire nations. Choosing a particular level of the agroecosystem to sustain will have serious implications for other levels below and above it. A relevant example is provided by Lowrance et al (1986) who identify four such critical levels, together with the different sets of factors considered most important for sustainability at each level, as follows: 1) agronomic factors for the field; 2) microeconomic factors for the farm unit; 3) ecological factors for the regional physical environment; and, 4) macro-economic factors for national and international economics. Shifting cultivation in the Philippine uplands, for example, may not be sustainable at the individual farm level, as Sajise and Ganapin (1989) explained, but may be sustainable when viewed at higher levels of the agroecosystem hierarchy.

- The problem situation is grounded on a natural resource unit within a hard ecosystem. Its existence is directly evident from what actors perceive as the visual and/or technical indicators for the occurrence of biophysical degradation of the resource in question, the corresponding changes in natural cycles and ecological processes, and their subsequent impact on the resource's productive capacity.

An analysis of sustainability done purely in biophysical terms however becomes seriously flawed as it isolates resource degradation from the human actions responsible for such processes. Soil erosion in Matalom and Pinabacdao, as well as deforestation in Matag-ob, were found to be closely linked to an array of social, economic and political factors. While

agroecosystems may have recognisable goals (Conway, 1994), these are assigned by people and not inherent of the natural systems themselves. To consider sustainability as being constrained solely by ecological conditions (Crews et al, 1991) ignores the underlying social factors for the emergence of problem situations. Redclift (1993) succinctly expresses this point by stating that the sustainability of the resource base makes little sense if it is separated from the human agents who manage the environment.

The social dimension assumes greater importance as it becomes clear that a singular natural resource unit can be the object of interests by a diverse set of stakeholders who, individually or collectively, impose their respective management agenda. Problem situations therefore do not arise from only the interface between society and external nature but also from contradictions within society itself (Allen, 1993). Increased agricultural pressure on the land to produce enough food for an expanding population, such as in Pinabacdao, may seem at first to be a *natural* problem involving the relation between people and nature. However, the emerging social conflicts make clear that it is a problem situation involving the relation *among* people in relation to nature.

Sustainability then requires taking not only a systems perspective, but a double systems perspective, combining the natural ecosystem and its corresponding social organisation. Such a coupled system framework (Röling, 1993) potentially offers a better tool for exploring sustainable natural resource management than one based solely on scenario/simulation models.

- A major limitation of prevailing efforts to address the sustainability problem in the Philippine uplands is that the problem itself is defined too narrowly. As the research showed, actors who occupy positions at a higher level of the agroecosystem hierarchy do not necessarily have a broader view of the problem situation. They can be as narrowly focused on sectoral or disciplinary interests as those actors found at the lower levels. PRCRTC, as a commodity-based research center, provided a good example. Even DENR, with its forestry bias, found it difficult to escape the blinding effect of institutional mandates.
- One basic condition lacking in many systematic attempts to improve problem situations in natural resource management is the failure to identify all affected parties and ensure that these are represented effectively. They are either deliberately excluded from the defined boundaries, or they may fail to find a representative for them, or they are not sufficiently organised to become a party at all. These party-related factors (Van Asselt, 1993) appear to affect the success rate of a negotiation or learning process especially in conflict laden situations. The forestland occupants in Matag-ob thus found themselves at a disadvantaged position during the negotiation process over the reforestation project.

In answer to the first research objective, it is therefore concluded that *a problem situation in natural resource management is not an objective, hard reality that takes place independent of the interpretation of actors. It is a complex of realities constructed by social actors who find themselves in a learning situation related to an external biophysical environment perceived as problematic.*

11.2 Objective Number 2

To determine how actors perceive and act on these problem situations. Having recognised that the problem situation involves a diverse set of relevant actors, the research explored their perspectives on the nature and significance of the problem situation, together with their responses in working towards desired improvements.

In examining the actors' field associated with a problem situation, a diverse set of actors was identified ranging from target groups of an intervention (and the subgroups within them) to mediating groups, service groups, indirectly affected groups and the total population of a region.

The findings suggest that natural resource degradation is much a result of the collapse of traditionally sustainable forms of management, such as what used to be a collectively managed, long-fallow swidden type of cultivation. Such breakdown in the management system stems from its inability to adequately cope with changing conditions and remain in its sustainable form. These are exemplified by the disintegration of long-established social organisations, loosening of local controls and the replacement of collective property management with a host of competing management regimes. In the case studies, the factors contributing to the breakdown of natural resource management were varied, e.g., demographic, economic, political, social or plain external interference. Problem situations in natural resource management therefore emerge not only due to the inability for actors to maintain the status quo but also to introduce innovation adequately and fast enough to adapt to the nature and rate of change in the wider social and biophysical environment.

The research also illustrated the direct link of human actions associated with natural resource management to the multiple realities and intentionalities in which the former are rooted. It therefore suggests the relevance of exploring how overt actions are determined in part by actors' perspectives of their external biophysical and social world. The conceptualisation of what constitutes a resource is in itself highly problematic since it may either be labelled by actors as such on the basis of instrumental, intrinsic or aesthetic values. Similarly, the scope of resource units depend on which stage in the wider ecological cycle they are identified or how they are viewed to relate to the larger ecosystem. A clear-cut definition of the *nature* of a natural resource unit turns out to be complicated as it is viewed in ecological, agricultural, socioeconomic terms depending on which framework actors' perspectives are anchored upon.

One particular source of conflict in the Philippine uplands is the competing ownership claims over resources by different stakeholders who derive basis from usufructuary, private, Regalian, *de facto* or ancestral rights. Related to this is the issue concerning the perceived boundaries of the natural resource unit and the problem situation itself, since these are likewise arbitrarily drawn based on the particular concerns and interests of actors.

Finally, in all of these, the sociocultural milieu in which natural resource management takes place provides the problem situation with a distinctly local colour. This is particularly true in Eastern Visayas where its long history of insurgency-related problems has markedly influenced local people's response to upland development initiatives. This links to Uphoff's (1993) assertion that people's behaviour is conditioned by community norms and consensus, and therefore preserving or instituting practices that are environmentally sound requires more than just individual incentives and persuasion.

