LOWLAND KHON MUANG AGRICULTURE: DYNAMICS OF A SYSTEM IN CHANGE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

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2004

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ABSTRACT

This study examines the causes and effects of agricultural change in a lowland Khon Muang hamlet in Mae Chaem District, Chiang Mai Province, Thailand. Lucien Hanks' classic study of agricultural change in the Central Plain of Thailand drew upon agricultural economist Ester Boserup's emphasis on population growth to explain farmers' intensification of irrigated rice fields. This study applies Hanks' model to a northern Thai multi-cropping hamlet in an intermontaine valley, which overcame annual rice deficits two decades ago due to the introduction of high-yielding rice varieties by a Royal Thai Government-U.S. Agency for International Development project. Rice yields have nearly tripled, providing food security for the hamlet. Meantime, farmers have expanded to cash-cropping in harvested rice paddies and to ecologically vulnerable hills where they grow seed maize under contract to the Thai multinational agroindustrial firm, Charoen Pokaphand Group. This study found that 76 percent of the hamlet's agricultural land area was in hill crops, or five times the amount of ground in rice paddies. Continuous hill production can pose potential problems for watershed functioning and the ecological stability of the highland area. In addition to the development intervention, an extensive road system is an impetus for change by linking farmers to middlemen and outside markets. The study concludes that Boserup's population thesis is too reductionistic because the

changes in this hamlet occurred while population stabilized. Hanks' overall model provides some insight because its holism takes into account state interventions in terms of infrastructure improvements and the effects of globalization. This study conforms that environmental deterioration is not necessarily the result of poverty or low-producing agricultural systems, but it can be due to a state-promoted "development dynamic," as asserted by geographer Philip Hirsch. This study also contributes to our understanding of northern Thai agriculture by including homegardens in the analysis. Homegarden production is often slighted in Thai agricultural studies, but is important in terms of household subsistence, ritual life, and also provides economic benefits.

Dedicated to my parents, Frank and Frances Zolvinski

ACKNOWLEDGMENTS

First and foremost, I want to thank the residents of my field site, Baan Lek Hamlet, and to all the people of Mae Chaem District for being great teachers on lowland Khon Muang culture and agriculture. They showed generous cooperation and hospitality to this *farang* researcher who spent seven months in their midst.

Secondly, I am grateful to my dissertation committee for their steady guidance, patience, and academic training in my many years at Ohio State University. I am indebted to my adviser, Dr. Chung-Min Chen, and to committee members Dr. Robert Agunga, Dr. Richard Moore, and Dr. Amy Zaharlick. I also want to express my special thanks to Dr. Anthony Walker, now at the Universiti Brunei Darussalam, whose seminars at OSU provided an extensive background on Southeast Asian peoples and cultures. Dr. Walker suggested that I study the lowland Khon Muang, and aided me in arranging the necessary contacts in Chiang Mai.

Also at OSU, I am grateful to the Office of International Studies who supported this research with an International Travel Grant.

I also express great appreciation to my sponsors and fellow researchers in Thailand who fostered the collaborative atmosphere that brought this project to fruition. These include the National Research Council of Thailand whose approval was necessary for obtaining a research visa. I also thank Mr. Mongkol

Chantrabumrong of the Tribal Research Institute, Chiang Mai, the official sponsor of this project. Also I thank Dr. Pornchai Preechapanya, Royal Forestry Department, who introduced me to Mae Chaem District, and gave me practical advice in carrying out this project. Dr. David Thomas, Dr. Horst Weyerhauser, and the Chiang Mai staff of the International Centre for Research in Agroforestry (ICRAF), provided the background information essential for the context of this study. I appreciate the lodging at the ICRAF field office in Mae Chaem, which allowed me to focus immediately and completely on my study. I am also grateful to my ICRAF field colleagues in Mae Chaem, Mr. Thanat Phromduang and Ms. Nonglak Kaewphoka, who helped me with the day-to-day minutia of living in a remote mountain district. I shall always treasure their friendship.

I am also grateful to my research assistant, Mr. Songdej Kaewkiew, who served as interpreter, field adviser and confidant for the duration of this fieldwork, and who supplied data to me after I left for the United States. Mr. Kaewkiew helped me to maintain a harmonious relationship with the residents of my field site and often provided advice on how to address various issues during the research. I am also grateful to Mr. Sunya, who served as an interpreter during Mr. Kaewkiew's absence during October 2001.

I also express my appreciation to my friend, OSU graduate student Benjamas Promsopone, who acquainted me with Chiang Mai in my first days in country. I also appreciate the friendship of Ranida Chomsong, now a graduate student at the University of Louisville, who extended her hospitality in Chiang Mai when I took breaks from my fieldwork. In addition, I appreciate the help of

Kanokwan Ukoskit, a retired faculty member of Chiang Mai University, who kindly translated important Thai materials for me.

While I was in the field, I depended on support from friends in the United States. My special thanks goes to my friend, Dr. Bang-Chool Kim, who supplied important academic articles to me while I was in the field. My friend, Dr. Gang Chen, also consulted with me about fieldwork problems I encountered in carrying out this ethnographic research. During the write-up phase, I appreciate the tireless efforts of my friends Dr. Tzu-Chi Kuo and Hyunsook Yoon, and Thattawan Kaewsakhorn, who helped me prepare the manuscript for submission.

Finally, and not least, I thank my family for continued support and encouragement during my graduate school career. This dissertation is dedicated to my parents, Frank and Frances Zolvinski, who greatly influenced me in seeking out this academic degree. My brother, Matthew and his wife Therese, were prime points of e-mail contact while I was in the field, and they provided supplies as needed. My brothers, Lyman, Frank J. and Michael; my sisters, Mary Ann Davenport and Jacqueline Lorzing, and their families, also kept in close contact, providing moral support during this project. To them all, I am grateful.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

CHAPTER 1

INTRODUCTION

This dissertation is about change in the agricultural practices of a lowland Khon Muang hamlet in an intermontaine valley of northern Thailand. The lowland Khon Muang, generically known as the northern Thai, comprise a cultural and linguistic subgrouping of the Thai population who inhabit the nation-state of Thailand. This study documents the ongoing processes and effects of agricultural change resulting in the transition from subsistence rice production to a more diversified agriculture based on both subsistence and cash-cropping.

The study was conducted from July 31, 2001, to February 22, 2002, in a lowland Khon Muang hamlet in Mae Chaem District, located in the western part of Chiang Mai Province. The lowland Khon Muang traditionally grew rice in both the irrigated paddies in the valleys and in slash-and-burn plots on the lower hillsides. About two decades ago, the hamlet had low agricultural productivity that caused an annual rice deficit. Consequently, households suffered several hungry months before rice harvest. As a result of Thai government and international development efforts, the hamlet now has a rice surplus. In addition, farmers have expanded into cash cropping as evident by vast maize fields on once-forested

hillsides. The majority of households in this hamlet grow maize for cash under contract for the Charoen Pokaphand Group (CP Group), one of the world's largest agroindustrial multinational corporations (Falvey 2000:2).

Contributing to these changes were road construction projects. Improved transportation in terms of all-weather roads has linked this once-isolated district to the markets beyond the mountains, thus stimulating land use changes toward cash-cropping.

I. Statement of the Problem

Students of rural Thailand are fortunate to have a depth of studies that lay the foundation for understanding change in Thai agricultural systems. Lucien Hanks' landmark *Rice and Man: Agricultural Ecology in Southeast Asia* (1992[1972]) was a historical study of ecological change in rice production spanning 150 years in the Central Plain north of Bangkok. Hanks introduced the concept of "holding," which encompassed all of the human and nonhuman energy requirements to bring a rice crop to fruition on a certain plot of land. Hanks drew upon Ester Boserup's (1995[1965]) thesis that related population growth to agricultural change. In northern Thailand, durable studies of Konrad Kingshill (1965), Michael Moerman (1968), and Tanabe Shigeharu (1994), also focused on irrigated rice production, while Laurence Judd (1961, 1987) focused on dry rice in upland plots.

These days, a visitor to Mae Chaem will find a more diversified agriculture than was described in the above studies. Lowland Khon Muang agriculture is centered on rice production because it is the staple crop, and households

allocate its annual labor in accordance to its seasonal operations. However, to understand contemporary Thai agriculture, one must take into account the economic diversity in terms of cash cropping both in harvested irrigated paddies and on the rainfed hills. This begs the question whether the ecological model for change, particularly as described in Hanks' classic, is still relevant to a rural world shaped by international development projects and the business plans of multinational corporations. Furthermore, the changes described in this dissertation occurred under conditions of population stability in the studied hamlet. This latter point calls into question the relevancy of Boserup's model that attributes population growth as the prime mover in agricultural change.

Finally, all of the above studies slight an important subsystem in the Thai agricultural ecological system. That subsystem is the homegarden, a lush mixture of trees and plants that surround the homestead, I consider homegardens to be a "cultural staple." Many aspects of Thai culinary, material and ritual culture depend on products grown in homegardens, yet they are hardly mentioned in studies of Thai agriculture. This is not surprising, as Robert Chambers (1983:80) observed that rural peoples knowledge is given a low priority in international agricultural research. This study incorporates homegarden production into the analysis, which distinguishes this dissertation from most other studies of Thai agriculture.

II. Purpose of this Study

The purpose of this study is to examine agricultural change in a lowland Khon Muang hamlet in Mae Chaem District, Thailand, in order to examine the

relevancy of Hanks' classic model of ecological change in a world influenced by international development projects and a globalized economy. The study draws upon the historical records of various international development projects in Mae Chaem District to provide the context for the quantitative and qualitative data collected through standard ethnographic methods in a particular hamlet.

III. Objectives of the Study

The specific objectives of the study are:

1. To describe "traditional" lowland Khon Muang agriculture in Mae Chaem and contrast it to the current conditions in the studied hamlet.

   The sub-objectives are:

   a. To describe the changes in the uses of land forms as related to cropping practices in the studied hamlet.
   b. To determine the distribution of subsistence practices and cash-cropping practices among the land forms, both historically and currently in the hamlet.
   c. To determine the trends in yield/production for crops grown on various land forms compared to the past.

2. To describe the relevant factors leading to agricultural change from a subsistence mode of production to one immersed in a cash economy.

   The sub-objectives are:

   a. To describe the household structure and pertinent demographic variables affecting agricultural production in the studied hamlet.

b. To determine the extent of nonfarm employment in this hamlet as an indicator of residents' participation in the district's cash economy.

c. To describe the roles of international, Thai government and non-governmental organizations' development projects in effecting agricultural change in the studied hamlet.

d. To describe the role of infrastructure changes, i.e. transportation, in effecting agricultural change in the studied hamlet.

3. To determine how the transition from subsistence agriculture to commercial cropping has affected the cultural life of residents in the studied hamlet.
4. To evaluate the ecological implications regarding the transition from subsistence agriculture to intensive cash-cropping practices in the studied hamlet.

IV. Significance of the Study

If anthropology is going to be relevant to policymakers and development planners, it needs adequate models to explain the processes of agricultural change in developing countries. The on-the-ground reality in Mae Chaem District shows us that change has proceeded as a patchwork of sometimes uncoordinated development efforts ranging from sporadic missionary activities to high-profile, expensive projects funded by international donors. This study then attempts to re-visit Hanks' highly regarded model to determine if it has any

predictive value in explaining current conditions in Mae Chaem District, using a particular hamlet as the study site. In addition to the theoretical aspects of this study, there are practical implications in terms of whether development has realized the expectations of its donors and recipients. The expectations concern the standard of living and quality of life for the hamlet residents. If Hanks' model is still applicable, then it should have explanatory power in terms of whether these expectations were realized, which are important objectives for any development intervention.

Agricultural change has created serious trade-offs for the residents of this hamlet. On one hand, the increased rice production means they no longer endure the hungry months before rice harvest as in former times. As for cash-cropping, residents appreciate the income from a more diversified farm economy, particularly from their CP maize contracts. This is also evident in the visible indicators of an improved standard of living. Farmers have renovated their houses, bought consumer goods and appliances, and also contributed generously to the upkeep and continued improvements at the hamlet's Buddhist temple.

On the other hand, the hamlet's farming activities occur in the context of a broader trend of environmental deterioration in northern Thailand. Geographers (Bernard and De Koninck 1996, De Koninck and Déry 1997) have documented the extensive retreat of forests in Southeast Asia due to agricultural expansion. A facile explanation would be to attribute the deterioration to poverty, "backwardness" of subsistence farming, and a general lack of development. The

situation in this hamlet, though, corresponds to what geographer Philip Hirsch (1987:119) calls “a particular development dynamic.” While development connotes a positive, forward-looking, progressive outlook, it also comes at environmental costs that are hard to overcome. This dissertation, then, will complement the broad trend documented in the geographical literature. This study uses ethnographic techniques to describe these changes at the micro-level world of a hamlet in Mae Chaem District.

Agricultural scientists have written extensively on the effect of land-use transformations on watershed functioning. Loss of forest cover can result in soil erosion, downstream sedimentation, as well as disrupt the hydrological functioning in terms of water yield, timing, quality, and even the levels of the water table (Hamilton and Pearce 1986; Tangtham 1999; Turkelboom, Poesen et al. 1997). In addition, intensive practices can mine soil fertility that requires increased applications of synthetic fertilizers over time (Craswell, Sahapongse et al. 1998:134). There is even preliminary evidence that fertilizer runoff is reaching the Gulf of Thailand and adversely affecting marine habitats there (Piyakarnchana 1999).

Unfortunately, the bulk of watershed research was done in temperate regions and there are questions about the applicability to tropical areas (Alford 1992:267-68, Craswell and Nimskul 2000:65-7). In addition, databases from developing countries may not be adequate to come to firm conclusions about watershed functioning in tropical areas. Collaborative research in sloping lands in Thailand and elsewhere in the developing world is just beginning to increase our

understanding of the interaction of land use change and watershed functioning in tropical zones.

This study, then, can contribute a sociocultural dimension to the emerging biophysical studies of land use changes in highland areas of developing countries. Land use changes are the result of human interventions in the highland environment. The changes are about real human beings making real decisions about natural resources as they are informed by culture in a particular political and economic environment. This is a complicated process that is best approached from a holistic perspective that anthropology brings to the development process. In this way, then, this study will attempt to apply the conventions of Hanks' model of agricultural change in order to sort out the complex factors that have converged on a particular hamlet at a particular point in time.

