

**Participatory research methods for consolidating resource management associations in
support of sustainable rural development in Mexico's humid tropics.**

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requirements for the degree of

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Abstract

This thesis presents one group of Nahua farmers' conservation and development ambitions and accomplishments by describing the results of a participatory research process that addressed current and traditional tree-cover management practices in Mecayapan, Veracruz, Mexico. This research paper details how the methods of participatory social forestry research were effectively used to contribute to local efforts to consolidate and extend small-scale sustainable development initiatives within a recently created 100 hectare agroforestry reserve on the ejido lands of Mecayapan.

This case study illustrates many of the pros and cons of participatory methodologies designed to assist in the process of creating and establishing broad-based strategies for addressing the socio-economic and ecological options and obstacles particular to a given region. The paper argues that genuine grassroots sustainable rural development is only possible where the research and development activities undertaken and the technologies employed are directly derived from the needs and priorities of local farmers, and adapted to the constraints under which they operate.

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This thesis paper is dedicated to my many mentors and supporters in all walks of life who have seen me through this program of training. I could not have done this without the strength of their courage and the wisdom of their actions. Many thanks to Jacques Chevalier, for inviting me to Carleton University in 1995, and thereby introducing me to the exceptional research and development projects occurring in Mexico through the on-going social praxis experiments of the Sierra de Santa Marta communities and Sustainable Development program.

Many thanks to those dedicated professionals and community activists of the Proyecto Sierra de Santa Marta for the chance to experience the practical processes of devising and achieving technical and socioeconomic solutions towards the goals of a more sustainable and equitable development. I remain particularly indebted in this sense to Luisa Paré, project director for the PSSM in Xalapa, and to my host in Mecayapan, Hilario Martinez Revilla, both of whom literally opened-up their homes and their lives to me in exchange for what we all hoped would prove a worthwhile opportunity to jointly explore alternative resource management strategies.

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Chapter One: Introduction

1.1 INTRODUCTION

This thesis paper is a detailed case study of a rural conservation and development initiative called I-CHAN CHANEKO' HUEHUE, or "The House of the Old *Chaneko*." Research for this thesis was conducted in Mecayapan, Veracruz: a Nahuatl farming ejido located in the subtropical moist forest transitional region on the southern slopes of the Sierra de Santa Marta. This mountainous region along the coastal area of southern Veracruz embraces the municipality of Mecayapan (with the ejido Mecayapan as its administrative center) and its four predominantly indigenous neighbors. This region of about 800km² is host to some of the northern most tropical humid forests in the Americas, and roughly 57000 Nahuatl, Zoque-Popoluca and Mestizo people. Not surprisingly, the Sierra de Santa Marta presents some of the highest levels of biological and cultural diversity in Mexico; a country already well known for its quite astonishing levels of 'mega-diversity'. This region is furthermore highly strategic for the rivers that originate in its core supply drinking water to a series of nearby towns and industrial cities (Velázquez and Paré, 1996:326).

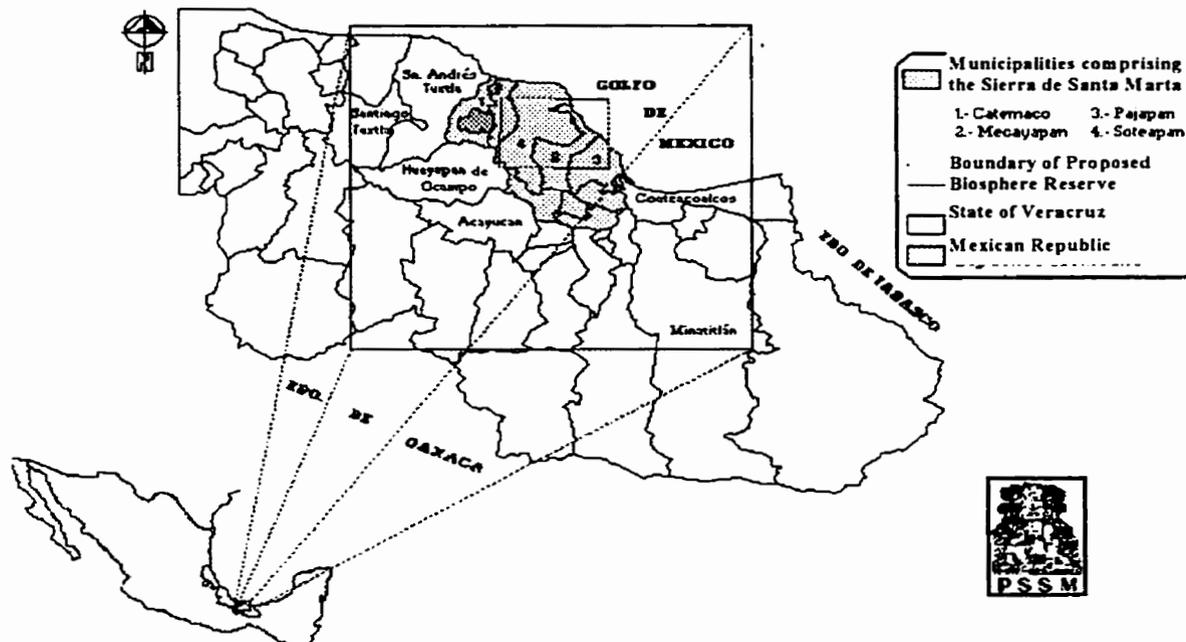


Figure 1.1 Source: Cartography Collection of the Basic Geographic Information System for the Sierra de Santa Marta.

Despite these advantageous socio-ecological characteristics, the Sierra de Santa Marta is notorious for the enormous contrasts that exist between the wealth and diversity of its natural species and the poverty and socio-economic marginality of its resident human populations. According to a recent survey of the quality of housing, access to basic services and education levels, more than 85% of local households are either excessively poor or else very poor. The municipalities of the Sierra also have the highest percentage of malnourished children in the state of Veracruz (91%) (PSSM-GEF;1996:4.2.6). This region therefore presents many of the challenges including economic development and quality of life issues, disappearing socio-cultural values, and the rational use and conservation of the biological wealth of its' ecosystems that are especially acute in Mexico and other developing countries in the south.

Given the extraordinary extent and inter-relatedness of these problems, scientific research and development programs in this region must attempt to address all three of the pressing issues of economic production, human welfare and biodiversity. This means simultaneously considering the processes of technological transformation, international and local commodity exchanges, the formation of capital and the distribution of wealth, socio-cultural and health conditions, demographic changes, the use and conservation of natural resources, and the region's historical and political evolution. A remarkably complex task, and yet precisely that which an inter-disciplinary team of specialists from Mexico and around the world has taken on with the determination and assistance of the Sierra de Santa Marta's residents.

I am referring to Proyecto Sierra de Santa Marta (PSSM), a non-governmental inter-disciplinary research project seeking to generate the information and analyses needed to formulate a truly sustainable social and economic development strategy for a bio-economic reserve in the Sierra de Santa Marta region. While natural resource conservation is the prime motivation of the PSSM, their approach to conservation differs from traditional ecological preservation strategies that sought only to exclude or severely restrict the use of particular resources within ecosystems. The PSSM on the other hand undertakes to address the problems of poverty while simultaneously maintaining and improving the essential ecological processes of species and integrated ecosystems (PSSM;1992:5-13).

After carefully examining the leading causes and factors relevant to the broad goals of sustainable development in this region, the PSSM prioritized certain key issues and

opportunities on which to focus their continuing efforts with local residents. These priorities have included preventing forest fires, soil erosion, over-fishing, improving agricultural productivity, encouraging traditional uses of medicinal plants, and facilitating community participation in conservation efforts by exploring ecologically sound production alternatives such as green manure, reforestation and agroforestry. They have actively promoted environmental education and monitoring of large scale development projects, and been instrumental in helping to develop natural resource management plans at the community level (for forests, lagoons, rivers, etc.). Based on the results of these experiences, the PSSM then moved to design further research projects aiming to favor the adoption, experimentation and diffusion of their proposals by and among local farmers (PSSM;1992:2-5).

These experiences have made it possible for those involved to identify and improve their understandings of the fundamental ecological, economic and social constraints facing the local communities of the Sierra in their search for effective development and conservation alternatives to their current inadequate resource-use practices. What makes these practices so inadequate today is that, for reasons that on-going research is making increasingly clear, current production and conservation strategies are threatening the long-term socio-economic and ecological sustainability of this region. As such, the PSSM is one of a growing number of sustainable development initiatives promoting participatory research methodologies and agroforestry techniques so that marginalized rural communities the world over can better evaluate and plan the course of their own development. In this capacity they were also instrumental in introducing me to this

fascinating region, and to those with whom the research for this thesis would be conducted.

1.2 PROJECT ANTECEDENTS

"Projects are not ends in themselves but a means to strengthen rural peoples' capacity to organize effectively" (Burkey; 1993:74).

When I began research in Mecayapan during the summer of 1995, I had not yet designated particular aspects of the issues that I wanted to examine in this thesis. Instead, what I had in mind was more like a perspective on sustainable rural development in the humid tropics, and the potential value of participatory research methods to indigenous farmers. This perspective guided my subsequent approach to local conservation and development issues as it proceeded from my decision to do field research in this area of the country, until my eventual choice of emphasis ensued from the insights and information that I gained while living in Mecayapan over that initial summer.

While studying in Mexico, I was also introduced to two national and international leaders in the fields of rural development and resource conservation: the International Center for the Improvement of Corn and Wheat (*CIMMYT*) in Texcoco, and the Proyecto Sierra de Santa Marta (PSSM) in Xalapa. I made additional visits to the Direccion General de Culturas Populares (Unidad Regional Sur de Veracruz) in Acayucan, and to various communities in the municipalities of Mecayapan, Pajapan and Soteapan, all located in the Sierra de Santa Marta mountains and foothills. These first-hand experiences with Mexican institutions and professionals account for much of the bibliographical and contextual data

that enriched my understanding of the many broad issues involved in conservation and development projects in Mexico and beyond.

For the other kinds of data that I used to evaluate my research objectives I lived and worked in Mecayapan together with the same group of interested farmers for two months. Hilario Martinez, a Nahua resident and ejidatario from Mecayapan, twice agreed to put me up for several weeks in a small room off to the side of his home, and thereby became essential to my being able to watch, listen and learn during my two brief stays in this community (July 1995 and July-August 1996). My eventual choice of emphasis for this thesis arose from the information and understanding that I gained while living and interacting with the members of the conservation association I-Chan Chaneko' Huehue, other residents of the ejido of Mecayapan, and a hand full researchers primarily from the PSSM but also from government agencies, universities and other non governmental organizations.

I first heard about the pilot project for an "Ejido Reserve" in Mecayapan from Luisa Paré, an anthropologist working with the PSSM in Xalapa, Veracruz. Paré described for me this recent initiative that she and Hilario Martinez Revilla - a rural promoter with the federal agency Direccion General de Culturas Populares (DGCP) and Nahua resident from Mecayapan - were advocating among a group of the village's farmers. These farmers, one of whom was Revilla himself, had each recently received 10-15 ha. land parcels in a more or less compact area straddling both banks of the Xochiapa creek (an important affluent of the Rio Huazuntlán) after Mecayapan's communal ejido lands were divided up among its' rights bearing members. Throughout 1995 Revilla and

these farmers (often accompanied by Paré or others from the PSSM) held a series of informal discussions with their friends and neighbors about their options for preventing agricultural fires from spreading to the remaining forested areas on their lands, and how they might diversify and improve their farming and resource management techniques. These discussions culminated in a joint document prepared by Paré and Revilla (1995) in which they outlined the conservation and development objectives agreed upon by this group of 12 native farmers from Mecayapan.

Upon learning of this project, I was initially concerned about their prospects for integrating both resource conservation and economic development goals within this recently created multiple-use area as they were set out in the Paré and Martinez document. After carefully scrutinizing these priorities and discussing the contextual factors that gave rise to them with several local villagers, I wondered what kinds of obstacles (technical, social, economic, political...) might confront those committed to these kinds of strategies for forest protection, and what factors might contribute to their overall chances for success. What types of social and cultural institutions would be necessary to sustain or promote such an initiative, and what would most likely be some of the costs?

These became the types of questions that provided the focus for my research as I became more familiar with the Mecayapan ejido reserve project and the roles that I could most productively play within that process. In order to find out more about these questions and issues I started by researching the literature detailing comparable situations where similar initiatives had been attempted. What I read about these matters in the small-scale participatory rural development and resource management literature all but

convinced me of the need for fostering a more ethical and sustainable rural development. The problem was that there remains no general consensus about how this was to be done in practice, and even less accumulated evidence upon which to evaluate the many possible approaches to promoting sustainable development in marginalized rural areas.

As I reflected on the experiences and prospects of similar projects as that being organized by the twelve Mecayapan farmers, I began to realize that their reserve project would be particularly affected by the factors that continue to shape the evolution of the institutional and cultural aspects of local forest management systems (i.e. traditional agroforestry practices, government forestry policies, NGO programs, etc.), and by the socio-economic conflicts occurring locally over forest land-use rights and responsibilities. The initial task of identifying these factors had fortunately also been tremendously simplified by the fact that much of the required data had already been supplied by the work of the PSSM researchers in the area. It then occurred to me that perhaps participatory social forestry research methods like conducting semi-structured interviews and sketch-mapping exercises might help contribute to the group's objectives by producing information that they would need in order for the ejido reserve project to succeed.

1.3 RESEARCH OBJECTIVES

The general objective of my research in Mecayapan was to contribute to the farmers of Mecayapan's explorations of rural development strategies by emphasizing and strengthening local problem solving capacities for diversifying food production and improving forest conservation. By adopting this overall goal I committed myself to experiment with the kinds of participatory research methodologies that have been designed to help generate and implement rural development solutions by combining new knowledge from scientific research in such areas as agroforestry and anthropology, with the traditional knowledge and production practices of local farmers. For after explaining my interests and abilities as a researcher to the Mecayapan group, all were in agreement that by doing so we could collectively evaluate how they might best consolidate their informal resource management association in support of viable sustainable development alternatives for their region.

The specific objectives of my research in Mecayapan thus became threefold:

- 1) To review with farmers their current and traditional tree-cover management practices.
- 2) To elicit and collectively analyze local farmers' priorities and alternatives for adequately managing their area's remaining forest resources as an important means of reversing recent trends towards generalized ecological deterioration and further socio-cultural and economic disintegration.
- 3) To describe and analyze together with local farmers their assessments of their changing environmental, economic and social opportunities and constraints with respect to their current management practices and their proposed alternatives.

I proposed to realize these research objectives by focusing on information about the proposed ejido reserve such as farmers' knowledge of the local climate, topography, and vegetation types, and such socio-cultural, economic and technical topics as farmers' experiences, problems, interests and priorities regarding agroforestry practices and their alternatives. By forging these new links between the myriad and profound knowledge of local indigenous farmers and that being produced locally and globally through scientific research, I sought to increase awareness and understanding of the many factors that affect the success of grassroots conservation and development initiatives such as the I-Chan Chaneko' Huehue association.

I believed and therefore sought to verify that by fostering debates locally about the issues described in these research objectives I could contribute both to these farmers' searches for sustainable alternatives for managing their natural resources, and to the important process of exploring and improving the ways and means of studying and adapting these developmental goals to real and particularly critical situations in some of the world's poorest and most environmentally degraded areas.



Figure 1.2:
Principal artery
in Mecayapan
looking north
to the peaks of
the Sierra de
Santa Marta in
background.

1.4 CHAPTER OUTLINE

Chapters two and three of this thesis examine secondary data sources in order to provide arguments concerning the relevant theoretical and contextual factors influencing local conditions in Mecayapan, and especially those affecting the I-Chan Chaneko' Huehue conservation and development initiative. This historical data and information from previous investigations in the Santa Marta region is vital for identifying and understanding the root causes of the socio-economic, political and environmental limitations confronting farmers, and also for describing and analyzing the opportunities that they might successfully exploit. Chapters four and five then present the results of my participatory field research with the I-Chan Chaneko' Huehue group about their current and traditional tree-cover management activities and patterns of forest product use. These chapters detail farmers' assessments of their forest product needs, and the management alternatives that are available to them for adapting their current agroecological practices to the prevailing socio-economic and environmental conditions of the region.

The information provided in the final chapters and the methodologies that served to produce it have been included in order to help discern the impact of the I-Chan Chaneko' Huehue farmers' decisions and activities on the group's objectives of increasing the conservation and production benefits that they derive from their local forested lands. The analysis of this data in chapter four is the basis from which I ascertained the significance of the general objective of this participatory research project in Mecayapan: that of contributing to local farmers' explorations of rural development strategies by

emphasizing and strengthening local problem solving capacities for diversifying food production and improving forest conservation.



Figure 1.3: Mecayapan ejidatarios pause at an almost entirely dry stream bed during a land survey exercise realized in order to improve land-use planning.

Chapter Two: Theoretical Context

This chapter explains the concepts and theories relevant to this thesis project and to the research methods that were used. My overall purpose in this chapter will be to situate this Mecayapan research project within the theoretical and methodological frameworks of something called participatory social forestry research. This will be accomplished by detailing the contexts, policies and practices that make up this relatively recent multi-disciplinary research approach that explores the junctions between the social and natural sciences in order to identify key social and technical skills important in farm and community agroforestry. This chapter will thus provide the necessary background data for shaping and assessing appropriate approaches for grasping and addressing the social and ecological problems facing indigenous peoples living in deteriorated rural environments.

In section 2.1 I outline some of the major issues related to anthropology, indigenous peoples and tropical forests. My discussion of these issues begins with a look at how a growing number of anthropologists have successfully and productively integrated the concepts and principles of ecology into their traditional theoretical frameworks and research agendas. By pointing out the similarities between key problems that remain at the forefront of contemporary anthropological and ecological inquiries, I emphasize the importance and benefits of adopting multi-disciplinary research approaches to the study of human / environment relations. These discussions will serve to highlight how these issues

have been treated in the works of researchers explicitly interested in Mexican peasant agricultural production systems and their social and ecological contexts.

The theoretical considerations introduced in this chapter will underscore several critical issues that reappear throughout the discussions that follow about the causes and effects of deforestation in Mecayapan and beyond. These discussions will emphasize the key concepts and questions that are necessary to keep in mind when attempting to evaluate the opportunities and constraints operating on agroforestry-type sustainable rural development projects in real world situations like the Sierra de Santa Marta. This contextual data about local and regional socio-ecological circumstances, together with the more detailed descriptions given in chapters three and four, constitutes the raw material upon which the theoretical conclusions about the overall processual dynamics of poverty and environmental cycles are based.

Next I describe how the multi-disciplinary approach that I call ecological anthropology (within which can be classified the sub-specialization of social forestry) can make substantial contributions towards reversing the long-term social and environmental implications of centuries of unsustainable development processes. Here I review the current status of thinking about the concept of sustainability, discuss the extent and value of existing commitments to 'sustainable development' and draw particular attention to the implications of these situations in so far as agroforestry planning is concerned. This review will demonstrate the many reasons for my belief that one of the most important challenges for future researchers to contend with will be that of experimenting with and

refining the tenets of sustainable development in order to evaluate its enthusiastic promises in actual situations of socio-cultural and ecological change.

Having thus sketched the many unresolved problems that cause and result from deforestation, I present a brief summary of what I have found to be some of the most promising alternatives to the detrimental practices and consequences of deforestation. In section 2.2 I suggest that the above mentioned evidence of simultaneous environmental degradation and socio-economic decline emphasizes the significance of participatory research methods for producing lasting solutions to the challenges posed by the goals of sustainable rural development. This section sets out exactly what it is that I see as the strengths and weaknesses of participatory research approaches, before turning to an extensive survey of how these methods are being successfully adapted by researchers working with indigenous farmers on community-based natural resource management projects.

2.1 Sustainable Rural Development: 'Diversity's Last Stand'

2.1.1 Ecological Processes in Social Theory

Among the many disparate concepts, methods, and procedures competing for preeminence within contemporary anthropology's latest crisis of representation, ecology - the biological science that deals with the functional relationships between organisms and their environment - is finding increasingly fertile ground. Whether it is cultural ecology, ecological anthropology or ethnobotany, what seems to be clear is that what we are witnessing is not simply passing fad. Nor can this phenomena be easily written off as social scientists trying to make themselves sound more 'Scientific'. The turn towards

ecology - begun in earnest several decades ago - more likely represents another example of the on-going search for a more penetrating frame of analysis within which to study the interaction between humans and the biosphere (Geertz:1971:1).

The application of the principles and concepts of ecological analysis to the study of human societies can be achieved in a variety of ways. Clifford Geertz suggested in 1971 that one of the most promising was to delineate an ecosystem within which certain selected physical, biological and cultural variables are determinably inter-related. Applying his kind of 'ecological-anthropological' analysis to the techniques of swidden agriculture (slash and burn technology) for example, focuses attention on the larger systems of which it is a part: the climatological and edaphic characteristics of tropical forest landscapes, the social organization of a shifting labor force, and the sets of beliefs that influence the uses of its varied and scattered resources (1971:9-10). This type of approach allows one to see clearly how the evolution of indigenous farming cultures can best be understood as the result of complex interactions between natural phenomena, farming systems and social systems.

Chevalier and Buckles have developed another such socio-environmental approach that they say converges on the "processual nature of social reality" (1995:p.7). In their view, changes over time should be compared across a broad range of interconnected phenomena such as agrarian politics, provincial capitalism, rain forest ecology, gender and inter-generational relations, narrative traditions, etc. This is an extremely valuable approach to these subjects because it emphasizes their dynamic and variable properties as well as their implicit internal contradictions (Chevalier and Buckles:1995:7). This processual model of analysis favored by Chevalier and Buckles

also turns up some very interesting results when applied specifically to the study of human / environment interactions.

In a processual framework the natural environment can no longer be reduced to simply the sum of a few fixed elements (i.e. water, temperature, soil, etc.) to be treated as isolated obstacles towards increasing overall technical development - as several Marxist students of peasant agriculture in Mexico would have had us believe. And nor can we pretend that these so called 'environmental variables' rigidly constrain all social and productive relations - as other Mexicans from the Cultural Ecology school of environmental determinism have argued. A more satisfactory conception of these human / environment relations is one where the natural environment limits the actions that people take, "but these limits are also mediated and altered by systems of social relations that vary over time" (Chevalier and Buckles:1995:201-202).

Many of the other disciplines that study social and environmental issues today are likewise no longer treating the physical environment as strictly an ontological given. It is instead being portrayed as socially constructed to both "...reflect and configure being in the world" (Soja in Greider and Garkovich:1994:5). Framed in such terms, an ecological analysis in anthropology can amount to a phenomenological exercise in understanding what it is that we think we know about the natural world and how it is that we have come to believe in the various versions of the natural world that we maintain (Vessuri:1994:185). Greider and Garkovich weigh in favor of this approach by drawing attention to the fact that our many definitions of the environment are themselves grounded in the symbols that transform 'nature' into a meaningful subjective phenomenon (1994:6).

Another major area of confluence between anthropology and ecology is that commonly referred to as ethnoscience, or the science that investigates traditional indigenous knowledge systems. Advances in ethnobotany and related fields have lead scientists and other researchers to the realization that every people constructs their own particular way of living that implies different types of classifications, manipulations, transformations and appropriations of the natural environment (Masferrer;1992:50). The complex and multivocal nature of these phenomena further tangible evidence of the need for closer collaboration on these issues between social scientist such as anthropologists, ethnohistorians, geographers and linguists, and biologists, ecologists, foresters, agronomists, etc.

This adoption of ecological methods and discursive forms by anthropologists offers additional confirmation of the eclecticism, tolerance of uncertainties and the embracing of whatever seems to work in practice that characterize an experimental period within such a comprehensive a discipline as is anthropology today (Marcus and Fisher;1986:xi). These developments are also evidence of the fluid borrowing of ideas that is forcing a profound reassessment of the dominant ideas across many genres and academic disciplines. Ecological anthropology should therefore serve as an important source of guidance to the growing number of researchers within the social and natural sciences who recognize the need for a complete revision of the basic assumptions that have constituted the foundation of our research and development paradigms, and for a change in their objectives. Ecological anthropology - with its broad perspectives, focus on interactions, capacity to elicit the often as yet non-explicit demands of traditionally marginalized groups, and its field-tested methods of studying concrete situations of

technological change - has much to contribute to this revitalization process (Vessuri:1994:200).

2.1.2 Domination and Resistance: The 'Indigenous Question' in Mexico

Many of the specific issues addressed in this thesis have figured prominently in a broad tradition of critical development theories including variants of Marxist anthropology, dependency theory and cultural ecology approaches to peasant agroecology and economic underdevelopment, and then again more recently in such multi-disciplinary frameworks as sustainable development and ecofeminism. Mexico in particular has provided an especially fertile ground for debating and testing these arguments.

One conclusion that these differing perspectives all tend to more or less agree upon is that in most of Latin America the main obstacle to broad-based rural development is the entrenched power of the allied public and private sector regional elites. This situation gives regional peasant organizations representing the majority of the rural population a critical significance. For only by combining the clout of large federations with the responsiveness of smaller associations will closed markets and political systems be opened, and development policies be made more accountable to the disenfranchised majority (Fox:1993:216). Although there has been much agreement among those holding differing perspectives on this matter of elites and political autonomy, there has yet to develop a consensus about the relative importance of the specific priorities that opposition political parties and autonomous social actors should pursue in order to further the goals of democratizing rural development

The debates about rural development that are especially relevant to the nature of this case study have centered around the themes of domination and resistance in capitalist state / indigenous peasant relations. Fortunately, these debates have for the most part avoided espousing too simplistic or rigid views of social hierarchies and of the absolute oppositional dichotomies of the kinds that seek to reduce all of social life to vulgar caricatures of disembodied 'systems'. I am of course referring to the right-wing liberal 'capitalism will prevail' dogma and the left-wing socialist 'inevitability of the victorious proletarian alliance' propaganda.