Just as actors have individual views on the problem situation, they also generally tend to act independently in seeking its improvement. The research indicates that while the separate responses made by individual, or subsets of, actors result in discernable improvement of the problem situation, the limitations of such fragmented efforts are recognisable and so is the need to devise a better coordinated action among relevant actors. Therefore, based on the findings regarding actors' perspectives and actions on problem situations, it is concluded that:

- Problem situations in natural resource management revolve around social encounters among intentional, sense-making human agents. These actors demonstrate what Long (1989) refers to as knowing, active subjects who problematise situations, process information and strategise in dealing with others. The intentionality of these actors is demonstrated in their capacity to set their own goals with regard to natural resource management. Such goals are formulated within

the reality -- images, concepts, attributions, beliefs, norms and values -- that they have created for themselves, through learning from experience and in their social interfaces with others. In realising these *projects*, actors thus exercise agency by finding space for manoeuvre in the situations they face and by manipulating resources and constraints (Villareal, 1990). Such capacity to make a difference is evident even among those labelled as helpless or powerless within specific circumstances, i.e., landless households squatting on public forestland. As Scoones and Thompson (1993) point out, those which appear subjugated or repressed are not always passive victims but are involved in various forms of active resistance.

While the presence of discontinuities in perspectives among actors is increasingly being recognised (Long and Van der Ploeg, 1989; Wiersum, 1994), such discontinuities are especially likely to occur in problem situations in natural resource management, given the many stakeholders involved.

- Given that actors actively construct their realities, there arise several perspectives with respect to any particular problem situation. Any situation thus becomes open to interpretation since all actors will have uniquely different perspectives on what is a problem and what constitutes improvement (Pretty, 1994). As the cases revealed therefore, there can be no single reality but instead numerous socially constructed realities. As such, the suggested starting point for seeking improvement is not helping actors agree on how to attain an improved situation, but clarify and arrive at a shared understanding on what the problem situation itself appears to be. One specific line of inquiry which the research found critically important, and likewise suggested by Wakene (1994), is to look closely at the issues of whose interpretations or models prevail over those of other actors and under what conditions.

In realising that actors have their own respective interpretations of a particular problem situation, it needs to be noted that these multiple realities are equally valid but at the same time partial since they represent contrasting epistemologies and are a function of actors' unique contexts and experiences (Scoones and Thompson, 1993). These underlying mental frameworks are directly relevant in inquiring on problem situations for a number of reasons. Firstly, world views aid in the interpretive effort to examine actors' perspectives since they serve as a frame of reference through which experiences are filtered and sorted out, meanings are attributed to experiences, and realities are (re)created. Secondly, some elements of world views may be characteristic of groups of actors and thus it becomes possible for them to identify and share aspects of their perspectives. Thirdly and most importantly, whenever a set of actors attempt to tackle a problem situation, their world views need to be exposed so that they can learn to appreciate and accommodate each others' perspectives.

- Actors' engagement in reality construction, as well as in setting and carrying out their agenda, takes place via processes of social learning. They are constantly engaged in learning about the characteristics of their environment in which they move about as part of building and maintaining enduring relationships with other people or with things around them (Wakene, 1994). Through learning, actors acquire and appropriate ways and repertoires to act, interact and reflect in the social and material world that can help realise objectives (Rap, 1992). At the same time, the nature of such learning processes considerably reveal aspects of what is learned.

Attempts at systematically describing these processes are made by Bawden and Packam (1992) who identify four steps: finding out about the concrete world (sensing), finding out about the abstract world (thinking), taking action in the abstract world (planning) and taking action in the concrete world (acting). Learning therefore becomes a form of adaptive performance (Richards, 1989) that gives actors the capacity to continuously deal with changing situations. The emergence of a problem situation can be seen as a failure on the part of actors to learn

effectively and adapt as rapidly as change. However, since these knowledge processes are embodied in social processes that imply aspects of power and authority, they are just as likely to reflect and contribute to the conflict between social groups as they may lead to the establishment of common perceptions and interests (Long, 1992).

In answer to the second research objective, it is therefore concluded that *problem situations in natural resource management cannot be effectively improved unless actors learn to: establish a shared appreciation of the problem situation; acknowledge their interdependency and joint ownership of the problem situation; successfully negotiate over interpretations, models, interests, goals and boundaries; and, act synergically at a level of social aggregation corresponding to the agroecosystem level at which the problem situation is perceived.*

11.3 Objective Number 3

To examine the role of intervention in supporting innovation to improve these problem situations. The research sought to determine the nature of external intervention required to effectively support innovation for improving problem situations in natural resource management. After exploring opportunities for change in the problem situation, the roles that intervention can play in supporting innovation likewise need to be considered as well, given the interventionist orientation of the research.

The research highlights three intertwined elements that make up the framework for change in attaining an improved situation in natural resource management. Firstly, a change in the framework for defining the problem situation beyond conventional focus on crops, commodities, individual problems and specific performance criteria. Instead, an innovation is required that takes a broader, holistic view of the problem situation, one that demarcates the boundaries of the natural resource unit at the relevant agroecosystem level.

Secondly, a change in the framework for viewing the problem situation beyond mono-dimensional character that solely focuses on biophysical constraints of a natural ecosystem. Instead, an innovation is required that takes a multidimensional perspective on improving problem situations in natural resource management; one that introduces changes not only in technical relationships but also in the social organisation of innovation consisting of all actors having a stake in a given natural resource unit.

Thirdly, a change in the framework for devising alternatives ways for dealing with the problem situation beyond simple reliance on technology fixes and concomitant inputs for individual, routine application. Instead, an innovation is required that takes a dynamic view of situation improvement by changing not only the products of knowledge but the processes of knowing.

All these make clear that intervention is called upon to perform an important facilitative, rather than a dominating, function with respect to introducing and supporting such forms of change. Intervention as facilitation implies enabling, instead of fully controlling, relevant processes. As outlined by Engel (1995), *intervening by facilitating* assumes that innovation-related processes are largely self-sufficient but at the same time also affected by the opportunities and constraints inherent in the way actors are organised. More importantly, it means an emphasis on process rather than product. The quality of the innovation-related processes actors engage in are considered as a relevant focus of intervention rather than the outcomes alone.

Overall, improving problem situations in natural resource management require a broad repertoire of intervention roles, many of which were found necessary but not performed by

intervening actors in the case studies. It is concluded that in order to effectively deal with sustainability concerns, different intervening actors will have to play different roles in every problem situation, such as:

- *Mediator* in the process of negotiation within the social arena, by helping actors locate mutually beneficial agreements. The role facilitates actors to move from struggle to joint decision-making and action by resolving conflict pertaining to incompatible views and preferences among a set of available management options for a particular resource unit. For example, facilitating a negotiated settlement among the various forestland stakeholders with respect to the reforestation project (Matag-ob).
- *Organiser* in convening or regrouping relevant actors around certain issues associated with the problem situation, in order to develop joint agency, engage in social leaning and achieve organised action. The role helps shift the rationality of social encounters from instrumental or strategic to communicative. It likewise fosters empowerment of local groups through building effective constituencies and developing capacity for leadership and learning. For example, organising the social networks of marginalised hillyland farmers into learning groups for jointly undertaking experimentation on problems of mutual concern such as soil erosion (Matalom).
- *Catalyst* in supporting pressure to change, by highlighting the existence of a problem situation through making visible its causes, processes, consequences and tangible outcomes of action. The role includes supporting constructive conflict by making explicit the multiplicity of perspectives and goals, encouraging debate and discussion, and allowing actors to confront each others' constructed realities. For example, demonstrating the tangible and visible outcomes of contour farming in contributing to the restoration of soil productivity (Pinabacdao).
- *Participant* in the process of social learning, by bringing intervention to an experiential level instead of falsely assuming to be external facilitators of local processes. The role requires openly acknowledging the intervening actor's institutional and personal interests, and thus establishing one's being a stakeholder with respect to the natural resource unit. For example, acting on the basis of the legal framework in laying claim over the forestland as part of the public domain (Matag-ob).
- *Consultant* in bringing to bear the scientific body of knowledge and methodologies to accelerate the process of situation improvement. The role represents an expert system which can be readily consulted or accessed, to enable actors to exploit the tools that science offers for social learning. For example, sharing science-based knowledge with hillyland farmers to improve the effectiveness of locally developed measures for soil resource management (Matalom).
- *Intermediary* in filling in the functional gaps while building and maintaining links among actors. Between intervening actors, the role aids in combining the complementary capacities of institutions; between intervening actors and local people, it serves as a broker for information, resources and opportunities for situation improvement. For example, consolidating knowledge from various sources and offering these to farmers as a menu of technological options for soil resource management (Pinabacdao).
- *Policymaker* in designing a facilitative policy framework for field-level intervention through regulatory mechanisms, incentives and other instruments. The role provides means for interactive discourse between public and central authority on providing a supportive context to non-coercive intervention, as well as external pressure for synergic behaviour among actors.

For example, reclassifying upland barangays from being secondary to primary service areas for agricultural extension (Matalom).

- *Advocate* in strengthening the capacity of disadvantaged groups to exert more leverage over decisions with respect to natural resource management. The role requires joining forces with certain actors or making representations in their behalf to increase their countervailing power and thereby making intervention more responsive to their needs and circumstances. For example, representing forestland occupants in negotiating for direct, long- and short-term benefits in exchange for their participation in the reforestation project (Matag-ob).
- *Coordinator* in facilitating horizontal and vertical integration among actors, to develop a configuration suited to the nature of innovation it supports. The role establishes and maintains networks covering both hierarchical coordination for multiple levels of intervention and sectoral coordination across different groups. For example, integrating the institutional capacities of government, private, academic and other organisations for dealing with location-specific constraints in soil resource management (Pinabacdao).

In answer to the third research objective, it is therefore concluded that *intervention for natural resource management needs to play important roles for social facilitation. Furthermore, intervention will have to facilitate social processes not only for learning to change a problem situation, but also for changing the way actors learn.*

11.4 Objective Number 4

To discuss the implications of the study for current intervention approaches in addressing problem situations in natural resource management. In the earlier chapters, the range of intervention approaches that have emerged in the agricultural development scene since the days of the Green Revolution were characterised. The case studies later provided opportunities for undertaking an empirical examination of how these approaches were operationalised in the context of the Philippine uplands. It now becomes important that these approaches be held up against the nature of intervention deemed necessary to support effective natural resource management, as outlined in the preceding section.

The research identified different blends of intervention approaches in the case studies, from the linear TOT to those evoking elements of client orientation, participatory development and systems focus. Although varying in emphases, they are unified under their common conceptualisation of the nature of problem situation, type of desired innovation and role required of intervention.

Problem situations remain largely predetermined according to the agenda of intervening agents and thus intervention is preset to address specific crops, commodities or problems. Even when espousing a systems view, the approach is still built around particular performance criteria chosen in advance and imposed on the problem situation. These are best exemplified by approaches attempting to integrate sustainability concerns while maintaining its original production-focused framework, and in viewing resource degradation as being limited to constraints in the interrelationships among biophysical components of a natural ecosystem. While there is to some degree a recognition of the centrality of human agents in the problem situation, the social dimension is based on teleological assumptions of sets of actors who have in-built goals and driven purely by economic motives. On the other hand, targeting specific client groups and beneficiaries leads to overlooking other actors relevant to the situation and of oversimplifying the general social setting.

Although emphasising a user-centred approach, in practice innovation is taken as process of change that is primarily induced from the outside. Also, the participatory label extends only as far as inviting local people to take part in a development process already structured by external agents. While offering a *basket of choices*, outsiders remain in control of what goes into the basket. Innovation remains narrowly focused on technical change and considers the primacy of seeking improvement in instrumental relationships. The process of change itself is conceived as following simple, linear and systemic patterns with actors seen as inherently sharing goals, interests resources and knowledge.

Given these premises, intervention approaches in the post-Green Revolution era appear not to dissociate radically from the TOT in terms of their basic underlying framework, and as such are better seen as reformative than truly revolutionary. Intervention continues to be assumed as an externally driven set of activities separated from general institutional, sociopolitical and temporal contexts. It considers the diffusion of innovation to proceed mechanistically with intervening agents in general not having moved beyond the stage of playing a dominantly expert role, while seeking to fit local knowledge into scientific frames of reference and criteria.

In none of the cases was external intervention shown to work effectively in helping local people improve problem situations in natural resource management. This suggests that introducing innovation for sustainability requires an intervention different from prevailing approaches, or for the latter to assume new roles for facilitating the creation of social platforms for natural resource management. This limited applicability of prevailing intervention to deal with sustainability becomes more manifest especially when viewed alongside the earlier described nature of intervention that seem required. To enhance its responsiveness to such emerging development concern, an amplification of client-oriented, participatory and systems-based approaches becomes essential.

This conclusion is particularly important for the user-oriented framework which UPWARD puts forward as an alternative approach, for three main reasons. Firstly, the framework embodies the earlier mentioned three interrelated forms of intervention approach. Secondly, UPWARD has taken sustainable agriculture as a priority programme thrust. Thirdly, the approach taken by UPWARD represents a growing trend among many other intervention programmes in the Philippine uplands.

The research indicates that while the user-oriented framework, as already described in Chapter III, is in itself a step ahead of earlier approaches especially with respect to agricultural production and food systems, it remains an inadequate tool as an alternative form of intervention when applied in problem situations for natural resource management. The findings of the research therefore underline the need to reexamine the approach and reflect on the experiences provided by UPWARD.

On the whole, the task of redesigning prevailing user-oriented intervention approaches in the Philippine uplands is in order so as to increase the breadth and depth of its focus, namely:

- *From users to actors.* The central concern of UPWARD for incorporating the perspective of technology users in the R and D process reaffirms the widely held view that for technologies to be relevant and useful, these must be tailor-fitted to the user's needs, preferences and circumstances.