V. Limitations of This Study

Any conclusions drawn from this study are limited by the following factors:

1. The study occurred in a single hamlet with a unique history so the results might not be generalized to all lowland Khon Muang communities in northern Thailand, and definitely not to non-Thai communities in highland areas.
2. The researcher is not an agricultural scientist and cannot technically confirm the ecological consequences of farming practices, even though the trend in this hamlet is similar to those reported by geographers elsewhere in northern Thailand.

However, the researcher believes it is better to sound an alarm to a potential problem rather than to wait for a disaster to confirm it.

3. Due to financial limitations, this study was done over a seven-month period rather than observing the one-year standard expectation for ethnographic research. This study might not capture the extent of community activities occurring during the remainder of the calendar year.
4. Methodological challenges concerning language and other factors are described in Chapter 4, Methodologies.
5. Lack of specific recorded historical data from the hamlet that might or might not conform to historical records available for Mae Chaem District at-large.

VI. Structure of this Dissertation

This chapter has covered the purpose, objectives, significance of this study and the pertinent background information about Mae Chaem District. The remainder of the dissertation will address a literature review of theoretical issues and the development record in Mae Chaem, the research methodologies, the findings from the fieldwork, and concluding analysis. The following gives a summary of the succeeding chapters:

Chapter 2, Mae Chaem District: Geography History and Ethnicity;

This chapter sets the geographical, historical and ethnic background for this dissertation. The chapter reviews the literature of Mae Chaem's mountainous

landscape as well as the climactic features that are pertinent for agriculture. The section on history traces Mae Chaem to its legendary Buddhist origins to the current encounter with international tourism. The final section introduces the reader to the non-Thai ethnic groups who inhabit Mae Chaem's highland landscape, their demographic trends, and farming practices adapted to their particular elevation.

Chapter 3, Literature Search I: Theoretical Issues; As Hanks' model is steeped in the theoretical paradigm of ecological anthropology, this chapter briefly reviews anthropological approaches to studying human-nature interactions. The chapter then delves into Hanks' model, and the influence of Boserup's ideas of population growth and agricultural development. Next the chapter addresses questions of the universal applicability of Hanks' and Boserup's models by examining a northern Thai farming system based entirely on shifting cultivation, rather than irrigated rice. What follows is Marlowe's obscure study that cautions against applying an irrigated rice model on the diverse farming systems of northern Thailand. The chapter concludes with recent geographical literature that argues that development of a cash economy has contributed to deforestation problems in northern Thailand.

Chapter 4, Literature Search II: Development Programs in Mae Chaem District; This chapter takes a chronological review of development programs that have attempted to effect social and economic change in Mae Chaem District, starting with Christian missionary activities in the post-World War II era. The next programs include United Nations programs to reduce opium

production in the 1970s, participatory initiatives implemented by the Thai Royal Family, the joint Royal Thai Government-United States-funded Mae Chaem Watershed Development Project of the 1980s, and the continuing work of the nongovernmental organization, CARE-Thailand. This section is intended to be as exhaustive so it covers programs that targeted non-Thai ethnic groups as well as lowland Khon Muang. An exhaustive examination is a necessary exercise because later programs were designed in reaction to the strengths and shortcomings of earlier interventions.

Chapter 5, Methodologies; As anthropology is a holistic enterprise, this chapter will describe the ethnographic techniques for collecting data in the studied hamlet, as well as the rationale for employing them. As this study examines demographic trends, land use patterns, cropping practices, agricultural yields and production, a household census was employed to gather the bulk of this quantitative data. Formal and informal interviews were conducted to identify community issues, to document historical trends in this hamlet, as well as to double-check the quantitative data. In addition formal and informal interviews gave some insight into the lowland Khon Muang's viewpoint toward changes. The study also employed participant- observation methodologies at temple rituals in order to examine culture change in this Theravada Buddhist society.

Chapter 6, Sociocultural Findings in the Hamlet; This chapter situates the study in the hamlet by giving a brief description of its land features, governmental administrative apparatus, ritual life centered on the Buddhist temple, infrastructure, and local leadership roles. What follows are the

demographic characteristics pertinent to population change, and labor supply and structure. As this study examines economic change in an agricultural community, this chapter also delves into occupational structure that includes full-time farming and non-farm employment, as well as any inequities in terms of land uses related to the former category. Education is important for continued economic change, so this chapter describes the improving educational levels in the hamlet. Finally, the chapter documents the economic effects of agricultural change on residents' material welfare by enumerating their accumulation of household goods.

Chapter 7, Findings on Hamlet Land Uses; The most visible aspect of agricultural change in this hamlet, and in Mae Chaem District as a whole, is in the agricultural land use patterns and the crops grown at various types of land forms. Hamlet residents still maintain a subsistence base in irrigated and upland rice production, and in homegardening, which is also associated with livestock husbandry. However cash-cropping has expanded in harvested paddies and on hillsides. This chapter thus documents agricultural change in the extent of subsistence and cash-cropping.

Chapter 8, Findings on Crop Production and Yields; The goals of major development initiatives was to improve food and income security in Mae Chaem District. This chapter documents that these goals were achieved in this hamlet, respectively, through increased rice production and the adoption of cash-cropping practices. The strategy employed by each household depends on access to various land forms, i.e. irrigated paddy and upland areas. For example,

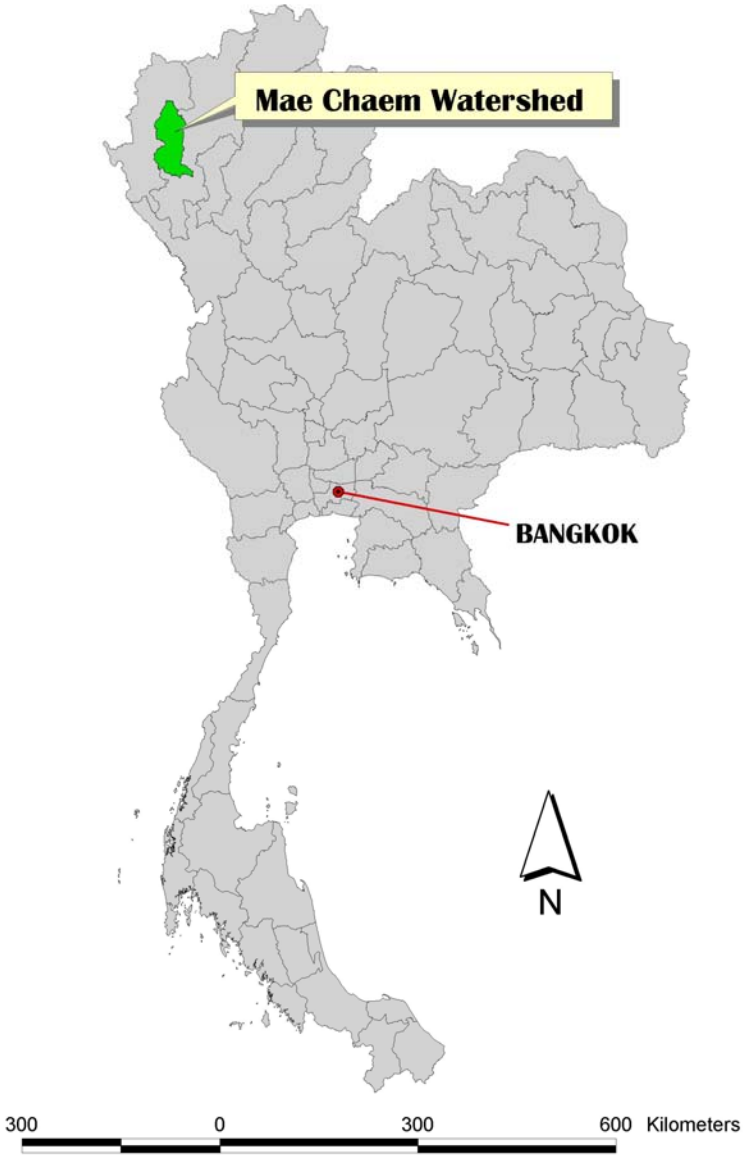
households without paddy access grow all of their rice in upland plots, where they also grow maize as a cash crop. Thus hillside production is a food “safety valve” for households lacking access to highly productive paddy, and is also an economic resource in terms of cash cropping.

Chapter 9, Discussion and Conclusion; This study examines the cultural and ecological tradeoffs resulting from agricultural change in this hamlet. Then the chapter analyzes the change in terms of Hanks’ and Boserup’s models of agricultural change, finding that Hanks’ holistic strategy that takes into account infrastructure and international economics is more explanatory than Boserup’s one-factor thesis regarding population growth as the sole impetus for change. Finally, the chapter concludes that the findings in this study correspond to a “particular development dynamic” (Hirsch 1987:129) that involves local households’ response to national development policies.

CHAPTER 2

MAE CHAEM DISTRICT: GEOGRAPHY, HISTORY AND ETHNICITY

As ethnography addresses a problem involving a particular people at a particular place at a particular time, this section will provide the background to situate this study in the historical, geographical and ethnic context of Mae Chaem District in Chiang Mai Province. The first subsection will describe the physical features and climate. The second subsection provides the historical record, as the current situation is an outgrowth of past social, economic and political conditions relevant to this study. The historical sources will show that this remote, mountainous district has always been absorbed by the mainstream of regional, national and international events. That process has been heightened by the recent history of development projects that have helped to integrate Mae Chaem into the national economy. The third subsection situates the study in the context of the ethnic diversity of Mae Chaem, which is also related to the geographical features of the district. Each ethnic group resides at a particular elevation and has developed subsistence strategies related to those particular ecological features. As each ethnic group transforms to commercial cropping, there are



Map 1. Mae Chaem Watershed, site of fieldwork in northern Thailand (map courtesy of ICRAF)

potential effects on the ecological functioning of the watersheds, which affects all who live there.

I. Geography

Mae Chaem District is situated in the narrow intermontaine valleys on the far western side of Chiang Mai Province. The elevations range from 500-2,565 meters above sea level (Buddhabooon 2000:20). The highest point is Doi Inthanon, also the highest point in the Kingdom, which is located in a national park bearing the same name. According to Buddhaboon (2000:290) and a district report (Amphur Mae Chaem 2001), 70 percent of Mae Chaem is “mountainous covered by various forest types,” while 20 percent is foothill flat area, and 10 percent is plain along major watercourses. The steep relief leaves a limited amount of arable, level land for rice production, which historically resulted in seasonal rice shortages in the months before harvest (Manu Srikhajon et al. 1985:22). In 1981, Mae Chaem District’s annual rice production was 10,950 kilograms, or 1,100 kilograms short of the district’s nutritional needs (Kampe 1989:36). Today, though, Mae Chaem produces enough rice for subsistence purposes, due to the introduction of high-yielding varieties and associated growing technologies in the mid-1980s.

Estimates of the area of the Mae Chaem watershed vary from 3,344-4,000 square kilometers, as reported, respectively, by Buddhaboon (2000) and the Northern Mountain Area Agroforestry Systems Research and Development Project (2001:7). The Mae Chaem River is the major waterway draining this area, flowing in a general north-to-south direction, passing the district government’s

office building in the district administrative seat, Mae Chaem Town.[1] Eventually the Mae Chaem River flows into the Ping River, a major northern waterway that eventually empties into the Kingdom's main watercourse, the Maenam Chao Phraya River that drains into the Gulf of Thailand.

Four subwatersheds drain Mae Chaem District. These are the Mae Malo, Mae Raek, Mae Paan and Huai Ban Yang rivers (Uparasit and Isager 2001:6). The sources of the district's numerous streams can be traced to Doi Inthanon, which incorporates the watershed into its ecosystem (Uparasit and Isager 2001:6).

A. Climate

Mae Chaem experiences three seasons, although the steep relief provides much local variation in rainfall, both within seasons and between years (Kuraji et al. 2001:355). The rainy season occurs from mid-May through early-to-mid October (Srikhajon et al. 1985:37-8, Uparasit and Isager 2001:7). A cold, dry season follows until mid-February, after which hot conditions prevail until the start of the rains again (Uparasit and Isager 2001:7-8).

The trade winds, or monsoons, that sweep across the Asia and the surrounding oceans influence the general weather patterns in Mae Chaem. The southwest monsoon brings the rainy season to Mae Chaem in two general "rhythms," which are separated by a short dry period in mid-July. Heavy precipitation can produce flooding in the second rhythm if it is associated with a

[1] The district government was planning to move its offices from downtown Mae Chaem to the outskirts of the municipality at some date in the future. During this research, land-clearing was underway for the new site.

typhoon from the South China Sea (Donner 1982 [1978]:675, Srikhajon et al. 1985:38). The rainy season ends when the drier, northeast monsoon sweeps down from China in October, bringing a considerable drop in temperatures as well (Donner 1982 [1978]:675; Srikhajon et al. 1985:7, 38; Uparasit and Isager 2001:7). The months with coldest temperatures and least precipitation are from December through February, after which both temperature and precipitation start to rise (Srikhajon et al. 1985:7, 38, cf. Uparasit and Isager 2000:7).

B. Climate Data Reliability

Historical weather data for Mae Chaem's seasonal trends may be unreliable despite systematic efforts to collect it (Uparasit and Isager 2001:7). Srikhajon et al. (1985:42) complained that long-term records collected in from 1952 to 1983 might be flawed due to "mistake of collectors, the movement of equipment and some unexpectable [sic] conditions during the collecting period."

Even if weather data is reliable, the steep relief generates microclimates that make it difficult to generalize the weather patterns across the district on a year-to-year basis. The geographer, Wolf Donner (1982[1978]:675), described the problem of generalizing weather data from northern Thailand:

> Climatic zones in the North [of Thailand] are rarely larger than a few square kilometers because the high mountain chains, rising steeply and running north-to-south, act as rain producers on one side and as dry weather promoters on the other, in the rain shadow, thus causing conditions which are alternatively humid and arid. The difference between the intermontaine valleys and the high mountains are actually so large that a few figures cannot characterize regional climatic conditions….