Chevalier and Buckles discuss these ideological pitfalls and perspectives on peasant agricultural production systems in Mexico in their book A Land without Gods. Their analysis of the state's and capital's relations with the peasant communities and tropical agroecosystems of southern Veracruz allows for what they call "important variations and contingencies" in the ways that these matters are carried out. Chevalier and Buckles argue that while the onset of capitalist relations of production in the area does in fact transform and exploit peasant agriculture, the results are by no means uniform (Chevalier and Buckles; 1995.Conc:2). Chevalier and Buckles' study of the capitalist transformation of indigenous relations of production in Pajapan, Veracruz avoids the common theoretical pitfalls of other more reductionistic analyses by describing this socio-economic transformation as a sort of "distorted reproduction" of pre-existing patterns. The reason for this varied outcome they say stems from the combined effects of the opposition and struggles of local peasants and what are some of the weaknesses and contradictions inherent in the processes of capital accumulation itself (Chevalier and Buckles;1995:c5). This analysis therefore has the merits of not only drawing attention to

some of the significant limitations and contradictions inherent in the powers commanded by the areas' ruling interests, but also of accurately conceptualizing the role and the significance of the unfolding struggles of subordinate groups against all forms of exploitation (Chevalier and Buckles;1995:c-3).

By focusing on the interactions between the state and society, the institutions that mediate these interactions, and the factors that account for how these institutions are themselves constituted and transformed, interactive perspectives like that of Chevalier and Buckles on social development in Mexico recast many conventional notions of state power, socio-economic change and cultural adaptation. Something that Fox also does extremely well in his analysis of the politics of food in Mexico. Fox explains how this country's revolutionary heritage embedded important reformist potentials within the state apparatus. He then argues that although government reformers' willingness and capacity to reach out to and support peasant movements usually tends to be quite limited, the combination of political openings from above and social mobilizations from below can radically shift the boundaries of the politically possible (Fox;1992:40).

2.1.3 Deforestation: Causes and Effects

The current global ecological crisis is continually confirmed by such facts as massive deforestation rates, the yearly loss of thousands of tons of topsoil, water and air contamination, epidemics and pest infestations, etc. Deforestation alone is known to pose many of the broad threats that are increasingly becoming the subjects of worldwide concern. Its effects are now recognized as having far-reaching environmental consequences such as: the elimination of unique habitats, plants and animal species,

desertification, disruption of water regimes resulting in erosion, flooding and siltation, climatic changes, etc. (van Beusekom:11, in van Beusekom et al. 1987). This crisis seriously undermines the potential of poor rural communities who depend almost exclusively on natural resources for their welfare to improve their quality of life.

But these ecological threats to the global environment are only one part of the overall problem with deforestation. The rampant destruction of almost 80% of the world's tropical and other forests (World Resources Institute:1997:1) is also sadly hastening the processes of socio-cultural and economic disintegration that are reaching alarming proportions in many rural areas of the world today. Equally worrisome and catastrophic as this ecological devastation is the concurrent social and economic crisis that has almost one fifth of humanity, and according to the PSSM-GEF as many as 85% of those living in the Sierra de Santa Marta (1996:4-4), living in worsening abject poverty, often denied even the most fundamental human rights and basic dignity (New Internationalist:1995:5).

It is also revealing of the underlying dynamics behind the processes of environmental and socio-economic decline that those living in the most precarious and abusive conditions of all (e.g. high levels of malnutrition, illiteracy, migration, etc.) are often ethnically indigenous peoples located in inaccessible refuge areas - places like high mountains and tropical forests - that remained available to them as invasions, wars, famines and epidemics forced them from their traditional territories. To this day it remains within the limits of these indigenous territories that the bulk of the world's biodiversity continues to be embodied (Alcorn, 1992; in Toledo et al. 1994:48).

Historically, the peoples living in rural hillside areas with high rates of deforestation - like for example the Sierra de Santa Marta where more than 59000 ha. out of an original forest endowment of 96640 ha. (61%!) disappeared between only 1967 and 1991 (PSSM-GEF:1996:2-5) - have been systematically ignored by both national and international agencies because of their lack of political power. These areas are generally located far from the centers of political and economic decision-making, and so the often minority ethnic populations who inhabit them have few opportunities for influencing the government policies such as access to improved technologies and credit that directly affect the well-being of their communities (Novoa and Posner: 1983:45).

A second problem associated with the institutional neglect of indigenous farmers in hillside regions is that agronomists and government officials have tended to view these remote areas as having low potentials for increased agricultural production. Consequently, development aid has gone disproportionately to the well-to-do farmers who control the flatter lands where soil and climatic conditions tend to be more favorable for intensive production of higher priced food crops for urban and export markets. In Mexico and other parts of and Latin America, the destructive impacts of these policy orientations have been further compounded by rapid population growth and industrialization that have combined to push the production of staple foods further onto the once-forested lands with steeper slopes and poorer soils than those flat lands now almost exclusively reserved for export crops, tree farms and/or livestock production (Novoa and Posner: 1983:45-46).

There also exist a host of other more direct and insidious ways by which government programs have encouraged destructive uses of natural resources for short-

term and unevenly distributed benefits. I will return to this topic in more detail in Chapters three and four of this paper, but for now suffice it to say that the story of deforestation in the Sierra de Santa Marta exemplifies how the neglect of rural areas and a lack of concern for natural resources in general, and specific political measures in particular are responsible for the excessive abuses of natural ecosystems and the continuing poverty of indigenous farmers.

Globally and throughout Mexico deforestation must therefore be recognized as a complex and changing multi-dimensional process varying over time, from country to country and between different regions of the same country. And yet the forces responsible for this devastation and its attendant human suffering usually stem from the same poor economic and social conditions, weak national economic management and the tendency to pursue short-term benefits no matter what the long-term consequences (Otto:108; in van Beusekom et al.1987). The dynamics of these situations point towards a very important conclusion: namely that deforestation is above all a political problem. As such, the fate of tropical forests - much as that of endangered species and/or aquatic ecosystems - is intimately (and thus ultimately) connected to the success or failure in obtaining sufficient political and financial priority for the development of rural areas and the responsible management of natural resources (Otto:99-100; in van Beusekom et al.1987).

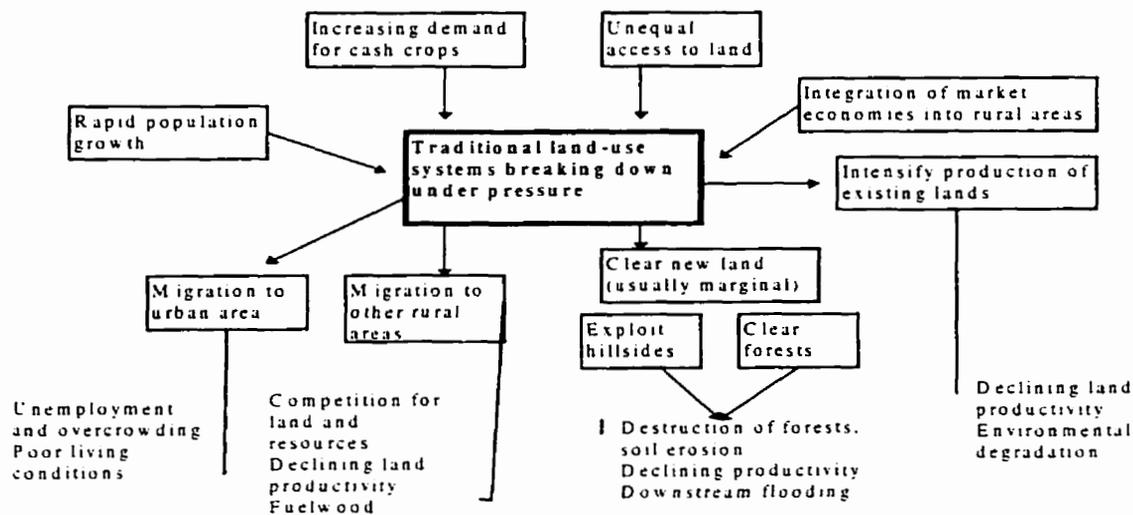
2.1.4 Panacea or Propaganda

In Mecayapan, like so many other places throughout the world, poverty is making people take desperate measures to survive from day to day, exploiting their natural

resources to meet their subsistence needs without the luxury of any regard for the future consequences of this consumption. This distressing pattern forms a vicious circle wherein the lack of viable productive alternatives places excessive pressures on locally available resources. This over-exploitation in turn leads to the widespread deterioration of the resource base, which leaves local residents even poorer and more dependent on their further degraded environments.

Figure 2.1 The Poverty / Environment Connection

Source: Adapted from Hawke (1992), and author's notes.



The outcome of this poverty / environmental degradation cycle is unfortunately only just beginning to be widely understood: environmental degradation worsens existing levels of poverty by imposing additional constraints on the capacity of such key resources as fuelwood, water and soil to sustain the growing demands of the poor (Warford and Pearce;1987 in Young and Ishwaran;1989:16). And yet almost paradoxically one of the most enduring themes present in contemporary discussions about ecology and society is one which suggests that strategies for satisfying growing economic needs while also conserving resources for continuous, long-term use are within our reach. Indeed while

there exists considerable consensus around the desirability of such 'sustainable' strategies, there has been very little actual positive experience or accumulated knowledge for putting them into action (Smith:1995:64). So even as sustainable development gains an increasingly vocal advocacy, its postulates continue to be relatively unsure.

This fact has not prevented "Sustainable Development" from becoming somewhat of a catch phrase equally as likely to be heard from World Bank executives as it is from impoverished farmers living in conservation areas. Not to mention the litany of resource company executives, government bureaucrats and the academics who are arguably its biggest supporters. This popularity has had the effect of casting sustainable development as everything from the key to harmony and diversity in the age of science and technology, to promoting the view that the poor should be encouraged to remain in degraded rural environments, 'participating' in conservation projects for the benefit of the community, posterity and nature. These promises of sustainable development have therefore understandably won over many new supporters, and not surprisingly, also invited many detractors.

Either way, this broad level of concern for sustainability reflects the seriousness of the deterioration in the quality of life in even the most affluent societies. The Preamble to the United Nations document "Agenda 21" points out that the Earth Summit process convened in Rio de Janeiro in 1992 represents a clear attempt to achieve a global consensus and definite political commitments at the highest levels in order to address today's problems and to prepare for the challenges of the 21st century. The Preamble to Agenda 21 warns us that:

Humanity stands at a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening poverty, hunger, ill health and illiteracy, and the continuing deterioration of the ecosystems on which we depend. (ELADA 21. Summary.txt)

For the objectives of Agenda 21 to be achieved and for the above circumstances to be reversed the following will be absolutely necessary: substantial flows of new and additional financial resources, especially to developing countries, strengthening the capacities of grassroots institutions, and well-conceived implementation strategies, plans, and processes. Particular attention will also have to be paid to economies in transition that face the unprecedented challenges of adopting structural adjustment policies in an atmosphere of heightened social, economic, and political tensions. If environmental and development problems are to be properly integrated into these questions, a fundamental reshaping of decision-making and institutional structures is going to have to happen first (ELADA 21. Summary.txt).

But if we look no further than to the results of those policies and programs arrived at through previous international political and economic decision-making processes like those designed to eradicate child poverty or improve the status of women, etc., it would be hard not to believe that the important measures called for in the Agenda 21 declaration will never amount to more than the same: broken promises and missed opportunities. In point of fact, a recent progress report on the status of implementation of the Agenda 21 accords in the five years since they were signed found that we now live...

in a riskier world with more people, more consumption, more waste and more poverty, but less biodiversity, less forest area, less available fresh water, less soil and less stratospheric ozone layer" (Earth Council report; The Gazette; 01/04/97:A8)

Given the far reaching socio-political and environmental implications of this situation, sustainability can no longer be reduced to the comparatively simple matters of material standards of living and environmental preservation, it must also be about the active participation of all peoples in the re-designing of productive systems that will allow them to prosper while conserving the planet's ability to host countless future generations. This comprehensive version of sustainability reflects an increasingly widespread acknowledgment that present levels of per capita resource consumption in the richer countries can not possibly be generalized to people living in other parts of the world. And nor can such high standards of living be continued much longer where they currently are practiced without disastrous consequences for our own survival as a species, not to mention that of other species that are disappearing at unprecedented rates. This more encompassing vision of sustainability professes that salvation from our current global predicament will only come when new organizations more sensitive to the earth's potential for reproducing life, replace our current inequitable and unsustainable systems of production and distribution (Barkin; 1995a:2-4).

According to Barkin, sustainability must therefore be about more than the environment, economic justice, and development. He argues that it:

is above all a question of whether and the way in which diverse groups of people and natural populations continue to exist. Sustainability is, most significantly, *the struggle for diversity in all of its dimensions* (emphasis added. Barkin;1995a:5).

The proof for this, Barkin claims, is that the expanding literature about the move towards sustainability celebrates the many groups who have successfully perpetuated their cultural

heritage, unique forms of social and productive organization, and specific ways of relating to their natural environments (Barkin: 1995a:2-3).

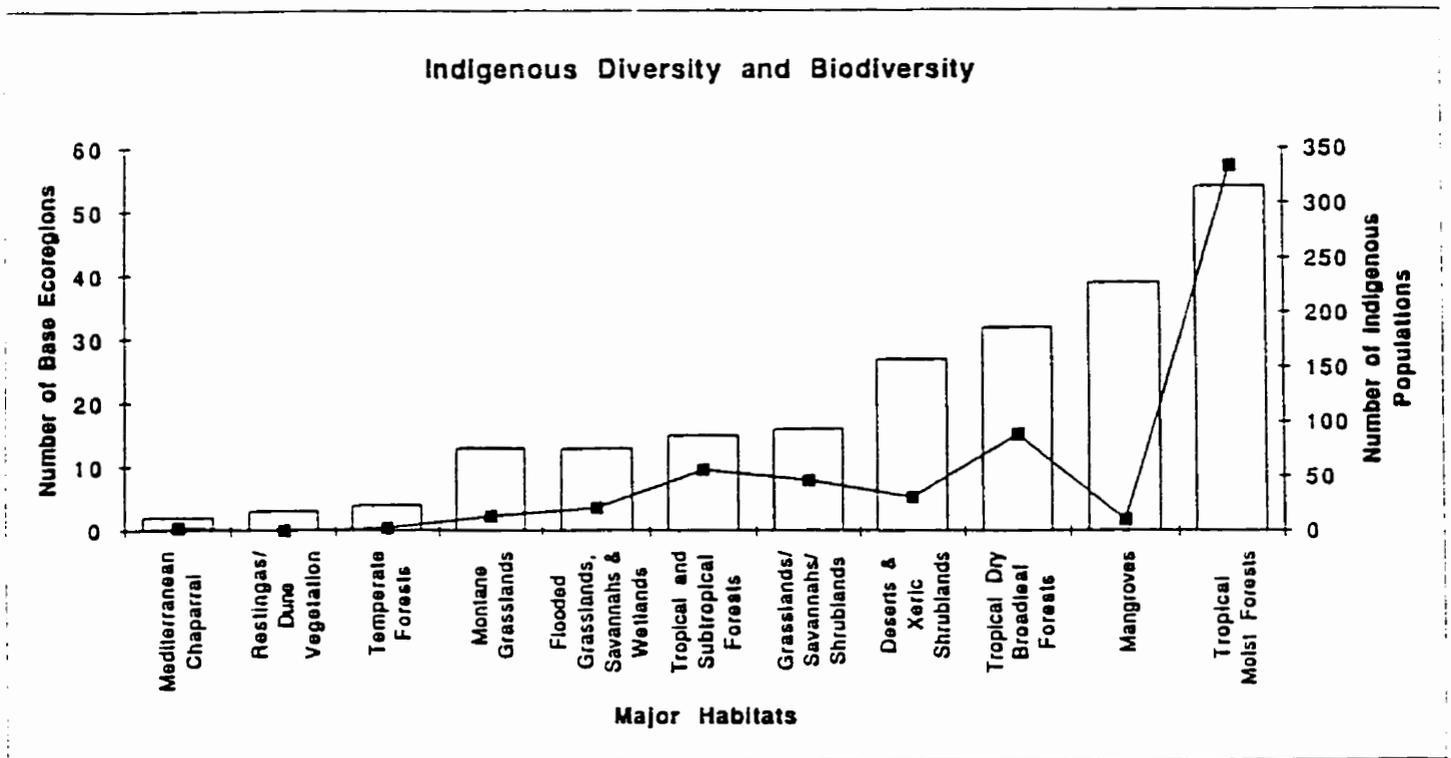


Figure 2.2 Indigenous Cultural Diversity and Biodiversity (Wilcox and Duin:1995:52).

This struggle for diversity is also played out daily in a multitude of local and international actions designed to protect endangered species and wild lands, to develop more appropriate technologies and to improve mechanisms for guaranteeing that fundamental human rights are guaranteed to all. These are the real development issues that we must face together if we are to refocus our collective capacities and avert further catastrophes. The real struggle in the coming decades will therefore be that of making sustainability in this broad sense of the word the central organizing principle of the post-cold war era.

Given that the global extent of concern for sustainability in the far-reaching sense of the term outlined above is only a relatively recent phenomena, many of our current ideas about how to pursue diversity in economic development and social justice while simultaneously protecting biological diversity continue to rest on largely untested assumptions. Where experiences do exist that have tried explicitly to combine these basic objectives within their theoretical frameworks and research agendas the results have mostly produced a mixed bag of promising initiatives and daunting obstacles. These ambiguities and contradictions have incited many researchers and non-specialists alike to attempt to redress this critical lack of knowledge concerning the interactions between resource needs, availability and distribution, especially when it comes to such vital resources as those required to produce food.

The significance of the research being conducted to improve the sustainability of food production is especially relevant in the context of the worsening global ecological crisis being provoked by our current patterns of production and consumption. Technical experts from a range of disciplines have analyzed the links between population and food and one of the conclusions reached was that, in view of the limited scope and high economic and environmental costs of expanding crop land, 80 percent of food production increases will have to come from increased yields on lands already in production (IFPRI, 1994:2). The overriding problem is therefore how to improve yields, especially of basic food crops, without further deterioration of the natural resource base.

In order to even begin to address this problem of improved yields, Food and Agriculture Organization (FAO) projections make it abundantly clear that national and international investments will be required in both *research* to generate productivity-

enhancing technologies without adverse environmental consequences, and *extension programs* so that there is extensive dissemination and efficient use of these technologies (IFPRI, 1994:3). The problem is that the technologies and management practices that slow down degradation and protect the resource base are either unknown or not available in many regions, or else they are just not being adopted. Furthermore, because of the recession in aid funding in recent years, investment in agricultural research and extension has declined drastically. Without such investment the challenges of sustainable agricultural development and increased food production will simply not be met (Van Crowder;1996:2).

Kidd and Pimentel have analyzed the available options for increasing crop yields without causing irreversible damage to any of the conditions that they say make food production possible in the first place. Their work reminds us that sustainability in agriculture can only be meaningful in specific, carefully defined contexts. They argue that when applying the concept of sustainability to systems of agricultural production, one must take into account at least the following elements:

Distinct interactive patterns of manipulation of soil, water, energy and geological resources, using capital, labor, technology and information in different proportions within given cultural, political and administrative contexts (1992:p.12).

The implications are that sustainable development in agriculture, forestry or even animal husbandry cannot be an absolute quality or a state of equilibrium, but can only be understood as a tendency towards sustainability on all fronts. Most importantly it must be measured by taking into account the bio-physical, technological and socio-cultural aspects of any particular agroecosystem (Adela;1995:22-25). What this means in terms of designs for food production systems is that any course of action that would lead over time to

“either a decline in agricultural production or productivity, or both, or to a decline in rates of their increase” is not sustainable (Kidd and Pimentel:1992:12).

Accordingly, Kidd and Pimentel contend that the ultimate goals for maximizing the sustainability of farming and agroforestry production systems should include: 1) a more thorough incorporation of natural processes such as nutrient cycles, nitrogen fixation, pest-predator relations, genetic and bio-physical potentialities, etc., into production processes. 2) A reduction in the use of off-farm inputs such as pesticides and chemical fertilizers with the greatest potential to harm the environment and/or the health of farmers and consumers. 3) Increased profitability and efficient production through emphasis on improved farm management and conservation of soil, water, energy and biological resources (1992; pp.19-20).

2.1.5 Alternatives to Deforestation

As we have seen, the push for sustainable development begins in earnest around the same time the first evidences began filtering in about some of the less desirable socio-economic and ecological consequences of the policies and practices of the so called ‘Green Revolution’. These conventional strategies for rural development can hardly be seen as very green or even revolutionary for that matter, since they were developed primarily as a series of technical transfers aimed at boosting production and generating wealth. In practice, these projects usually targeted medium to large scale ‘progressive’ producers, supporting them with technology, credit and extension advice in the hope that improvements would gradually extend to more ‘backward’ strata of rural society. In many cases however, the channeling of development assistance to the better-off has led to

concentration of land and capital, marginalization of small farmers and alarming growth in the number of landless laborers (FAO;1996:1-2).

It is clear from the previous paragraphs that new sustainable development objectives and strategies are needed to redress the wide-spread socio-economic and ecological devastation that is resulting from the policies behind the anti-democratic modernization processes that have encouraged such massive levels of deforestation as those presently occurring in the Sierra de Santa Marta and elsewhere. It should also be clear where not to turn for solutions to these problems. The reason being that while national and international development projects are often the primary stimuli for the destruction of tropical and other forests, small-scale grassroots programs using traditional indigenous and peasant technologies have been repeatedly promoted as examples of environmentally rational and socially appropriate sustainable economic development.

The agroecological studies that I review in this and chapter three of this paper (Kidd and Pimentel, Novoa and Posner, Poffenberger, PSSM-GEF, Van Orman, Xolocotzi...) reveal that many of the indigenous swidden farming and agroforestry systems of Mexico and Latin America are based on the efficient use of land and labor and cause little damage to the larger forest ecosystem. Examples of these traditional peasant agroecological practices commonly used to ensure stable production include mixed cropping, crop rotations, terracing, minimum tillage and maximum exploitation of genetic and climatic diversity. These low-energy input multiple resource management strategies are not only characteristic of many traditional modes of rainforest adaptation, but they also often represent some of the few economically secure, socially appropriate and

ecologically sound production strategies available to a great number of peasant households world-wide (Kidd and Pimentel;1992:215).

Figure 2.3: Contrasting rationalities of the peasant and agro-industrial modes of appropriating nature. Based on several authors. (Adapted from Toledo;1995:11).

PEASANT MODE	AGRO-INDUSTRIAL MODE
Production for consumption	Production for exchange
Use value is predominant	Exchange value is predominant
Reproduction of producers and of the productive unit	Maximization of profit and accumulation of capital
Based on ecological interchange with nature	Based on economic exchange with the market
"Ecosystem people"	"Global People"
Sacralized relationship with nature	Secular relationship with nature

These agroecological studies have helped to convince conservationists and natural resource administrators that a widespread adoption of the technologies characteristic of traditional peasant management systems would substantially reduce the pressures on remaining forested lands, while simultaneously encouraging the rehabilitation of already degraded ones. Poffenberger even suggests that by intensifying production strategies along the lines of these traditional agroecological practices - with the possible addition of modern inputs such as genetically improved species and/or other scientific management techniques where appropriate - thousands, if not millions, of jobs could be created world wide (Poffenberger;1990:xix-xxiii).

These facts are finally beginning to be recognized by a growing number of international agencies who, in conjunction with non-governmental organizations and farmers from all over the world, are attempting to design innovative and cooperative ways to improve composting, water conservation, soil fertility, etc., as a means towards achieving better livelihoods in more environmentally sensitive ways. Recognizing the

vast potential of these traditional techniques, researchers, government institutions and development organizations are becoming more appreciative of the fact that several of the benefits of these traditional resource management systems can be achieved relatively simply, quickly, and cheaply by individual farmers with very little outside advice or assistance. Many governments appreciate the need for a participatory development approach to overcome the persistence of poverty in rural areas and to avoid the threat of social instability. These are the kinds of developments that are compelling governments and development organizations to recognize that the best guarantee for the protection of biodiversity- especially in the humid tropics where the bulk of the world's genetic material is concentrated- is to satisfy the basic necessities of the local populations (Adela, 1995:11).

By shifting institutional supports towards those practices and strategies that have proven their long-term conservation effectiveness, we would begin to recognize the importance of conserving small-scale fragments of tropical forests that could be integrated into regional networks of peasant reserves, each protecting and managing an area appropriately designed and articulated to local economic and ecological necessities (Toledo et al.1994:47). These alternative strategies for conserving biodiversity would mean thinking beyond the than the less than 5 percent of the earth's land surface that is currently considered to be under some form of protection scheme, mostly national parks and nature reserves (Ryan;1992 in Toledo et al.1994:47). Which would be tantamount to founding the environmental management of development on its grassroots bases, thereby contributing to the democratizing economic activities and the decision making processes upon which these are based (Leff et al.;1990:20).

The urgency of such alternative development solutions for sustainable resource management strategies that respect the cultural diversity of peasant communities and fully utilize the ecological potentials embodied in their diverse natural environments is all the more apparent where social and ecological changes have resulted in the loss of cultural values and the abandonment of traditional resource-use practices. Yet often because of the inability of modern national economies to create ecologically and economically viable technological alternatives or opportunities for peasants and indigenous peoples, in many different geographic and cultural contexts these age-old technologies persist (Leff et al.;1990:21-22).

2.2 PARTICIPATORY SOCIAL FORESTRY RESEARCH METHODS

2.2.1 The Potential of Participatory Research

The governments and agencies that promote the kinds of 'improved-traditional' solutions for sustainable rural development (i.e. combining elements of both traditional and modern production and conservation strategies) that I described in Section 2.1.5 of this chapter tend to do so out of the conviction that developing appropriate technologies is also the key towards increasing the stock of available resources, facilitating socio-economic development and preserving essential ecological processes. However, one of the primary difficulties that this approach encounters (and one that is all too often glossed over for the sake of ideological expediency) is that for this technological development to respond to the material and cultural needs of poor farmers, high priority must also be attributed to socio-economic factors like independent farmer organizations capable of securing available financial and technical supports (Xolocotzi et al.: 1983:206).

Conventional methods of assessing farming techniques such as calculations of the productivity labor, land or capital may indicate some of the economic effects of a particular farming practice, but they rarely tell us anything about their ecological, social and cultural effects. And it is precisely this type of insight into these kinds of effects of the available technical options that are needed to help develop strategies that farmers regard as feasible for transitions to sustainable farming. The following example should help to illustrate my point. Although it is now commonly accepted that introducing trees into treeless farming can bring about great economic benefits, many farmers still hesitate to do so. This is probably due to the amount of extra labor involved and the lower economic gains in the first few years, but it is also likely the result of things like the low demand for tree products locally, laws prohibiting tree cutting, ecological risks, gender relations or customs related to tree management and so on (ILEIA;1990:27).