Users though cannot be lumped under a single homogenous category. The user-oriented approach recognises that for perspectives to be meaningful, users such as those in a food system need to be segmented into target categories, e.g. farmers, processors and traders. User segmentation has been most visibly applied by UPWARD in response to gender issues (Velasco, 1992). By zooming in on the key, but often underestimated, role of women in agriculture, significant variations in perspectives between subsets of male and female farmers

are exposed. However, as this research shows, deconstructing the myth of a farmer stereotype need not be limited to gender concerns. It can be pursued further by exploring other unconventional but significant segmentation criteria which in this research was shown to include sociopolitical, economic, cultural and agroecological ones.

User sensitivity intends to bridge the large gulf between technology developers and users. Applying the same level of sensitivity to other actors, besides users, can lead to a more holistic understanding of problem situations in natural resource management. UPWARD has shown interest in exploring how users strategise to meet input requirements in agricultural production by highlighting the interactions between users and local financial institutions (Bagalanon, 1991). Such a line of inquiry can be further expanded in highlighting users' social encounters with other stakeholders of a given natural resource. Otherwise, there is a danger for the user-oriented framework to overlook social dilemma situations involving the tragedy of the commons or provision of public goods (Brewer and Kramer, 1986). While users may represent a key component of an agricultural or food system, an approach can only be truly systemic if it pays adequate attention to the whole range of actors in any human activity system. This requires that the search for actors should not only be directed inward as in segmentation but also outward to include those in the system environment.

In studying development interventions especially for sustainable agriculture, it becomes crucial to examine not only at the *intervened* but also at the *intervening agents*, as well as the interactions between the two parties, considering that their being both resource stakeholders blur the distinction between insiders and outsiders. This is consistent with the sociological thinking to deconstruct planned intervention and view it instead as an ongoing, socially constructed and negotiated process, not simply the execution of an already specified plan of action with expected outcomes (Long, 1990). After having focused on users in the first programme phase, it is high time UPWARD increasingly examine how they interrelate with other actors in the wider social arena.

Since the process of improving problem situations does not occur in a vacuum, actors who may be external to a system but nevertheless influence its functioning also need to be considered. These *moving forces* (Kaimowitz, Snyder and Engel, 1990), e.g., policymakers, donor agencies and private companies, often exercise focused external pressure on the system. This is particularly true in the Philippines where the implementation of Republic Act No. 7160, otherwise known as the Local Government Code, saw the rise of political leaders as key influences in agriculture and rural development. Among others, the law provides local government units with administrative control over field personnel of key government agencies such as the Department of Agriculture. Institutional legitimisation, for one, has been shown to provide a favourable political environment for development interventions (Escalada et al, 1993).

In other words, being user-centred runs the risk of overlooking those actors in the periphery. In the case of UPWARD, the need to go beyond users seems long overdue since the call for a meta-framework to guide the programme is not new (Verdonk, 1990).

- *From problem to problem situation.* The research shows how diagnostic frameworks often produce a blinding effect on intervening actors. In the case of UPWARD, its focus on root crops serves to remedy the lack of attention given by intervention to these secondary crops and the households that they support. However, it can also seriously restrict the ability of UPWARD professionals to respond to problem situations with a fairly open mind. This equivocation on crop orientation at the same time stresses that problem diagnosis is not a straightforward task as it may seem to be. Identifying and defining a single problem can be

difficult. Questions on the scope of the problem are hard to answer because often it does not have sharp or hard boundaries.

These become even more ambiguous in the case of problem situations in natural resource management, given the complexity that surrounds how different stakeholders seek to influence the manner in which natural resource units are managed. Intervention is thus bound to encounter major difficulties by attempting to immediately identify and isolate a single problem, or by focusing on seeking solutions without having clearly defined the problem. Instead, it is relatively advantageous to start the fieldwork by examining the problem situation -- the structures, processes and climates (Wilson and Morren, 1990) that bear on the various feelings of unease and themes of concern expressed by actors. A broader view of the situation can help form the basis for the identification of common problems and ways to address them.

As such, intervening agents can make more effective use of the menu of diagnostic methods made available through the user-oriented approach if they immerse themselves in messy real-world situations not with the immediate aim of defining the problem but rather starting the field inquiry by painting a rich picture of the problem situation based on the variety of views provided by actors. In this way, intervening actors are better able to grapple with and make sense out of complex human affairs.

- *From agroecosystem to human activity system.* The user-oriented approach considers actors as *users* primarily because they use technology for technical control of or adaptation to their biophysical environment. This conceptualisation fits well with conventional agriculture as people seek to manipulate factors associated with, for example, crop production. Predictable outcomes based on natural laws enable human beings to establish an instrumental or technical relationship with their biophysical environment.

However, problem situations in natural resource management display constraints not only in a biophysical but also social sense. In many cases, human agents not only have to act towards their natural environment but more so towards each other. To improve such situations, there is a need to build synergy among them. While this is ideal, any situation in which human beings try to act together will be complex because individuals are autonomous (Checkland, 1989) -- epistemological and intentional.

While the biosphere involves manipulating objects that operate with law-like attributions, the sociosphere involves interacting with other people. In the latter, intervening in problem situations exclusively through technology use is inadequate, if not inappropriate, because human beings as social individuals are not nomological. In other words, to be able to deal effectively with problem situations rooted in the sociosphere, one needs not only technical knowledge but also social process knowledge (Röling, 1992). For UPWARD to seriously address sustainability, it means broadly redefining innovation as being more than just a research and development process limited to technological change.

Considerations such as the above have also led to the distinction between *hard* and *soft systems* (Checkland, 1989). The concepts of natural systems (wholes created by nature, e.g., sweetpotato plant) and designed systems (wholes created by man, e.g., computer) have been helpful in understanding biophysical problems. However they are not rich enough concepts to cope with the complexity of human situations (Wilson and Morris, 1990). There is a need therefore to set alongside natural and designed systems the concept of a human activity system as a *holon* (Checkland and Scholes, 1990), focusing on sets of purposeful human activities which are aimed at improving a particular problem situation.

Hard systems, i.e., natural and designed systems, are construed to exist objectively independent of observers, with clear and predetermined boundaries and goals. On the other hand, soft systems, i.e., human activity systems, do not exist in the real world. While the system is based on observable activities, soft systems thinking is essentially a mental construct or way of looking at the real-world. It assumes that a systems-based view of human situations, that is facilitating actors to perceive themselves and behave as a system, become a useful tool in planning and implementing desirable and feasible improvements.

Agricultural and food systems are people-managed, not to mention the natural resources supporting them. Therefore, the user-oriented framework has to move beyond viewing these systems solely in terms of user-soil-water-plant-animal relationships. The research shows that even many of the so-called natural ecosystems have not escaped from human interference. While a hard systems view can be helpful in addressing their technological needs, only a soft systems view can fully bring to light complex social processes as people seek ways of working together. Indeed, much could be gained by viewing inherently hard systems as soft systems too. Through a soft systems view, the conflicting goals people assign to a natural or designed system becomes manifest.