Another problem is the "altitudinal increase in rainfall," whereas higher elevations tend to get more rainfall. In Mae Chaem, Koichiro Kuraji of the University of Tokyo has been measuring these effects at 15 sites since June 1998 for the Global Energy and Water Cycle Experiment (GEMEX) Asian Monsoon Experiment-Tropics program, also known as GAME-T. Doi Inthanon consistently showed the highest rainfall levels in contrast to lower areas (Kuraji et al. 2001:357).[2] The trend is consistent with earlier research (Srikhajon et al. 1985:42) showing that Doi Inthanon's annual precipitation of 2,508 mm was more than double the annual mean of 1,079 mm in Mae Chaem's intermontaine valleys. Another study (Uparasit and Isager 2001:8) showed similar annual large differences in precipitation between Doi Inthanon and Chiang Mai University (CMU), located at a lower elevation.

For temperatures and other climactic conditions in Mae Chaem, see Table 1 adapted from Buddhaboon (2000:10). Note that the lowest monthly *minimum* temperatures characterized Mae Chaem's 1999 cold-season months, although the January maximum reading (30.8C) was the highest for that year. The data was collected in Chang Khoeng subdistrict, which is a local administrative unit in Mae Chaem Town.

C. Climate and Agriculture

The northern Thai indigenous irrigation system, known as the *muang fai*, is an efficient and reliable year-round water supply for rice farming and second-

[2] A project summary with latest data is reported at this World Wide Web site: http://www.uf.a.u-tokyo.ac.jp/~kuraji/MaeChaem/

crop production in Mae Chaem District. The *muang fai* system is essential for rice farming in intermontaine valleys. Annual rainfall is insufficient for the growing requirements for rice, even though the southwest monsoons bring six months of moisture to northern Thailand (Tanabe 1994:14). For example, the rainy season's average precipitation is 1,000-1,100 mm in the Chiang Mai Valley, which falls short of sufficient moisture due to a 25 percent loss through evaporation. Monsoon rainfall is also undependable (Tanabe 1994:14). The advent of the first rains may vary by up to two months, and the amount of precipitation may be localized and come in downpours too erratic to meet the vegetative growth stage of rice (Tanabe 1994:14). Annual precipitation can vary by as much as 1,000 mm in the intermontaine basins of northern Thailand (Tanabe 1994:15). In a worst-case scenario, these factors can cause crop failure in Thailand, according to Tanabe (1994:15).

The social, technological and ecological aspects of northern Thai irrigation have been extensively studied in numerous works. Among the most detailed is Vanpen Surarerks' *Historical Development and Management of Irrigation System* [sic] *in Northern Thailand* (1986). Less detailed, but no less durable is Tanabe's *Ecology and Practical Technology: Peasant Farming Systems in Thailand,* and Tan-Kim-Yong's *Muang-Fai Communities are for People: Institutional Strengths and Potentials* (1995).

Month	Max. Mean Temp. (C/F)	Min. Mean Temp. (C/F)	Mean Temp. (C/F)	Precipita-tion (mm/inches)	Wind Velocity (km per hour/miles per hour)	Humidity (%)
Jan.	30.8/87	15.2/59	23.0/73	0.0	5.5/3.4	76.4
Feb.	30.4/86	17.1/62	23.8/74	0.0	8.0/4.9	65.8
March	30.5/86	18.1/64	24.3/75	0.0	19.9/12.3	61.2
April	28.6/83	19.8/67	24.3/75	75.5/2.9	9.6/5.9	76.0
May	25.6/78	19.0/66	22.3/72	222.8/8.7	6.6/4.1	78.0
June	24.6/76	19.5/67	22.1/71	198/7.7	8.5/5.2	86.4
July	25.0/77	20.2/68	22.6/72	130.6/5.1	7.3/4.3	85.6
Aug.	23.9/75	19.9/67	21.9/71	231.7/9.1	7.9/4.98	85.3
Sept.	25.1/77	20.0/68	22.6/72	214.9/8.4	3.8/2.3	86.9
Oct.	25.0/77	19.3/66	22.2/71	226.3/8.9	5.09/3.1	84.3
Nov.	24.7/76	17.0/62	20.9/69	37.1/1.4	5.2/3.2	81.8
Dec.	23.4/74	12.8/55	18.1/64	4.4/.0.17	7.8/4.8	76.0
TOTAL	--	--	--	1,341/52.8	--	--
MEAN	26.5/79	18.2/64	22.3/72	--	7.9/4.9	78.6

Table 1. 1999 Weather Data, Chang Khoeng Subdistrict, Mae Chaem District (Buddhaboon 2000:101)

In addition to being a reliable system for food production, paddy field agriculture provides environmental benefits, to which some researchers have applied monetary values. The benefits include flood prevention, fostering water resources, soil erosion control, landslide prevention, and soil and air purification (Ministry of Agriculture, Forestry and Fisheries of Japan 2004). Paddy fields also preserve a pleasant rural landscape and are even considered to offer recreational amenities that are desired by urban visitors. A 1999 Mitsubishi Research Institute study valued the environmental externalities of Japanese paddy field farming at 1,952.7 billion yen (US$17.8 million).

Northern Thai irrigation systems deliver water to the paddy via a farm ditch that is supplied from a lateral canal (Surarerks 1986:453). The lateral canal

connects to a main canal that receives water at the weir of a river or stream. This delivery system compares to the paddy overflow technique in the Central Plain, whereby water is distributed by allowing it to overflow the dike from one paddy to the next. According to Surarerks (1986:453), “farm ditches can be dug across the fields or along the boundaries of different owners.” The system provides for a quicker delivery because farmers do not have to wait their turn for neighboring paddies to receive water. The system is also said to help conserve water.

Mae Chaem farmers employ transplanting techniques in their irrigated rice fields, and fieldwork begins with the rainy season, while harvest occurs in November. Harvest occurs near the *Loy Krathong* Festival, the date of which shifts every year because it is based on the lunar cycle. The festival takes its name from the *krathong,* which is a decorative, handheld banana leaf float that local people place on a major waterway at night. The *krathong* carries a lit candle and sometimes burning jossticks, and the practice is said to wipe away bad luck from one’s life.

On hills, the rainy season is the only time when non-irrigated crops receive enough moisture for their growing requirements. The lowland Khon Muang may grow upland rice for subsistence, or cash crops, such as maize, in hilly areas.

Multi-cropping in paddy lands after rice harvest does not depend on rainfed moisture directly due to the *muang fai* dependable water supply in the dry season. Farmers may also use water from the *muang fai* to water their homegardens during the dry season if a canal runs proximate to the house.

Drier conditions at the end of the (Western) calendar year are also when numerous burning activities take place both in fields and around homesteads. In December, farmers burn the rice stalks in harvested paddies in order to prepare the ground for a second crop. The burn is said to control weeds, and the ash provides some fertilizer to the soil. Around homesteads, householders rake up and burn fallen leaves, which are considered to be a valuable mulch homegardens. Burning leaves also has a social dimension in the cold season. Homes in northern Thailand are not heated. When temperatures turn cold, a common sight in the morning are villagers huddled around a fire outside a homestead to warm up and share local gossip before starting daily activities.

As the dry season wears on through March, the hill vegetation turns tinder brown, and high winds present a considerable fire hazard in Mae Chaem when villagers burn off fields in preparation for rainy season crops. Fires get out of control and can burn extensive landscape. Fire control has been a long-term problem in the district as a USAID document reported 20,000 rai (3,200 ha.) burned in 1986 (Roth et al. 1987:230). At the field site for this research, the Village Forest Conservation Committee reported that fire destroyed 800 rai (128 ha.) in 2001, and about 250 rai (40 ha.) in 2002.

II. History

The major theme recurring throughout Mae Chaem's history is its remote physical location, as Thailand's tallest mountains, the Doi Inthanon range, separate it from the rest of the Kingdom. That is also a point the district government emphasizes in characterizing the local heritage and traditions

(Amphur Mae Chaem 2001). Outsiders must travel on all-weather, but narrow, winding, steep mountain roads through Doi Inthanon National Park, established in 1972, to get there (Uparasit and Isager 2001:16). The first road accessible to motorized vehicles reached Mae Chaem from Hod District in the south in 1965 (Research and Development Center 1989:146). This road was paved by 1980, making a 156-kilometer (96 miles) trip to Chiang Mai, the major urban center of the north and Thailand's second most populous city (Renard 1981:1, 8). In 1976, a route paved eastward through Doi Inthanon National Park cut 46 kilometers from the trip to Chiang Mai (Research and Development Center 1989:146). This road leads to Chom Thong District to the east, and from there, the traveler goes north to Chiang Mai.

It is an oversimplification, though, to say that Mae Chaem was ever completely isolated from the rest of northern Thailand. This is important because the lowland Khon Muang peasantry in Mae Chaem was definitely affected by the shape of political events occurring in major centers of Thai power on the other side of the Doi Inthanon range, and those events have intensified up to the current day.

Historian Ronald Renard (1981:1) made an ecological argument that Mae Chaem never became a center of influence because the narrow intermontaine valleys limited agricultural production, which kept the population in check. With population limited, Mae Chaem never achieved the level of prominence and "sophistication" to churn out its own history as powerful courts (Renard 1981:1):

> As a result, Mae Chaem never was a powerful kingdom and Thai Chroniclers ignore the place, considering it an unimportant backwater…. Consequently, only in the twentieth century does the history of Mae Chaem become at all well-known.

In contrast, Hans Penth (1977) disputed that the hills west of Chiang Mai were ever marginal to Lanna Thai, the royal center that was precursor to today's Chiang Mai. To be fair, Penth did not specify Mae Chaem. But inscriptions found in the ruins of great monasteries in the mountains suggest a relationship between the far-flung communities and the old Chiang Mai court centuries earlier (Penth 1977:181-82). The sheer size of one monastery compound indicated it "had a numerous and prosperous population which could afford the construction and maintenance of a great monastery…." (Penth 1977:187).

Penth's (1977:180) model could be apt to Mae Chaem:

> [West of Chiang Mai there are] quite a few of the tiny to middle-sized valleys...inhabited by people who professed and practised Buddhism, and who lived a life not basically different from the life in the larger valleys to the east, i.e., in the valleys of the Ping (Chiang Mai), of the Wang (Lampang), etc.

A. Legendary and Early Historical Roots

As the lowland Khon Muang are Buddhist, it is no surprise that religious legends explain the district's origins in terms of ancient visits by the religion's founder. A mural at Wat Chang Khoeng temple in downtown Mae Chaem depicts the Buddha settling a dispute between two lions fighting over hunting territory on the Mae Chaem River (Renard 1981:1). The temple takes the name from *chang khoeng*, or "halfway measure," for the point that Buddha is said to have

demarcated between the lions' territories. However, a tonal shift in the language changed the phrase to its current meaning, "half elephant."

Buddhist legends also relate the origins of the name of the district, Mae Chaem (Amphur Mae Chaem 2001). An ongoing famine was said to have prevented the people from presenting alms to the Buddha during his legendary visit. Hence the district receives its name from those conditions, *chaem*, or "famine."

Also relevant to the district's Buddhist heritage are several temples named for the Buddha's footprint, or *phrabat*. Typically, villagers have found meter-long footprint impressions on a rock in the countryside, which they ascribed to the Buddha's travels. They would then transport the rock for dedication at an appropriate site to build a temple (Renard 1981:1-2).

Documentary evidence is scanty about the early Thai in Mae Chaem, but the district's fortunes of Mae Chaem clearly rose and fell with the powerful Lanna Thai court. In a local oral history project, Mae Chaem residents considered the period of 1355-1525 as their "golden age" or "glorious period," coinciding with the rise and decline of Lanna Thai. (Academic Subcommittee for Amphur Mae Chaem). The next phase, 1558-1774, started with the Burmese sacking of Lanna Thai, and Burma's domination of the region until the northern Thai reconquest. Defensive earthworks found in the district are evidence that Mae Chaem was involved in these wars. Two caves also revealed Buddhist manuscripts that were hidden from the invaders (Renard 1981:4, 1988:19, cf. Keyes 1970).

Regardless of its political role, historic Mae Chaem was an active commercial and transportation point on the route between the old Lanna Thai Kingdom and provincial towns in Myanmar. The "name 'Mae Jaem' [Chaem] first appeared on this route around 1369 A.D.," wrote art historian M.L. Surasawasdi Sooksawasdi (1991). With the Burmese conquest and then their overthrow, Mae Chaem figured in the re-establishment of the new Lanna Thai Kingdom. Lanna Thai repopulated "settlements in the outer areas such as Mae Jaem [Chaem] which then served as an important communication center" (Sooksawasdi 1991).

The movement of people brought diverse artistic influences to Mae Chaem. These influences are evident in the stucco "Kitchakoot," a model of the holy Gujhakute Mountain, located in the Buddhist temple, Wat Nyang Luang, in the district.

B. The 19th Century

Not much else is available about Mae Chaem until the 19th Century--well after Burma's defeat--when Lanna Thai's political successor, Chiang Mai, shaped Mae Chaem's administrative apparatus into the precursor of the current local government. In the late 1800s, Chiang Mai appointed a governor for the district, Pinya Khuan Kaeo, whom his son-in-law, Pinya Choi, succeeded in 1890 until his death in 1920 (Renard 1981:6). At that time, the local administrative unit was a *khwaen,* equivalent to the district or *amphur* today. Subsequently, the Siamese state based in Bangkok extended its control over the north, and the central government appointed its district official, or *nai amphur,* named Nai Chuan, to succeed Pinya Choi. That is not to say that Mae Chaem villagers passively

followed Bangkok's governance. They opposed unfavorable policies from the central government. As an example, they staged a tax revolt that killed a district officer in the early part of the 20th Century (Renard 1981:8).

During Khuan Kaeo's rule, international capitalism made inroads into Mae Chaem in terms of British logging companies that harvested teakwood, a valued shipbuilding material due to its termite resistance (Renard 1981:6, 1988:32). The Bombay Burmah and the Borneo companies set up logging operations staffed by Burmese, as well as hired local Karen and northern Thai. The life and times of this period is depicted in a faded and water-stained mural inside a building at Wat Pradaet, a major Buddhist temple in the district (Renard 1981:6). A Burmese logging overseer sponsored the painting that shows scenes of Mae Chaem's rural life and farming practices, including local people wearing Burmese dress. A significant portion of the mural is devoted to various Buddhist religious scenes.