The basic fault with the conventional approach to agriculture and forestry based rural development strategies is that the rural poor are rarely consulted in development planning and usually have no active role in development activities. The vast majority of the poor have no organizational structure to represent their interests and this lack of effective local organizations only serves to reinforce the city-educated development officials biases against relinquishing their control over the top-down development process. Isolated, under-educated and often dependent on rural elites, the poor lack the means to win greater access to resources and markets, and to prevent the imposition of unworkable programs or technologies. The lesson should be clear: unless the rural poor are given the means to participate fully in development, they will continue to be excluded from its benefits. This realization is provoking new interest in an alternative rural

development strategy, that of people's participation through organizations controlled and financed by the poor (FAO:1996:3).

The FAO's experience in rural development projects has also demonstrated that true participation is possible only when the rural poor are able to pool their efforts and resources in pursuit of objectives they set for themselves. The most efficient means for achieving this objective, they say, are small, democratic and informal groups composed of eight to 15 like-minded farmers. FAO research on this subject concludes that for governments and development agencies, people's participation through small groups offers distinct advantages:

- 1) Economies of scale. The high cost of providing development services to scattered, small scale producers is a major constraint on poverty-oriented programs. Participatory groups constitute a grassroots 'receiving system' that allows development agencies to reduce the transaction costs of their services, thus broadening their impact.
- 2) Higher productivity. Given access to resources and a guarantee that they will share fully in the benefits of their efforts, the poor become more receptive to new technologies and services, and achieve higher levels of production and income. This helps to build net cash surpluses that strengthen the groups' economic base and contribute to rural capital formation.
- 3) Reduced costs and increased efficiency. The poor's contribution to project planning and implementation represent savings that reduce project costs. The poor also contribute their knowledge of local conditions, facilitating the diagnosis of environmental, social and institutional constraints, as well as the search for solutions.

4) Building of democratic organizations. The limited size and informality of small groups is suited to the poor's scarce organizational experience and low literacy levels. Moreover, the small group environment is ideal for the diffusion of collective decision-making and leadership skills, which can be used in the subsequent development of inter-group federations.

5) Sustainability. Participatory development leads to increased self-reliance among the poor and the establishment of a network of self-sustaining rural organizations. This carries important benefits: the greater efficiency of development services stimulates economic growth in rural areas and broadens domestic markets, thus favoring balanced national development; politically, participatory approaches provide opportunities for the poor to contribute constructively to development (FAO:1996:4-5).

This evidence clearly indicates how critical it is that major efforts be undertaken to reinforce local organizations' capacities to innovate and diffuse technical, educational, cultural and political alternatives to the current practices that are so obviously inadequately resolving the fundamental quality of life issues envisioned under the framework of sustainable rural development. Accordingly, new approaches to planning and design for integrated conservation and rural development projects are becoming equally concerned to identify and reduce the *socio-economic* constraints facing farmers (i.e. attitudes towards tree growing and protection, land ownership and tree tenure, gender roles, etc.) as they continue to be with the *bio-physical* ones (i.e. soil fertility, climate, pest management, etc.).

At this stage, an alternative profile for genuine socio-economic development begins to emerge. Contrary to the traditional process whereby projects are dreamt up and

implemented from downtown office buildings. the original idea for a project should now come from within the community where it is actually going to be organized. The focus has shifted away from the exclusive domain of the educated experts and towards those groups of poor farmers who (theoretically at least!) stand the most to gain from participating in the dynamic learning processes of small-scale, bottom-up development projects.

One of the first steps in this alternative process is for sensitizing community members through actions designed and carried out by local people using their own knowledge and resources. The actual rate of project implementation should be gradual, relying on the leadership style and activity preferences of those most directly involved. A continuous process of evaluation should result wherein errors are embraced and corrected, and those involved feel empowered to contribute freely and fully to the best of their abilities (Adela, 1995:19). These participatory approaches empower community members by recognizing that those experiencing the problems are often the best situated to understand and address them. In this approach, outside researchers are no longer the experts with the quick techno-fixes, but rather short term facilitators who can encourage people to participate in the process of generating solutions through community fora and workshops (Kurelek;1992:62). The idea is that only in such a way can specific projects be defined that correspond with the interests and the needs of the local population.

During the 1970s this new focus and methodological commitment among development planners and officials became known as Rapid Rural Appraisals (RRA). Theoretically, the roots of Rapid Rural Appraisal are to be found in the Popular Education and the Participatory-Action Research movements envisioned by the likes of Paulo Friere

in Brazil and Orlando Fals-Borda in Colombia. These two influential activist-leaders dedicated their lives to liberating Latin American peasants from their historical condition of servile exploitation through consciousness-raising participatory education techniques. Future practitioner-theoreticians inspired by the optimism and clarity of purpose of these visionaries elaborated and attempted to perfect a series of activities designed to rapidly acquire information and formulate new hypothesis about rural life.

Rapid Rural Appraisal diagnostic techniques are generally adopted in order to guide development efforts by community actors in collaboration with government and non-government organizations. The research strategies for doing RRAs involve using techniques similar to those traditionally employed by anthropologist for listening, questioning, and taking notes about what people in rural areas are saying. These techniques have been used effectively to generate relevant information about local bio-physical characteristics, social structure, land-use and cropping patterns, livestock, labor calendars, etc. RRAs therefore constitute a marked improvement over previous conventional methodologies for the simple fact that they recognize the importance of local knowledge in the search for solutions to the problems experienced in rural areas.

It took another decade or so and the advent of something called Participatory Rural Appraisals (PRA) before this source of local knowledge was deemed sufficiently important to warrant incorporating into the actual research planning and the decision making activities (Adela:28-31). In general, PRA tends to focus more on visual research techniques, and to stress broad-based participation throughout the process. Participatory Rural Appraisals are therefore usually more suitable for understanding the subtleties and

complexities of a particular theme or issue within small, relatively homogeneous rural communities where many values and beliefs are shared.

The differences between Rapid Rural Appraisals and Participatory Rural Appraisals can best be understood in terms of a continuum, since many of the basic tools (semi-structured interviews, life histories, group discussions, aerial photographs, etc.) are common to both. The following table explains the nature of the different tendencies between these two sets of approaches.

Figure 2.4: Comparison between Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA)

	RRA	PRA
Period of Major Development	Late 1970's and early 1980's	Late 1980's and early 1990's
Primary Innovators	Universities	Non-Governmental Organizations
Primary Users	Aid Organizations Universities	NGOs Government Agencies
Key Human Resources Previously Neglected	Local Knowledge	Local Skills
Principal Innovation	Methods	Behavior
Predominant Nature	Extractive	Facilitative, Participatory
Primary Objectives	For External Promoters to Learn about a Region	Empowering Local Population
Long-term Results	Plans, Projects, Publications	Sustained Local Action

Source: Chambers (1994:958) adapted by Adela (1995:32).

Researchers using PRA have at their disposal a wide repertoire of methods and techniques from which to choose depending on the type of information required, the scale of the phenomena in question, and the availability of particular resources (i.e. human, time, financial...). These techniques would be essential in order to understand local perceptions of the functional utility of certain plants or trees within traditional production strategies. And besides the greater levels of community participation in the research

process. another of the main advantages that PRA constitutes over the more traditional scientific methods of investigation is their lower costs (Adela:34). PRA dispense with the need for a highly trained team of outsiders using sophisticated and expensive research tools and requiring major logistical preparations and supports.

Visual Analysis Techniques	Interviewing and Sampling Techniques	Group and Team Activity Techniques
<ul style="list-style-type: none"> - Participatory Maps and Models - Analysis of Aerial Photographs - Transect walks and Group Field Trips - Seasonal Activity Calendars - Historical Profiles - Productivity and Value Matrices for Classifying Options - Systemic Flowcharts and Diagrams for demonstrating Impacts 	<ul style="list-style-type: none"> - Semi-structured Interviews - Direct observation - Key Informants - Ethnohistories and Life Histories - Possible Futures - Classification of Wealth and Welfare - Social Maps 	<ul style="list-style-type: none"> - Presentations and Discussions - Notes and Journals - Participation in Local Activities (Work Sharing) - Team Contracts - Preparation of Joint Reports

Figure 2.5: Methods most often used in Participatory Rural Appraisals
Source: adapted from Cornwall et al. (1993:17) in Adela (1995:36).

As with any methodological choice that one makes. Participatory Rural Appraisals also present certain difficulties. One problem consistently associated with PRA's is their tendency to down-play the significance of the differences between community actors, and consequently to seek to exaggerate an artificially achieved consensus around fragile points of general agreement (Mosse:1993 in Adela:39). PRA's can also take much longer to complete due to the fact that instead of simply reacting to a series of pre-formulated questions guided by the biases of the principal researcher, in the PRA situation local people become at once analysts, creators and actors (Chambers:1992 in Adela:37). This

means that in most cases where PRAs are practiced the structure of the project will be flexible, non hierarchical and multi-disciplinary, the sampling methods opportune, and the analysis immediate and on site (Theis and Grady:1991:35 in Adela:35).

Another limiting factor in the PRA approach is that local farmers must take time off from their busy agricultural schedules to participate in the research, and as such they may lose valuable days in their fields if they are unable to contract someone else to do this vital labor. The time factor is a bit of a double-bind though, for if the research project goes ahead too quickly, not wanting to put excessive demands on people who already work long hours, the level of confidence among participants and community members may be extremely low and so compromise the quality of the results produced (Adela:39). An enormous amount of trust is required for this process to work smoothly, and can therefore take up to several years to prepare and plan before people develop the confidence to participate fully.

Through these participatory processes of investigating the fundamental causes and consequences of the prevailing socio-economic and ecological status-quo we can hopefully learn from our mistakes and create alternative development models and methodologies with which to promote and diffuse more appropriate actions that will produce a more sustainable and equitable quality of life for all. Which is why I staunchly support Leff et al. when they call for universities, non-governmental organizations and government agencies to intensify their support for participatory research projects involving academic and civil specialists with rural communities in the design and implementation of alternative technologies and resource management strategies (1990:15-18). These then are what I believe to be some of the kinds of solutions that will be

required to help redress the problems afflicting rural areas in developing countries today, and by extension, to reduce the dangers that deforestation poses on a global scale.

The evidence concerning the dynamics and potentials of participatory research methods in sustainable rural development projects points inescapably towards the following fundamental conclusion: namely that the process of attaining sustainable development is fundamentally incompatible with classical planning approaches that often lead to rigid intervention and leave little room for local initiative and gradual adaptation to change. Sustainable rural development projects must instead rely on spontaneity, identity, conviction, confidence and commitment, and can not therefore be duplicated in any pre-planned or off-the-shelf manner. Authentic, self-reliant, self-sustaining grassroots development in poor rural areas seems to depend more upon participation in the methodological process of helping people to prosper than it does upon having a list of pre-planned buildings, purchases, teaching plans, pills and pumps, etc. For these latter articles of faith among many development officers and even among many of the rural poor themselves may only succeed in establishing new dependency relations (Burkey;1993:145).

2.2.2 Social Forestry: Making the Links Between People and Trees

Social forestry attempts to consolidate the traditional anthropological emphasis on the cultural dynamics of human and environment relations with more recent efforts to make this research more participatory and therefore more relevant and accountable to those who have traditionally been only its objects. Social forestry commonly does this by emphasizing *agroforestry* technologies (i.e. ones that integrate both trees and crops) in

order to accomplish both social goals - participation, education, cooperation, etc. - and production objectives - food, fuel, construction materials, etc. For these reasons I believe that social forestry presents a huge potential for improving understanding of the objectives and limitations of ecological sustainability, economic equity and socio-cultural appropriateness in rural development projects.

A number of studies of traditional resource management systems and human / environment interactions (Poffenburger, Leff et al., Larman and Sedjo, Geertz, etc.) have also lent credence to this participatory approach. These researchers have reported that where the technical development of agroforestry-type production systems contribute most towards sustainable land use, there is a concurrent need for greater support measures and organizational structures, especially at the community level. The reason for this is that these low-energy input integrated productive systems require relatively large amounts of technical information. The relevant information that makes these production strategies most effective includes everything from how to optimize soil and water conservation, pest management, soil fertility, seed selection and tree pruning, to community organizing and product marketing. These studies therefore confirm the need for technological changes to be derived from and tested within the context of local farmers' actual socio-ecological and cultural conditions.

Failure to recognize the importance of these kinds of social and cultural factors in the past has meant that many a donated tractor now sits rusting where it broke down for lack of available parts or trained mechanical expertise, and many a development project fails to produce any tangible results once the funding dries up and the promoters are withdrawn from the community. Technology, it seems, can not be counted upon to solve

extreme problems that are essentially social or economic in nature. Social changes are often necessary to direct the technological changes towards farmers' appropriately chosen goals (Xolocotzi et al.: 1983:205-206).

Agroforestry is by definition any productive strategy wherein multiple-use woody tree species are deliberately combined with crops and/or animals in spatial and temporal sequences on the same plot of land. Perennials such as trees are an important component of any such stabilization strategy. Agroforestry plots often contain tree species for forestry and construction needs, fruit trees and non-timber forest products, short cycle food crops and foraging plants for animal feed. Agroforestry plots thus reproduce a fundamental aspect of the original tropical forests that they replace: a diversity of species. Another characteristic of such systems is their three tiered vertical organization, mirroring once again the original forest canopy, understory, and ground level spatial architecture (PSSM-GEF:5-13).

Agroforestry as an integrative scientific discipline is a relatively recent development, but agroforestry as a productive technique has a very long history. Early scientific research on crops was separated from that on trees, and each was located respectively on agricultural and forestry research stations. Only some 20 years ago did agronomists rediscover trees as possibly useful in farming (Kieft:1990:21), and only more recently than this did foresters discover farmers as potential allies in tree growing and management. Indigenous peoples on the other hand, have know about the benefits of combining trees and crops in their production systems for centuries. Many of the best designers of widely adopted traditional agroforestry systems have been farmers themselves.

Figure 2.6: Nutrient Recycling: comparison between forest ecosystem, agricultural systems and agroforestry systems. (P.K.R. Nair:1982 in Hawke:p.83)

Indigenous farmers offer a significant alternative to deforestation: one that can be called 'managed deforestation'. Forests meet farmers' needs for a variety of goods and services, and farmers use agroforestry strategies to insure that the forest is not destroyed.

Several characteristics of indigenous agroforestry strategies allow them to accomplish this. These include taking advantage of native tree communities, native successional processes, placing trees in places where they will provide ecological services, spreading risks by retaining diversity, and maintaining a reliable back-up to meet needs should other sources fail. By understanding the needs, the knowledge, and the successful strategies of traditional farmers, agronomists and agroforesters can help to develop new and imaginative alternatives for managing deforestation (Alcorn, in Anderson;1990:143-144).

These attributes make agroforestry-type production systems exceptionally well-suited for helping to consolidate some of the Sierra de Santa Marta's remaining forest fragments that are currently geographically and biologically isolated. This would in turn provide additional spaces for wildlife habitats, and ensure the long range reproductive stability of existing forests. The most notable positive environmental impact that would result from the development of agroforestry systems in the Sierra de Santa Marta would therefore be to contribute to forest conservation goals by eventually eliminating extraction pressures on declining populations of local plants and animals, and also reconverting deteriorated lands and ex-pastures to diversified production systems (PSSM-GEF:5-13).

Developing this kind of sustainable resource management strategy requires an integrated approach to the many different forms of land-use that are possible in any given area. Something that is likely only to be achieved by blending economic, agrarian, institutional, cultural, and political information from different processes, sectors and scales to formulate plans, evaluate alternatives, and balance various interests. For example, understanding the existing social and economic arrangements (distribution of

property rights and the age/sex division of labor), as well as cultural perceptions and values concerning traditional and modern adaptations to natural processes, can be essential towards determining the overall viability of a particular agroforestry technique, or management system.

The participation of women in (agro)forestry projects can be especially crucial to their success in alleviating poverty. While not all constraints to women's participation are easily lifted, policy measures can go a long way to help. But this is often proverbially easier said than done, since many factors - not the least of which is security of tenure of land and trees - effectively exclude women from participating. Involving women in project design as well as execution can eliminate some of the less desirable practices of the past in which, for example, projects planned to employ large numbers of women in nurseries- but only because they could be paid less than men. The fundamental need is to evaluate the potential impact on, and expected benefits to, men and women separately (ILEIA;1990:26).

Typically, agroforestry initiatives designed within the framework of rural sustainable development rely heavily on things like public information, project promotion and the technical assistance provided by extension agents. But rarely do such 'technical packages' work unless they are designed and tested through participatory strategies. This realization has lead many researchers to pay particular attention to the role of planning and design as being critical to the eventual success or failure of a conservation and development project. According to Laarman and Sedjo, the last two decades of experiences in farm and community forestry research have helped to identify the most desirable characteristics for the first phase of agroforestry project design. They argue that

plans and designs should build upon thorough understandings of how trees are managed according to current knowledge, priorities and motivations (pp:217-218). An all-important first step in the research process is therefore to debate the various social, economic and environmental objectives of the project, and to compare the alternative means of achieving them. The initial phase of this research process therefore requires researchers to link social processes with ecological ones, explaining each in terms of the other (Burch, 1988; in Laarman and Sedjo: 233).

The information necessary for the successful completion of the first phase of such projects is usually achieved through a combination of surveys, assessments, semi-structured interviews and observations. Another methodological procedure often used for analyzing resource-use problems and potentials is to compare the data from existing ecological surveys with field-based data generated through participatory mapping techniques, transect walks, and local histories. These techniques are designed to stimulate a process whereby local people produce resource-use and property structure maps as instruments for community discussion and involvement in the research project (Smith:1995:45). The end result is that during this diagnostic phase the participants become more familiar with the nature of the problems, and also as to where and why they exist.

In other words, interventions in farm forestry should begin with an understanding of the ecological, social, and economic processes that govern tree management practices at a local level. But there is no exact science for achieving this, since the entire process is subject to errors in communication, interpretation, and judgment. Clarification of tenure, choice of appropriate units of social organization, attention to gender roles, and the initial

use of familiar and versatile agroforestry systems and tree species are other key elements in strategies for reducing the risks and increasing the incentives associated with participation in social forestry research projects. It can also be crucial to develop an extremely broad political base since political changes can lead to an end of funding support, and a lack of valuable cooperation (Novoa and Posner:46-47). A key skill in the execution of this diagnostic phase is the interpretation of social and anthropological theories of rural life in terms of their implications for management guidelines for trees, woodlands and forests (Laarman and Sedjo: 228-229).

Approaches such as agroforestry Diagnostic and Design (D&D) and Community Planning of Land Management are community-based resource management strategies that draw extensively on the participatory research methods of Rapid Rural Appraisals (RRA) and Participatory Rural Appraisals (PRA) in order to organize productive projects with poor farmers in rural areas. These approaches were designed to help generate and implement sustainable development solutions by combining new scientific knowledge with the traditional knowledge and production practices of local farmers. Through joint participation and effective cooperation, better use can be made of existing complementarities and competencies. This teamwork aspect is all the more important given that the failures of the past and the challenges of the future assure us that neither researchers, extensionists, bureaucrats or farmers have all the right combinations of skills and knowledge necessary to make the decisions required to remedy the many problems related to deforestation independently of each other.

On the basis of the information gathered during the initial diagnostic phase, participants can begin suggesting interventions and resources that might help improve

their social and economic welfare. During the next phase of a social forestry research project, that know as the design phase, participants attempt to identify potential agroforestry solutions based on the earlier findings about the nature of the perceived problems and opportunities. The scope for such interventions must be understood as constrained (though not immutably so) by a number of factors including cultural attitudes concerning tree management, the economic and political circumstances of land and labor availability, and the place of trees in overall household priorities (Laarman and Sedjo:235-236). And because people living in poverty will tend to want to take very few risks with their scarce resources, changes will have to be small and gradual at first, evolving only after demonstrated successes that could take years to materialize. An important skill for completing this design phase and the subsequent implementation phase is therefore the ability to create and influence the direction of social organizations that help the rural poor to more effectively manage trees and forests (Burch,1988; in Laarman and Sedjo: 233).

One of the major difficulties with this research plan though - and one that is too often glossed over by the optimism of academic do-gooders - is the fact that multi-disciplinary projects investigating social, ecological, and economic phenomena require teams of professionals who can work together within what are usually very brief time constraints. It may prove to be unrealistic to expect such a scenario, especially given that there has been very little in the way of a tradition for evolving this type of working relationship. This difficulty though in no way diminishes the importance of multi-disciplinary research, for experience has proven that socioeconomic and anthropological investigations are needed to help chose among the proposed development alternatives.

that, in turn, will help to determine the orientation that the agronomic investigations should take. This way the social problems requiring political changes can be better understood, and only then will it make sense to talk about simultaneously increasing agricultural productivity, improving the quality of life of small farmers, and conserving natural resources for the use of future generations (Oñoro;1983:225-226).

Many more challenges arise from the nature of doing this kind of research on farm and community agroecological issues with indigenous peoples in the humid tropics. One major problem is that all too often researchers like myself fail to begin with a clear sense of which issues to address, and why. According to Macdicken, the way around this problem is to incorporate the findings from past studies into current research designs and field practices. In this thesis I have attempted to take this recommendation to heart by including information from previous studies when ever it proved to be directly relevant to this research experience. An other step that I took to confront this challenge was to take the time necessary to find out what the group of farmers in Mecayapan were actually doing before attempting to design any specific research agenda.

A second challenge identified by Macdicken is that of thinking beyond academic findings to how the results can be used in the field. In other words, developing guidelines and practices that are within the users' capacities to implement. This means attempting to direct the research process towards the development of solutions to the practical problems identified by those who stand to gain the most from implementing these changes in the field. (1989; in Laarman and Sedjo;1991:225-226). This challenge makes up the bulk of what I report on in chapter four.

A number of NGO's have successfully implemented these recommendations with the help of social and natural scientists who's grassroots orientation and genuine commitment to the poor has won them the trust of project participants. Positive experiences of this nature continue to filter in from around the globe. In countries as diverse as Denmark, Russia, Greece, Senegal, Nepal, and Mexico crop and livestock yields have been improved by agroforestry techniques including shelterbelts and living fences, trees for shade and fodder, improved shifting cultivation, etc. (Laarman and Sedjo:204-212). In all of these examples, broad connections have again been established between tree management, socioeconomic development and environmental protection.

The theoretical and contextual information that I have presented so far should emphasize the fact that better ways of implementing local and regional strategies for the sustainable use of natural resources are urgently needed to slow down and eventually reverse the destructive processes currently threatening the survival of so many of our planet's natural populations. These strategies for recuperating environmental equilibrium will also have to be proposed and supported in such ways as to permit their diffusion and adoption by and among immensely differing rural populations. For only by re-valorizing the embattled resources that indigenous peoples all over the globe have struggled to maintain can they be effectively and efficiently conserved for continuous long-term use.

As I hope to have shown, many previous efforts to do this have proven that one of the most effective ways of fostering sustainable development in poor rural areas is by encouraging producer associations to act as social mechanisms for extending sustainable land-use systems over a broad geographical landscape. And having said this, the success of such grassroots efforts to improve the sustainability of food and fuel production can

also depend as much on policies at the national and inter-national levels as it does on the wisdom and efficacy of local actions. The key seems to be in combining as much momentum from as many different sources as possible with as much patience as is required for this momentum to take hold and produce the desired changes. Skeptics will doubt whether its worth the effort, while others continue to think that we are on the verge of remaking a post-industrial future of limitless potential. Somewhere between these two extremes dedicated and thoughtful individuals are reflecting on their daily situations and taking both small and major steps towards assuring that their quality of life incorporate - to an extent which is found to be appropriate - the values and objectives of sustainability that I have described in this chapter. The following case study that I present in the remainder of this paper chronicles and analyses how these issues are being felt among one small group of Nahua farmers from the ejido of Mecayapan, in the Sierra de Santa Marta.

Chapter Three: The Sierra de Santa Marta -- History and Environment

So far I have been concerned to describe the theoretical and methodological issues that characterize some of the most promising aspects of social forestry and sustainable development research projects. This chapter attempts to pull together many of these recommendations, and to connect them to one particular place: the Sierra de Santa Marta. The way that I do this is by providing a brief portrait of the environmental conditions and the socioeconomic history of the study area. These discussions are necessary to integrate the locally prevailing combination of circumstances in Mecayapan that I describe in chapter four to the broader dynamics of the regional and global contexts.

3.1 RURAL MEXICO: PROBLEMS AND POLICIES

3.1.1 A Brief History of Gulf Nahua Forest Use

'Mecayapan' meaning place on the river where Makaya trees grow, although today very few remain, has been populated for a very long time. Archaeological findings in the region date back at least as far as the ancient classic Olmec culture (1500 to 900 b.c.). The same records suggest that towards the end of the Olmec era a rebellion forced many important monuments to be destroyed and the area to be abandoned. For many years to follow, it was successively reoccupied and abandoned by Mixe-Zoque-speaking groups, until around the year 500 a.d. when the ancestors of the current Zoque-Popolucas

inhabitants began arriving in what is at present the neighboring municipality of Soteapan. Then around 800 A.D. different groups of Nahuas from the Central Valley started to appear in the region (Velázquez;1994:2-3).

Oral history among the Mecayapan Nahuas tells of their arrival in the Sierra de Santa Marta after fleeing a French invasion of their previous homeland in what is now the neighboring state of Tabasco (Cruz;1979). The section of jungle where they sought refuge in the Sierra de Santa Marta belonged to the Soteapan Popolucas, so in return for a payment of tribute consisting mostly of corn and other agricultural food stuffs, the Popolucas accepted the Nahuas' settlement within their traditional territory. The Nahuas of Mecayapan continued to contribute to Soteapan until the state of Veracruz government proclaimed its first political constitution (1825) and created the separate municipal territorial divisions that have remained more or less the same until today (Velázquez;1994:5-7).