To reconcile the differences in perspectives between hard and soft systems while recognising their dual importance, it is helpful to talk in terms of a coupled system (Röling, 1994) to recognise both the existence of natural and/or designed systems, such as an assembly of food processing equipment, and a human activity system, consisting of the people involved in its operation and management.

- *From perspective to multiperspectives.* The user-oriented approach in a way rightfully guides intervention to work around the user's perspective and build on it the foundation for their participation in improving problems situations that they are faced with.

However, the perspective that actors develop through their encounters with concrete situations are shaped by characteristic mental frameworks which UPWARD often refers to as cognised models (Rappaport, 1979 as cited by Nazarea-Sandoval, 1990). Actors use different mental frameworks based on their unique experiences, feelings, emotions, attitudes, values, morals, beliefs, tastes and personalities of individuals, as well as their patterns of reasoning and intelligence, and their store of knowledge (Morris and Wilson, 1990). These different lenses for viewing the world give rise to different perspectives. This explains why individuals perceive the same event in different, even conflicting, ways. Intervening agents who seek to elicit stakeholders' views realise that there is rarely such a thing as a *users' perspective* but instead *multiple perspectives* (Linstone, 1989). User-oriented diagnostic methods can be expected to yield as many perspectives of a single situation as there are relevant actors. That one actor perceives as a problem situation what another considers an improved situation underline how different world views can lead to different perspectives.

Creating awareness of this multiplicity of perspectives is not meant to complicate an intervening agents' task. Instead, the multiple descriptions provided by actors as seen from different angles help build a rich picture of the problem situation as a concrete basis for subsequent joint learning processes. Making prior assumptions about actors sharing common goals and interests, in other words being systemic, not only denies multiperspectives as characteristic of social encounters in general but also misleads the entire process of designing and implementing intervention.

On the other hand, while perspectives in themselves are relevant inputs for innovation, these become a lot more meaningful and useful when linked to their underlying assumptions. Actors

may hold conflicting perspectives simply because these are rooted in conflicting mental frameworks. In other words, there is a clear advantage if diagnostic exercises go beyond examining user's perspectives, that is by also probing into the underlying mental frameworks. Exposing not only *what* actors think but also *why* and *how* they think foster opportunities to negotiate for the reconstruction of their perspectives and the possible development of joint agency in natural resource management.

The emphasis on multiple perspectives and mental frameworks apply not only to the intervened but to the intervening agents as well. Discussion and debate of different perspectives are a norm where research and development professionals gather.

There is already an overflowing body of literature expounding on the merits of interdisciplinary. Castillo (1990) systematised the patterns of interdisciplinary work which has helped guide UPWARD's efforts to develop an interdisciplinary approach to research. Learning the how's of interdisciplinarity needs to be accompanied by a proper understanding of the why's behind it. One fundamental, and obvious, reason for UPWARD to encourage scientists representing different disciplines to undertake joint research is that the multiple perspectives generated through such an approach is expected to lead to a holistic, and hopefully clearer, understanding of an ill-structured problem situation.

The different perspectives of scientists reflect the body of knowledge available in their respective fields. And just like users, these perspectives are rooted in certain mental frameworks, i.e., dominant scientific paradigms. Genuine interdisciplinarity comes about when scientists, while drawing from the stock of knowledge in their individual fields, become willing to share a common mental framework, such as the one offered through the user-oriented approach, for viewing problem situations. It goes without saying that UPWARD researchers can effectively undertake interdisciplinary work only when they willingly adopt and share the user-oriented framework. In particular, the *R&D triangles* (Prain, 1993) as modes of interdisciplinary and participatory research being developed by UPWARD can become fully operationalised when predicated on a *shared appreciative system* (Checkland and Casar, 1986).

Furthermore, interdisciplinary work enhances the conduct of research since scientists make available the different methodologies used in their respective fields. Soft systems, hard systems, applied science and basic science all have their place in the research process although each methodology assumes critical importance at different phases in the inquiry. Interdisciplinary research thus operates by spiralling through several methodologies (Bawden et al, 1984).

- *From knowledge to knowing.* The growing interest in the potentials of indigenous knowledge for development further underscores the need for a user-oriented approach. Perspectives of users emanate in part from the vast reservoir of local people's agricultural and natural resource knowledge borne over centuries of experience.

While studies on indigenous knowledge have surged in recent years to include UPWARD's, these deal mainly with the documentation and storage of local knowledge, beliefs and practices (Bautista and Vega, 1994; Mula et al, 1993; Palomar et al, 1993). These attempts to extract fragments of indigenous knowledge and store them under certain predetermined categories somehow reflect the difficulties of international science to record and analyze indigenous knowledge in its holistic form (Indigenous Knowledge and Development Monitor, 1993).

The findings of such studies are undoubtedly helpful in describing and systematising aspects of indigenous knowledge. But while its existence, as well as importance, is already well

established, indigenous knowledge seems far from attaining legitimacy in mainstream thinking and be seriously considered as a relevant input in research and development. Intervention therefore needs to move a step further by outlining approaches and procedures on how indigenous knowledge can be expanded, incorporated into or enhanced by formal science. Otherwise, terminal reports of research projects which list down unique agricultural practices of tribal groups may only find their way in the bookshelves of libraries, side by side with the Guinness Book of World Records, ending up as good materials to fascinate, intrigue and entertain readers.

A holistic approach to indigenous knowledge research and development, as contrasted with the typical *extractive* type mentioned earlier, helps avoid the tendency to abstract knowledge from the sociocultural system from which it evolved. The term *local knowledge* is often used to emphasise that it is unique to a given community. Indigenous knowledge items, beliefs or practices therefore need to be appropriately viewed and examined against the particular milieu from which these were drawn.

A major constraint in incorporating indigenous knowledge in the R and D process is the wide gap between science-based and indigenous knowledge systems. There remains a big challenge for research on how the two systems can be intertwined so that the partnership can exploit, as how UPWARD put it, the broad principles of global science while being guided by the practical understanding of local agroecological, socioeconomic and cultural conditions and possibilities. This is however easier said than done. As Scoones and Thompson (1993) emphasise, attempts to blend or integrate indigenous knowledge into existing scientific procedures falsely assumes that it represents an easily definable body or stock of knowledge ready for extraction and incorporation.

As the research also showed, the difficulty seems to be not only because the two knowledge systems maintain two distinct bodies of knowledge but because they stem from different assumptions, values, methods, circumstances and intentionalities. As Scoones and Thompson (1993) emphasise, neither of the two can be regarded as unitary stocks of knowledge but instead they represent contrasting multiple epistemologies produced within particular agroecological, sociopolitical and economic settings.