C. The 20th Century

Major worldwide events engulfed Mae Chaem in the 20th Century. World War II brought Japanese soldiers to Mae Chaem. According to Renard (1980:8), Mae Chaem's relative isolation benefited the local economy. Local people continued to make handmade cloth to sell to northern Thai outside the district who had forgotten the craft, as well as to Japanese soldiers. In addition, residents prospered by selling food to the foreign occupiers. If Renard is correct, Mae Chaem would have been one of the few bright spots in Thailand's wartime

economy, as the war on the high seas choked export markets that benefited rice farmers in the Central Plain (Steinberg 1987:352).[3]

After World War II, Mae Chaem became a battlefield in the superpower conflict of the Cold War. In the late 1970s, communist insurgents attacked sub-district and district officials, and Bangkok sent soldiers to suppress them (Research and Development Center 1989:148-9). A district officer was killed in one skirmish (Renard 2001:92, Uparasit and Isager 2001:140). The fighters were college students and teachers who had become disillusioned when the military restored control of the national government three years after a democratic uprising overthrew the military dictatorship of Field Marshal Thanom Kittikachorn (Renard 2001:103-4). All hostile activity ceased by 1981 (Research and Development Center 1989:148-9).

Mae Chaem's prosperity had dwindled in the post-World War II era as improved health care lowered infant mortality, and in-migration of non-Thai ethnic groups swelled the population, creating pressure on natural resources (Renard 1981:8-9). In a nutshell, Mae Chaem's modern development is a reaction to these demographic circumstances, as Renard (1981:9) asserted, "The district of Mae Chaem, thus which was one of the most prosperous in all the north of Thailand just three decades ago, today is one of the poorest."

[3] Thailand aligned itself with Japan, which invaded the country on Dec. 8, 1941, although Thailand never declared war on the United States (Renard 2000:116fn). Despite its official stance, Thailand was home to the anti-Japanese resistance movement, the Seri Thai, which was led by many Thai political and military leaders (Banomyong 2000:197-209).

By that time, Mae Chaem drew development intervention to suppress opium production as part of an international war on drugs. Mae Chaem's rugged inaccessibility gave it an advantage in terms of opium grown largely by the Hmong ethnic group in the highest elevations. The lowland Khon Muang increasingly became involved in production by the 1970s (Renard 1988:70).

The Royal Thai Government also took steps at eradicating opium production by partnering with the United Nations Drug Enforcement Program and other international development agencies, including the U.S. Agency for International Development (USAID) (Renard 1988:60-1).

Up until the international development phase of Mae Chaem's history, villagers likely viewed the government as an onerous burden and even acted against its intrusion into their lives. This was evident in the tax revolt at the start of the 20th Century. Later international development assistance demonstrated that government could be a potential source for changing the local living standards. Thus Mae Chaem's links with the outside world intensified at the hands of development agents who directed the effort.

D. The Recent Past

Mae Chaem's relative remoteness is becoming a consumable commodity for the international tourist trade. Mae Chaem offers tourists a seeming bygone era of simpler times. This is explicated in Hargreave's (1998:102) regional tourist guide, "The town is relatively unspoiled by development and the ways of the people are still traditional."

Although Hargreave' s depiction oversimplifies today's Mae Chaem, it is not entirely superficial or impressionistic. Many traditional customs of Khon Muang life still thrive in Mae Chaem, such as local elaborate woven designs, called *tin chok,* that decorate the hem of women's tube skirts, *pha sin.* Owing to its remote location, Mae Chaem is one of the few districts that preserve *tin chok* styles that were once common throughout all of northern Thailand (Renard 1981:9).

According to Prangwatthanakun and Naenna (1990:67), *tin chok* is a very ancient art "that display[s] the status of the wearer and skill of the weaver. In the past every woman could weave." The Mae Chaem *tin chok* comes in two types: 1) a special Khon Muang *pha sin* worn for special occasions, and 2) a garment for daily wear that is adapted from the Lua *pha sin*. The technical requirements of these styles are provided in their book, *Lan Na Textiles: Yuan Lue Lao* (1990).

In fact, the Queen of Thailand recognized this traditional craft and even invited a Mae Chaem seamstress to teach it to her at the northern palace in Chiang Mai (Renard 1981).

III. Non-Thai Ethnic Groups and Demography

This section will give a brief summary of the various non-Thai ethnic groups residing in Mae Chaem District. Each has its own language, culture and agricultural practices. Regardless of those differences, all are linked by their ecological relationships to the Mae Chaem watershed, which they share in common. In addition, all are linked in a common social field. Kunstadter's well-worn comment about northern Thailand's multi-ethnic social system is apt here:

"Historically they are associated, economically they are interdependent, ecologically their cooperation is imperative" (as quoted in Walker 1986:12-15). The section begins with the Lua, who are the earliest inhabitants, and follows with the Karen and Hmong, who migrated into the district centuries later.

A. The Lua

Local legends give accounts about Mae Chaem's first inhabitants, the non-Thai Lua, also known as Lawa, who are an Austroasiatic-speaking group. The 14th Century Chiang Mai Chronicles also mention the Lua, who were said to have been in Mae Chaem by as early as the mid-eighth century (Renard 1981:2, Penth 1977:1). By the mid-19th Century, the large majority of Lua were assumed to have assimilated into either the northern Thai mainstream, or else into the Karen ethnic group, a minority whose current population outnumbers the northern Thai (Renard 1981:5; 1988:19).

These days, just a few Lua villages dot Mae Chaem's highland landscape. Numerous ruins give traces of ancient times when the Lua predominated the landscape. Temple ruins, cemeteries, abandoned villages and stone slabs commemorating former chiefs are evidence of the Lua's past presence here. The district traces its Buddhist heritage to the Lua, as active temples, such as Wat Nyang Luang and Wat Kong Kan, are associated with their past (Renard 1981:3, 1988:21).

B. The Karen

Other non-Thai ethnic groups migrated into Mae Chaem in more recent centuries. The most populous, the Karen, entered the district in the mid-1800s as

they fled fighting between northern Thai and the Burmese (Renard 1988:23). They occupied the mid-elevations where they practiced the pioneering form of shifting cultivation. They also maintained trade relationships with the lowland Khon Muang. They exchanged “wild game, pharmaceuticals, honey, homemade cotton cloth and silver jewelry” (Renard 1981:5). At one point in their history, the Karen even spied for the Chiang Mai court, according to Renard (1981:5).

The Karen once were nomads who moved farmsteads every few years after their farming practices exhausted the soil fertility. Since then, the Karen settled into permanent communities where they developed environmentally viable swidden practices in a 10-year field rotation system (Renard 1981:5). The traditional system is stressed by population growth, expansion of upland and lowland cultivators, and government policy. In the meantime, some Karen are transitioning from the traditional subsistence farming system to cash-cropping. (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:17).

C. The Hmong

A third non-Thai ethnic group, the Hmong, migrated into Mae Chaem just after World War II. They occupied the highest elevations where they produced opium poppy through shifting cultivation methods. The Hmong influx in the 1950s and 1960s pressured the natural environment as they competed for land with the Karen and Lua at mid-elevations (Renard 1981:9). Meanwhile landless lowland Khon Muang on the valley bottoms sought out higher ground, putting pressure on the Karen in the middle. This set the stage for many of the upstream-downstream

environmental conflicts that affect the Mae Chaem watershed users today (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:16-17). Once they were opium producers, the Hmong today largely plant cabbages, which require applications of fertilizers and agricultural chemicals for optimum production. Sediment and chemical runoff from steep slopes potentially threaten stream quality at lower elevations of the watershed (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:25).

D. Demographic Effects

The historical effect of in-migration has affected the ethnic demography of Mae Chaem District. The lowland Khon Muang are a minority group, although they control the civil apparatus and dominate the economy. Figures in Table 2 show that the lowland Khon Muang's proportion of the total population has also been gradually decreasing relative to the Karen. About two decades ago, the lowland Khon Muang were still a fairly sizeable group, comprising about 45 percent of the population compared to 55 percent for all non-Thai groups, out of a total district population of 40,438 (Srikhajon et al. 1985:1, 21). Recent sources indicated the lowland Khon Muang comprise about 30 percent of the population, whereas the non-Thai were about 70 percent (Academic Subcommittee for Amphur Mae Chaem 1998; Northern Mountain Area Agroforestry Systems Research and Development Project 2001).
Although demographic data varies by source, what remains consistent is size of Mae Chaem's ethnic groups relative to each other. The Karen are the most

populous, while the lowland Khon Muang are the second most populous, and the Hmong come in third. Recent data is not available for the Lua or Lisu, as their numbers are so insignificant they are often aggregated with the major groups living at similar elevations.

Ethnic Group	Srikhajon et al. (1985)*	Research and Development Center (1989)**	Academic Subcommittee for Amphur Mae Chaem (1998)	Northern Mountain Area Agroforestry Systems Research and Development Project (2001)[4]
Karen and Lua	---	--	30,842*** (58.3%)	42,900*** (63.2%)
Karen	18,867 (46.6%)	26,646 (52.0%)	--	--
Lowland Khon Muang	18,052 (44.6%)	20,156 (40.0%)	17,668 (33.4%)	18,829 (27.2%%)
Hmong and Lisu	---	--	4,402 (8.3%)***	6,192 (9.1%)
Hmong	2,410 (6.0%)	2,720 (5.0%)	--	--
Lua	1,002 (2.5%)	1,260 (2.5%)	--	--
Lisu	107 (0.3%)	254 (.5%)	--	--
TOTAL	40,438	51,036	52,912	67,921

* data refers to 1980
**data refers to 1987
***data not disaggregated for either ethnic group

Table 2. Ethnic Composition of Mae Chaem District (Various Sources)

[4] These figures were based on data supplied by the International Centre for Research in Agroforestry (ICRAF), and the Ministry of the Interior.

E. Ethnicity, Landscape and Farming

Mae Chaem is typical of northern Thailand, where elevations are associated with particular ethnic groups whose farming practices are specific to the ecological context of soils, climate, flora and fauna. Walker (1992) described this complex of ethnicity and land forms as a "geo-ethnic mosaic."

A summary of land forms and current agricultural practices in northern Thailand follows (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:16-17):

- ***Lowlands***, lowland Khon Muang, 300-600 meters above sea level (msl); dry dipterocarp forest; farming practices include irrigated rice and multiple cropping, homegardens, tree crops and continuous field crops on lowland slopes.

- ***Middle zone,*** Karen, Lua, Khmu, (also Htin, according to Walker 1986:8); 600-1,000 msl); mixed deciduous forest; farming practices include permanent upland fields and shifting cultivation with 3-7 year fallow, shortened from a traditional 10-year fallow system.

- ***Highlands,*** Hmong, Lisu, Akha, Lahu, and Yao; 1,000-1,600 msl; hill evergreen forest and coniferous forest; farming practices include temperate/sub-tropical fruits, intensive cultivation of cabbages, carrots or other high-value vegetables.

Above 1,600 msl are uncultivated areas of hill evergreen and coniferous forests. Higher, at 1,800 msl is moist temperate forest or cloud forest (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:16).

The above agricultural practices have developed from historical sequences in northern Thailand, and they are by no means end points, as they will continue to change. The highland zone has seen the most dramatic change with the virtual eradication of opium poppy production (Renard 2001). Elevations of 1,200 msl are ideal for poppy production (Walker 1986:7). The Hmong formerly practiced a nomadic form of shifting cultivation, known as “pioneering,” by which they cleared large areas of climax forest for poppy cultivation. These days the Hmong are in settled communities where they intensively cultivate cabbages for distribution through national channels. Their farming practices often require intensive chemical and pesticide use that raises concerns about water quality at lower levels of the watershed. Their permanent fields have replaced forests, and the loss has potential negative ecological consequences for watershed services to land forms at lower elevations.

The Karen at middle elevations traditionally practiced terraced paddy production where geography allowed, and shifting cultivation based on a 10-year fallow. Under the traditional system they “take much better care of their land than the pioneer swiddeners,” according to Walker (1986:8). But current pressures of population growth, encroachment from highland and lowland groups, and government policy in general, has reduced the fallow to 3 to 7 years, creating food security concerns among these people (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:17).

The lowland Khon Muang at 300-600 msl traditionally practiced wet-rice production in valley bottoms as well as cultivated homegardens around

farmsteads (Northern Mountain Area Agroforestry Research and Development Project 2001:17). They have intensified paddy production, followed by cash-crop vegetable production. They are expanding permanent fields into forested watersheds as they engage in contract cropping with Thai agroindustrial companies.

CHAPTER 3

LITERATURE REVIEW I: THEORETICAL ISSUES

This chapter will review the theoretical issues pertinent to this dissertation. Agricultural change involves farmers' interactions with the environment as they manipulate nature for productive ends. Anthropological ecology is a field that addresses these kinds of interactions with specific methodologies dating back to the pioneering studies of Julian Steward. The first section of this chapter, then, examines the early anthropological paradigm and a later shift in thinking called, the "new ecological anthropology." The crux of this dissertation is concerned with models of Thai agricultural change. The next section addresses the classic ecological model developed by Lucien Hanks, which adopted ideas of population dynamics from Ester Boserup. However, the northern Thai situation shows much agricultural diversity beyond the irrigated rice production system described by Hanks. In that regard, the following section describes northern Thai swidden systems, and then the plural systems that include gardening. The chapter ends with the more recent geographical literature examining the extent and causes of environmental degradation in northern Thailand, namely, deforestation.

I. Ecological Anthropology

The American anthropologist Julian Steward (1997[1938]) pioneered anthropological ecology with his studies of the Shoshoni hunter-gatherers in the Great Basin region of Utah starting in the 1930s. Steward's approach (1972[1955)], "cultural ecology," sought out regular patterns in subsistence practices in order to write universal laws of cultural development. His paradigm was an adaptation from the earliest anthropological theorists who believed cultures passed through a single series, or "unilineal," stages of development toward civilization based on European standards. Steward was not so ethnocentric to believe that all cultures were headed toward a European ideal of "civilization"; rather, he posited a "multilinear" approach by which cultures developed along various trajectories. He believed cross-cultural studies would reveal some basic patterns based on how people configure their lives to the environment. The essence of these relationships is constructed as a "cultural core," taking into account, economic, social and technological arrangements related primarily to subsistence. The paradigm has been thoroughly debated in the past 50 years, and it would be superfluous here to add to those arguments (Geertz 1970[1963], Tanabe 1994:3-4, Vayda and Rappaport 1968:485-89). Steward and his followers fell short of discovering laws of cultural development. But Steward's methodological contribution is lasting in that anthropologists continue to examine the relationships embodied in his "cultural core" when they take to the field for ecological studies.