For many generations, the Nahuas and Popolucas' territory- meaning the spaces that they were familiar with, valorized and appropriated- did not stop at the edges of their cultivated fields, but extended far beyond to include the Sierra mountains and the Gulf coast. Under this traditional land tenure system, farmers could claim and make use of several agroecological plots dispersed throughout the region so as to maximize their advantages and minimize their risks. They might for instance plant corn and beans on the fertile plain and along the banks of the rivers, as well as fruit trees and more recently coffee on the steeper slopes of the volcano. The general rule for avoiding conflicts over ownership was the respect for work invested. All community members could thus claim

access to land, but this right was only socially recognized when exercised in this manner (Velázquez; 1994:8-10).

Until quite recently, the people living in the Sierra continued to do so in a manner that closely resembled that which they had been for the preceding several centuries. Many area residents still travel by foot or donkey into the jungles that cover the high slopes of the volcanoes to collect plants, hunt and fish. The reason for this continuity in so many productive activities seems to be because of the relative isolation and the traditionally low population density of the area. But changes beginning around the time of the Spanish invasion were to have far reaching implications for the future.

During the XVI century, the Spanish began consolidating their dominion over the new colonial agrarian order by imposing different rules of appropriation and access to the land. The Nahuas in neighboring Pajapan, similar to the Zoque-Popolucas in Soteapan, had much of their land base expropriated by the Spanish who were then introducing the first cattle ranches to the area in the early parts of the XVII century. By the mid 1700's, both groups were forced to re-acquire 'legitimate' titles to parts of their lands (they never did recuperated all of it) by buying them back from the individual Spaniards who had been granted the titles to these lands under the guise that they were uninhabited. It was on the basis of these land titles that these indigenous groups resisted further attempts to dislodge them during the mid to late 1800's. In contrast to Pajapan and Soteapan, the Nahuas of Mecayapan never held such titles to their land. The reason being that they were considered to be living on Soteapan lands, and not their own (Velázquez;1994:3-5).

3.1.2 XXth. Century Revolutions and the "New" Rural Order

Agricultural development over the last fifty years or so in Mexico has again intensified the polarization and social-spatial differentiation of many of the country's rural areas. The 'successful' accomplishment during the 1960s and 1970s of the objectives of the green revolution that sought to promote higher-valued crops that required a more intensive use of irrigation and agrochemicals has meant that small-scale landowners sowing traditional crops in rain-fed areas like the Sierra de Santa Marta could hardly compete against the highly capitalized modern commercial agroindustrial sector serving domestic and trans-national interests. Most of the ejidatarios who benefited from the post-revolutionary war land-distribution programs of President Cardenas during the 1930s have, for lack of credit and/or technical assistance, since been relegated to producing corn and beans for domestic consumption using traditional cultivation systems (Barkin;1995b:2).

By the late 1980s, the socio-economic and ecological conditions across Mexico were being further exasperated by neoliberal policies for agricultural modernization and a repressive official justice system that murdered several hundred journalists and opposition politicians for having dared to openly criticize ruling party corruption. Technical assistance and loan packages to small-scale producers were cut or eliminated, along with crop subsidies and state sponsored transportation and distribution networks. These social and political factors affecting rural conservation and development conditions in the Sierra de Santa Marta are needless to say provoking a serious crisis in the traditional production systems long the mainstay of the region's indigenous population.

These changes combined with growing population pressures to aggravate a crushing rural poverty to the point where many people with nothing left to lose are turning to violence. Faced with the certain prospects of declining real incomes and fewer job opportunities, the uncertainties of migration to urban areas or even violent revolution seem brighter than the certainties of a slow and painful death by starvation. The squalid conditions of the working and unemployed poor living in the 'rings of misery' that surround Mexico's cities and the indigenous peasants in EZLN rebel controlled Chiapas are social barometers of the types of changes now sweeping the country.

These radical alternatives will almost certainly continue to appeal to the poor and the destitute once the as yet inadequately understood environmental effects of the new capitalist production systems of the twentieth century become disastrously clear. By this I am referring to the consequences of deforestation and over-exploitation that threaten the very resources that currently sustain and make possible productive activities. In these new social and ecological contexts, peasant communities engaged in traditional food production must find additional productive activities that offer greater income prospects and therefore greater overall protection for the social integrity of their communities whose very continued existence is now threatened (Barkin;1995b:2-4). For the native and peasant communities like Mecayapan that continue to manage their agroecosystems for their own and the survival of future generations, this means coming to terms with the unprecedented challenges of adapting their technologies and strategies for improving their quality of life to these new and adverse social and ecological circumstances.

This analytic focus on the natural resource decision-making policy environment and the range of culturally appropriate technological options available to local farmers is in my view not only justified, but necessary for understanding and explaining agroecological development cycles in Mecayapan and elsewhere. For although certain real economic situations like the decline of coffee prices and the lack of regional economic integration are partially to blame for the social marginality of local farmers, the fundamental cause of their material poverty has been the imposition of an anti-democratic model of economic development. This neoliberal development model whereby vast areas of forest and unknown quantities of associated flora and fauna are destroyed in order to be replaced by a supposedly economically valuable alternative (e.g. cattle ranching), has instead created hunger, poverty, unemployment, and land degradation in rural areas, and thus further exasperated the pressures on local forests (Velázquez and Paré: 1996;330-332).

3.2 BIO-PHYSICAL CHARACTERISTICS

3.2.1 Location - Geology - Climate- Vegetation

Mexico is one of the four most biologically diverse countries in the world. Its biological wealth also includes a high proportion of unique species (i.e. endemism). The modernization of Mexico, however, is taking place at the expense of its environment: currently 17% of Mexico's endemic species are considered "in danger of extinction", 60% of the country's streams and rivers are polluted, and 500,000 hectares of forest representing 2% of all Mexican forests are lost every year (Embassy of Mexico in Canada; Internet web-site, 1997). Mexico's tropical forests, ecosystems that are especially high in

biodiversity and endemism, have fared particularly badly: just over 10% of its original 22 million hectares are still standing (PSSM;1992:3).

The Sierra de Santa Marta in southeastern Mexico is part of the Sierra de los Tuxtlas, the northernmost tropical rain forest in the Americas. Within this location, climate, topography, soil conditions, water and vegetation create a delicate web of biological relations that produces the natural constraints and potentials that continue to shape local resource exploitation. It is becoming painfully obvious though that the enormous potential embodied in the local diversity of this region is only rivaled by the extent of its recent abuse and destruction. For of the 200,000 hectares of original forest that existed up until 40 years ago, only 30,000 now remain (PSSM, 1992:3).

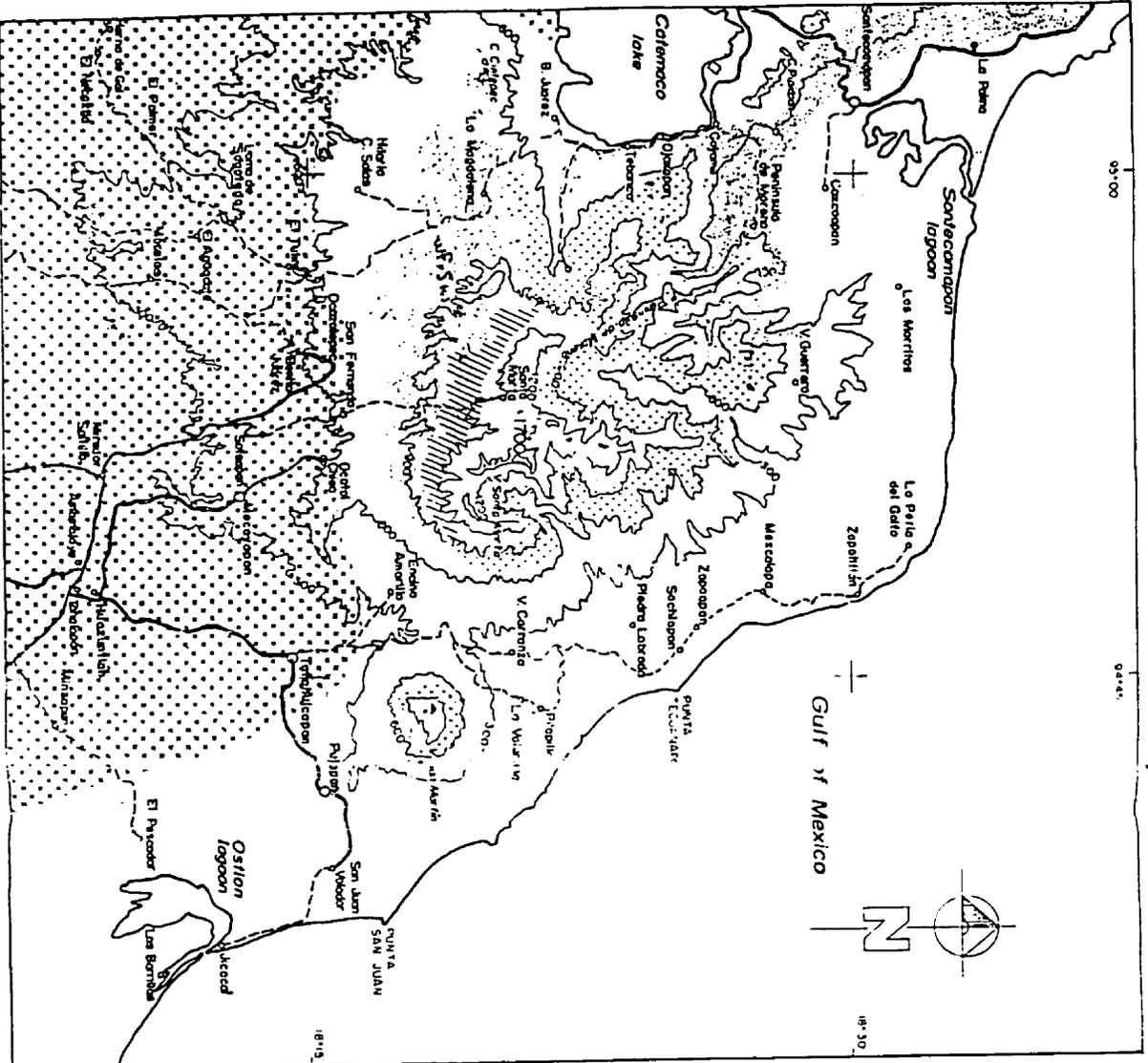


Figure 3.1: Two young residents from Mecayapan on an overnight expedition to collect rare and medicinal plants found only in a remote rainforest region of the Sierra de Santa Marta.

This mountainous region is located on the fringes of the massive oil-producing urban industrial complex (Coatzacoalcos-Minatitlan) to the Southeast, the Gulf of Mexico

to the north and northeast, and the industrial population centers of the Valley of Mexico to the Northwest. The five Southern Veracruz municipalities comprising the Sierra de Santa Marta (Pajapan, Mecayapan, Soteapan, Catemaco, and Hueyapan de Ocampo) receive on average yearly rainfalls of between 1200-4500 mm., and report average temperatures over the same period of between 18o-26oC. These two climatic factors, taken together with an altitudinal range of from 0 to 1,750 meters above sea level, have combined to produce an impressive array of 14 different vegetation types, including lower montane rain forest, mountain rain forest (cloud forest), swamp forest, dry evergreen woodland, mangrove woodland, palm and oak forests as well as others (PSSM;1992:1).

On the whole, more than 1,500 out of an estimated total of 3,000 plant species have so far been registered in the Sierra de Santa Marta. The indigenous population considers that approximately 263 of these have medicinal properties, they collect another 73 species for food, and use 54 others in the construction of houses, furniture and tools (Paré et al. 1992 in Chevalier and Buckles; ch.5:10). 410 bird species have been sighted (41% of all those observed in Mexico); 102 mammals and 1,149 other animal species, 102 of which are presently endangered (i.e., jaguars, tapirs), and 21 of which are endemic to the area (PSSM:2). These extraordinary levels of biodiversity found in such a relatively small area have coexisted with human settlements for thousands of year, but recent developments do not bode well for the next century.



ECOLOGICAL LIFE ZONES OF THE SIERRA DE SANTA MARTA, VERACRUZ *

- ml-S Subtropical moist forest
- ml-S-1 Tropical moist forest, subtropical wet forest transition
- w-f-S Subtropical wet forest
- w-f-T Tropical wet forest, subtropical rain forest and subtropical wet forest transition
- w-f-S1c Subtropical wet forest (cool)
- r-f-S Subtropical rain forest
- w-f-S-LM Subtropical Lower Montane wet forest
- r-f-S-LM Subtropical Lower Montane rain forest

* Based on World Life Zones Classification (L. R. Holdridge, 1967)

- Town or Pico
- Villages
- Paved road
- Carri road
- Path
- Contour



PROYECTO SIERRA DE SANTA MARTA

Biol. Fernando Ramirez: R
(1 9 9 3)

Figure 3.2: Ecological life zones in the Sierra de Santa Marta.

According to Ramirez (1992, as quoted by Martinez:81 in Boege et al. 1995), in 1967 the area of the Sierra still covered by different types of primary vegetation represented 81 770 ha. By 1992, Martinez found that only 23 624 ha. represented an area of contiguous undisturbed forest, while another 9 542 ha. were covered with remnants of the original pine, oak, mangrove and savanna vegetation. Added to these surviving areas of natural forest vegetation, are another 7 027 ha. of forested area distributed among fragments of unequal sizes and each showing different degrees of deterioration (Martinez:81). The ecosystem characteristic of the region of Mecayapan that was the focus of this research project is primarily made-up of sub-tropical oaks. These forests once covered large swaths of the lower slopes on the south side of the mountains that receive on average lower precipitation levels and have much older soils (PSSM-GEF;1996:1.4). This vegetative complex has been listed as one of the most endangered in the region owing to the extent of deforestation and other anthropomorphic disturbances that have and will in all likelihood continue to occur.

3.3 SOCIO-ECONOMIC CHARACTERISTICS

3.3.1 Demography

The village of Mecayapan is the site of the municipal government that regroups approximately 30 settlements of predominantly Nahuatl speaking farmers and cattle keepers. The Ejido of Mecayapan itself is an area of 5352 ha. located in what is now known as the 100 000 ha. area of influence surrounding the buffer zone directly adjacent to the relatively inaccessible core area constituted by the high peaks and steep slopes of

the Sierra de Santa Marta volcanoes. The area around the southern slopes of the volcanoes is where most of the population of the Sierra is concentrated, and is also where the first and largest continuous human settlements were established. Population figures projecting an annual growth rate of 2.5% produce a figure of roughly 20 000 inhabitants for the entire municipality of Mecayapan in 1995. 5100 or so of these people live in the "urban area" at the core of the ejido of Mecayapan. 520 residents of this municipal capital are Ejidatarios and their extended families with legally recognized access to land (average household = six people), and a lesser number are *avecindados*, residents without land-use rights, and their dependents (Personal communication; 1996).

Over 80% of residents list agriculture as their principal employment, and while 7% are registered cattle owners only 25 or so villagers possessed between 1-30 of these animals in 1996. About as many locals do little or no farming, working instead at jobs in construction, sales, light manufacturing, or social services in nearby cities. A dozen or so others are principally engaged in hunting and fishing. Recent patterns of accelerated population growth are contributing to pressures that are increasing ecological instabilities. Increased population densities are contaminating local streams and rivers with potentially hazardous levels of pesticides, plastics, garbage and feces (Personal communication; 1996).

3.3.2 Infrastructure

In most communities located in the Sierra de Santa Marta, services such as electricity, potable water, sewage systems and health care are either severely deficient or entirely lacking. The same is true for production assistance such as credit, inputs,

transportation and other forms of technical assistance. It was not until the 1960's that dirt roads were built linking the municipal centers of Mecayapan and Sotepan in this historically only marginally accessible region to the nearby commercial and manufacturing towns of Acayucan and Minatitlan. Today Mecayapan is reached by a 12km dirt road from Huazuntlan which lies at the south-eastern edge of the Sierra, 30km up a paved road from the Trans-Isthmus highway connecting Coatzacoalcos, Veracruz to Salina Cruz, Oaxaca and to the north of the country via Acayucan.

3.3.3 Land Tenure

As the social and ecological circumstances of the Sierra municipalities changed, the traditional norms for regulating access to ejido lands and their resources have also been transformed. Under the previous communal use system all ejido land was held in common by all ejidatarios with hereditary rights. Ejido rights could not be bought or sold, and all land-use allocation decision were subject to approval by the General Assembly of local ejidatarios. Where this collective tenure system started to breakdown though was when politically influential native ranchers began fencing-off huge tracts of land and converting them into pasture for privately owned cattle. Small farmers throughout the Sierra suddenly found that their access to these 'collective' lands had been severely restricted and therefore began to push for the privatization of the ejido that had since come under the control of a few economically powerful ranchers (Velázquez; 1994:14).

In Mecayapan ejidatarios have enjoyed more or less official individual entitlements to exclusive land-use rights over their plots since the ejido's collective tenure system was effectively scraped in 1990, limiting each person with traditional use-rights to a parcel of

approximately 10 to 16 hectares. This arrangement is known in Mexico as “fraccionamiento economico”, or economic partition, but the actual legal status of this change has yet to be formally recognized by the government agrarian reform institution (PROCEDE). The quantity of land that each ejidatario received is sufficient from the point of view of a single family engaged in subsistence cropping, but because of some of the worsening socio-economic and ecological problems that the region is experiencing this amount of land may not be sufficient in the future, especially if the population continues to increase.

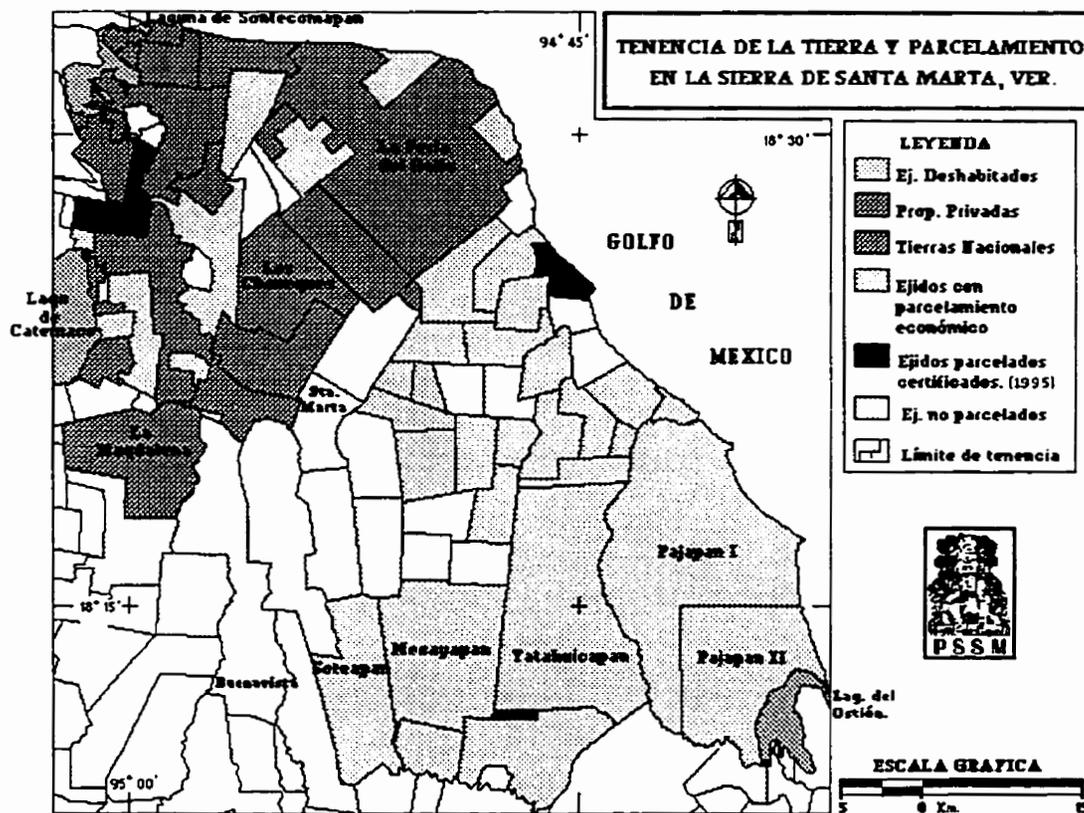


Figure 3.3: Map showing economic partition land tenure patterns in Mecayapan and surrounding predominantly Nahuatl ejidos, communal or non-partitioned ejidos in the predominantly Zoque-Popoluca east, and the privately held lands where cattle ranching is strongest in the north (PSSM-GEF: P. 2-5).

There exists some controversy about the impact that this land tenure reform will have on conservation efforts and the survival of biodiversity in the Sierra region. Some researchers with the PSSM believe that the social and environmental impacts will be negative, as previously communal lands in forested areas that are not appropriate for farming and ranching activities are parceled out to individual ejidatarios who will now enjoy exclusive economic use-rights over them. The problem is that these new property owners often take possession and clear the forests in order to plant crops for one or two cycles, and when the productivity inevitably drops after a few short years they seed grass for cattle pasture.

Another problem with these changes to communal land tenancy practices stems from the fact that a majority of villagers without the land-use rights defined by the status of ejidatario have effectively been excluded from all of the ejido's newly privatized lands. PSSM researchers believe that this situation represents not only an unfair redistribution of local resources, but one that will also increase extractive pressures on the forest's remaining resources as those without land to farm will have to seek their livelihoods farther up on the steep forested mountain slopes that are inappropriate for any other use except as permanent forests.

A second hypothesis about the effects and merits of partition is the one most widely shared by the ejidatarios who created the conservation and development project at the core of this research. The members of this group argue that before partitioning the ejido lands anybody could cut down a tree or pasture their animals wherever they pleased. No one cared to protect or regenerate the surviving forest fragments within the ejido

because there were no guarantees of any pay back. Because of this lack of secure tenure, farmers argue that they made no extra effort to protect the standing forest vegetation. Under the old communal tenure system there were no incentives for the long-term protection of forested land because anybody could come along and kill the animals that might live there, or else clear the trees in order to grow crops on the land. But now these ejidatarios argue that since they each have their own assigned lands, nobody else has any business cutting wood or collecting plants or animals on the parcel of another.

I personally feel that both of these positions make valid points, and would tend to agree more with the PSSM were it not for the fact that Mecayapan is a fairly large and diverse ejido, and therefore it has proven extremely difficult to achieve the level of consensus required to effectively communally manage local land-use activities. Because of internal divisions between farmers and ranchers and their respective political organizations, the Ejido Council elected by the General Assembly of Ejidatarios has never succeeded in adopting any of the kinds of internal regulations that would allow for a more rational and sustainable use of local resources. There are no official sanctions to promote controls on the use of fire to clear vegetation, over-fishing / over-hunting, domestic animals causing crop damage, and until 1990 there was nothing to stop local ranchers from using all the land that they wanted for their own personal profit. Under these circumstances, it may just be that the ejidatarios who supported the partition process decided between the lesser of two evils. At least this way there is some degree of hope that effective land-use policies will develop at the level of individual parcels, and proceed

from there outward to the rest of the ejido, the municipality and eventually to the entire region.

3.3.4 Current Land Uses

The principal land-use activities in Mecayapan today are first and foremost agriculture, followed in importance by cattle ranching, pig and chicken raising, some hunting and fishing, and some gathering of plants and other non-timber forest products. The most dramatic impact that local land-use practices have had has been the loss of almost 60% of the area's original forested areas between 1967 and 1991. This large-scale destruction of forest resources continues to have a series of negative consequences on the ecology and economy of the region.

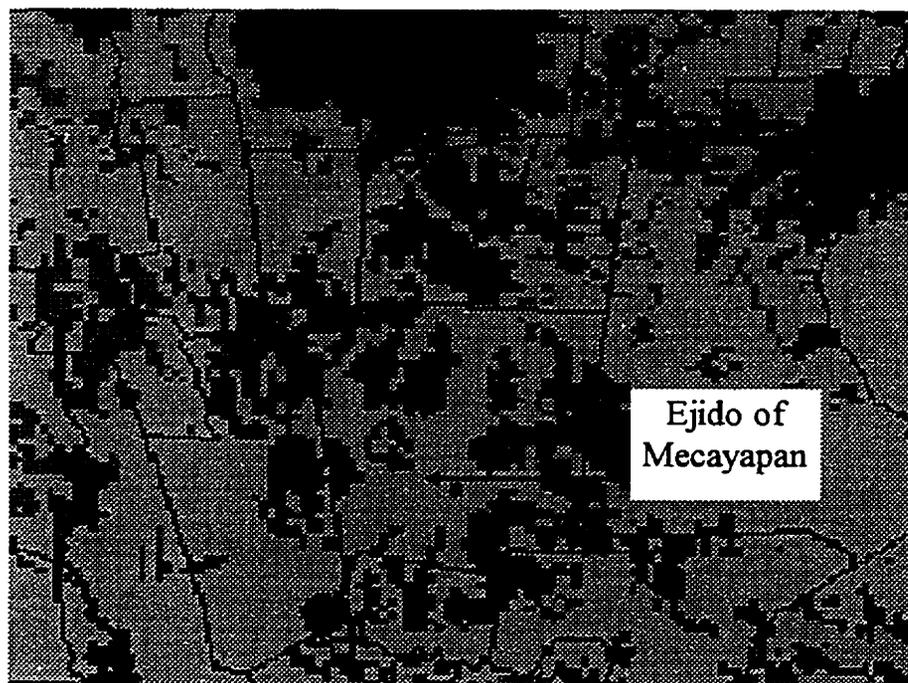


Figure 3.4: Map showing Ejido Boundaries and conversion of forest vegetation to crops and pasture for cattle. Gray areas represent agricultural landscapes, darkest areas represent remaining forest and lighter areas are recently cleared forest (PSSM-GEF 1996:4-12).

Official land-use policies promoted in the Sierra region over the last half century have included subsidized credit for cattle ranching, hastily planned colonization schemes, logging concessions, and changes to agrarian laws. Each of these measures has been used at one time or another to the detriment of the Sierra's natural forests and local communities. These political choices debilitated local institutions, abetted unequal land accumulation and landlessness, reduced agricultural fallow periods and the availability of forest products for subsistence and/or sale, and resulted in many local families finding it increasingly impossible to survive without additional sources of off-farm income (PSSM-GEF;1996:3-10-11).

Non-farm income in Mecayapan has tended to come from migration to the cities to work in the informal labor markets of the construction or sales industries. But with the chronic economic recession in Mexico, locals say that there are no more jobs to be had there, and that nobody there has any money with which to buy. So the young men without adequate access to the partitioned ejido lands no longer have this option. Increasingly they are being forced to work small plots belonging to close relatives or else to depend upon the meager bounty of the land, adding to predation pressures on nearby plant and wildlife stocks.