Given such disparate mental frameworks, it is not surprising that the two often clash rather than complement. If science-based and indigenous knowledge systems are to be interlocked, scientists and local people need to converge towards a commonly shared vision. As to how this can be achieved is not yet clear enough and perhaps this is one area where the user-oriented approach can make a major contribution.

In trying to make full use of this newly rediscovered resource, it must however be kept in mind that not unlike other types of knowledge, indigenous knowledge has both its limitations and potential contributions to development as this research shows. Thrupp (1989) cautions against idealist and romanticised visions which suggest that all forms of indigenous knowledge are superior. This can be misleading and inappropriate. It should be stressed that the type, extent and distribution of knowledge vary greatly in Third World societies.

In its pursuit of partnership with local expertise, UPWARD can pave the way for research on indigenous knowledge that go beyond archival interests. In addition to identifying and classifying knowledge products, research can capture the dynamic character of indigenous knowledge such as by describing not only the indigenous practice per se, but the processes involved as knowledge is generated, transformed, exchanged, adapted or utilised, as well as the actors and their linkages that support these processes.

The dominant focus on knowledge alone paints a static and simplistic picture of indigenous knowledge. With the emphasis on content, it mainly serves to highlight the already widely confirmed existence of indigenous knowledge rather than seeking to explore how such knowledge is learned and under what conditions. It does not fully capture learning as a fundamental but indiscrete aspect of the farming profession (Stolzenbach, 1994) nor the political and sociological complexity of learning settings (Scoones and Thompson, 1993). For intervention seeking to exploit indigenous knowledge for development, the emphasis then should be less on what local people learn and more on how they learn and with whom.

Such refocussing from indigenous *knowledge* to *knowing* directly relates to the conclusions made in this research, and in works done by others, about: 1) local people as sensemakers (Brouwers, 1993) who actively construct their own realities through learning in an interactive, value-bound, dialogical and context-determined process (Scoones and Thompson, 1993); and, 2) innovation for natural resource management as essentially resting on a process of social learning and therefore the facilitation of such knowing (Röling and Brouwers, 1994) is a key role for intervention seeking to support sustainable development. The challenge therefore for UPWARD in particular, and intervention in general, is to build not only on local knowledge but on local people's capacity for knowing.

In answer to the fourth research objective, it is therefore concluded that *problem situations in natural resource management raise a number of important issues that are not adequately dealt within the framework of prevailing client-oriented, participatory and systems approaches. Prevailing intervention approaches to agricultural development will have to be continuously adapted if these are to become fully responsive to the rising challenge of sustainable agriculture in the Philippine uplands.*

11.5 General objective

After drawing conclusions and implications from the findings for each of the specific research objectives, the central question raised at the beginning of this book is revisited: *How can intervention be designed to effectively support natural resource-management for sustainable agriculture?*

The research concludes that any answer to this question must first seek to clarify what is it that needs to be *intervened*. Agriculture, being chosen as the subject of intervention, therefore has to be reexamined especially in light of the research findings. With natural resources supporting agriculture now continuing to be degraded, awareness of the ecological imperative (Röling and Jiggins, 1994) is fast emerging, that it is no longer sufficient for people to gain control over natural resources or to beat other equally strategic actors in the race for resource use. This realisation prompts actors to take new perspectives on agriculture. Firstly, to change the view of themselves from *entrepreneurs* to *custodians* of farm resources. Secondly, to change their view of themselves from *masters* to *stewards* of the natural environment. Thirdly, to change their view of agriculture as the management of *production enterprises* to *natural resources*. Fourthly, to change their view of agriculture from *agri*, focusing on its techno-scientific and economic rationalistic dimensions (Bawden, 1992), to *culture*, focusing on the meaning derived from social interactions in agricultural activities (McClintock and Ison, 1994).

In a similar vein, a reexamination is called for in the case of sustainability, being the object of intervention. Putting back human agents in agriculture suggests a perspective that considers not only nature but sustainability itself as being socially constructed. Therefore, it no longer represents a fixed set of practices or technologies, nor a model to describe or impose upon the world (Pretty, 1994). That until now there is no universally accepted definition of the concept stresses that the primary task in working towards sustainable agriculture is not on how to achieve set goals but on setting goals

itself. The definition of sustainability becomes part of the problem and not a given. And since sustainability is open to interpretation, it can only come about as a product of social construction through learning.

With such a radical redefinition of sustainable agriculture, are prevailing intervention approaches still relevant? Does the user-oriented framework offer a viable alternative system of inquiry for sustainable agriculture (Pretty, 1994)? As a whole, the research findings echo Agudelo and Kaimowitz's (1989) contention that improving a problem situation requires a consistent combination of innovation, knowledge processes and actor configuration. As such, the emerging task of intervention in the context of sustainable agriculture is to demonstrate capacity to facilitate social learning for managing complex systems (Röling and Jiggins, 1994). This new role entails dealing with technological needs vis-a-vis a new host of issues including but not limited to multiple realities, power relations, institutional arrangements, resource negotiation and property rights. The research findings provide adequate basis to conclude that these issues cannot be adequately addressed within the confines of prevailing intervention approaches, a point also shared by an increasing number of authors (Amanor, 1990; Bentley, 1994; Long, 1992; Okali et al, 1994; Rocheleau, 1994; Röling, 1994; Scoones and Thompson, 1993).

The general implication then is that current intervention itself needs to undergo *adaptive learning* by further problematising the concepts underpinning its practice in the Philippine uplands. In seeking to adapt current client-oriented, participatory and systems-based approaches to sustainable agriculture, a further rethinking is in order guided by key questions such as: Which *clients* and in relation to whom? How *participatory* and according to what types, forms and levels? What sort of *system* is referred to and linked to which other types of systems? Far from being viewed as a threat to their reason for being, the sustainability challenge has to be taken by intervening agents as an open invitation to build a coherent, larger body of shared knowledge and practice (Rocheleau, 1994).

Such a task of improving the capability of intervention for improving problem situations in natural resource management can begin by broadening its horizons to discover the wide range of possibilities available, and to reaffirm its continued relevance in this age of sustainable development. For a starter, there are at least three distinct but intersecting paths for the rethinking of intervention for sustainable agriculture in the Philippine uplands:

- Rethinking the *role of intervention* through expanding the repertoire of roles that it is capable of providing to different groups across different problem situations. From limiting itself as an agent for generating and transferring scientific knowledge, it can explore the many opportunities for modifying and combining elements of the intervention mix to suit particular problem situations, thereby fully demonstrating its capacity to work in a continuously changing environment.