Geertz (1970[1963]:6-11) challenged Steward's preoccupation with

subsistence practices as a prime cause for organizing activities in a culture. Rather than isolate certain subsistence activities from the rest of the culture, the ecological anthropologist would be better off identifying the social organization of energy flows through the entire cultural system, Geertz argued. Geertz (Moran 1990:11) called for a biological model that employed the ecosystem as a unit of analysis: “Its merits were eloquently stated: systems theory provided a broad framework, essentially qualitative and descriptive, that emphasized the internal dynamics of such systems and how they develop and change.”

Roy Rappaport’s (2000[1984]) highly influential study of the Maring Tsembaga subsistence system in the New Guinea highlands is the epitome of the ecosystem approach. Impressive for its volumes of quantitative data, Rappaport ascribed cybernetic functions to the Maring religious ritual system, which he claimed regulated their relationships to pig overpopulation, swidden cycles, and also to the Maring’s allies and warring neighbors. In other words, religious ritual was a mechanism that regulated human-nature interactions to the extent of avoiding environmental degradation. Advocates of the ecosystem approach viewed the study as an exemplary application of the methodology, while detractors criticized it for its functionalism (Moran 1990:15). The most scathing critique on functionalist grounds came from Jonathon Friedman (1974), who termed the study as “vulgar materialism.”

On one hand, the pioneering approaches of Steward, Geertz and Rappaport are now termed the “old ecological anthropology” in that they do not address the current world situation characterized by rapid international flows of

energy, people and capital. Or as Kottak (1999:24) put it, “how many groups subsist almost exclusively on local resources?” On the other hand, Kottak overstated the case, as broad economic structures have always been in the backdrop of ethnographic community studies, and anthropologists have recognized their potential for affecting local change. For example, Steward (1973[1955]:56-57) wrote how the Western Shoshoni were drawn “into a relationship of dependency upon American national culture” two decades before Marxist-inspired dependency theory originated from Latin America. Geertz (1963) recognized colonial political economic structures in his analysis of wet-rice and swidden cropping systems in Dutch-controlled Indonesia. Hanks’ (1992[1972]) classic analysis of the Central Plain of Thailand involved the specter of Royal Thai Government policy as well as the international rice trade that affected farmers’ decisions to intensify their wet-rice production.

Kottak (1999:23) hailed the so-called present trend as the “new ecological anthropology,” because it “blends theory with political awareness and policy concerns.” However, the record shows that even the old ecological studies were driven by an applied approach, as the search was underfoot to understand the global scale of social and cultural change in the development ethos of the post-World War II era. Hence, Geertz (1970[1963]:ix) was part of an interdisciplinary team that explored what post-colonial Indonesia needed to do to “take-off” for economic growth. Harold Conklin’s (1957:v-vi) classic study of the Hanunoo, funded by the Food and Agriculture Organization, had the ultimate aim that “improvements to their standard of living should develop naturally among the

people themselves,…" Finally, William Geddes' (1976) classic study of Hmong ecology in Thailand, was among various studies concerned with the problems of opium production in the context of the international drug trade.

The difference between the "old" and "new" ecological anthropology, then, is not a matter of kind as much as it is a matter of degree to which ethnographers address issues of international energy flows, political economy and public policy issues. Intervening between the two paradigms was the Cold War that divided the world into Western and Eastern ideological camps. The ideological divide prevented the rapid free-flow of capital, goods, services and human beings across borders (Friedman 2000). Today the unleashing of global capitalism in a world with few if any boundaries has launched the uncontrolled rush of change to which Kottak refers. The isolated foraging band or tribal horticulturalists studied by the lone ethnographer are no more. They have been immersed into a culture of global proportions set forth by the process of commercialization (Bodley 1999:6):

> In the global culture, the economy assumes an independent existence and economic growth is universally recognized as the highest priority for government policy, even when what is good for the economy conflicts with the interests of particular human groups.

Kottak echoed non-anthropological scholars who argued that the discipline suffered from methodological preoccupation with the ethnographic present, i.e. that cultures were static and bound to tradition. They argued that this paradigm could never account for change, and thus had little relevance to policymakers

interested in doing exactly that in terms of development work. Historian Ronald Renard (1988:160) epitomized this view: “Anthropologists, however, who aim to describe individual small societal groups almost as if they exist outside of time, often find it difficult to accept change or to agree with advocates of change in those societies.” Of course, studies such as Rappaport’s conformed to this characterization. In contrast, the record also shows that many others linked present conditions to the past and also engaged in a higher scale of analysis. This will become clear in the next section in a discussion of Hanks’ (1992[1972]) classic study of ecological change in the rice-growing Central Plain of Thailand.

II. Thai Farming Systems and Ecological Change

Hanks’ (1992[1972]) classic, *Rice and Man: Agricultural Ecology in Southeast Asia,* documented the transformation of rice agriculture from production for household subsistence to a commodity that is bought and sold for cash. As such this was not an inevitable or natural sequence of events similar to the stages of cultural evolutionary development or stages of economic growth. Rather, Hanks 1992[1972]:138) characterized the changes as adaptations, which he defined as “altered relationships between households and their environment.” Hanks (1992[1972]:139) considered an adaptation to be successful if it maintains “in some manner the functioning integrity of these households,” without specifying any qualifying criteria to judge the “functioning integrity.” The fact that households continue to persist, though, is sufficient criteria to judge that an adaptation has succeeded, according to Rappaport (1979:146). General purpose

systems do not have specific goals in terms of a productive output, but their ultimate reason for being is merely to exist in the face of environmental change.

If Rappaport is correct, then, one can quibble about Hanks' precise use of the term, "adaptation." Households on the Central Plain had already successfully adapted because they were self-sufficient in rice, or as Hanks 1992[1972]:121) assured, "No one starved…." Households changed their agricultural practices not merely to guarantee their survival, but rather, they wanted to increase rice production to sell to an impersonal market that had become globalized. The rice economy had become commercialized, and the desire for cash was the source of change. Or as Hanks (1992[1972:121) put it, cash had become the "addicting stimulant of social systems."

What were the adaptations to the environment? Hanks identified three: slash-and-burn, broadcasting, and transplanting (Table 3). Each was associated with particular technologies and impetuses for adoption. Each mode required increased energy inputs as reflected by human-days expended to grow a single crop. Shifting cultivation required 245 human-days; broadcasting, 301 human-days, and transplanting, 430+ human days. The prime mover, though, was population density, and the associated scarcity in land. Farmers were required to work harder on less land to get more output from it, or as Hanks (1992[1972]:66) put it, "At each moment of distress, someone managed to comprehend nature's response to their insistence and reply suitably."

Adaptation	Impetus for Adoption	Ecological Requirements
Shifting cultivation, 1850-1890	• San Saeb Canal opens uncultivated lands • Royal land grants to military and ministers	• Plentiful land • Least labor requirement
Broadcasting, 1890-1935	• King Rama V abolishes slavery • Cultivators dispossessed from Bangkok urban expansion • Government irrigation improvement	• Natural flooding, (no dikes for water control) • More labor required
Transplanting, 1935-1970	• Post-World War I internationalized rice market	• Dike construction • Weed & insect control • more labor required

Table 3. Modes of Adaptation, Rice Cultivation in Bang Chan Village (Hanks 1972)

Hanks' analysis countered the Malthusian thesis that land productivity is fixed, leaving people to starve as population growth outstrips the ability to grow food on it. Hanks argued the converse: increasing population density provided more labor that stimulated technological change and more production. The argument was not new as Hanks 1992[1972]:63) pointed out, but corresponded to the insights published a decade earlier by Danish agricultural economist Ester Boserup in *The Conditions of Agricultural Growth* (1995[1965]). Boserup (1995[1965]:59) argued against the Malthusians' "static geographic theory of land use." Instead, cultivators accumulated a memory of agricultural techniques used in the past, and they utilized those technologies when population density demanded more production (1995[1965]:38-390). If Boserup was correct, then

rural cultivators are not at the mercy of nature's vicissitudes. Instead they have a self-interest and incentive to practice land stewardship, in order to support their households and to maintain their communities, according to Boserup (1995[1965]:21-22):

> The new version of Malthusian theory is based on the idea that the increase of population leads to the destruction of the land; and that people, in order to avoid starvation, move to other land which is then destroyed in its turn. But nevertheless, the neo-Malthusian theories…are misleading, because they tend to neglect the evidence we have of growing populations that managed to change their methods of production in such a way as to preserve and improve the fertility of their land.

As Boserup's theory was a broad sweep that tracked the long-term trends, its application would seem to vary widely depending a specific ecological circumstances and political economic history of a region. However, the relationship between agricultural technology and population density roughly followed Hanks' analysis in the Central Plain of Thailand. In contrast, Boserup's (1995[1965]:15-16) modes of adaptation included various fallow cultivation practices (shifting cultivation or slash-and-burn techniques), annual cropping and multi-cropping, each of which reflected increased intensification under population pressure. Furthermore, Boserup (1995[1965]:56-59) did not view these modes as a sort of natural fit to the local environmental conditions. Rather these modes could co-exist in a given environment, where one eventually began to dominate the farming system as population became denser. As late as World War I, for

example, plow agriculture had co-existed with forest fallow systems in Sweden for 3,000 years.

Another point to be considered is the effect of population decline on agricultural development. Boserup (1995[1965]:62-3) asserted that high losses due to war or epidemics left intensive systems in disarray and disrepair, and the people resorted to fallow systems. A case in point was the decline in indigenous populations in Latin America since pre-Columbian times, resulting in “apparent technical regression” even among European colonists who brought more intensive techniques over from the homeland. With the availability of birth control in developing countries these days, the question remains whether a population that is under control will result in the same consequences of “technical regression.”

Boserup’s analysis largely applied to subsistence agriculture, in which the household was the major consumer of its farm production. The analysis did not go far enough to account for commercialized systems, in which farmers use intense, high-input production practices to raise crops only for marketing purposes. At one level, the analysis makes sense in that people are going to intensify production when there are more mouths to feed in the household. However, to what extent is population a factor when the farming system transitions from subsistence to commercial production, and what role does population increase play, if any, in the continued development of commercialized systems? Boserup (1995[1965]:116-21) acknowledged the existence of industrialized agricultural systems in the United States and Europe, but she

seriously doubted a similar transition would take place in the foreseeable future in the Third World. Until that happened, then, Boserup (1995[1965]:121) concluded the past would still be a guide to the future: “Past experience may therefore still have some relevance for the planning of agricultural growth in the developed world.”

Hanks waded into the theoretical waters left uncharted by Boserup, because the history of the village he studied, Bang Chan, was a transition toward a capitalist, market oriented agricultural system. As stated earlier, Hanks provided compelling data that population density as a prime mover, and ranked alongside is the cultivator’s ultimate desire for wealth accumulation, or “the transforming element was cash.” (Hanks 1992[1972]:138). However, Hanks was not as entirely reductionist as Boserup. He acknowledged that the world of the rural cultivator is a sort of patchwork of competing and coinciding interests that exist among households and also beyond their control: “The active agents that instigate change are as many and as complex as the social system itself. Many so-called causes operate in the same way as do their apparent opposites” (Hanks 1972:154). As cited by Hanks, the elements of change are:

> ***Regularities*** (Hanks 1992[1972]:151-2): a “versatile household” that was able to expand and contract given the fluctuating labor requirements for rice production.
>
> ***Agents of change*** (Hanks 1992[1972]:152-4): technologies required for producing rice in the floodplain; land shortages and overpopulation; fluctuating prices of the international rice trade.

> ***Contingencies*** (Hanks 1992[1972]:154-6): interaction of random coincidences of history and geography all impinging upon the farmer's decisionmaking in the ecosystem, i.e. availability of thousands of years of rice production techniques from China, household decisions about human labor expenditures and technology adoption, globalizing rice trade, relative political stability of the Thai state, fairly regular flooding of the Chao Phraya River basin, human migrations from Bangkok, and later urban sprawl of the metropolis.

Whereas Boserup's analysis was deterministic, then, Hanks' was more holistic as he considered all factors, no matter how remote in time and space, that result in the particular circumstances of a farming system. Hanks used compelling evidence to support Boserup's theory, and one could argue it was a main mover in his model of agricultural transformation in the Central Plain. But as a researcher trained in ethnographic field methods, he considered population growth within a context of cultural, social, and political economic and even the religious life of Central Plain' cultivators.

III. Northern Thai Farming Systems

This section will explore the diversity of farming practices in Thailand. Whereas Hanks' classic study examined irrigated rice production on the Central Plain, farmers engaged in other kinds of practices in different environmental regions of the Kingdom. In particular, this section looks at northern intermontaine valleys where Judd (1961) found a Thai community based entirely on swidden methods on the hillsides. Another study by Marlowe (1969), showed much diversity within a wet-rice community, where farmers grew cash crops in addition to rice, and they also cultivated produce in gardens.

A. Swiddening

A well-cited anthropological study by Church of Christ missionary, Laurence C. Judd (1961) bears discussion because village studies by Hanks (1992[1972]), Kingshill (1965), Moerman (1968), and Tanabe (1994) focused on wet-rice production, while tremendous diversity existed depending on the region. Judd (1961:6-7) estimated that only 4.5 percent of the land was suitable for wet-rice production in the narrow valley bottoms of Thailand's eight largely mountainous northern provinces. At least 90 percent of northern Thailand was either government classified forest or unclassified land (presumably forested), which theoretically offered lowland Thai farmers an expansive area for clearing swidden plots for additional rice production. In fact, Judd estimated that 1 million northern Thai farm households—about two-fifths of the ethnic northern Thai population—used swidden practices, either regularly or occasionally. More than 90 percent of the adult residents were swiddeners at Judd's field site, Commune Baw, in Nan Province (1961:133). Swiddening was so important to the northern Thai, Judd (1961:5) asserted that it was "a significant element" in their farming systems.