Behind so much of this destructive evolution in Southern Mexico's humid tropics no single factor has had as much of a profound social and ecological effect as the common cow. As the cattle population of the region increased during the 1960s, the amount of land available for crop cultivation on the fertile low lands decreased, forcing peasants to clear forested lands further up the slopes of the volcanoes. As more mature forests were cleared

and burned to be converted to pasture, the all-too-well known consequences of such 'developments' started showing up: soil erosion and the loss of soil fertility, pest and weed build-ups, loss of biodiversity, over hunting and over fishing, etc.

The disastrous implications of such conditions are already well known: carbon dioxide released into the atmosphere contributes to global warming, sedimentation accumulates in streams and riverbeds, and it is impossible to know what the unforeseeable consequences will be for the future of agricultural and medical research. Probably most damaging of all to local residents has been the effect this is having on secondary forest vegetation established on fallow lands (acahuals). Fallow periods have been dramatically reduced and many well-adapted fertility restoring tree species have been entirely eliminated, carrying serious implications for the agricultural resources of subsistence and overall system performance (Chevalier and Buckles;1995:191-196). The result is that many local lands have lost their usefulness for anything other than low-grade pasture (PSSM-GEF;1996:3-1). These consequences seriously compromise the possibility of a more sustainable management of the region's biodiversity.

According to Boege an other important cause of the current socio-ecological crisis in Mexico is the co-optation of independent peasant and native organizations into functioning as partisan institutions tied to the implementing agencies of official policies. In many instances these co-opted groups have become reliable promoters of an agroecological model of production that not only encourages them to over-exploit their lands, forests and water, but that is above all incapable of even providing for the basic subsistence needs of the vast majority. In this context, Boege argues that it is imperative

to increase support for new types of native and peasant organizations that demonstrate broad commitments to the needs of their members (Boege et al;1995:24).

By the early 1980's, ecological deterioration in the Sierra de Santa Marta had reached a level critical enough to warrant a presidential declaration setting aside some 80,000 hectares of land for forest protection and as a wildlife refuge along the lines of those established under the UNESCO sustainable development program: Man and the Biosphere. The idea was to manage the Sierra's vanishing forest ecosystems in such a way as to satisfy increasing human needs while also guaranteeing the continued reproduction of the complex and rich environments that generate the valued resources present in these ecosystems. But of the 80 000 ha. supposed to be protected under the law that created the Sierra de Santa Marta Biosphere reserve, only 25% is covered with primary or only slightly modified forests. Another 8.5% contains secondary forests (acahuals) or forest fragments, a whopping 30% is currently dedicated to pastures, 28% are lands used for traditional agricultural purposes, and the remaining 9% is under coffee cultivation (PSSM-GEF;1996:2.3).

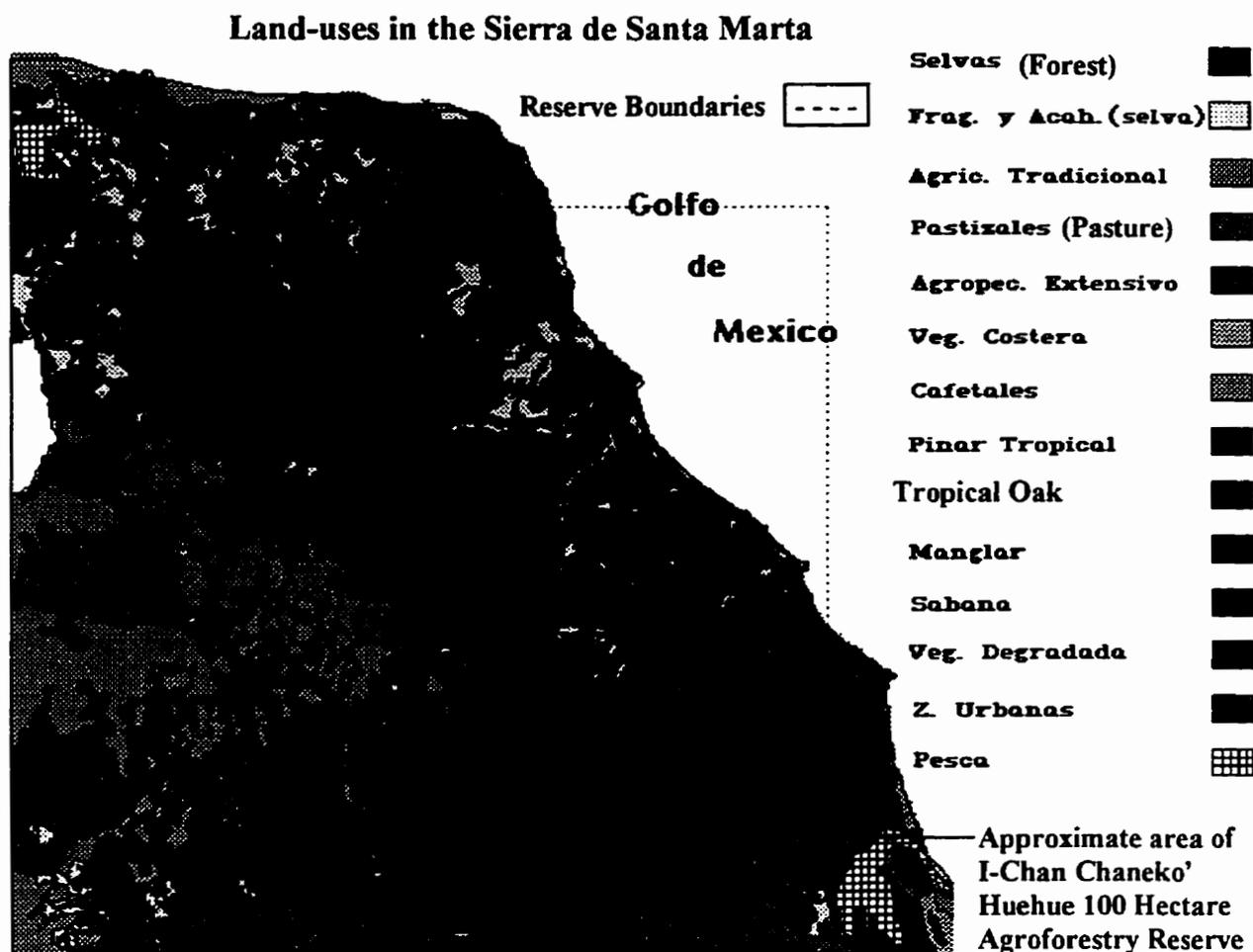


Figure 3.5: Map of current land-use practices in the Sierra de Santa Marta. Arrow points to oak forest fragment where I-Chan Chaneko' Huehue ejidatarios plan to carry out conservation and development activities. (PSSM-GEF: P.2-7)

Despite these government decrees conferring a special 'protected area' status on the Sierra de Santa Marta, forest fires, cattle ranching and logging continue to threaten the survival of a variety of natural populations within this federally protected area (Paré and Martinez; 1995:1-2). This poorly organized government sponsored conservation project may even have been counter productive to its conservation goals. The reason for this is that government agencies failed to make any efforts to explain to or otherwise involve the

surrounding communities in any aspect of this initiative, and therefore many local farmers were led to believe that the government was going to expropriate all forested lands whose active ownership had not been established through the customary means of proof of tenure: clearing the forest and planting crops or pasture. That the Sierra de Santa Marta Biosphere Reserve has proven so incapable of reversing or otherwise slowing down the deepening local agroecological crisis only serves as a reminder of how even where legal prescriptions and technical recommendations are developed for a conservation area, these measures alone are often insufficient to prevent the continued deterioration of the targeted ecosystems (Boege et al., 1995:24).

These recent experiences in the Sierra region have confirmed that an effective and democratic rationalization of local resource-uses must begin at the level of the small plot, moving progressively outward to include the ejido, the municipality and only eventually the entire region. The I-Chan Chaneko' Huehue initiative is one such attempt to mobilize resource users at the smallest land-use unit and to expand outward from there to the ejido and so forth. These previous experiences at organizing conservation plans for the region have also shaped the Proyecto Sierra de Santa Marta's proposal for a territorial reorganization of the region based on the zoning concepts of Core Conservation Zones, Buffer Zones and a surrounding Area of Influence. These designations are based on a combination of socio-economic and ecological factors such as location, geology, climate, existing vegetation, land-use capacity, demographics, infrastructure, land tenure, and traditional, current and projected land uses.

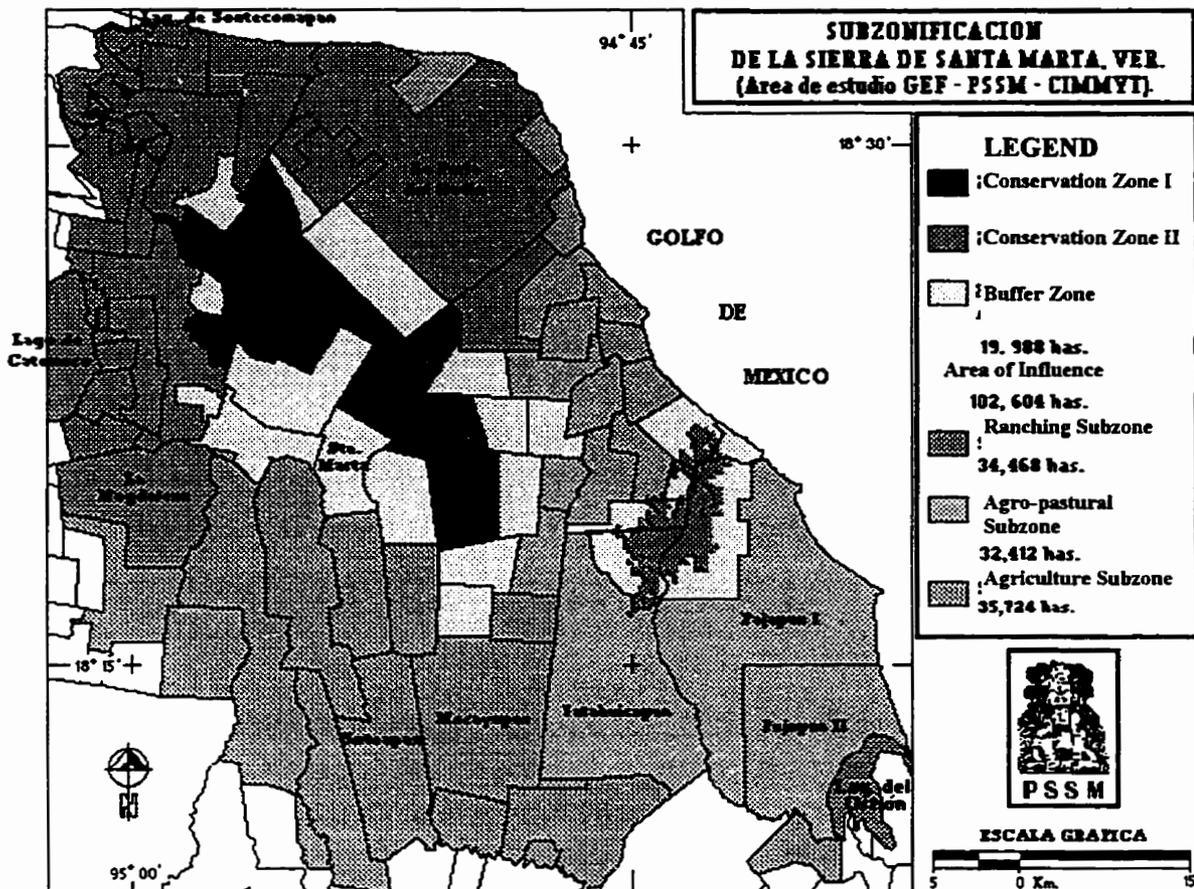


Figure 3.6: Map showing proposed zoning of appropriate land-use activities for the Sierra de Santa Marta. (PSSM-GEF:P2-9).

3.4 INFLUENTIAL INSTITUTIONS IN THE EJIDO OF MECAYAPAN

3.4.1 Proyecto Sierra de Santa Marta A.C. - UNAM (PSSM)

The PSSM is clearly the most active and important non-governmental organization currently operating in the Sierra de Santa Marta. This multi-disciplinary group of scientists and researchers have carried out extensive studies and community workshops on such diverse topics as rural development and rainforest ecology, ethnicity and native power systems, deforestation and appropriate technologies. Their fundamental goal being to improve the socio-economic and ecological sustainability of this unique region. Examples

of this work include recent publications by Chevalier and Buckles (1995) analyzing several decades of political struggles and economic transformations, a work by Velásquez and Paré (1996) dealing with the social consequences of authoritarian economic development models, an alternative management plan for the Sierra de Santa Marta Biosphere Reserve, a number of studies of local and regional history, economy and vegetation, and several papers that chronicle the evolving social dynamics of land-use practices.

One particular series of investigations that has been extremely helpful in allowing me to come to grips with the social dynamics of land-use practices in Mecayapan was that conducted by Velásquez (1994a-b). These articles provide much of the basis for my own brief history of forest use in Mecayapan. These materials, along with some published surveys, maps, census and archival data form part of a broad data base designed to integrate different analyses of the relationship between ecology, economy, and culture among the residents and ecosystems of the Sierra de Santa Marta.

Another important research project carried out by the PSSM in the region was one on which they collaborated with the Washington based Global Environmental Facility (GEF). This four part exhaustive study produced a historic assessment of the principal socio-economic causes of the processes that have resulted in the increased rates of environmental and social deterioration in the region, as well as a projected scenario of the likely outcomes that these changes in natural resource-use will produce over the next five years. A key section of this study is what they have called an "Alternative Strategy" that identifies specific sustainable development activities that would be economically, socially and politically appropriate for the region. This alternative strategy assumes that the best

solutions for rural development must emphasize the recuperation of the institutional and organizational capacities at the community and municipal levels. This study closes with an evaluation of what the costs and methods of implementing this alternative strategy should be (PSSM-GEF;1996:1.2).

The information generated through these studies has allowed the PSSM researchers to identify the major problems affecting the region, and to formulate action-investigation strategies for rural development alternatives in the Sierra. But addressing the macroeconomic and historical roots of forest mismanagement is only one part of the solution that they envision. This is because they also recognize that no strategy for forest conservation in the region would be complete without developing methods of effectively and productively involving rural people in local and regional forest management activities (PSSM;1994:19-20).

For these reasons the PSSM has consciously promoted a participatory research methodology throughout their attempts to facilitate the local residents in formulating their own diagnostic and participating in the designing of productive alternatives. This commitment presented the PSSM with a small problem though, since in many communities throughout the Sierra there was a distinct lack of autonomous producer organizations. The PSSM therefore often found it to be necessary to foster the creation of local work groups interested in learning a particular technology - like vanilla cultivation, living borders or organic fertilizers. The participants in these workshops have since become organized into a network of promoters who teach their families and neighbors the techniques they have learned.

The consolidation of such networks not only encourages greater awareness and participation in natural resource management, it also guarantees that sustainable development strategies will remain essential elements of natural resource planning well after projects and promoters such as the PSSM have come and gone (PSSM, 1994:4-5). The existence of these active networks of trained promoters also facilitates the work of future researchers. This is because they no longer need to invest as much time encouraging people to participate in research projects that have already proven beneficial results in their own communities.

In addition to the accumulated wealth of relevant information about the region and its people, the PSSM experience in the Sierra provides a model with field-tested methods that can guide current and future research projects towards achieving the broad-based democratic participation that will create the basis for a more equitable distribution of wealth - the fundamental prerequisite for forging a strategy of sustainable development. The I-Chan Chaneko' Huehue ejido reserve project in Mecayapan that I describe in Chapter four therefore has a lot to be thankful for in these PSSM investigations.

3.4.2 Consejo Ejidal de Mecayapan

A second important institution that effects land-use practices and consequently tree cover management practices in Mecayapan is the Ejido Council, an executive body elected to oversee the day to day functioning of the ejido's productive activities by the General Assembly of local ejidatarios. A large number of the indigenous communities in the Sierra de Santa Marta and throughout Mexico were designated as ejidos under the post-revolutionary government's programs designed to recognize native land claims, or at least

prevent the whole-scale displacement of these communities that continues to occur. Ejidos were created in the Mexican countryside to supposedly achieve greater justice and equity in the rural sphere, by having government agencies intervene in the promotion of production and organizational efforts, the administration of justice, the conservation of natural resources and the registry of operations related to associations of producers (Salinas and Solís;1994:7). As defined in Mexican agrarian law, ejido property belongs to the collectivity, and it is only the use of that property that is private since the parcel is granted so that all of its products belong to the person (ejidatario) that receives it. The ejidatario can not therefore dispose of the property or even legally rent out the use of its products, although these types of arrangements have become relatively common.

During the late 1980s and early 1990s the crisis in Mexican agriculture demanded that something be done in order to increase production, productivity, and investment in rural areas. Agrarian reforms were adopted giving ejidatarios more decision making power over questions related to land tenure and the organization of production, and in order to relieve the state of its constitutional obligation to redistribute land to marginalized sectors of the rural population. These objectives were pursued by investing ejido assemblies with greater freedom to decide the use and forms of productive exploitation, and the eventual transformation or termination of the ejido regime itself. These reforms have made ejidatarios proprietors of their parcels in the fullest sense. They may now decide to use, share, rent, or even sell their lands to third parties. However, these reforms have also led to the reduction or even complete withdrawal of many state agency support programs for rural development (Salinas and Solís;1994:6-7).

In practice the institutions of the ejido in Mecayapan are a mix of these contemporary legal statutes and of the traditions inherited from their indigenous system of civic-moral authorities who used to regulate local land related questions. Although the traditional authorities no longer exercise more than the very limited powers of persuasion within the legal framework of the ejido's current administration, the new structures adopted from Mexico's agrarian legislation have yet to be adequately adapted to local customs and circumstances. This is most obvious in the administrative confusion that has contributed to the difficulties that the ejidatarios of Mecayapan have experienced when trying unsuccessfully to establish guidelines and sanctions covering local land-use rights and activities that jeopardize the interests of other community members.

The ejido councilors elected by the General Assembly are often hard working and well meaning ejidatarios with a desire to serve their community, but the margin within which they must operate is limited not only by the lack of wide-spread participation by their fellow ejidatarios, but also by the municipal authorities who control access to external state and national resources. There is very little formal or informal cooperation between these two important local institutions. Municipal politicians have been known to stymie initiatives organized by councilors that they see as potential threats to their own power bases. This rivalry is therefore a significant constraint on the potential of community development and conservation initiatives locally. Regionally and nationally the political / administrative situation in so far as natural resource management is concerned is not much better.

3.4.3 Alcaldia Municipal de Mecayapan

This is perhaps the most undemocratic and abusive of all local institutions in Mecayapan. The contest for the municipal presidency, treasury and secretary is responsible for much of the destructive in-fighting that has divided the community and limited the chances of any concerted actions aiming to improve local conditions. The presidency is looked upon as something of a blank check with which to rule almost exclusively in favor of those who helped the successful candidate to get elected. This tradition of executive privilege extends right up to the national president who's office is attributed considerable discretion in personal and national affairs. The spoils of office in Mecayapan include everything from vehicles donated to the community through official government anti-poverty schemes that end up serving as personal taxis complete with driver, to bribes and kickbacks from allies and especially opponents requiring the services of City Hall for every thing from permits to slaughter their animals for market, to cases of arbitrary detention and major human rights abuses by the local police.

A local school teacher and his family and friends were very candid with me about the political situation in the municipal capital. They described their involvement in an opposition political party to the current municipal administration, who's treasurer also happens to be a close friend of Hilario's "sindicato". They talked about the lack of cooperation and even the deep seated mistrust that reigns between the supporters of these different political parties. The picture that emerges is one of successive administrations enjoying the spoils of their electoral victories by ruling almost exclusively for their own personal benefit and that of their supporters. They pointed out a previous mayor who no longer lives in Mecayapan because he somehow made enough money while in office to buy a house in a nearby city.

The members of a local opposition party with whom I spoke were emphatic about having no recourse for controlling these abuses of power until the next municipal elections in several years time when they would try to get one of their own into office. But without the support and consent of the powerful region elites and their official state and national party structure(s), the Partido Revolucionario Institucional (PRI), it has been excessively difficult to dislodge the PRI partisans who have ruled Mexican political life since the end of the revolution in the 1920s. A related problem with the local municipal government is that it makes very little attempt to coordinate its work with the local Ejido Councils - the institutions responsible for managing the ejido's productive activities.

Consejos de Desarrollo Municipal (Municipal Development Councils) are a further example of this lack of cooperation. MDC's were established throughout the state in an effort to decentralize some of the municipal decision making powers. These councils

receive state funding to act as local instances for planning, management and financial operations oriented towards an alternative path of development promoted through broad-based community participation. The problem is that very few people in Mecayapan are even aware of their existence, and the Mayor of Mecayapan seems quite content to keep it that way.

The main voting blocks in Mecayapan's municipal elections are the teachers generally associated with the center-left Partido Revolucionario Democrático (PRD) and the ranchers supporting the PRI. Each of these groups has its hard-core supporters among the majority peasant farmers that they try to expand come election time by distributing campaign hats and posters and making promises that go unkept. A good example of this tactic is the inevitable promise that each candidate makes to pave the access road to the village. They have been talking about this for many years but nothing has ever come of it. Once in power both of these political parties have limited themselves to implementing the policies locally that were developed and promoted nationally and in the state capital (PSSM-GEF;1996:4.2.4). This apathy was particularly visible in so far as environmental management, where the municipal administration has limited itself to circulating government pamphlets about preventing forest fires and vaccinating animals, and mediating the odd conflict over boundaries and resource-use issues between neighboring communities.

3.4.4 Secretaria del Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP)

The federal and state governments have recently attempted to consolidate jurisdictions over natural resources and the activities that affect them in order to circumvent the problems of bureaucratic inefficiency and confusion that they were having under the old system of fragmented and independent administrations under many different ministries. The result of this restructuring is the new Ministry of the Environment, Natural Resources and Fishing or SEMARNAP by its Spanish acronym. One of the major obstacles that the Mecayapan group of ejidatarios has consistently run up against has been precisely this confusion that exists around the roles and responsibilities of the various levels of the Mexican rural bureaucracy. The neighboring ejidos of Pajapan, El Pescador and Benito Juárez have also proposed similar conservation and development initiatives, but despite many efforts and much time invested, their actions received no positive response from any of the three levels of government.

Three Mexico City officials working in the soil conservation department of the federal SEMARNAP were invited to visit the Sierra de Santa Marta to learn more about local conservation initiatives, and to give their advice on how farmers might more effectively proceed with their conservation and development plans. The Mecayapan group met the SEMARNAP officials and took them on a tour of their ejido reserve lands. Predictably, as often happens when government officials based in far away capital cities make brief visits to their rural constituents, the meeting turned out to be a disappointment for the ejidatarios. The group had hoped that the officials would support their

conservation initiative by committing specific resources to the project or at least clarifying what the responsibilities of the state agency were in these matters. Instead, the officials simply listened to one ejidatario describe the group's objectives and recent actions and then asked a few mundane questions about the details of the project. These questions were not even very appropriate since they pertained to details such as the legal status of the reserve lands and others which had already been forwarded to them before the meeting by Luisa Paré of the PSSM. Later on during that afternoon, one official proceeded to lecture the group in his best bureaucratic legalese about the various government funding categories that could potentially apply to their project.



Figure 3.7: I-Chan Chaneko' Huehue farmers (wearing hats) take government officials from SEMARNAP on a tour of proposed agroforestry reserve in Mecayapan.

After the meeting, several ejidatarios said that they felt even more confused by what was said then they were going into it. So for these ejidatarios it was almost like being back at square one. Fortunately these farmers are quite used to empty promises and so

they are not easily dissuaded. The only positive thing that they retained from the event was a clearer sense that even though their ejido lands were no longer communally managed since the partition, the Ejido Council still retains legal responsibility over land-use practices locally. They therefore agreed that the ejido General Assembly should become more of a priority focus for their organizing activities. They soon after resolved to draw up a list of accords to be agreed upon by the twelve members of their association, that would then serve as the basis for promoting the process among the members of the General Assembly so that one day they might achieving the consensus needed to approve genuine and legitimate binding regulations for the ejido as a whole; with or without federal support.

I followed up on this meeting with a letter to the SEMARNAP officials (copies sent to Proyecto Sierra de Santa Marta) explaining the rather unfortunate outcome of their visit, and stressing how the meeting might have been made much more productive had they been willing to consider a formal partnership with the ejidatarios. Such recognition, even were it to remain purely symbolic, would surely have encouraged the group to strengthen their efforts to achieve more significant levels of participation and cooperation from other villagers and neighboring ejidos. Needless to say I never received a reply.

3.4.5 Direccion General de Culturas Populares - Acayucan

The General Direction of Popular Cultures is the federal agency under direct control of the executive branch of government that seeks to strengthen and promote the many indigenous and folk cultures that exist in Mexico. Typically their projects have included support for indigenous language publications and craft work, but they have

recently begun to focus increasingly on ecological issues and problems. This agency employs a network of local promoters who are themselves - like Hilario Martinez in Mecayapan - members of the cultures and communities with whom they work. The problem is that like so many government agencies around the world, operating budgets for staff and for community investments have been severely curtailed.

3.4.6 Instituto Nacional Indigenista (INI)

The National Indigenous Institute has recently begun to pay more attention to the traditional productive processes that native and peasant communities developed to preserve the ecological benefits provided by their complex agroecosystems. This agency isn't terribly visible in the Sierra, but they have contributed some funding for training workshops for traditional doctors who use medicinal plants, and the odd reforestation and cash crop projects here and there. The main reason for including this agency among the influential institutions affecting resource-use practices in Mecayapan is that the I-Chan Chaneko' Huehue association filled a funding request with the INI that if successful could see considerable resources directed towards local conservation and development activities.