Among field-level extension staff, for example, it means reorienting the long-accepted role centred on delivering technologies, inputs, products and associated services to their supposed clients. The role of facilitation would necessarily involve newly defined tasks for supporting adaptive social learning, for stakeholders to make collective choices and decisions, to enhance the quality of relations with others, and to undertake planning that shapes future conditions (Goldstein, 1981).

- Rethinking the *design of intervention* through building a better theory-informed practice. The overall design of intervention defines the broad context in which the rethinking of its role can take place. The types of (potential) roles that intervention can play is limited to those that its overall design allows.

Current discourse on sustainability issues in the Philippine uplands can serve as a vehicle in moving from an era of cookbooks, which emphasises providing field practitioners with a collection of extension methods, to a renaissance period for strengthening the theoretical basis of intervention. The underlying intent is to establish its legitimacy in the country and elsewhere as a scientific discipline, able to integrate various insights and ideas into a distinct body of knowledge to support intervention practice.

Rethinking intervention design to promote actors' reliance on the intervening agents' facilitation may also fall into the same dependency trap of dominant approaches. Therefore, it must be designed so as to build self-facilitation among stakeholders, by making them take and share responsibility for facilitation as part of the innovation. The aim of the intervening actor as facilitator then is its own redundancy (MacGill and Beaty, 1992).

- Rethinking the *epistemology of intervention* in light of increasing realisation of the socially constructed nature of many problem situations. As it appears now, sustainable agriculture points to the need for intervention to learn whole new ways of thinking. From a single epistemology based on the omniscient nature of science, it can move beyond positivist notion of thinking *about* thinking and develop newer, alternative forms of learning and inquiry systems.

For instance, facilitation implies accepting that no single actor can develop a fully comprehensive view of a problem situation, not even the intervening agents themselves. Allowing for partiality in perspectives then becomes a necessary ingredient for any intervention approach to sustainability (Engel, 1995).

While this research has boldly outlined the nature of intervention deemed necessary for sustainable agriculture, it also makes clear that these conclusions and implications are no more than plausible assertions of alternative ways of intervening, conscious of its *being exploratory while anticipatory* (Castillo, 1994). The generally unsuccessful empirical cases in the Philippine uplands earlier presented limit the research to making tentative inferences on the broad character of the intervention designed to improve problem situations in natural resource management.

Further research is therefore suggested to examine the general applicability of the intervention design just described. Additionally, there is a need for follow-up inquiry to determine how the proposed intervention design can be adapted to specific problem situations such as:

- *According to type of resources.* The critical agroecosystem level in which the problem situation needs to be dealt with appears to vary depending on the natural resource in question; e.g., soil management through contour farming at the farm level in contrast to forest management through reforestation at the watershed level. Subsequent research can be done also on other types of resources, e.g. genetic, water, aquatic and wildlife resources.
- *According to the extent of resource degradation.* A different intervention design may be required in crisis situations or when there is a serious threat to the collective societal interests. In such cases, the mix of intervention elements particularly the balance between compulsory and voluntary forms may have to be more closely considered.
- *According to the type of agroecological systems.* The intrinsic DCR character of the uplands makes the task of natural resource management essentially difficult. On the other hand, the more homogenous and favourable conditions of the lowlands appear to be a simpler yet almost entirely different situation. As an area where much of the Green Revolution made an impact, the sustainability challenge for intervention in the lowlands may present itself in problem

situations centred on maintaining the earlier production successes while dealing with second-generation problems.

Nonetheless, what this work considers as its most significant contribution is having helped open wide the doors to discourse on intervention for sustainable agriculture in the Philippines, by suggesting a constructivist knowledge systems perspective as an alternative approach to scientific inquiry. The research findings are therefore meant to stimulate renewed interest in the quest for fresh options to deal with the messy issues surrounding sustainable development in the country. And at the rate that the state of the Philippine uplands continues to deteriorate, it seems the urgency for undertaking such research requires no further elaboration.