Boserup and Hanks downplayed the deterministic effect of the environment in farmers' choice of farming system. They assumed that the environment was variable enough to allow farmers to adjust their practices in order to get more human-hours of labor of production into their system. Judd did not overtly challenge those assumptions. But in retrospect, his study showed the environment does matter, as the amount of arable lowland available for intensive

wet-rice production was limited in Commune Baw. In theory, then, if population increase stimulated intensification, northern Thai farmers had very little arable bottom land suitable for intensive practices.

Judd's study in the mid-1950s was highly regarded, but for a different reason. It was often assumed (Pelzer 1948:28) that only non-Thai ethnic groups employed swidden methods to any extent. Following Harold Conklin's (1957:3) classification of swidden systems, Judd (1961:6) categorized one-half of northern Thai swidden systems as "integral," which was the core production practice deeply related to the culture, and within this category, the northern Thai employed "established" systems, which were considered to be environmentally viable. The other half were "partial" systems, following the Conklinian typology, which are temporary and destructive practices of inexperienced farmers.

Judd's (1961:5) stated intent, then was to contribute to understanding northern Thai rural society because previous studies were based in the Central Plain around Bangkok where irrigation is the main mode of production. The study is rich in technological description as it contains a detailed monthly work schedule of swiddening activities. But it is not a classic ecological study as it delves into swiddeners' cognitive valuations with the apparent motive to evaluate the northern Thai's receptiveness to change based on Western values. Judd (1961:340) described the northern Thai swiddeners' cultural outlook by their:

> swidden-type agriculture; hamlet cohesiveness and ownership of land, rice, both as the important food and as the symbol and proper measure of wealth; satisfaction with a technology based on locally available resources; and proper spirit propitiation.

Judd's study preceded Boserup's formulation of her population thesis. The only population issue identified by Judd (1961:357) was that its increase was forcing households to locate swidden sites so far from the village "that a large amount of time is wasted in commuting to work." Instead, Judd anticipated change based on external factors either imposed or available to Commune Baw residents. Among them were a new national law banning swiddening that was expected to have future influence, depending on the "thoroughness and speed" of government enforcement (Judd 1961:356). Other influences were government land titling programs, imposed community development programs, and greater access to education.

Consistent with Hanks, though, was the emerging cash economy in a largely subsistence culture, which stimulated rising desires for permanent housing and manufactured goods (Judd 1961:360-1). Interestingly enough, Judd (1961:360) associates the rising material expectations to the influence of Buddhism, Christianity and "urban value systems." By identifying external change agents, Judd's study contrasts to the closed-systems approach of Rappaport. But the study also escapes Kottak's (1997:25) critique that it is the "new ecological anthropology [that] must be appropriate to the complex linkages and levels that structure the modern world," as Judd was studying those linkages four decades earlier. Nevertheless, the study is straightforward and pragmatic, rather than theoretically significant.

An overlooked, but valuable contribution of Judd's study is its ethnographic detail of gardening practices, the most extensive in the

ethnographic literature up to that time. Hanks (1992[1972]:121, 127, 140-1) only discussed home gardening in scattered passing references. Judd (1961:178) outright dismissed gardening as a “supplementary” occupation, but he (Judd 1961:131-2) did recognize the importance of garden produce at meals, which was the source of his dietary data. In fact Judd (1961:131-2) concluded that “…it can be seen that the Commune Baw villager eats surprisingly well. Although he does not have the wealth of the Bang Chan villager, he does have many food resources.”

In making that later statement, Judd inadvertently addressed an important issue in development, or planned change. A capitalist development model based solely on wealth creation may ignore or negatively affect other important aspects of community well-being, such as health, nutritional status or the local ecology. In other words, if something is not wrong, it does not need fixing. Indices of development cannot be confined narrowly to one set of criteria, but must include a host of factors to judge the peoples’ quality of life. Taking a holistic approach, then, one must consider whether the trade-off is worth the intervention, which is a moral/ethical issue if the people are not asking for change in the first place. Food abundance did not seem to be a problem at Judd’s field site despite the lesser level of economic development. So the questions that should confront any development professional are: does the target group really need “development” as characterized by foreign models, and if so, what aspect of their lives is it expected to improve, and how can we preserve the positive aspects of traditional lifestyles that do not need “development”?

According to Judd (1961:178-9), gardening occurred: 1. in the swidden, 2. in the hamlet where it was done on house porches, and 3. near the house or on the riverbank, and in the jungle by carefully harvesting plants to insure future yield, or in commercial orange orchards. Thus gardening showed the diversity within Thai agriculture in general, but Judd did not link it to household organizational forms or to any other level in the social structure. It is a credit that Judd recognized the contribution of gardening to northern Thai nutrition, but he does not go into much detail about its social and ecological ramifications.

Judd's restudy in 1987 (30 years after the initial study) found that swiddening had given way to commercial orange orchards as the major form of agricultural production, or as he put it: "Due to the spread of orchards, it has become harder and harder to find swidden sites, and fewer are being planted." Depending on the hamlet considered, from 25 percent to 90 percent of households had orchards, and one hamlet even formed an orange growers' association. One reason for the change was the income potential from cash cropping, compared to subsistence swiddening, and secondly, that it was harder to find suitable swidden sites nearby as hillsides were converted to orchards (Judd 1987:29).

What Judd left out of the analysis, though, was the effect of an all-weather road, which he mentioned elsewhere (Judd 1987:1), on the farmers' adoption of orchard farming. It was conceivable the road linked the once-isolated community with marketing centers for farmers' produce. Without the road, then, farmers

would have no incentive to transition from subsistence practices to cash-cropping.

The change to cash-crop orchard production was associated with a change in farmers' outlook and social relationships as well (Judd 1987:28-9). Farmers did not yearn for the "good old days" of swiddening, and gone was a social cohesion based on local codes of natural resource management. Instead, Judd (1987:28-9) found "the increased attachment to material possessions," and social differentiation based on accumulation of personal goods, and "workaholic individualism" (Judd 1987:31). The ideological change also had religious implications, as it contradicted basic tenets of Buddhism that stress self-denial.

The value of Judd's study then was in its pure ethnographic description that widened our knowledge of Thai farming systems, which were often assumed to be based only on rice irrigation. In addition, it further widened our knowledge beyond rice production and looked at other sources of household subsistence, i.e. gardening. This is important, because a subsistence system should be described according to all of its parts, and dwelling on rice alone misses other important pieces that can contribute to the overall welfare of the people. In agreement with Hanks, though, Judd documented the impetus of an emerging cash economy that raised farmers' expectations for material goods and wealth accumulation.

B. Plural Systems

An obscure, but instructive article by anthropologist Gertrude Woodruff Marlowe (1969) cautioned against treating northern Thai farmers as if they were

exclusively rice growers. Instead, Marlowe (1969:15) elaborated upon the "economic variety" in her study of the lowland Khon Muang village, Ton Kwen, south of Chiang Mai. Like Judd, Marlowe also recognized the important of *suan* or garden production, in addition to rice and cash-cropping in irrigated fields, or *naa.* In addition, she reported on the emerging non-farm wage labor market as well as crafts and household marketing activities. Each household may or may not have been involved in each of these activities, so Marlowe pointed out that it is difficult to think of lowland Khon Muang agriculture as a single system. In fact, Marlowe (1969:16) reported extensive variation between other Khon Muang villages as well, and that farmers were well aware of the distinctions. Marlowe argued for studying subregional differences within each ethnic group in the culturally diverse north. Marlowe's insight is worth heeding in a region where agricultural systems are described in the context of a particular ethnic group, i.e. Karen farming practices, Hmong farming practices, etc., when intra-ethnic systems may exist. According to Marlowe (1969:16):

> If the traditional view of [lowland Khon Muang] villagers as paddy farmers persists, planners will have an unrealistic picture of the lowland economy and the points of articulation between it and that of the hills, as well as an incomplete view of the wide variety of economic opportunities exploited by rural North Thais

One form of variation in Ton Kwen was in household access to land, consisting of these categories: owner-cultivators, landlords, sharecroppers, renters of land for tobacco growing, and more importantly, various combinations of these. For example, an owner-cultivator might also be a landlord, or in another

case, an owner-operator could also sharecrop and rent land for tobacco (Marlowe 1969:18). In some cases, landlessness was not a diagnostic for household poverty. Marlowe (1969:18) reported that some sharecroppers got higher annual returns by working large land tracts compared to farmers owning smaller holdings. In addition, the landlord "class", so often decried by Marxist theorists (Turton 1976) as exploiting the poor, often consisted of elderly widows renting their holdings to a family member. Still Marlowe (1969:19) overstated her case, as 33 percent of the households were landless and had absolutely no access to land, indicating a systemic land access problem. Their only participation in rice production was as day laborers "if at all" (Marlowe 1969:18).

Marlowe pushed her insight further by elaborating the household land-use patterns for *naa* concerning the extent of subsistence and cash crop production. In other words, farmers with access to land might or might not grow rice and/or cash crops. The main cash crop was tobacco, contracted by a company, although some farmers grew it in place of irrigated rice in the rainy season. Other cash crops, in order of importance, were peanuts, soybeans, onions and garlic, the last two also consumed by the household.

The second major land-use type, *suan*, "is everything that is not *naa*," according to Marlowe (1969:20). Marlowe acknowledged its importance not only in the village economy, but also in farmers' psychological outlook as a marker of household prosperity, particularly those *suan* planted in the lucrative *lamyai* fruit. Households either consumed garden produce or else marketed it for cash income. *Suan* land types included orchards separate of the house site, *ti suan*, or

homegardens at the house site, *tii baan*, according to Marlowe (1969:20). Species planted at either site were mango, areca, durian, coconut, papaya, banana, *phak la*, and bamboo.

Although Marlowe recognized *suan* as an important land-use type, it was not given that all lowland Khon Muang households had access to a *suan,* either as an orchard or a homegarden. This point built her case for describing the "economic variety" in a northern Thai village. Only 29 percent of households in Ton Kwen owned a house site, in addition to *suan* and *naa,* whereas 28 percent owned a house site without either *suan* or *naa.* Eleven percent owned a house site and *suan* only, while 12 percent owned a house site and *naa* only. Eight percent owned no house site, but still farmed either a *suan* or *naa*, or both, while 13 percent had no land of any kind.

Whereas agriculture was a major occupation in Ton Kwen, off-farm employment was an equally significant category of economic activity, according to Marlowe (1969:23). So much so, Marlowe (1969:23) argued, "Ton Kwen *is* a labor pool," which had implications for coordinating household labor between fields and off-farm employment. Residents migrated to work in stone quarrying, construction and rural laboring, while some did carpentry work in the village. For other jobs, others commuted to the northern regional center, Chiang Mai, where they worked in teaching, gardening at the famous Buddhist temple at Doi Suthep, zookeeping, and hairdressing.

Marlowe's paper was a preliminary report on an 18-month study; it did not detail the relationships between farm labor, off-farm labor, and the various ways

households organized labor to perform those categories. Unfortunately she died after the fieldwork, and published nothing else on the subject (Anthony Walker, personal communication, Aug. 23, 2003). But Marlowe (1969:24) did observe the trend that both wage labor and agriculture were expanding, the latter into cash-cropping, and the potential existed for competition between both spheres. Nevertheless, Marlowe (1969:24-5) argued for an in-depth study of the many economic activities of the lowland Khon Muang:

> Each economic activity, even each crop, has its own system of organization, and one household usually participates in several of these systems. A great deal more research needs to be done on the character of these systems, their inter-relationships, their extent and growth potential in each region, so that knowledge of them can be fully utilised in planning for economic development in both hill and plain areas.

C. Thai Farming Systems in Retrospect

While ecological anthropologists searched for a big theoretical picture to explain household farming ecology, especially, in Southeast Asia, they left out important pieces of the puzzle. These questions come to light when examining the purely ethnographic work in lesser-known studies. Hanks focussed on the big picture of population density and agricultural intensification, assuming that land productivity was unlimited. Although Judd did not squarely ask the question, his work begged it: is intensification possible if the land, i.e. hillside swiddening areas, is not suitable for it? A restudy after 30 years gives a different kind of "yes" to this question. Households had intensified their production on the hillsides, but not in swidden plots. Instead they had transitioned to intensive

cash-cropping production in the form of orange orchards. And then the transition was not inevitable, as it depended on infrastructural improvements, i.e. roads for marketing products from the once-isolated village. Otherwise one can assume that out-migration or else fertility control would have been the only ways to avoid overuse of swiddening areas.

Marlowe, on the other hand, expanded our knowledge of northern Thai agriculture by describing other land uses beyond irrigated rice. This included gardening lands, or *suan*, which "is everything that is not *naa* [irrigated rice fields]" (Marlowe 1969:20). Marlowe argued that northern Thai agriculture could not be depicted by a single pattern of land use, rather, there was much variability between households and between villages. This is an important point, as development planners in northern Thailand classify farming systems by ethnicity, as if every household in the ethnic category is doing the same thing. It also begs the question about the Boserupian thesis regarding population density and whether intensification occurs beyond the production of staple crops in a particular culture.

In general, though, the ethnographic studies of Thai agricultural change showed a trend towards commercial cropping, as infrastructure developments opened farmers' access to markets, and political economic structures immersed them in the cash economy of global proportions. The outcome was that farm households' material expectations rose, but they were also left vulnerable to the boom-and-bust cycles of a market economy. In addition, villages became more stratified as farm households moved from subsistence to production for the

market. In fact, this development prompted a Marxist critique of the social inequity of economic change in northern Thailand (Turton 1976).

IV. Deforestation in Southeast Asia

As this dissertation is concerned with upland land uses, this section will review the literature on land use conversion that has resulted in deforestation in Southeast Asia. Due to methodological differences, studies vary on the amount of forest cover loss in Southeast Asia. Yet, the studies do confirm an extensive amount of forest loss in the latter part of the 20th Century. It is tempting to blame poverty and overpopulation for environmental degradation. However, the literature argues that deforestation is the result of national development policies that have encouraged farm households to expand agricultural production into hilly areas.