Chapter Four: Participatory Research and the Ejido of Mecayapan Agroforestry Reserve

4.1 Farmers' Needs: The I-Chan Chaneko' Huehue Association

The I-CHAN CHANEKO' HUEHUE association was created in August of 1996 by a group of 12 Nahua farmers from the ejido of Mecayapan who were concerned about the deteriorating local environment in their region of the Sierra de Santa Marta. These 12 ejidatarios had each received 10 to 15 Hectare plots of land in an approximately 100 ha. area of sub-tropical oak forest straddling the Xochiapa Creek when their old communal ejido land tenure system was replaced by private access to land in 1990. The original idea behind the formation of this association was to create an 'Ejido Reserve' with a voluntarily established conservation and development association responsible for managing it as a compact, permanently forested area for the economic benefits of its members and the environmental benefits of all.

Several of the I-Chan' ejidatarios had previously participated in farming and conservation experiments with researchers and promoters from the PSSM and the DGCP since the early 1990's. These efforts and experiences resulted in, among other things, the production of a document entitled "Trial for a an Autonomous Territorial Management in the Sierra de Santa Marta" (Paré and Martinez; 1995). This document discusses the overall socio-ecological context prevailing in the Mecayapan sector of the Sierra de Santa Marta, and puts forth an alternative economic development strategy for a more sustainable

use of the area's natural and cultural resources.

With the release of the Paré and Martínez document, the PSSM promoters and local farmers were seeking to establish agreements among themselves that could serve as the basis from which to involve neighboring farmers and the local government-recognized Ejido Council. The reason for seeking the council's endorsement is to assure that other villagers and ejidatarios either willingly cooperate with the association's goals of protecting and restoring this small remaining section of the local oak forest ecosystem, or else that some legal recourse exist to sanction cases of non-compliance.

The ejido reserve group also intended to register their agreement with the state, federal and municipal authorities so as to benefit from additional support with things like designing the legal and alternative production aspects of this innovative conservation model for the region. Farmers expressed their expectations that these authorities should contribute some initial economic incentives to their management plan once a detailed proposal for the actual conservation and development activities to be undertaken had been prepared. Importantly though, the success of this initiative does not depend on a windfall of government or other funding, for as I will describe in this chapter, that financial success has not exactly been forthcoming. In point of fact, the process of specifying the commitments summarized in the Paré and Martínez document has already made it possible for several of these farmers to unite individual efforts to keep fires out of their forested lands, and to transfer a few plants and trees from other areas where they remain relatively abundant.

So as I first became involved with the Mecayapan reserve project in 1995 it seemed to have made an auspicious start. A core group of farmers with much experience in common and many shared ideas about farming and conservation had been formed and was meeting informally about once or twice a month to discuss and plan collective strategies and actions. The group was beginning to publicly air their concerns about reduced supplies of the traditional resources that continue to be the staples of the local economy (soil, trees, water, plants, wild animals, etc.), to discuss the reasons for the decline of these elements, and perhaps most importantly what they could do to reverse these trends.

Then after spending some time in the village and speaking with researchers from the PSSM who had worked in Mecayapan, I realized that much remained to be done towards adopting and implementing the policies and changes contained in the mission statement prepared by Paré and Martinez (1995) with the eleven other farmers. For instance, several months after all 12 farmers had agreed to clear a fire break around the perimeter of the reserve only two had actually followed through in doing so. Regrettably other ambitious commitments contained in the initial project statement such as to reforest the river banks had also yet to materialize.

Across the village of Mecayapan only those who had taken part in the project planning discussions knew anything about the conservation initiative, and even those who were aware of the project's existence had some widely differing interpretations of what exactly it would amount to. Some farmers I met favored fencing the area off in order to allow cattle to roam freely among the remaining vegetation, others believed it better to

remove the ground cover with herbicide and then to chemically fertilize the standing tree crop. Most would simply continue to do as they had been for years until for whatever reason this were no longer possible, or else someone offered them an incentive to change.

This confusion surrounding the project's general goals and implementation schedule was no doubt in part due to the fact that the PSSM has worked only sporadically in Mecayapan since its origins in the early 1990s. To this day it remains relatively unknown to most villagers. And yet I soon discovered that there were other more basic factors undermining the Mecayapan group's early organizational efforts. As described in Chapter 2 of this thesis, the literature on agroforestry-type sustainable rural development projects stresses that organizational pitfalls occur because of considerations like skewed land-tenure patterns, the lack of available information about technical alternatives, and differences of interests between communities and among individuals. And while the research data to be presented in this chapter reveals that these complex issues were clearly operating in Mecayapan, another critical issue consistently stymied local farmers' abilities to bring about their desired changes in land-use practices. This was their own lack of knowledge about the economic potential and the ecological importance of their oak forests.

The disregard that most people in Mecayapan today hold for their much impoverished oak forest ecosystem stems from the fact that it is perceived as providing little of economic benefit aside from fuelwood for cooking and the occasional fence post or house beam. These poor farmers are by no means ignorant scoundrels concerned only about increasing their own personal wealth irrespective of the ecological impact, but

instead they are simply acting as any rational, goal-oriented economic actor would. This goes to show that ecological protection is most likely to occur as a secondary effect of activities that generate income. The inescapable fact remains that ecological conservation is most attractive where it also guarantees the continued conveyance of certain real economic benefits to its protectors.

A further impediment to the desired changes set forth in the Paré and Martinez document was the resistance and jealousy that a PSSM researcher met with from a key contact involved in the Mecayapan reserve whom they believed was feeling threatened by the presence of knowledgeable outsiders temporarily residing in the community. As late as February of 1996 my contacts with the PSSM informed me that they were not receiving any cooperation from the de-facto group leader in Mecayapan, and were therefore considering abandoning the whole project unless relations improved.

Confronted with the complexity of these issues and obstacles, I seriously questioned the likelihood of the Mecayapan group achieving their objectives of economic development and ecological conservation. And stationed as I was during the winter of 1996 in Ottawa preparing for the field research component of this thesis project, I had little choice but to overdose on background research in order to better orient myself towards these fundamental questions and concerns. I believed this to be essential preparation for what would evidently not be the simple task of contributing towards these farmers' conservation and development project - if in fact there still was a project to speak of.

Then approximately eight months after my initial exploratory visit to the Sierra de Santa Marta region, Luisa Paré of the PSSM informed me that she had secured some seed money for the Mecayapan reserve project (not yet known as “I-Chan Chaneko’ Huehue”), and that she thought that it would be prudent to wait for an actual proposal of activities and related expenses to be realized by the 12 ejidatarios before distributing the funds. I took this opportunity to signal that the group now needed to review and systematize their own and others’ findings concerning the nature of the current ecological and socio-economic problems and possibilities in Mecayapan, and then to focus on the selection, design, and evaluation criteria for testing the specific agroforestry techniques that would satisfy their needs and goals.

These Diagnostic and Design (D&D) phases of agroforestry projects, as described in Chapter II, are participatory processes that have proven their effectiveness at awakening interest among those who undertake them to learn more about their society and the others that they interact with. This improved awareness among participants will then often lead to calls for specific well-targeted actions based on farmers’ own understandings of their needs, problems and potentials. Like Participatory Rural Appraisals (PRA) the effectiveness of this D&D approach to encourage genuinely sustainable bottom-up, socio-economic development proceeds from the methodological commitment that the participants should always make their own decisions about what they want to do, and when and how to do it.

Shortly after arriving in Mecayapan I introduced myself to the farmers’ group as a researcher who had come to their community on my own behalf and in order to find out

how I might be able to help the group to make their decisions on the basis of a thorough analysis of the problems, possible alternatives, probable complications, and available resources. I made it clear from the outset that my role as a researcher would not be to solve their agroecological or any other problems, but instead to ask questions, draw ideas and reflections out of the participants, direct their attention towards those suggestions that seemed to have the greatest potential for realization, and pose problems and difficulties through a process of open dialogue between persons with different and yet potentially complementary but fundamentally equally valuable information.

My next step was to attempt to reach a consensus among project participants as to why this participatory D&D research process outlined initially in Chapter Two and then briefly restated above could be of use to them. I told the members of the reserve project that I had access to both practical and theoretical knowledge about similar attempts to organize small-scale conservation and development projects throughout Mexico and elsewhere in the world that they might find helpful and instructive with respect to their own endeavor. For instance, I possessed information about institutions and programs that the group could approach for additional information, training, outside funding and other resources.

Upon learning about the nature of my role and objectives for being in Mecayapan the ejido reserve group decided to include me in their continuing process of collectively addressing their farming and ecological problems. The information required to achieve such participatory solutions to these resource-use problems we then decided would be produced through a combination of assessments, observations, surveys, and semi-

structured interviews. We also decided to compare the data from existing ecological surveys, in this case that realized by the PSSM, with field-based data generated through participatory mapping techniques, transect walks, and local histories. The end result of this research process we hoped would be that all participants would become more familiar with the nature of the agroecological problems prevailing in Mecayapan, why they exist and perhaps most importantly what can be done to overcome them.

What follows in this chapter will therefore be the story of that process over the roughly two years during which I was in contact with these farmers, their families and the wider Mecayapan and area society. But instead of beginning with the details of the current and tradition agroecological practices in Mecayapan - as is generally the norm in the agroforestry Diagnostic and Design research process that I described in Chapter 2 - I decided to first present the group's reflections on the ways of improving their current socio-ecological circumstances. The sub-chapters and sections that follow therefore represent the results of my editing and restructuring of the data that was generated during the group meetings and activities that took place between June of 1995 and September 1996.

The reason for reversing the usual logic of presentation in this manner is to better highlight what exactly it is that these farmers are seeking to accomplish with the formation of their association, and then with these goals in mind to consider the nature of the problems and opportunities manifested in their current and traditional productive practices. Another reason for proceeding in this fashion is that the members of what was to become the I-Chan Chaneko' Huehue association were understandably more interested

in discussing the solutions and changes that they could implement to improve their situation than in rehashing the details and the logic of those activities that by necessity they were already extremely familiar with. This point about the order in which most of the data from this research process was generated and is now being presented, while seeming to put the apple cart before the horse, was in fact in keeping with the methodological commitments that I outlined above.

As far as the I-Chan Chaneko' farmers were concerned, the specific interventions and resources that they identified as having the potential to contribute towards improving their socio-economic and ecological welfare (a process that corresponds closely to the design phase of an agroforestry D&D project) were in fact derived from their own elaborate analysis of the ecological, social and economic processes that shape natural resource management practices at the local level. Even if many of the actual research activities and discussions that sought to explore and better understand these specific processes and the ways by which they have helped to shape local agroecological practices (in other words the diagnostic phase in D&D projects) were sometimes carried out subsequently to their decisions having been made about what and how they wanted to improve. I believe this logic of presentation to be perfectly acceptable given the fact that for investigations of local productive practices to lead to recommendations being carried out for actual social and ecological improvements, the whole on-going and creative process will depend largely upon the unique skills and motivations that farmers themselves put into the project. Not necessarily upon the types of action nor the order in which these research phases are accomplished.

4.2 Priority Objectives for Agroforestry Alternatives

From the events outlined above surrounding the creation of the ejido reserve project in Mecayapan, it should be fairly evident that the release of the Paré and Martínez document in 1995 marked an important milestone in the history of this local conservation and development initiative. Since the release of this document, and no doubt in part because of the interest that it has generated, other farmers have joined in the group's efforts by attending the about once a month meetings to discuss common problems and plan alternatives for addressing them. The existence of this organized initiative was also the reason for my own and other researchers - both Mexican and international alike interested in life in the Sierra de Santa Marta - having chosen to work in this particular ejido. But it was not until the second summer of my research in the village that the original group of 12 farmers officially adopted the name I-CHAN CHANEKO' HUEHUE and elected a five member executive to represent them.

This organizational achievement marked another important step in the evolution of the project because it signaled a transfer of authority and responsibility away from Hilario Martínez - upon whom the whole endeavor initially exclusively depended - and towards others in the group who now occupy (at least on paper) the main decision making positions. Formalizing their association in this manner seems to have been a natural progression from a simple question of friends, families and neighbors sharing common interests and some degree of mutual trust towards attempting to broaden and to coordinate their actions for maximum effectiveness on several critical issues. The proceedings of the Ejido Reserve group were carried out with remarkable cohesion and

respect for each person's right to be heard and have their opinions considered. This respect consistently characterized the group's interactions whether they be official as during scheduled meetings with government representatives, or as was more common, when ever two or more association members gathered to pay visit to one and other.

The actual impetuous for choosing the name "I-Chan Chaneko' Huehue" (The Home of the Old Chaneko) for their association and debating the responsibilities of the newly elected executives was the invitation that Hilario Martinez received in his capacity as a local promoter for the Direccion General de Culturas Populares (DGCP) in August of 1996 to prepare a funding proposal for submission to the Instituto Nacional Indigenista (INI). This opportunity to advance the goals of the Ejido Reserve association came under the rubric of "Techniques for the Advantageous Use and Conservation of the Environment" and also became the pretext for defining the group's broad objectives and prioritizing their short-term activities accordingly.

An impromptu meeting was called for a Sunday afternoon when local farmers were most likely to be available to discuss the request for funding. Then about one hour before hand Hilario sent one of his young sons out to notify the group's members at their homes that the meeting would in fact take place. Some time after the proposed hour for the meeting to commence, a significant number of those members who could be reasonably expected to show up had arrived and the session was begun in earnest. As usual Hilario Martinez acted as Chair and presented the order of business for the day. Hilario had recently met with the INI's representative who briefed him about the guidelines and procedures for submitting a successful funding application to the INI before the deadline

that was only three days away. Over the next several hours the group discussed these guidelines and compared them to their own needs and goals until a general consensus emerged around the importance of six major objectives. Throughout this participatory process I was able to help the group clarify and articulate these objectives in writing, and to offer plausible interpretations of the often ambiguous wording contained in the INI's funding application package. The results were that the members of the now officially known as I-Chan Chaneko' Huehue association adopted the following specific resolutions:

- 1) To protect and restore their area's natural vegetation.
- 2) To establish a tree nursery for the purpose of reforestation with native and multiple-use tree species such as oak, cedar, and fruit species such as lime, mango and avocado.
- 3) To develop and experiment with other productive resource management alternatives which allow for both the strengthening of their household economies and the conservation of their natural environment.
- 4) To promote reflection and awareness locally about the ecological and cultural value of ejido's remaining forests.
- 5) To continue to solicit additional support in order to obtain the necessary investment and technical assistance required to consolidate these and future sustainable development initiatives.
- 6) To strengthen community organization by establishing work groups to carry out each of the above mentioned activities.

To accomplish these six major objectives the group agreed to realize the following five sets of related actions:

- i) Clear a three meter wide fire-break around the protected area and fence it off to keep out domestic animals and non-respectful people when no one is there to keep watch. Regular visits to the site and the construction of a small shelter on a strategically located vantage point are also planned to facilitate monitoring and protection in the area.
- ii) Establish a tree nursery which includes the following tasks: site and species selection, selection of seed trees, site preparation, including fencing off the chosen location, construction of seed beds, seed planting and care, preparation of the earth to fill transplant bags, transplanting the germinated seedlings, watering, etc.
- iii) Meeting with local and state authorities to garner their support for the discussion and promotion of association projects with the wider community, and the application of sanctions in the event of any transgressions against these activities.
- iv) Continue experimenting with traditional resource conservation strategies and production techniques such as green manure, cover and shade tolerant crops, living fences and borders, etc.
- v) Organize additional training sessions to study and productively apply these techniques on a broader scale.

As these priority objectives and activities were being discussed the group debated their viability and costs given the kinds of resources and supports that they had at their disposal. Labor was one of the only factors that they did not consider to be in short supply, as they were completely willing - if the case need be - to realize these activities without financial compensation. This being said, they still needed certain kinds of tools, materials and services in order to proceed with these plans. The following budget was

therefore submitted along with the group's proposal for funding to the INI. The US dollar amounts quoted below represent 1996 values based on an exchange rate of 1.00\$US = 7.50N\$ pesos and were calculated to accompany the two English versions of the project proposal that I translated and submitted to two funding agencies in the United States of America: the Catalyst Grants Program administered by the New York based Rainforest Alliance and the Minnesota based Cotton Wood Foundation.

1) Tools (machetes, rakes, hoes, wheel barrels, vaporizers...)	800.00\$US
2) Materials (barbed-wire, seed bags, wood, fertilizer, saplings...)	1700.00\$US
3) Transportation and Communications	250.00\$US
4) Technical assistance (training workshop on tree nurseries)	250.00\$US
Total amount requested	3000.00\$US

Farmers were enthusiastic about this process of writing funding proposals, even though they knew fully well that there were no guarantees that they would be successful. It seemed as if just knowing that someone somewhere cared enough about what they were trying to do in Mecayapan to offer financial support was heartening to these people who are more accustomed to hearing disparaging remarks about their ethnic and cultural heritage being made by outsiders than to genuinely respectful solidarity. A further reason for the group's eagerness to participate in the drafting of the INI proposal was the satisfaction they derived from achieving the above described consensus around what the priority goals and commitments of their association should be. The importance of this achievement should never be underestimated, especially in the early stages of a project

when the absence of many tangible and immediate results can discourage continued participation.

Based on my own experience during this and other sessions working with the I-Chan Chaneko' Huehue farmers it would be fairly safe to say that the main emphasis of the group's organizing activities was to obtain additional financial or other material resources with which to improve their economic situations (objective #5 in above funding proposal). This priority also regularly surfaced in the discussions the group maintained with the SEMARNAP and the PSSM. Whenever considering the relative merits of the various productive alternatives to their current resource management strategies, the discussion would inevitably turn to the going market price of the given product.

The question of market value was ever present as they suggested and debated alternative species that they could plant in their fields. Someone once suggested planting oranges only to be met by a resounding chorus of voices declaring that the current market price was too low to justify the production costs. Other farmers spoke of having planted papaya trees only to discover that after paying for transportation to regional markets, there was almost nothing left for their troubles. But for limes, zapotes, guanavanas and a particular species of mango called 'petacon' the economic situation was deemed to be quite different. Association farmers were categorical about the guarantees to returns on labor and investments with these crops.

Another product that the group was seriously considering planting because of its growing level of commercial demand is mushrooms. Their oak forests have traditionally provided excellent breeding grounds for several edible species of mushrooms. At one

meeting they passed around a small plastic bag of shitaki mushrooms brought to them by a PSSM researcher and chuckled in a somewhat puzzled way over the price of almost 12.00US\$ per 100 grams! By comparison other mushrooms grown and consumed locally sold for as little as 0.50US\$ for the same amount. Vanilla is another commercial species with considerable interest in the Santa Marta region. Several farmers jumped at the chance to enter into small-scale production of vanilla when promoters from the PSSM made the plants available to them.

The I-Chan Chaneko' farmers were also interested in the benefits of added food security through developing alternative production strategies (objectives #1,3). Most of the group's members produce themselves the bulk of what their families consume, selling or bartering small surpluses in order to procure the essential goods that they do not themselves produce. Under the proposed measures envisioned by the I-Chan farmers their lands would continue to supply even greater quantities of quality essential subsistence products with which to diversify and improve dietary habits. These include plantains and bananas, avocados, and other fruits, beans, vegetables, mushrooms, medicinal plants, and the all important fuelwood with which they cook their food. By intensifying their use of agroforestry technologies to increase the value and the variety of goods produced without increasing the land area necessary to produce those goods, more forested area will be available for conservation. Those farmers who already experiment with these techniques report that the regenerating forest is beginning to attract and support increased populations of valuable animal species like deer and birds which can also be hunted and eaten for subsistence.

Farmers were also intent on improving the soil and water quality of their lands. Many say that in the past their plots produced abundant harvests of several import subsistence and commercial crops, but that now they are lucky if they can grow even one good single crop harvest a year. Now they say the soil is “tired” and that they can’t afford the chemical fertilizers and pesticides that have become almost necessary to prevent declining yields and disastrous crop losses. What shows their commitments to these questions is their willingness to experiment with erosion controlling techniques like living fences, hedges of nitrogen fixing leguminous shrubs, contour planting against the slope of a hill, and organic pesticides and fertilizers (objectives #1-3-4).

Related to these efforts to improve soil fertility management through reforestation and erosion prevention is the goal of protecting the water quality of local streams and rivers. In fact, one of the top priority areas selected for reforestation was the presently bare river banks of the Xochiapa, an affluent of the major Huazuntlan river which drains the elevated reaches of the Sierra de Santa Marta and provides hydroelectricity and drinking water to nearby towns and cities. These days after a heavy rain storm the river swells with the runoff from surrounding fields, carrying down stream in its murky red waters the precariously thin layer of fertile topsoil, organic matter and any too slow to be absorbed recently applied chemical inputs. These river swells have also caused devastating losses to unsuspecting farmers by drowning their crops and poorly drained fields under several centimeters of water for prolonged periods of time.

A forth important category of benefits that the I-Chan Chaneko’ Huehue association identified in their project funding proposal is social in nature. These benefits

are ones that the group sees as primarily dependent upon the success of their plans to seek a formal land-use regulations agreement with the General Assembly of the Ejido Council (Objectives #4-6). Such an agreement would provide an added measure of protection to their activities by setting out clearly what the rights and responsibilities of land-users are, and also the applicable sanctions and settlement mechanisms governing disputed cases. Many of those with whom I spoke, while on the one hand convinced of the beneficial impacts that these accords could have on local forests and community relations, were also slightly skeptical about the chances for obtaining the broad levels of local cooperation that achieving such an agreement demands. Others went so far as to blame the lack of internal community land regulations for the worsening ecological and social conditions that their village is currently experiencing.

These efforts were seen as complimentary to and equally important as their more informal attempts to convince their neighbors of the advantages their association seeks to promote. The reasons for the I-Chan farmer's emphasis on these objectives derive from their keen awareness of the vulnerability of their initiative to the actions of other villagers and government authorities. They fully realize that as little as one match carelessly discarded on an unusually dry and windy day could lay to waste all of their painstaking work. My own personal feeling on this matter of public acceptance of the I-Chan project was that if the group appeared to be confronting or else to be seeking to over-shadow the local authorities with their efforts, they might not only risk losing their sole recourse for compensation in the event that a disaster should occur, but they might also be courting precisely that which they had sought to avoid. I got the distinct impression from some of

the group discussions of this topic that rivalries often run very deep, and that some people in Mecayapan as in just about everywhere else are prepared to break the rules when feeling the least bit threatened. But I do not know this with any degree of certainty, since Mecayapan is not so large a town that people speak freely about the personal scores and vendettas that are often settled anonymously and under the cover of night.

Other threats they recognized and sought to avoid by means of these local lobbying and public-relations campaigns included loose pigs and cows rooting around in the tree nursery, or envious and anti-social elements within the village refusing to respect the rights of the association's members to safeguard the benefits of their judicious resource management strategies for themselves and those whom they determine. For unfortunately, property theft and vandalism have become increasingly serious problems in this and other of the Sierra's larger settlements.

4.3 Current and Traditional Agroforestry Practices

The following section of this research project developed out of the conviction that traditional agroecological production systems can and should be used as starting points for research activities aiming to increase the production and the productivity of agroecosystems through the use of improved varieties and better management techniques, without decreasing the overall ecological sustainability of such systems.

4.3.1 Shifting Cultivation (Slash and Burn)

Shifting cultivation is the form of agriculture practiced in Mecayapan that most resembles the methods used by the Sierra de Santa Marta's original inhabitants. Shifting

cultivation, or as it is sometimes called 'swidden farming', is a subsistence production strategy still widely used in much of the humid and sub-humid tropics throughout the Americas, Africa and Asia. The popularity of this traditional technique among Mecayapan's farmers is most likely the result of its suitability to the contexts of very low-input agriculture that prevail in the region. In fact, the minimum requirements to practice the technique are tools (steel machetes have now completely replaced their predecessors made from stone or obsidian) and/or fire for clearing vegetation, and seeds to sow (a pointed stick is also sometimes used to open a small hole in the ground into which the seed is then dropped).



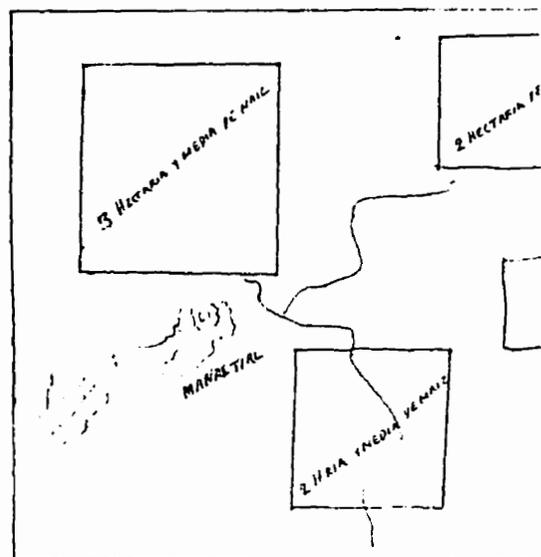
Figure 4.1: Mecayapan landscape with corn field (milpa) and child in foreground and house in background.

The basis of the shifting cultivation strategy practiced in Mecayapan is a chronological succession of two distinct phases. The cultivation phase (milpa) is where a combination of corn, beans, squash and wild herbs are grown together on the same plot of land. The milpa is then succeeded by the resting phase (acahual) where wild trees and

bushes reclaim the forest clearing thereby restoring biomass and hence soil fertility. A key element in the logic of slash and burn production systems is this capacity of the soil's fertility to be regenerated. The first step in the traditional cultivation process is site selection. Selecting a site was typical influenced by such factors as proximity to the farmer's place of residence, and the location of other relatives' plots who may, from time to time, help out with the more difficult tasks of clearing stumps and controlling fires. Farmers would also look for particular qualities in a site that would make it ideal for specific crop varieties. For example they might cultivate a few hectares of corn on a site close to the village, and some other crop such as chilies or beans on another site as many as several kilometers away where soil and microclimate conditions were significantly different.

To this day many farmers plant several native species of corn in addition to the high-yield varieties whose use is encouraged by government agricultural extension agents. Farmers do this based on their knowledge of each plant's specific characteristics such as maturation rate, and susceptibility to drought, disease, cold and wind, etc. But since the communal ejido lands were partitioned in 1990 farmers have had no choice except to return, year after year, to their same assigned 12-15 ha. plot. Other factors that farmers consider when choosing where to plant include existing types of vegetation, soil types high in organic matter, adequate humidity and drainage, slope, etc.

Figure 4.2: Map of a 15 ha. agroecological plot drawn by proprietor / ejidatario located within the proposed I-Chan Changko' Huehue Reserve.