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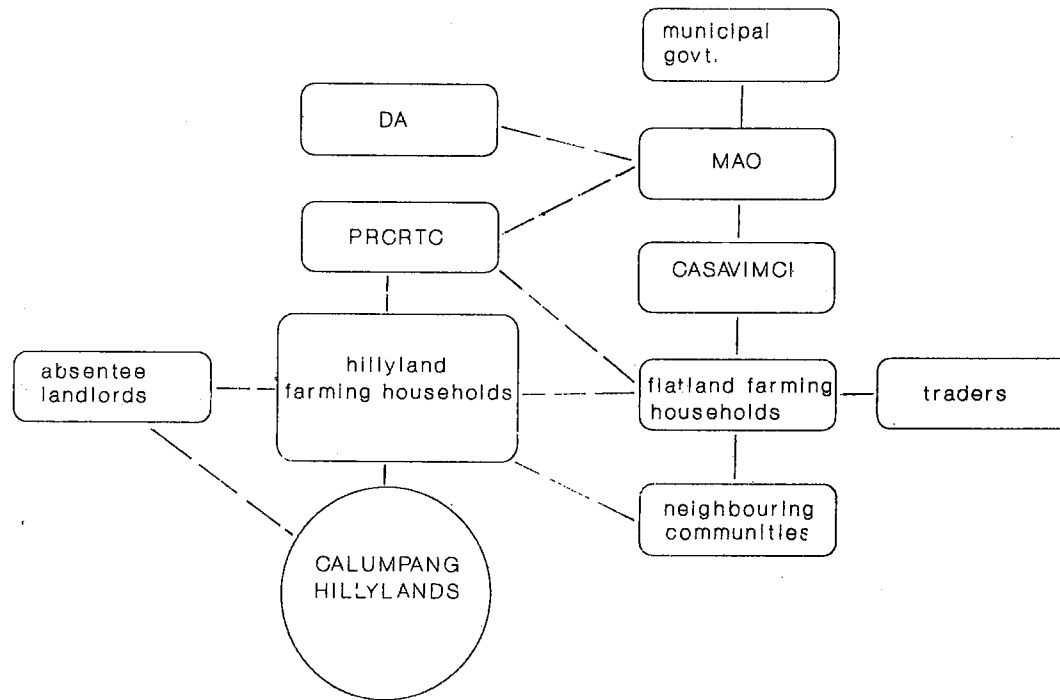
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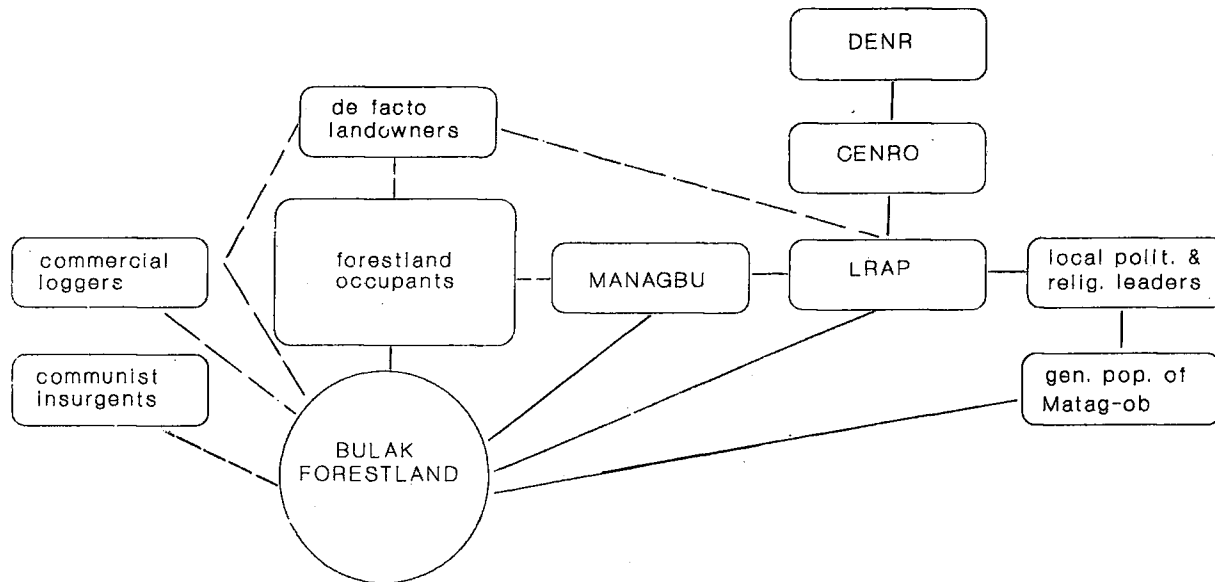
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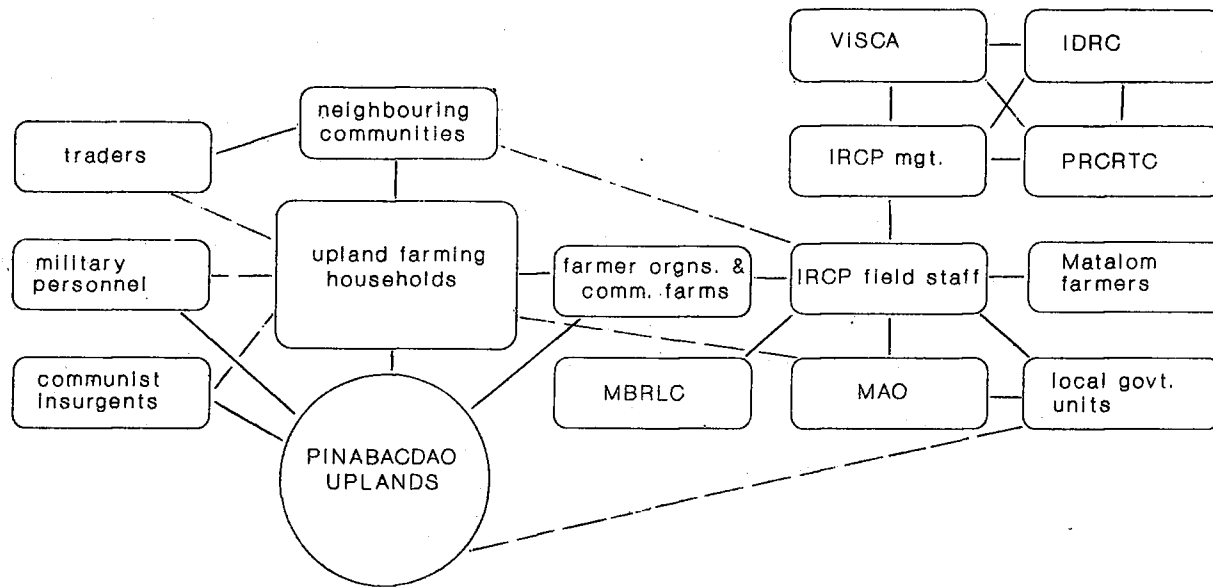
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Appendix A. Actor configuration of Matalom case.



Appendix B. Actor configuration of Matag-ob case.



Appendix C. Actor configuration of Pinabacdao case.

SAMENVATTING

LEREN VERANDEREN, VERANDEREN LEREN

Het beheren van natuurlijke hulpbronnen voor duurzame landbouw in de hooglanden van de Filipijnen.

Dindo M. Campilan

Voor dit onderzoek zijn probleemsituaties bij het beheren van natuurlijke hulpbronnen in de hooglanden van de Filipijnen onderzocht. Met behulp van het kennissteemperspectief is het benodigde veranderende karakter van de ontwikkelingsinterventie bestudeerd sinds duurzaamheid steeds meer als een belangrijk criterium van landbouw productie wordt beschouwd.

De empirische case-studies wijzen uit dat duurzame landbouw in de hooglanden vanwege de biofysische degradatie van natuurlijke hulpbronnen meer dan alleen technologische oplossingen behoeven. Net zo belangrijk is dat de verschillende betrokken actoren manieren kunnen onderzoeken om synergetisch deze bronnen te beheren. De resultaten geven aan dat duurzaamheid een eigenschap is die ontstaat vanwege bewuste, zingevende actoren die een gedeeld begrip van de probleemsituatie bereiken, strijdige perspectieven endoelen oplossen, beslissen over compromissen en gezamenlijk overeenkomen aan de gewenste veranderingen te werken.

Bij het beheren van natuurlijke hulpbronnen is daarom een holistisch begrip van ingewikkelde sociale processen een voorwaarde om effectieve interventies van duurzame landbouw te kunnen ontwikkelen. Clientgerichte, participatieve en systeem-gerichte benaderingen hebben ertoe bijgedragen dat de aandacht van landbouw ontwikkeling in het land verschoven is naar marginale boeren gemeenschappen in de hooglanden. Om beter op kwesties rondom duurzaamheid te reageren moeten deze post-overdracht-van-technologie-(TOT)-benaderingen echter verder worden aangepast aan meerdere actoren, realiteiten en doelen die de probleemsituatie bij het beheer van natuurlijke hulpbronnen karakteriseren.

In het algemeen suggereert het werken aan duurzame landbouw in de Filipijnen een heroverweging van de dominante visies op: 1) landbouw, van beheer van productie naar beheer van natuurlijke hulpbronnen 2) duurzaamheid, van een objectief bepaalde reeks indicatoren naar een produkt van sociale constructie door middel van leren en 3) interventie, van een positivistische benadering van kennisontwikkeling en overdracht naar het creëren van platforms voor sociale leerprocessen.

Onderwerpen: landbouwvoorlichting, Filipijnen, rurale sociologie, duurzame landbouw.

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