A. Estimating the Extent of Forest Loss

In a survey of cartographic maps and published figures, geographers Stephanie Bernard and Rodolphe De Koninck (1996:2-7) concluded that Southeast Asia had the world's "highest" deforestation rates in the latter part of the 20th Century. The survey estimated the region lost more than one quarter of its forest cover from 1970 through 1990, although percentages varied by country. Vietnam appeared to have the highest loss of 70 percent compared to a minimum of 17 percent for Indonesia. However, accuracy of the assessments was a problem, as the geographers (Bernard and De Koninck 1996:8) reported "discrepancies and inconsistencies" apparently due to methodological differences in the studies. In addition, the survey found differences in the way each study

defined "forest" and "deforestation" given that secondary forests may be in various stages of regeneration (Bernard and De Koninck 1996:3). Other geographers, Lesley Potter (1993:106) and R.A. Cramb (1989:31) reported similar methodological problems in assessing extent of forest cover in Southeast Asia.

Thailand ranked among the "the most intensely deforested" among eight countries listed in the survey. Between 1970 and 1990, Thailand had lost 41.7 percent of its forest cover with 106,900 km^2 remaining. Also in that category were Vietnam, as already mentioned, and the Philippines. Vietnam had lost 68.8 percent of forest cover with 124,820 km^2 remaining, while the Philippines lost 56 percent of its forest cover, or 83,980 km^2 remaining. Bernard and De Koninck (1996:6) also cited that the Food and Agriculture Organization (FAO) showed similar trends, but gave more conservative numbers. These three countries also had the least amount of forested land as a proportion of national territory of all states in Southeast Asia by the late 1980s (Bernard and De Koninck 1996:6). The percentage given for each country was: Thailand, 24 percent, Vietnam, 17 percent, and the Philippines, 22 percent.

Another source, the Northern Mountain Area Agroforestry Systems Research & Development Project (2001:9) showed comparable, significant declines in Thailand's forested area for the same time period. The Project showed that forest cover declined from 54 percent of the national territory in 1960 to 25 percent in 1998. The northern region, where Mae Chaem District is located,

saw forest cover decline from 69 percent of the region in 1960 to 43 percent by 1998, according to the Project (2001:9).

The figures from Southeast Asia reflect the spectrum of development strategies and political systems in the late Cold War era. Thailand and the Philippines followed capitalist economic models under dictatorial regimes, while Vietnam followed the command economy approach of communist states aligned to the former Soviet Union. Yet in each case, the result was the same: accelerated forest losses as these nations exploited natural resources for national development. Although political ideologies differed among these countries, the ideology of development was the same, i.e. to view forests as an extractive unlimited natural resource to serve the rational "modernization" of the nation-state. For example, Vietnam resettled lowland farmers from crowded lowland areas to the highlands, all in a rational attempt to achieve national development (Evans 1992). The resettlement scheme turned out to be a sort of Wild West land-grab resulting the disastrous environmental consequences.

In Thailand, deforestation was the result of commercial development of highland areas in terms of heavy logging, which was banned in 1989, and agricultural expansion from the 1960s on (Northern Mountain Area Agroforestry Systems Research & Development Project (2001:8). Agricultural expansion included subsistence production to feed an increasing population as well as cash-cropping to feed export markets. However, another body of literature showed that these are just proximate causes—symptoms—of larger historical processes at work that lead to deforestation.

B. Dynamics of Deforestation

So what caused the extensive retreat of the forest in Southeast Asia, and more particular our area of interest, Thailand? Geographers De Koninck and Steve Déry (1997:14) concluded that deforestation resulted from agricultural expansion without demographic pressures. Thailand represented a “unique case” compared to other Southeast Asian nations where demographic pressure was associated with deforestation. As evidence, De Koninck and Déry argued that population increased six- to seven-fold (to 55 million) while agricultural land put into production increased eleven-fold, for the period from 1910 to 1990. Thus deforestation could not simply be a response to demographic pressure as agricultural expansion outpaced population growth. Secondly, there is evidence to show that Thai farmers increased rice production by putting more land into use rather than intensifying production on existing lands. The consequence was that Thailand’s rice yields increased only 5 percent from 1980 to 1991, whereas Indonesia and Vietnam saw increases of 34 percent and 50 percent, respectively.

Finally De Koninck and Déry (1997:16) argued that Thailand’s agricultural expansion was the spontaneous effort of individual farmers, and not the result of government-sponsored migration programs as in the Philippines, Indonesia, Vietnam and Malaysia. To some extent, the Thai government encouraged peasants to settle in peripheral areas of the north and near Burma, but the government did not direct land colonization programs, which resulted in mass migrations to less densely populated areas. Basing their argument on the

research of Harald Uhlig (1984), De Koninck and Déry (1997:20), pointed out that the private sector sponsored and financed agricultural expansion for the purpose of obtaining timber and cash crops. If that were the case, then one would have to argue that expansion was not as “spontaneous” as De Koninck and Déry asserted. Rather, commercial interests organized a process that engaged peasant labor to exploit the natural resource base.

The expansion process diversified Thailand’s agricultural production from primarily a rice monoculture. The proportion of land planted in rice fell from 98 percent in 1920 to less than 50 percent in the late 1990s. The crops that surpassed rice were rubber, cotton, tobacco, soybeans, maize, cassava and sugar cane. The consequence of this development was “a relatively well-balanced population distribution,” compared to other Southeast Asian countries, where population densities vary considerably by region (De Koninck and Déry 1997:20).

The process of agricultural expansion has had consequences in terms of the environment, namely deforestation, argued De Koninck and Déry (1997:25). Cultivators cleared land to grow cash crops, as well as to engage in inexperienced forms of subsistence production, i.e. slash-and-burn agriculture. A belief persisted that ethnic minorities’ traditional slash-and-burn practices were deforesting upland areas. But De Koninck and Déry (1997:25) argued that minority groups’ traditional practices tend to be environmentally sound compared to expansionist farmers who are inexperienced in employing the techniques in a new, unfamiliar environment.

While Koninck and Déry viewed agricultural expansion as a bottom-up decision made by individual farm households, geographer Philip Hirsch (1990:32) emphasized the Thai government role in promoting it. Or as Hirsch (1990:38) succinctly put it: “Historically [forest] settlement was directed by the state.” Agricultural expansion was the result of historical changes in the Thai political economy since the late 19th Century, Hirsch argued. Hirsch pointed to the expanding Thai bureaucracy that instituted policies to incorporate peripheral, i.e. forested, areas into the mainstream polity governed from Bangkok.

These sorts of policies can be traced back to the late 19th Century, a canal building program opened the Central Plain for expansion of rice cultivation. Next came railway building that connected Bangkok with the North, Northeast and the South in the early part of the 20th Century. A more recent spate of infrastructure developments has been roadbuilding, stemming out of Cold War security concerns beginning in 1950s, supported by the U.S. Operations Mission (USOM). New roads provided military access to strategically sensitive areas, at the same time opening up remote areas to national markets, thus giving the impetus for cash-cropping (Hirsch 1990:50).

However, changes in the structure of the political economy were also international in scope (Hirsch 1990:32-33). Thailand integrated into the international capitalist economy starting with the Bowring Treaty that opened the Kingdom to foreign commerce in 1855 (Hirsch 1990:32-33). As a result, farmers expanded their production beyond levels of mere household subsistence in order to meet the world demand for rice. This is also consistent with Hanks

(1992[1972]:138): “For Bang Chan, the transforming element was cash, the result an infatuation with the market. But out of the narcissism of consumer buying there arose producers of rice for unseen persons in a distant land.”

In an earlier article, Hirsch, (1987) disputed the neo-Malthusian argument that rural poverty and overpopulation caused deforestation, as people are assumed to have moved on to degrade fragile ecosystems after exhausting the natural resources of their traditional subsistence base. Hirsch (1987:29) countered that deforestation resulted from complex factors, which he termed “a particular development dynamic” based on an economic growth and national security issues. On the surface, Hirsch’s argument appeared to be counter-intuitive as it is often assumed that “development” broadly defined is a positive process that promotes peoples’ welfare by raising their standards of living. On the other hand, an economic growth model consumes enormous natural resources in order to satisfy the raising material expectations of society. Hirsch (1987:134-136) cited three main factors in this dynamic:

> ***Unequal development***: Thai government policy favored urban populations and rural elites, resulting in widening income inequalities with the masses of rural residents. Newly prosperous groups demanded wood products for furniture and house construction, thus stimulating logging in the Kingdom’s forests.
>
> ***Agricultural Expansion:*** Agricultural diversification occurred by expanding into forested areas rather than by intensification of paddy production. Smallholders diversified their production into crops such as kenaf and cassava in the Northeast, sugar cane and cassava in the East, maize and sugar cane in the West, and maize in the Lower North. In many cases,

> this process was financed and supported by ethnic Chinese entrepreneurs.
>
> ***National Security:*** Consolidation of peripheral areas for national security purposes is a theme running through Thai history dating back to policy reforms of King Chulalongkorn in the late nineteenth Century. Road and railway construction was the means by which Bangkok consolidated its grip on outlying areas. In the modern era, road construction provided military access to areas controlled by the Communist Party of Thailand (CPT), particularly in the Northeast.

Hirsch (1987:137) also addressed the cultural meaning that the Thai attach to the word, "forest," or *paa,* and its Khmer derivative *theuan*. These words imply a notion of "danger and backwardness," and *paa,* more specifically, can mean wild or remote from civilization. In local contexts, then, "development," or *kaanphatthanaa* reflects a mission to transform those areas into an agricultural state that is "civilized" in the eyes of Thai cultivators. Thus the process of development is a process of forest clearing as rural households transform the landscape into what they consider culturally appropriate for their use.

Hirsch's cultural interpretation coincides with a Marxist (1961[1844]:71) view that people construct human-nature relationships in terms of their dominant ideology. Anthropologist J. Stephen Lansing (1991:9, 1993:98) applied this kind of analysis when he referred to the "engineered landscape" in his study of the Balinese irrigation system. According to this view, the transformed landscape is a mirror image of the people cutting trees and moving earth, the product of a people's vision of what is right and proper. Or as Lansing (1993:98) put it, and

referring to Marx (1961[1844]:71): “in the process of reshaping nature, society gradually reshapes itself.”

V. Literature Review—Discussion and Conclusion

The ecological literature from Southeast Asia clearly refutes Kottak’s (1999) argument that the “old” ecological anthropology was concerned with closed systems and functional interpretations of cultural practices in those ecosystems. Definitely Rappaport’s influential study of the Tsembaga Maring in Highland New Guinea fits Kottak’s critique, as they were a fairly isolated, self-sufficient tribal people. If anything, this was a methodological issue, as Rappaport chose an approach that was appropriate to his problem.

Anthropologists elsewhere in the region were studying peasants, a different sort of social type compared to the Tsembaga Maring. Peasants are defined by an asymmetrical power relationship with state structures and urban centers, which necessarily require a broader analysis outside the immediate farming ecosystem. As such, the literature was concerned with change, as farmers adjusted their practices to survive in changing political economic conditions that have increasingly become global in scope.

In addition to studying change, the literature from northern Thailand was concerned with diversity of farming systems. While it is tempting to narrowly characterize the Thai as only wet-rice cultivators, Judd described a farming system focused on swidden rice production. Judd and Marlowe, to a larger extent, also presented ethnographic data about gardening, which is barely addressed by other studies of the region. This is important because the Thai do

not live on rice alone, even though the Thai emphasize rice in their cultural symbols and rituals. For example, “to eat a meal,” or *gin khao*, literally means, “to eat rice.” However, Thai cuisine is also widely characterized by its spiciness, thanks to the chilies that households raise in their homegardens. The process of ethnographic discovery, then, takes the researcher beyond what is publicly stated in order to find deeper meaning within the culture. Judd and Marlowe began to fill the gap by giving a more complete picture of Thai subsistence practices that included garden production. Their analysis did not link social variables of the household, such as composition and division of labor to garden production, however.

The latter section of this literature review dealt with deforestation in Southeast Asia, and focussing on proximate causes within the context of the Thai nation-state and international political economy. The literature is more recent, taking into account enormous destruction in Thai highland ecosystems in the post-World War II era. It is necessarily more recent, because deforestation is the end result of a “particular development dynamic” (Hirsch 1987:130) that coalesced in the very late 20th Century and continues today. With the end of the Cold War and the unleashing of international flows of capital into this development dynamic, we can expect the effects to have accelerated since the literature was published.

A common theme running through both the anthropological and geographical literature, then, is that emergence of a cash economy has been an important impetus for change, Boserup notwithstanding. Unfortunately, the

literature only gives a diagnosis and provides no prescriptions to the ecological problems. At this juncture, the policy concerns are: 1) whether accelerated capitalist development can be conducted compatibly with environmental quality, 2) whether accelerated capitalist development leaves no choice but to destroy the environment, and 3) what role can cultural norms and values play in managing local ecosystems, if any. In that regard then, the literature has yet to "devise culturally informed and appropriate solutions to such problems and issues as environmental degradation,….", which Kottak (1999:25) regarded as the hallmark of contemporary ecological studies.

CHAPTER 4

LITERATURE REVIEW II: DEVELOPMENT IN MAE CHAEM DISTRICT

This chapter will describe development efforts to direct social, cultural and economic change in Mae Chaem District, all intended to improve the standards of living of the many ethnic groups living there. Funded by Royal Thai Government, international, non-governmental and religious organizations, these programs intended to raise incomes, and make educational, health, nutritional and infrastructure improvements, all the while conserving the natural resources for the benefit of the people.

The success of development programs in achieving the stated goals was mixed. However, their long-lasting, pervasive effect was increased interaction between Mae Chaem's cultivator communities and the urban centers of influence beyond the mountains. Regardless of any measurable improvements, Mae Chaem was no longer relegated to the periphery, or as an "unimportant backwater" (Renard 1981:1). Instead, Mae Chaem is now irretrievably integrated into the larger Thai society while intensifying its linkages with the international economy.

I. Historical Trends in Development

Mae Chaem's 30-some years involvement with the development process reflects the historical trends in thinking in international development. According to a development scholar, Everett Rogers (1995:126), early development programs were top-down technology-transfer interventions modeled on the United States' and European industrial experiences. These programs were inappropriately applied to developing nations in order to create "*economic growth* through industrialization" (Rogers 1995:26). A shortcoming of this paradigm, was that organizations directing the change were assumed to have superior expertise for "developing" a targeted population without considering local wants and needs. Development agents blamed rural cultivators for being too traditional if they did not adopt the technology. Rogers subscribed to this "blame assignment syndrome," in the early versions of his influential classic, *Diffusion of Innovations*, first published in 1962, according to Agunga (1997:105).