Once a sight has been selected and the existing vegetation removed by burning, corn is usually cultivated over two consecutive years, usually two spring cycles (temporal) and one winter (tapachol), before the land is left fallow for anywhere from five to twenty planting cycles. The actual time allotted for each phase depends on the type of soil and vegetation, the amount of land and labor available, access to modern inputs like credit, fertilizers and herbicides, and individual farmers' options and preferences. This technological cycle operating within the prevailing social and ecological conditions in Mecayapan has meant that at any given moment an ejidatario might have two to three hectares under intensive cultivation (the minimum area required to support an average sized family of six) and an approximately equal area dedicated to family members (usually married sons) who did not receive land rights when the communal ejido was divided up.

The remaining lands will be lying in various stages of regenerative fallow. The cycle eventually begins anew when the farmer returns to clear the plot of its regenerated vegetation and sows new crop seeds.

Traditional patterns of shifting cultivation such as that practiced in Mecayapan continue to play important roles in Mexico and the Sierra de Santa Marta within spatially and temporally integrated production systems involving crops, animals and forest products. But as more farmers in Mecayapan are drawn into producing for sale to urban commercial markets, their choices of how much to plant of what and when are increasingly dependent upon market conditions such as commodity prices, marketing infrastructure, government subsidies and consumer preferences. Another notable difference in the way the system has changed over the past two decades is that as the use of modern industrial chemical fertilizers, pesticides, herbicides and high-yield seed varieties became more popular and wide-spread, the diversity of valued species present in the milpa and acahual has actually decreased (PSSM-GEF:3.4).

The principal problems restricting the productivity of this system today are numerous and of varying difficulty to overcome. For instance, farmers are under considerable pressure due to problems associated with shorter fallow periods that have resulted in lower levels of soil fertility and consequently in an overall declining agricultural productivity. This problem has also contributed towards reducing the benefits associated with inter-cropping several complementary species on the same piece of land, as increasingly additional crops are being grown in a separate corner of the milpa in an effort to limit competition for scarce soil fertility. Secondly, the practice of burning the standing

vegetation increases the probability and extent of soil erosion and nutrient leeching. Farmers are therefore beginning to find that some traditional practices like sowing in the direction of the slope, low density planting, and the reluctance to use fertilizer that once adequately provided for their subsistence needs have become - within today's changed socio-economic and ecological setting - problems that are rendering this relatively intensive cultivation pattern no longer sustainable.

In addition to these technical problems with the way shifting cultivation is practiced in Mecayapan today, farmers mentioned that population growth and government policies like the NAFTA free trade agreement were meaning that more people like themselves were having to grow more food with less adequate land and virtually no technical support and for less economic returns. This fact that none of the technical problems described above have been effectively resolved is further proof of the inadequacies of existing agricultural policies and the withdrawal of technical assistance by the responsible government agencies (i.e. SEMARNAP, ProCampo, Rural Development Bank).

In response to this crisis organizations like the PSSM have directed their efforts towards developing and disseminating alternative technologies such as green manure and soil conservation techniques like living fences that will allow farmers to shorten the length of the fallow cycle to as few as one and a half years without compromising the effectiveness of the soil fertility restoring acahual phase (PSSM-GEF:5-10). Consolidating subsistence agriculture with the use of such techniques would permit local farmers to

realize several beneficial propositions concurrently: production for both commercial and/or family consumption, and conservation benefits over the short, mid and long range.

4.3.2 Improved Shifting Cultivation (Integral Agroforestry)

Improved shifting cultivation is, as the name implies, an adaptation to the traditional shifting cultivation system that attempts to increase the economic and/or biological productivity of the fallow (acahual). This means that the desired effect of integral agroforestry is to produce more economically valuable outputs and/or to reduce the amount of time necessary for the regenerative cycle to restore soil fertility. Commonly this technique is chosen for some preferred combination of both of these goals. These objectives of integral agroforestry are accomplished by improving the mix of beneficial plant and animal species present in the fallow, and therefore tends to involve greater management responsibilities than traditional shifting cultivation strategies.



Figure 4.3: Members of I-Chan Chaneko' Huehue (on right) consult a homemade map of the proposed Ejido Reserve area recently completed with the help of researchers from the Proyecto Sierra de Santa Marta (PSSM - on left). The use of such locally produced maps, photos and diagrams means that local people remain

By selectively introducing several of these soil fertility enhancing and/or economically valuable species to the milpa and acahual productive phases, farmers will increase the per hectare productivity and overall economic value of their corn production strategies. Such productivity gains have been credited with the ability to translate into about a third less cultivated land being required to produce the same harvest yields. This means that each family will need less land under cultivation at any given moment to satisfy their consumption and commercial needs, thereby freeing up additional lands on which to further diversify agricultural production or regenerate secondary forests.

Economists at Mexico's CIMMYT calculate that although these agroforestry measures are economically more viable in the long run, the rewards do not really start to show up until after the first five or so experimental years of working with the techniques. For this reason they suggest that some incentives should be contemplated in order to offset the initially slightly lower returns that follow the transition from monocultures or today's relatively species-poor production systems using traditional shifting cultivation techniques (PSSM-GEF:5-10,11). This incentive though should only be necessary until the new agroforestry measures have had a chance to produce their economic and ecological benefits.

4.3.3 Home Gardens (Solar)

The term 'solar' applies to the lots zoned for housing in the 'urban area' at the core of the Mecayapan ejido. It corresponds roughly to what we think of as a yard, but with a slightly more elaborate role in agroecological production strategies. Throughout Latin America home gardens are used to supplement and diversify family food supplies,

provide medicines, plants for fuel and construction, and to provide an aesthetic and congenial living environment. People in Mecayapan plant many species of trees and vegetables, raise domestic animals, and beautify these spaces with flowers and other useful plants, including medicines and condiments.

The solar is also an area of considerable experimentation with new or previously unknown plant species and agricultural techniques. Trials and experiments are conducted in the yard or home garden where a plant's progress can be monitored and corrected if need be. If a successful plant grown in the solar is eventually deemed desirable enough to be cultivated on a more significant scale, it may then be transferred to the milpa and/or shared, along with important information about how to grow and care for the plant, with others. Several farmers actually make special trips up the nearby mountains in search of rare and unusual plant species to transfer their home gardens. The solar therefore presents those looking for ways to increase the overall productivity of local agroecological production systems - without decreasing the overall ecological sustainability of such systems - with some very interesting opportunities and challenges, many of which have yet to be fully explored. Given the wide variety of both essential subsistence and market products and services derived from the solar, I had expected farmers to be more interested in improving their quality and overall value, but this was not often the case.

I attribute the lack of enthusiasm on behalf of the male farmers that I worked with in Mecayapan towards home gardens to two basic factors: firstly, it is primarily women who are responsible for the health and reproduction of the family, and so they tend to be the ones who look after the products of these gardens. This gender-based association of

the solar with women has proven an excellent opportunity for encouraging women to participate more actively household production choices. Secondly, in a trend that is by no means limited to rural villages in Mexico, the tradition of maintaining these productive and highly diversified gardens is being replaced by the village store and the cash economy. Very few farmers still strive to be self-sufficient in food products, most choosing instead to produce a marketable surplus of a single crop like corn or chilies that can be exchanged or sold for the money with which to buy other essential goods like oil for cooking, vegetables and sugar.

4.3.4 Living Fences, Hedges and Borders

The practice of using living fence posts to attach rows of barbed wire is widespread in tropical America. Besides holding wire, live fences produce fuelwood, fodder, and food, act as windbreaks and protection from wildlife, keep domestic animals from wandering into gardens and fields and their branches are used to establish more fences and to repair old ones. Many trees are used, depending on ecological zones, availability, and special needs dictated by preferences and beliefs of the farmers.

Living fences are very common in Mecayapan, and figure prominently in the I-Chan Chaneko' Huehue funding proposal. One of the main priorities of the group was to fence-off an area of land that will serve as a tree nursery for their reforestation project. While discussing the need for a fence to keep out foraging animals and destructive people, the benefits of live fences were also said to include their relative permanence. This characteristic is of utmost importance given that barbed-wire is very expensive by local

standards, and it therefore often goes missing unless it can be attached to a living tree in such a way that the tree grows around the wire securing it in place for good.

One of the most common example of living borders employed in Mecayapan and throughout the region is the *pica pica*, a leguminous shrub native to the area. Some local farmers plant pica-pica immediately after abandoning a milpa plot, and return several years later to mulch the plant using machetes so as to better conserve its 'green manure'-like organic compost. The principal benefits of this plant can also be derived from its use along the edges of cornfields and even between rows of cornstalks. This is because its root system hosts nitrogen fixing bacterial nodules, and its broad leaves shade out competing weeds. Other benefits of this technique include providing a ground cover which acts to slow the pace of soil erosion due to frequent alternations between torrential downpours and prolonged droughts.

Other erosion controlling plants promoted by the PSSM and know throughout the Santa Marta region are aquatic plants such as *pachira acuatica* and *malanga* which are well suited to be planted along river banks, and lemon grass (zacate limon). This latter plant offers the added benefits to farmers of being both commercially valuable and having several recognized medicinal properties. The use of hedges and natural borders has been known to favorably reorient other agricultural practices such as encouraging farmers to switch to contour planting against the direction of the slope, and not burning the left-over corn stalks before the next planting (PSSM-GEF:5-9). Taken all together, the beneficial features of this technology can contribute significantly towards reducing farmers' dependency on costly chemical inputs.

A further possibility for encouraging the dissemination of this agroforestry technology that I was surprised to find was not being given much consideration by farmers is that of promoting living fences and borders as fodder crops for cattle and other domestic animals. As it now stands, those lucky enough to own farm animals either pasture them on lands that have been cleared and planted for this purpose, or else the animals are kept within the home enclosure (solar) and fed grass cut from wherever it can be found. Because of the extensive nature of these practices, and especially during the hot dry season, serious shortages of fodder for feed are becoming more frequent in the region. And yet very few people in Mecayapan actually grow or cut fodder for sale as animal feed, even though most recognize the potentially expanding market that this product represents.

4.4 FARMERS' ASSESSMENTS OF LOCAL OPPORTUNITIES AND CONSTRAINTS

4.4.1 Environmental Opportunities and Constraints

Local farmers in Mecayapan have elaborate understandings of soil, climate, water and vegetation in their region. A common metaphor that they use to convey this knowledge depicts the earth as origin, mother of the corn god, that which nourishes and sustains all living creatures in this world. The logic of this metaphor is projected onto the plants that cover the surface of the earth which are considered the mother's clothing. Farmers accordingly say that they have shamefully laid bare their mother by clearing much of the natural vegetation and exposing the soil. And yet despite this mistreatment they praise her (mother earth) selfless patience and generosity for continuing to provide them with her fruits. Today when Nahua farmers talk about environmental problems like

deforestation and contamination they say that what is needed to remedy these situations is more respect for that which is being harmed. An idea that echoes the traditional Nahua reverence for the natural order ruled by supernatural forces such as the chaneques.

The Nahua soil classification system uses properties such as color, texture, consistency, percentage of rock and parent material to characterize such fundamental aspects of the surface horizon as fertility, use capacity and the practices required for its adequate management. The dominant soil type over the 100 ha. area considered for the I-Chan Chaneko' Huehue reserve is what Nahua farmers call *chiltiktal*, or 'colored' soil for its reddish appearance. They evaluate the relative fertility of this soil as compared to other locally occurring soil types as being from average to bellow average, making them somewhat suitable for corn cultivation, but ideally left to support the oak forest vegetation and the native species of fruit trees that traditionally grow in this area. This 'colored' soil type is furthermore often associated with drainage problems.

The farmers that I worked with were also adept at monitoring and adapting their agroecological practices and productive strategies to fluctuations in climatic factors such as wind and rain patterns. Many complained about strong gusting winds from the north (*nortes*) that tear through their corn fields toppling young plants and wiping out entire harvests. They say that these winds are strongest where no vegetation exists to slow their passage. As far as rain is concerned, they say that significant micro variations occur from one area to the next. It is not uncommon for a farmer to be working his fields on a mostly sunny day and to look over a few hundred meters away and see that rain clouds are showering only others' fields with their life-giving cargo. Many feel that this situation is

somehow related to the imbalances created by the severe deforestation that continues to proceed throughout the Sierra region. These are particularly sensitive issues to local farmers since none of their fields are irrigated they depend exclusively on the cyclical rain patterns to feed their crops. In fact, it is the coming of the summer rains during the months of May and June that signal the beginning of the major (temporal) planting season in Mecayapan.

Some of the I-Chan Chaneko' farmers were keenly interested in turning their still relatively extensive clean water supplies into economic advantage. There is a growing sentiment among those living in the Sierra that they deserve to be compensated for the removal of their potable water resources by their more populated neighboring municipalities. The I-Chan Chaneko' group has started looking into the feasibility of establishing some legal mechanism that would reward their efforts to protect natural resources that provide ecological services to the wider society. Still others among the group envision acuaculture projects that would divert several local streams in order to create reservoirs for fish farms (an increasingly scarce and expensive traditional food source in the region).

The remnant forest vegetation in Mecayapan today is primarily composed of several species of native oak trees (*encino*). These are dispersed in groves along slopes considered too steep for agricultural use, and in areas where farmers have taken special preventative measures against fires. Such measures are said to include clearing some of the dry under brush around the forest edges and even at critical times keeping a constant vigilance complete with water sprayers to prevent the flames from spreading. Another

reason for the limited occurrence of these oak forests today is their common use as fuel for cooking, as construction materials for houses and fences, and as handles for farm tools. The only oak specie locally deemed unsuitable for these latter purposes is the black oak (*encino negro*) because of what farmers say is its structural weakness. Many ejidatarios have planted other tree species such as pines and cedars, and were therefore excited to learn from a state government agricultural official on a rare visit to Mecayapan that someone in a nearby village had actually received a government subsidy (ProCampo) to reforest several hectares of degraded pasture with trees of these species.

4.4.2 Economic Opportunities and Constraints

One of the major impetuses for the I-Chan Chaneko' Huehue initiative was the increasingly common realization among residents of the Sierra that growing demands for resources are outstripping the availability of those resources. This was the case for several important forest products including cedar, pine, oak, fruit trees, ornamental flowers, wild foodstuffs, etc. On many occasions farmers debated the price and availability of these different species of native forest plants with commercial and subsistence value. The resources and products supplied by these plants are considered extremely important by local farmers since their absence would imply impossibly high cash expenditures in order to obtain them.

Many farmers among the group have had enough previous experience with commercial agricultural ventures and hunting / gathering of wild forest products to know that any amount of effort can be in vain unless there is a buyer willing to pay a price that is at least comparable to what they stood to gain from other kinds of productive activities.

What they absolutely did not want was a repeat of what happened the time two local farmers planted several hectares of papaya only to watch it rot in the field for lack of a purchaser offering anywhere near the price that would cover the transportation costs of simply getting the fruit to regional markets. This feature of demand for forest products is likely to remain a constant concern among farmers as they seek to improve the economic productivity and ecological benefits that they derive from their agroforestry reserve. In developing policies in support of sustainable activities, it is therefore important to distinguish between those products whose demand has a potential to grow and those that do not.

I-Chan Chaneko' farmers also took into consideration policies affecting the level and type of production in which they were engaged, especially crop subsidies, when evaluating proposed changes to their land-use practices. One particularly important government policy that affected farmers' choices of what to produce, where and how to produce it was the ProCampo assistance program for agricultural producers. The main objective of ProCampo is ostensibly to revitalize lagging corn production by providing lump-sum cash subsidies to farmers on a per hectare basis in order to offset rising production costs and falling commodity prices. But this program has had the unintended negative effect of encouraging deforestation as many farmers started to clear unsuitable forested lands simply to qualify for the subsidy. On the designated day of the pay-out to those working lands registered under the Procampo program, special buses needed to be chartered to ferry people to the agency office some 40km away in Jaltipan. This process was organized with the help of the Ejido Council.

Fortunately the notoriously corrupt and inefficient government agency in charge of implementing Procampo and other agricultural policies, the *Secretaria de Agricultura y Recursos Hidraulicos* (SARH) is aware of these unforeseen consequences of the ProCampo program, and has begun to take steps to remedy the situation. These steps include encouraging farmers to use the subsidy to plant multiple-use tree species as well as cash and subsistence crops, tightening regulations concerning how much and what kind of land a farmer can register under the program, and increasing monitoring and spot checks by SARH officials to farmers fields to prevent cheating and abuses of the program.

Policies governing tree cutting and the logging industry were also seen as effecting local production choices. Since the repeal several years ago of the logging concessions that supplied a regional saw mill set up in the neighboring town of Tatahuicapan, and the imposition of stringent regulations and taxes on the harvesting, transportation and sales of trees, a lively black market has developed. Several of the village's carpentry shops have the required permits for purchasing and transforming their inputs, but even more do not. At present an almost complete commercial ban exists on the cutting and sale of trees from the Sierra de Santa Marta, but it is questionable if such a ban is ethical let alone enforceable. For natural resources throughout the Sierra continue to be exploited to the point of extinction while those responsible for their protection are paid to deny the extent of the damage.

Many peasants living in the remote jungle ejidos on the steep mountain slopes of the Sierra have few other economic opportunities except to fell trees for sale as boards which they drag down to town on horse-back to supplement their almost non existent cash

earnings. The same goes for many of those who purchase these contraband trees, they profess to being unable to pay the high prices that these policies have resulted in for wood bought from the few authorized dealers operating in the large commercial centers. Restrictions like these on the private production and sale of forest products can therefore further impede the development of farm-based sources of these products. The I-Chan Chaneko' group also discussed economic policy issues like regulations that discriminate against the informal sector by demanding that all small-scale producers register with the authorities through a system of costly permits. While these restrictive policies may have been motivated by a legitimate desire to curb excessive deforestation, it is debatable whether or not they actually succeeded in doing more than driving the problems underground, thereby making them more difficult to monitor and combat.

Besides these policy issues influencing the group's resource management strategies, the very existence of an organized association of ejidatarios in Mecayapan was widely recognized as having been a precondition for receiving government and other external financial supports. One of the primary stumbling blocks related to this organizational process was money, or more precisely the lack of the funds with which to purchase the inputs necessary for carrying out the conservation and development activities envisioned by the group. Although farmers were willing to invest their own time and labor for obtaining the deferred benefits of conservation and tree planting, they rarely if ever considered investing their own savings (at least those who might have had any such savings to speak of) in the project. One of the main focuses of their attentions was therefore exploring potential sources of capital or external funding.

For these reasons the group sought the advice of the PSSM and their contacts within the SEMARNAP about the benefits and requirements pertaining to obtaining legal recognition for their association. This preoccupation led to the group's applications to several funding agencies including the *Instituto Nacional Indigenista* (INI), SEMARNAP, the Rainforest Alliance Catalyst Grants program, and the Cottonwood Foundation. While it seems as though many of these projects were never approved, the group's collaborative efforts with the PSSM did come to fruition in August of 1996, when an agreement was reached for the transfer of approximately US\$1000.00 from the PSSM to I-Chan Chaneko' Huehue Association. The PSSM was also instrumental in securing close to 30000 saplings of cedar, oak and other tree species. The young trees were the result of Luisa Paré's intervention with the state government (SEMARNAP) run tree nurseries on behalf of the Mecayapan group.

The group agreed that the money would be spent on the purchase of fruit trees of four commercially valuable species: mango, lime, guanavana and chico zapote. Preliminary investigations carried out by the PSSM and several ejidatarios from Mecayapan revealed that the price per seedling at one of the region's commercial nurseries ran anywhere from US\$0.75 to US\$2.00. The group also decided that some portion of this money would be spent on the necessary tools for carrying out this project such as wire for fencing, machetes, picks and shovels, wheel-barrels, etc. This type of incentive is precisely the kind of well targeted positive intervention that can catalyze poor farmers' priorities in favor of continuing to organize beneficial collective actions.

What is most interesting about this loan though is that it is to be paid back not in cash to the creditor organization, but in the equivalent number of fruit trees to other interested farmers in the region. The PSSM is hoping that this process will have a snowball effect as those who receive the second generation of trees will in turn promise to make available an equal number of new seedlings to more local farmers once their plants enter into production. Another innovative aspect of this credit arrangement is the way it was initially negotiated between the PSSM and I-Chan Chaneko' Huehue. Luisa Paré of the PSSM gave an initial cash advance of about US\$100.00 to two of the group members who were in Xalapa on other business. This money was intended to serve to open a bank account in the group's name in the nearby city of Minatitlan, to which the remaining funds would then be transferred. This credit arrangement has the virtue of encouraging local farmers to develop financial management skills, and the self-confidence to involve themselves in the otherwise quite intimidating world of commercial banking, while simultaneously minimizing the potential risks.

The availability of material and technical supports such as seed and plant sources, farm and transportation equipment, research stations, extension agents, and donor organizations therefore clearly influenced the direction that the members of I-Chan Chaneko' Huehue chose to emphasize in their organizing activities. At every step of the project planning process problems were discussed and solutions debated, and these solutions inevitable came to center on some institutional resource that they could call upon. On one such occasion the group was expecting to receive the assistance of the state government officials from the SEMARNAP for transportation of the 30000 seedlings that

they were promised, along with unspecified amounts of fertilizer to care for the plants once they were in the ground. *The Direccion General de Culturas Populares* in Acayucan where Hilario Martinez Revilla works has also been a valuable source of material and technical support to the group. In fact just about all of their group activities have benefited one way or another from the involvement in the region of research institutes such as the CIMMyT and the state, nation and international universities, and the donor organizations that have channeled many resources and much expertise into local projects with the advocacy of the PSSM.

At the I-Chan Chaneko' Huehue general meeting called together on August 18, 1996 several ejidatarios proudly reminded the others that the trees and the money that their association obtained were the first successes that their collective actions had given rise to. They spoke derisively of previous legions of broken promises and disappointments that were the fruits of official and external interventions in their village. But this time things were going to be different they all agreed. Securing the loan money and the seedlings represented for them the first stage in a vision that they shared about a united future where their willingness to work together will bring further support and attention from government and other sources. For this reason it was extremely important for their continued motivations towards the project that their efforts produced tangible benefits in a relatively short period of time.

A final economic issue that farmers considered while designing their agroforestry project was the availability and cost of labor and the competing needs for their own labor that they had to balance. Every ejidatario in the I-Chan Chaneko' Huehue association

worked primarily at farming with the exception of Hilario Martinez who worked full-time as a promoter of indigenous language and culture for the DGCP in Mecayapan , and one other member who teaches at a local primary school. Farming activities in the Sierra are seasonal and therefore require different labor needs during the agroecological cycles of field preparations, weeding and fertilizing, harvesting and food storage. Because of declining crop yields and the availability locally of many valued subsistence resources most of the group take other jobs whenever possible.

Most farmers worked simultaneously in construction and/or petty retail, especially younger farmers who were somewhat less likely to have access to enough good land to farm successfully and therefore more likely to seek uncertain employment in the south-eastern oil cities of Minatitlan and Coatzacoalcos. There an “unskilled” laborer (these workers often have carpentry, masonry, painting and plumbing skills on top of their agroecological and other life skills and yet the work they do is still considered unskilled) could earn about 3.00US\$ a day, while field hands in Mecayapan earned at most 2.00US\$. Because of these labor commitments the group agreed to schedule the activities related to their association’s projects according to the following calendar for 1997:

ACTIVITY	J	F	M	A	M	J	J	A	S	O	N	D
Clear Fire-Break		X	X									
Tree Nursery					X	X	X	X	X	X	X	X
Project Promotion	X		X				X					X

Fencing Reserve				X	X							
Agroforestry Experiments						X	X	X	X	X	X	X
Reforestation Workshop				X								

4.4.3 Social Opportunities and Constraints

Throughout most of the predominantly indigenous hamlets in the Sierra de Santa Marta, traditional indigenous forms of social organization are in transition. The more communal and patriarchal allegiances to family, village and ethnic group are giving way to the more conventional legal structures of the ejido and the municipal government that I discussed in chapter three. This transition has been accompanied by corresponding shifts away from the cooperative social groupings like religious associations and voluntary work brigades that used to predominate in Nahua society and towards increasingly atomized individualism as the main organizing principle for community relations. Peasant organizations in the Sierra de Santa Marta have become centered around particular types of productive activities such as coffee production, ranching, fishing, etc. The consolidation of these narrowly defined economic interest groups has meant that these groups are more easily co-opted by governments who control access to vital inputs and markets through legislation and subsidies. These changes have complicated efforts aimed at improving

community conditions because now people are more suspicious and less willing to cooperate with each other.

The growing predominance of the Catholic mestizo culture and of Protestant evangelical sects in the region especially since the 1960s has resulted in the disintegration of traditional community organizational structures and the values that created them. Many educated and partially assimilated locals now speak of the old ways and beliefs as having been clearly wrong headed superstitions created by people too ignorant and poor to have known any better. But apart from meaning the decline of ancestral costumes and beliefs, the recent proliferation of religious sects and political organizations espousing foreign inspired ideas and activities also underscores some of the palpable effects of a generalized ethnic identity crisis affecting much of the region's indigenous population.

At the outset of this section on social opportunities and constraints I spoke briefly about the kinds of social changes taking place in Mecayapan and how these affected the chances of success for the I-Chan Chaneko' Huehue initiative. This project represents an attempt to restore the spirit of cooperation that once flourished in the Nahua culture, but has been rapidly eroded by the many socio-economic and political factors that I have discussed in this thesis. One important institution that epitomizes this tradition of community cooperation that is being replaced by individualism is the *faenas* or volunteer work brigades organized to carry out tasks that benefit the entire community such as cutting the grass around the school or painting the health clinic. Many ejidos formed in the collective spirit of traditional indigenous political and economic practices also used *faenas* for farming plots of land reserved for widows or for artisans without secure access to land.

In these tightly-knit communities ejidatarios could be sanctioned with fines or additional work days, but in Mecayapan this does not seem to be the case.

These days *faenas* in Mecayapan draw only the most dedicated, leaving those who do participate a little discouraged and with much more work for fewer hands. “Since the partitioning of the ejido’s lands, it’s everyone for themselves” was a popular refrain uttered as justification for exclusionary measures designed to guarantee that the benefits of land ownership flow solely to the rightful owners. In this sense it is also interesting to note that the ejidatarios who formed I-Chan Chaneko’ Huehue were just as emphatic about protecting their acquired benefits as they were in the belief that such measures would be widely accepted throughout the community. This initiative has the makings of a legitimate attempt by individual producers to pool their resources and efforts in order to work towards collective goals, and at least on the surface there has been some demonstrated interest in expanding beyond the core group of twelve farmers who have been involved since the beginning. After having gotten to know the current leadership of the group, I believe that they are serious about extending the benefits that they acquire to other villagers who would support their efforts.

These kinds of changes in both the formal and informal community social structures have instilled among many Mecayapan Nahuas an at times self-deprecating attitude towards their ancestors and their ethnic heritage. However, most Nahua in Mecayapan have maintained their indigenous language and are struggling to guarantee its continued relevance in the lives of the younger more assimilated generations. Language in this sense continues to be, along with corn cultivation, an important element of community

identity and cohesion. Even though it only took approximately three generations for many traditional aspects of Nahua community social, political, economic and family organization to be superseded by those of the dominant mestizo Mexican national culture, this assimilation is far from complete. Many basic hurdles continue to span the gulf between natives and non-natives, remaining serious points of contention and cultural misunderstanding. These issues range in importance from a general lack of trust between locals and outsiders to a vague cultural expectation on the part of the former (created and reinforced by denigrating stereotypes and socio-ethnic discrimination) that the latter hold the keys to their salvation and must therefore be tricked or else placated in order that they will wish to share them.

Sex roles and the sexual division of labor are another aspect of community social relations that will affect the outcome of this and other conservation and development projects. Men and women in Mecayapan do not often interact outside of the household. This is because sex roles and the division of labor are highly segregated along gender lines and quite rigidly enforced. Men go off to their fields or migrate to the cities in search of work, while women with children are expected to stay at home cooking, cleaning and caring for the health of their children. Female and male children are socialized to embrace these gender roles by progressively assuming more of the responsibilities of their respective same sex parent. Part of what makes this particular sexual division of labor so wide spread and seemingly permanent throughout the region is that a whole host of factors involved in the formation of personal and collective identities, everything from

cosmology to cosmetics, are employed to legitimize and ordain it as part of the natural order of things.

A major problem that this division creates is that it severely curtails women's opportunities to participate in activities outside of their households. This is as true for young girls who are less likely to go to school, as for teenage girls whose social activities are much more strictly regulated than those of their male siblings, and most notably for married women who are less likely to have inherited land-use rights, and are expected to obtain the permission of their husbands every time they wish to leave the village. But like any norm of human social conduct the sexual division of labor is adapted as is needed to not so extraordinary situations such as when a family has only female offspring, or could not expect to survive with their productive labor. Young girls are now entering local high schools in greater numbers than ever, and many more are with their words and deeds beginning to challenge patriarchal traditions that have kept them from developing to the extent of their capacities.

For these reasons it was regrettable, and yet not very surprising, to find that those ejidatarios participating in the I-Chan Chaneko' Huehue project were without exception all male heads of households or their male offspring. This situation might very well present a significant limitation to the success of the agroforestry alternatives that they are seeking to implement, since many of the strategies involved require additional levels of family and community participation to carry out the tasks of watering seedlings, preventing the spread of infections and harvesting and marketing the surplus production.

Several other traditional values and beliefs were also deemed relevant from the stand point of the group's objectives and the obstacles that they believed would have to be overcome for their project to succeed. The name "I-Chan Chaneko' Huehue" (The House of the Old Chaneko') was suggested and debated at one group meeting convened to discuss the invitation to submit a project proposal for funding to the Instituto Nacional Indigenista (INI) in Acayucan. The name was selected for its relation to the values and teachings of their elders who believed that Chaneques were mythical beings belonging to the natural order of the world that was established and overseen by *Chane*, the Jaguar God or Lord of the Bush. Nahua cosmology teaches respect for the natural environment and instills a healthy reverence for the powers of supernatural forces such as the Chaneques that belong to the natural order. Nahua mythology uses stories and legends to teach us that places of exceptional natural beauty and strength, such as rivers, waterfalls and jungles are powerful and sacred places that are closely connected to the supernatural realm.

Over five thousand years ago a stone effigy of Chane was installed high above the region on the steep jungle covered slopes of the San Martin volcano from where he oversaw that only appropriate uses were made of his properties, representing all forms of life. Then some government bureaucrats in the state capital got wind of him and in their infinite wisdom decided that more people could admire him if he were brought to a museum in the state capital where he now sits. What is ironic though about this otherwise quite common incident in Mexico where the best of what is produced in the regions is appropriated by city based elites, is that Chane's transfer to the museum coincided with

the intensifying of ranching, logging and agricultural pressures that have so devastated the very ecological balance that he was thought to have been protecting.



Figure 4.5: *Chane*, the Jaguar God of the Jungle and PSSM mascot photographed at his state capital museum home in far away Xalapa, Veracruz.

The extent of social marginalization which prevails in Mecayapan and the Sierra de Santa Marta also limits the ability of local farmers to radically improve their economic and ecological well-being. Along with housing conditions and access to such basic social services as clean drinking water and sewage, education levels round out the three categories taken into account in calculations of social marginality. Mecayapan ranks among the few relatively better off indigenous communities in the Sierra with scores in the mid-range on the marginality scale, which is still quite a bit worse-off than the state average for Veracruz (PSSM-GEF;1996:4-3). Its status as municipal capital has helped it to capture more than its share of social service investments ear marked for the region.

There are three kinder gardens, two primary schools, one educational institution that works on and off with no fixed address in the community (*CONAFE*), and a distance-education secondary school (*telesecundaria*). All classes are conducted in Spanish. These institutions provide community children with basic learning opportunities in reading, writing and arithmetic, and some classes on nutrition and health given by the community nurse have also been directed towards young mothers. A plan is currently in the works for a second distance-education school (*telebachillerato*) that would provide further training in arts and sciences for those who finish secondary school. As it now stands, those who wish to pursue their education and who have the economic means to permit it, must leave the community and travel several hours to attend classes in one of the regional cities. Those very few community elites who have the resources and the contacts to do so prefer to send their children to these schools in the city. They argue that the educational standards of these schools are higher, and that they therefore prepare the children better for productive and successful lives within the wider and more prestigious national society.

Low educational preparation is one of the main reasons that over 85% of the economically active population remains engaged in primary sector activities such as subsistence agriculture, ranching, hunting and fishing even though the profitability of these resource-based activities has steadily declined. The result has been that many farmers are left with little or no alternative but to seek employment as unskilled laborers in the construction industry. This problem is also reflected in the absence of much entrepreneurial spirit in Mecayapan. A few locals have wood-working and carpentry skills, and several others have some basic clerical skills such as typing and bookkeeping. There

are no licensed electricians in the community, and yet a few people know enough about the subject to pirate electricity from those wires leading to the homes of those who have kept up their payments to the utility.

Farmers lack of formal education or training has not made them any less open to innovations in a wide range of areas from traditional farming practices to community organizational structures. The following example, while not typical of all local responses, is none the less revealing of the willingness to try different problem solving approaches that exists in Mecayapan. At one point while explaining the requirements for applying for a Rainforest Alliance - Catalyst Grant to a group of ejidatarios gathered at the Ejido Council office, one of the farmers suggested that they could apply for money with which to buy pesticides and chemical fertilizers and then spread these all over their trees, because this is what he believed first world ecologists would want them to do. Probably a more accurate gauge of local willingness to experiment with different technologies is the fact that many of those who are members of the I-Chan group collaborate on an ongoing basis with PSSM promoters. Several of these ejidatarios agreed to establish test plots on their lands and then to invite other farmers to learn what these different technologies might do for them. Many have also participated in workshops designed to help improve the productivity of their milpas by selecting genetically superior plants for breeding purposes.

In terms of their openness to innovative social and organizational arrangements, they might not be willing to go quite as far or so fast. This reserve initiative after all did grow out of the coordinated efforts of several related male ejidatarios and their close friends and neighbors. While they are quite fond of repeating that their association is open

to anyone interested in working towards the same goals, and that they will seek to expand their membership by promoting their internal agreement through the Ejido Council, it is unlikely that these actions represent as much of a priority for them as do others aimed primarily at benefiting the 12 core members of the group.

The development of the I-Chan project is also subject to a number of political factors related to local patronage alliances and rivalries. During both of my stays in Mecayapan, I spent most of my time with the members and the families of the I-Chan Chaneko' Huehue association. As I became less of an oddity and more of a fixture in the community, several people not related to this group began approaching me with questions of their own and inviting me into their homes to talk.

On one such occasion I was taking part in an informal gathering outside the house of a relatively well-off school teacher, and as I explained the nature of my work in the community he suggested that the I-Chan Chaneko' Huehue association might not be as altruistically motivated in their intentions as I was led to believe. He feared that any benefits obtained by the group such as credit or material donations would go only to those aligned with Hilario's faction of close friends and families; an informal group that jokingly refers to itself as "el sindicato" (the union). While I could not ascertain the truth of this claim, since it contradicts the groups self-professed openness to sharing their achievements with any interested community members, it did bring home to me the levels of contention that exist between various community actors.

Chapter Five: Conclusion

5.0 Conclusions

I began this thesis report by looking at some of the lessons learned from the failures and excesses of the previous decades of rural development policies and practices. I went on to describe how these unsuitable policies have resulted in the worsening global ecological and socio-economic crisis that is affecting so many parts of the world today. Then by detailing the complex, interlocking social and economic causes and effects of the devastation being wrought against the world's tropical forests by policies that promote the expansion of commercial agriculture, ranching, and logging I tried to explain the reasons for our desperate need for practical development alternatives to end this abuse and destruction.

Fortunately, I also found that alternatives to these destructive practices will not all have to be developed from scratch, or even over-night for that matter. This is because many indigenous and rural cultures have for centuries maintained unique and efficient systems of rural production that are at once ecologically sustainable, economically sound and socially appropriate. Traditional indigenous natural-resource management systems are therefore justly receiving more attention these days from those concerned about our current global socio-ecological crisis, and consequently there is a growing recognition among conservationists and natural resource administrators of the leading roles that these millennial cultures will have in the designing of adequate alternatives for our increasingly uncertain future.

My intentions throughout the introductory chapters of this thesis were to show how the many mistakes made in the name of progress and development based on misguided modernization policies may be avoided in the future by paying more attention to designing participatory sustainable rural development projects based specifically on the needs of poor farmers and adapted by them to their particular ecological, economic and social settings. I tried to make this point by clarifying the ambitious and at times uncertain concept of 'sustainable rural development', so as to be able to evaluate its relevance in actual situations of environmental and technological change and not as a purely romantic fantasy of utopian proportions. This led me to focus on two essential components of sustainable rural development: appropriate technologies and implementation strategies. The appropriate technologies part of this concept corresponds to the low-energy input multiple resource management strategies component of this paper, and the implementation part to the participatory social forestry research methodologies.

The research that I was involved with in Mecayapan and that which I encountered in an incredibly vast and comprehensive literature on these subjects has convinced me of the importance of these technologies and strategies when considered as fundamental parts of a people-centered development process emphasizing human resources, social equality and ecological sustainability. This conviction permeated my reflections on the information and actions that were the processes of this research project and hence the subject matter of this thesis: an attempt to show how grassroots knowledge, awareness and perceptions can be mobilized and transformed through participatory social forestry research methods to generate

further motivations and the skills necessary for a more effective environmental management of rural development.

With this idea in mind I proposed to help design and carry out a research project that sought to remedy some of the destructive processes occurring in the Sierra de Santa Marta region of Southern Veracruz by helping one group of ejidatarios to use the resources that they still had in the most creative and productive ways as possible. I believed that the way to do this was to work with the affected farmers at organizing and completing a participatory research process that would identify and analyze critical social and environmental issues affecting the success of their agroforestry reserve initiative. I discussed this idea with the I-Chan Chaneko' farmers who agreed that a research project involving semi-structured interviews, discussions with key informants, direct observations, participatory mapping techniques, activity calendars, work sharing, presentations and group discussions could be extremely valuable to them given that so many details pertaining to the orientation and priorities of their project remained unclear.

What we then did was to design and carry-out a research project that relied almost exclusively upon the resourcefulness of those who were its intended beneficiaries. In all fairness I did at times have my own academic agenda that biased me to want to make certain types of suggestions or to ask certain questions, but for the most part it was the ejidatarios themselves who determined the direction and the scope that our activities and inquiries were to take. This meant that the data produced could not always be relied upon to fit neatly into artificially contrived categories like the kinds that try to make sense of survey responses. Instead of proving or disproving particular statements like: "Do you plant or encourage multi-

purpose trees in your primary food crop agroecosystems? And if so, which species and for what benefits?”, I asked farmers to describe the productive strategies that they believed affected the trees growing on or near their milpa plots. Some farmers chose to talk about fish ponds instead, and so we explored this potentially profitable option in some detail. Still others confided to me that in their very own best of all possible scenarios, they would have cattle grazing among the very oak trees whose disappearance was the catalyst for their association and their conservation and development activities.

Although these research choices make this case study site-specific per se, I believe that it also provides a relevant example of the kinds of sustainable land-use models - and the organizational strategies required to design and implement them - that are appropriate throughout much of the humid tropics. This research has led me to conclude that appropriate land-use strategies for small-scale farming in the humid tropics will ideally include some combination of the following: 1) expanded low-impact extractive use of natural forest remnants, 2) tree planting for commercial and ecological benefits, 3) diversified production, and 4) intensified production through increased reliance on fertility restoring technologies.

Implementing these goals though is a proposition fraught with difficulties. The major obstacles that prevent a simple transition to the more sustainable types of farming practices that these techniques would permit are both country-specific and global in nature, ranging from insecure land tenure to the lack of technical agroecological and/or socio-economic knowledge, and government policies that promote monoculture cash cropping and cattle ranching. As it is impossible for any single land-use strategy to successfully harmonize

conservation and economic development objectives for all regions of the globe, different strategies will have to be adapted to diverse local conditions.

Other researchers interested in these questions will no doubt find a certain degree of overlap between several of the prospects and difficulties identified in this research paper, and those associated with small-scale rural sustainable development initiatives in general. For some of the factors contributing to the sustainability of the I-Chan Changko' Huehue initiative included 1) the formation of an independent local association, 2) organizing training workshops for improving particular agroforestry management and research skills, 3) developing links between community members and locally available resources such as credit, farm inputs, markets, extension services, 4) increasing local awareness about the value and importance of protecting forests.

The I-Chan Changko' farmers were on the whole very impressed even with these admittedly quite modest achievements that they had managed over the last two years since they began talking about an Ejido Reserve project. In the true sincere fashion of these most humble and gentle people they attributed their most obvious success - getting the trees to start a nursery and the money for fruit trees and extra tools - to the dedicated advocacy of the PSSM on their behalf. And while this is in fact quite an accurate assessment of the situation, I felt it necessary to remind the group not to down-play the significance of their own actions in these matters. For were there no willingness locally to consider resource management alternatives, the Proyecto Sierra de Santa Marta could hardly be said to have any reason to exist, or at least not as a 'popular' organization promoting grassroots development.

This bolstering of their institutional relationship with the PSSM will no doubt be beneficial to the I-Chan Chaneko' group in more ways than those just mentioned. When the group got the news about the loan and the trees, it was touching to hear them talk about how they should pool their limited resources in order to offer a turkey or some other esteemed token of their appreciation for all the support that those at the PSSM have demonstrated towards them and the indigenous peasants of the Sierra region in general. I was touched by the inspiration that lit-up these farmers faces as they realized that their efforts were being rewarded. They were all smiling confidently having realized that by working together they could continue to change their world for the better. I also found their emotion a little frightening because their reactions signified to me that they were not at all familiar with this kind of positive outcome. I imagined that over the years they must have heard so many times that the source of their material poverty was their cultural ignorance and/or genetic deficiencies. Then I thought to myself how these messages were constantly reinforced through exploitative market relations and authoritarian political structures. Finally when I looked back at the faces around the room I thought for a minute that what I was witnessing was a true case of empowerment.

I knew then that what I had read about peoples' 'participation' being an end in itself, and not just a means towards development, made sense. For it was now quite obvious that through this process of collective self-reflection on their experiences and problems, they had become more aware of the characteristics of their reality, and most importantly, what they themselves could do to transform it. At this point I can quite honestly say that while the commitment to do participatory research may not always be the most appropriate for

producing the necessary data for evaluating every possible category of a pre-determined research hypothesis, the benefits that it does provide will in most cases more than compensate for the added difficulties.

Which brings me to the second major research objective of this thesis: to evaluate the benefits and disadvantages of using participatory research methodologies in an attempt to contribute to the success of the first objective, achieving a more genuine grassroots sustainable rural development. Conducting the research for this thesis made me realize that participatory research with farmers about their assessments of the potential of different natural resource management strategies to contribute to their current and long-term production and conservation objectives is an essential step in the process of developing solutions towards redressing many of the complex problems afflicting indigenous communities in rural areas around the world. These activities allowed the participants in this research project to improve their understandings of some of the ecological, social, and economic processes that influence tree management practices at the local level, and to identify potential agroforestry solutions based on these findings about the nature of the perceived problems and opportunities.

This participatory process also had its down side though. For one thing, the farmers decided who to invite and who to consult with and so the responses and views presented in this paper are those of only a small proportion of villagers from Mecayapan - those who interact frequently with a particular, well defined circle of friends. They can not therefore pretend to accurately represent all local conservation and development issues and problems. Also, because it was their interests and motivations that kept the project going, time tables for realizing objectives had to be extremely flexible and gradual. This meant that a more

significant length of time was required to complete this process since it depended entirely on the group's availability and efficiency at planning and executing project activities. And yet had this not been the case, this process may never have led to the formation of an independent organization, the I-Chan Chaneko' Huehue association, capable of securing available financial and technical supports. Yet knowing that this support for small-scale sustainable rural development is extremely limited, and that any attempts to significantly change the regional socio-economic status quo will face powerful opposition from the entrenched interests of politically dominant groups, this is nothing to get overly excited about.

The main contribution that I hope to have made with this paper is therefore to have helped characterized some of the environmental, economic and social opportunities and constraints facing the members of the local I-Chan Chaneko' Huehue association and their plans to increase and improve the benefits they derive from their surviving oak forests. A significant contribution of this aspect of the research was therefore to have identified priorities for further research and as the basis for greater community participation in forest management programs throughout the technology design and on-farm experimentation planning phases of a future agroforestry extension project. The results of these future findings should then help to evaluate the possibility raised in the discourse on sustainability that new organizations and associations, much more sensitive to the earth's capacities for supporting and reproducing life, will replace our current inequitable and unjust patterns of over/ under development. A final contribution that the retelling of the events of this research process in this paper makes is to have demonstrated some of the achievements and pitfalls that may reasonably be expected to

be encountered when using participatory research methods with small groups of indigenous farmers.

These then were the goals that motivated this experimental research project, and it was their successful realization that helped to determine the value of promoting small-scale agroforestry reserve associations like I-Chan Chaneko' Huehue. Small groups of like-minded farmers interested in reforestation, intensive agroforestry technologies, and the protection of river banks and natural forest habitats now seem to me to be essential elements in any strategy for agricultural development and environmental conservation (i.e. sustainable rural development) in most tropical forest areas. And the most effective way to foster the development of such associations is in my view by emphasizing local problem solving capacities and traditional technologies for diversifying food production and improving forest conservation.

If this I-Chan Chaneko' Huehue conservation and development project is successful at providing additional income opportunities from environmentally benign or even favorable production activities, than many other farmers in Mecayapan and beyond might also be expected to do the same. When this happens, the benefits will be immediate and far reaching. Stopping the spread of forest fires will help to preserve wildlife habitat and local biodiversity, controlling erosion will increase agricultural production and watershed management, and ultimately improve the quality of life for all of us who derive our daily sustenance directly from the benevolence of Chane , lord of the natural order, and as such a determining factor in the events that govern the destinies of not only the Nahua people.

In the words of Maurice Strong, long-time environmentalist and secretary-general of the United Nations' 1992 Earth Summit that gave the world the Agenda 21 recommendations for building a sustainable future: "We have won some battles, but we are losing the war for a sustainable future." (Epstein;1997:A-9). To give up the hope that this war will eventually be won in favor of sustainability, biodiversity, social equality, etc. is to deny the possibility that the future will look any different from the present. And given the seriousness of our current global predicament, it would be foolish (if not suicidal) to pass up any chance however small or seemingly unlikely that chance might be. A tiny step forward is still better than two steps back.

In closing I would like to add that this participatory research process focused on one group of farmers' self-professed needs and objectives, constraints and opportunities, beliefs and understandings, ambitions, priorities and accomplishments. As such, it addressed several of the fundamentals of human socio-ecological development and adaptation, including the issues of perception, knowledge and motivation, and the comparatively more mundane yet often no less complex subjects of land-use practices, administrative contexts, social norms and the likes. In casting my gaze so broadly across these questions I have at once revealed and sought to explain the reasons for my acceptance of and commitment to the age-old premise upon which multi-disciplinary research is built: namely that two heads are better than one.

The challenge with doing this type of research remains that of tempering the goal of always making the most informed choices and decisions with a healthy respect for the law of diminishing returns. For as with just about any particular sentence in this thesis report, to subject something to a never ending process of careful scrutiny under the light of new

information that is constantly in need of accommodation within the flux of each passing moments very quickly becomes more energy and time consuming than the qualitative value of the generated 'improvements' would seem to justify. Objective truth will always remain a question of subjective evaluations, and so the thing to do seems to me to be to build into your objective model as many subjective truths as can consciously be considered.

In cherishing this conviction I am reminded of the blind certainty that is all too often the direct result of the kind of single-minded ignorance so admirably demonstrated by the conservative American politician who is reputed to have once said that "...a foolish consistency is the hobgoblin of a small mind". To all the Barry Goldwater's of this world and to those who have yet to clamor onto the scene, I want my research to serve as a stunning rebuke for I am absolutely convinced that were the feminist and cultural studies writer, filmmaker and composer Trinh T. Minh-ha aware of what this man had said she would wholeheartedly support me. In her own words:

In this unwonted spectacle made of reality and fiction, where redoubled images form and reform, neither I nor you come first. No primary core of irradiation can be caught hold of, no hierarchical first, second or *third* exists except as mere illusion. All is empty when one is plural. Yet how difficult it is to keep our mirrors clean. (p.22)

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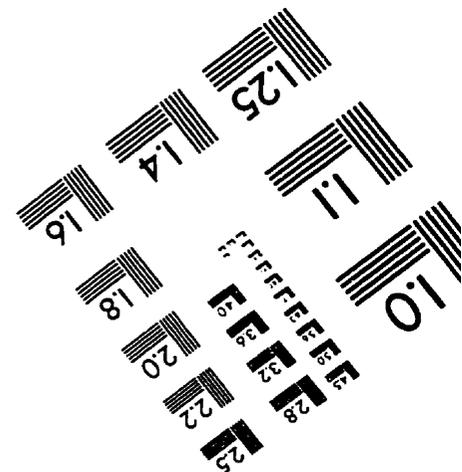
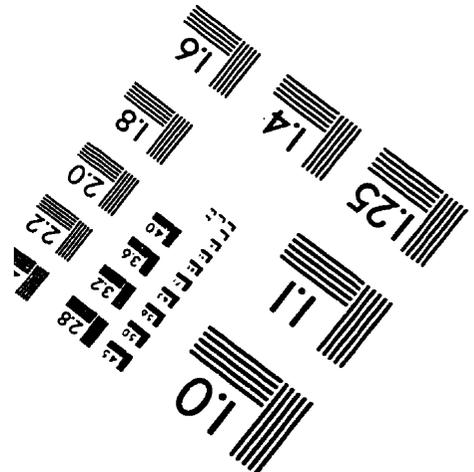
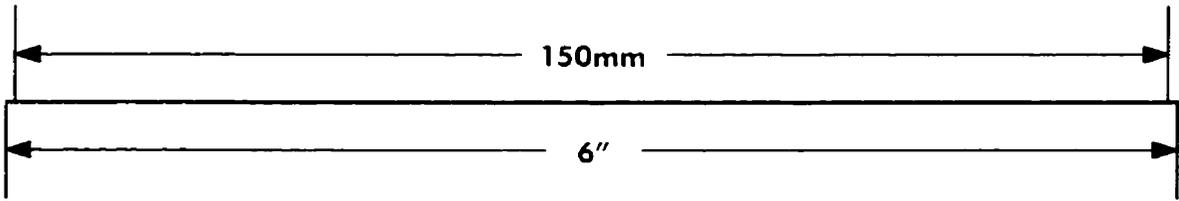
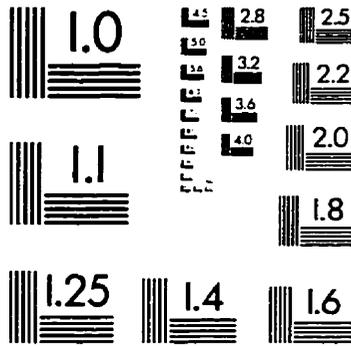
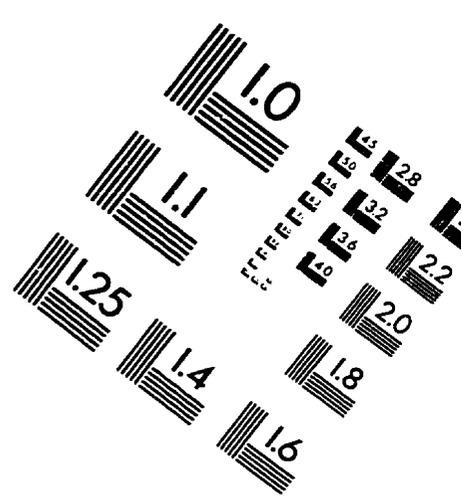
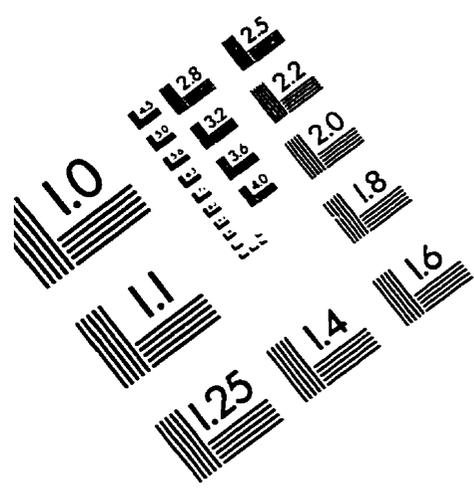
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