By the fourth edition (1995) of his tome, Rogers redefined development as a partnership involving two-way communication between peasant farmers and development experts. No longer were peasants considered to be passive recipients of "goodies" from a development package, but rather, they were to be involved in a participatory approach. This new conception also paid attention to the equitable distribution of benefits to the rural poor because the earlier paradigm tended to favor the urban elite with superior access to sources of development aid. As newly conceived and currently applied, then, development, according to Rogers (1995:127) is:

> a widely participatory process of social change in a society intended to bring about both social and material advancement (including greater equality, freedom, and other valued qualities) for the majority of the people through their gaining greater control over their environment.

One might quibble that “control over their environment” justifies the destruction of natural ecosystems for the sake of making an economic profit. However, “control” can be interpreted to mean careful regulation to conserve resources for future users. Secondly, “environment” can include human social systems rather than simply natural ecosystems. A good example was the October 14,1973, student revolution that overthrew Thailand’s military dictatorship (Renard 2001:104-5). These students took control of their political environment resulting in a new relationship between the people and the state. Their success was short-lived. The military regained control of the national government three years later. Mae Chaem was not immune from the aftereffects. Students took to the hills where they waged a low-level communist insurgency against the government.

Early development programs in Mae Chaem applied the classic technology-transfer approach to the Hmong, by introducing substitute crops to as replacements for opium. These were top-down extension projects assumed growers would imitate farming practices in demonstration plots as an alternative to opium. In time growers did shift away from opium, but they did not adopt crops promoted by these programs. Instead they adopted highly profitable cabbages, which they learned about independently of any directed change program (Renard

2001:61-2). However, the development programs had set the stage for change by teaching them new technologies that could be applied to cabbage production, i.e. the use of “chemical pesticides, gravity-fed sprinklers and stone retaining walls” (Renard 2001:62).

Rogers’ embrace of the participatory approach reflected a paradigm shift in international development in the last decade of the 20th Century. Participation was viewed as a needed corrective to the coercive, top-down technology-transfer approach that had failed to deliver its promises. Donor agencies rushed to include “participation” in project designs, even though it was still a relatively new, untested paradigm, according to development anthropologist Robert E. Rhoades (2000:238). Worse yet, the paradigm was expected to deliver results in poorly conceived complex, multi-objective watershed projects involving various institutions. These interventions were known as “integrated watershed management” projects. In other words, the new paradigm was expected to deliver all things to all people without much thought about its limitations. Instead, the paradigm was putting a cosmetic, supposedly human face on the methods it is was supposed to replace. In the real world, the paradigm emphasized “donor or researcher demands instead of local needs” (Rhoades (2000:330).

Rhodes had misgivings because he wanted to see the paradigm properly applied so it would reap results. He was worried that poorly planned projects would doom it to the “graveyard” of bygone development trends (Rhoades 2000:300). Rhoades (2000:331) saw the paradigm’s applicability to watersheds because of the sheer proportion of the world’s population living in upstream-

downstream relationships. A watershed approach moved development research beyond the study of crop components and broadened “the analytical framework to encompass cross-ecosystem linkages” (Rhoades 2000:331). In other words, it provided common ground for interdisciplinary research across the biological and social sciences.

Critics argued that watersheds are not natural sociocultural entities, making them inappropriate units of analyses (Rhoades 2000:332). The boundaries of human communities and organizations are rarely congruous with the biophysical structure of the watershed. Rhoades (2000:332) described this as a “messy overlay,” but he was confident that participation would bring all parties to the table to make it coherent. Participation would bring together the disparate methodologies of social and biological scientists into one analytical framework, along with donor agencies and governments, while giving local people a say in project design and implementation. The goal was to create interaction among all involved so that issues could be brought to the forefront that would eventually influence policy makers.

Despite the promise of the paradigm, Rhoades identified four conceptual and four implementation pitfalls in bringing participatory multipurpose watershed projects to fruition. The conceptual pitfalls, according to Rhoades (2000:335-337) are:

> **Reinventing the Wheel:** failure of development practitioners and project managers to learn from mistakes made in prior projects.

Scale: failure to integrate temporal and spatial scales into a common dimension appropriate for cross-disciplinary or inter-institutional communication. Unconscious "scale wars" erupt that inhibit the transfer of results to another level.

The Participatory Fetish: practitioners, usually overzealous biological scientists, sometimes employ simplistic, even childish, methods to develop rapport with local populations, and in the end they lose the latter's respect. Social scientists are often marginalized for alleged "turf-guarding" when they demand to apply sound social science to the situation.

Social Underdesign of Projects: projects may rely entirely on nongovernmental organizations' social information and bypass data-gathering through proven social science methodologies. Consequently, the projects are underdesigned for the social aspects they are supposed to address.

Implementation pitfalls, according to Rhoades (2000:338-340) are:

Great Expectations: by promising "participation," all involved parties have high expectations about the results, even though the multiple objectives may be contradictory. For local people, then, the project may just focus on research and ignore the development benefits, which increases their alienation.

Tragedy of the Participatory Commons: participants assume each has equal input into design, whereas the project structure requires prioritization that may leave some specialists out of the process. Consequently, some specialists may feel alienated, or else gear their objective to the own short-term goals rather than contribute to the group effort.

Duplicating Management Structures: Watersheds are not natural sociocultural systems, so outsiders may be confused about the local organizations, which with they should deal. In addition, project committees may evolve beyond local indigenous structures and succumb to the political fights of competitive groups.

> **Stakeholder Complexity and Competition:** the process is unable to identify either the competing or common interests among the multitude of participants, thus hindering collaboration.

Mae Chaem's rich development history provides a basis for examining these issues, because the watershed is commonly the unit of analysis in this mountainous region. Furthermore, a participatory approach was envisioned for some projects in Mae Chaem well before it became a trend in international development in the latter 1990s. In that way, practitioners can learn from past experiences as they adapt the paradigm to today's problems.

II. Development Programs in Mae Chaem

The following section will discuss the major development programs in Mae Chaem directed at both non-Thai upland groups and the lowland Khon Muang. Although this dissertation is primarily concerned about the lowland Khon Muang, this section will cover projects affecting all ethnic groups. Mae Chaem is a multiethnic watershed where land use practices in one area affect environmental quality in another area. Therefore to understand the environmental consequences of development in Mae Chaem, one has to study changes in the land use practices of all ethnic groups farming there. To do otherwise would be to single out a certain ethnic group, which would understate the effects of development on the entire watershed. Secondly, development has been directed in a certain ethnic context, whereby some groups were targeted and others were not. In other cases, planners implemented an "integrated strategy," which attempted to address the needs of all ethnic groups, but usually ended up

favoring one. The outcomes for the lowland Khon Muang is then related to a historical process based on planners' attention or inattention to bringing equitable benefits to all ethnic groups there. In some cases the lowland Khon Muang benefited, and other cases another ethnic group did. Finally, a close examination in Mae Chaem is a useful exercise for development practitioners working in the district and those working elsewhere. The exercise shows the successes and shortcomings of projects, which can inform future planning.

A. Missionary Development

Ronald Renard, Prasert, et al. (1988:48-9, 64, 72) argued that there was much to learn from Christian missionaries' methods, even though anthropologists may not like their messages. Missionaries succeed because they are astute students of the targeted culture, to which they adapt their messages. In essence they adopt an ethnographic approach that studies the culture from the "insider's" view. In addition, missionaries have a long track record in implementing successful social development work, and secular organizations could learn from their models.

Christian missionaries started entering the northern Thai hills in the 1950s (Renard, Prasert, et al. 1988:48-50). In the course of converting souls they also became acutely aware of the desperate earthly needs of the people. Missionaries distributed medicines, introduced public health practices, built schools and roads, promoted handicraft production and started rice banks. They also fended for the local people against outside powerful interests seeking to exploit them.

To this day, Christian missionaries have had an active presence in Mae Chaem District. The Karen Baptist Convention and Roman Catholic Church have visible presences there, and there are probably other Christian denominations involved there. However, the extent of overall missionary activity escapes the purview of available reports. We may be no better off than when a 1989 report stated, “There have been no complete survey of the religious organizations operating in the area or the number of persons involved” (Research and Development Center 1989:196).

Mae Chaem District has a sizeable, but minority Christian population. A 1980 report indicated that 20 percent of the Karen were Christian (Thailand-Mae Chaem Watershed Development Project 1980:E-2). The Karen population was then reported at 18,052, of which 20 percent would be 3,610 Christians. A report issued at the decade’s end placed the total Christian population at 24.1 percent without reference to either specific denominations or ethnic group (Research and Development Center 1989).

As for the number of Mae Chaem’s Christian congregations, the numbers are sketchy. A 1989 report indicated 17 Christian churches without specifying the denominations (Research and Development Center 1989:148). A more recent report indicated 23 Protestant (64 percent) churches and 13 (26 percent) were Catholic (Amphur Mae Chaem 2001).

Thailand’s Department of Public Welfare probably published the most complete report of Christian missionary activity in Mae Chaem in 1983, titled, *A Directory of Development Activities in the Opium Popy* [sic] *Cultivation Areas of*

Northern Thailand. The report is based on data collected three years earlier.

Table 4 summarizes information from that directory. A national Buddhist

Organization	Projects	Villages	Problems
Chiang Mai Diocesan Social Action Centre (Roman Catholic)	1. Rice Bank 2. Cattle Bank	Ban Pa Tung TOTAL: 1	1. Insufficient rice 2.a. Baby buffaloes disease-prone b. Unable to reach target
Christian Service Foundation (various missionary groups & World Vision Foundation)	Hill Tribe Handicraft Promotion	Ban Pui TOTAL: 1	a. Quality control b. Unable to meet demand
Northern Baptist Foundation	1. Hill Tribe Agricultural Development Project 2. Hill Tribe Irrigation Project	1. Ban Mae Or, Ban Mae Ma Law, Ban Mae Om, Ban Pa Tung, Ban Mae Ja, Ban Mae Cha, Ban Mae Hoi, Ban Le Pi, Ban Mae Pard, Ban Mae Woe, Ban Mae Jor, Ban Lub Saw, Ban Khum Pong, Ban Huai Pong, Ban Wat Chan, Ban Mae Chaem Luang TOTAL: 16 2. Ban Lub Saw, Ban Na Klarng TOTAL: 2	1. Villagers do not adopt new rice varieties
Sri Soda Temple, Chiang Mai (Religious Affairs Department of Ministry of Education)	Buddhist Mission Project	Ban Huai Pu, Ban Khun Mae Luang, Ban Nong Daeng, Ban Huai Pong, Ban Pang Ong, Ban Mae Yord, Ban Sob Long TOTAL: 7	a. Inadequate budget b. Monks unfamiliar with upland peoples' cultures and act insensitively

Table 4. Missionary Development Projects, Mae Chaem District, 1980 (Department of Public Welfare [Thailand], 1983)

missionary program targeted toward non-Thai ethnic minorities, *Thammacharik,* has been active in Mae Chaem. The program's effectiveness is hard to judge, but elsewhere in the north, the results have been unremarkable in converting non-Thai upland groups (Renard, Prasert , et al. 1988:64). The Department of Public Welfare (1983:116) described the program's shortcomings as due to "low government budget," and that "Buddhist monks lack sufficient Knowledge [sic] and some have improper behavior," in reference to their sense of cultural superiority.

B. Opium Reduction Programs

The highlands of Mae Chaem afforded an ecological advantage that linked the district to the outside world in a nefarious way: opium production. The so-called "Golden Triangle" of northeastern Myanmar, northern Thailand and northwestern Laos was a major world source of opium. Opium poppy grows best in frost-free locations at altitudes of 914-1,524 meters above mean sea level, and the region's rugged topography kept the fields out of reach of law enforcement. Derivative narcotics such as heroin and morphine supplied the illegal drug markets in major Western centers such as New York, Amsterdam, London and Stockholm (Suwanbubpa 1976:10, Williams 1979:2-5). The United States government was concerned about illicit drug use among military members serving in Southeast Asia (Renard 1986:37).[1]

[1] Actually the United States ultimately withdrew its military forces from then-South Vietnam in early 1973, just as these anti-opium programs were getting underway in Thailand. U.S. Air Force personnel were still assigned to various bases in Thailand until early 1976 when the United States pulled all of its active military out of Mainland Southeast Asia (Girling 1990[1981]:93).

Opium production, though, was often associated as a symptom of a bigger problem faced by mountain farmers: poverty (Thailand--Mae Chaem Watershed Development 1980:9). Mountainous terrain left few crop alternatives as profitable as opium. Opium was also easily transported in small parcels, thus overcoming the difficulties of sending product to market over rugged terrain (Renard, Prasert, et al. 1988:62). In fact, buyers came to villages to obtain the crop. Therefore, opium was the crop of choice, due to demand, and also as the only viable means to raise money to buy food to supplement the meager food production in highland areas (Williams 1979:5, Zinke, Kunstadter and Drew 1979:29-30).

The Thai government had a legal monopoly on opium production from the mid-1800s when an illegal trade flourished outside of official channels, giving an impetus to widespread production in the hills (Renard 1988:49). The 1959 Opium Act outlawed its sale and use, bringing about "a considerable loss of revenue" for the government and put non-Thai upland farmers in a precarious position as illegal growers (United Nations/Thai Programme for Drug Abuse in Thailand, Vol. 1, 1973:1). The government also had a tremendous addiction problem on its hands as non-Thai upland peoples traditionally used opium as a home remedy for illnesses and depression (Williams 1979:34). At least 1 percent of the Kingdom's population was addicted, and as much as 10 percent of non-Thai upland peoples suffered from addiction (Highland Agricultural Marketing and Production Programme 1980:53; United Nations/Thai Programme for Drug Abuse Control in Thailand 1973:1).

1. Thai/UN Crop Replacement and Community Development Program (CRCDP), 1972-79

In 1980, a United Nations agency declared the highland areas of Mae Chaem District as "the principal area of opium production in Thailand," (Highland Agricultural Marketing and Production Programme 1980:2).[2] The main producers were reported to be the Hmong, and a major growing area centered on Ban Phui Neua village, in a far southwestern border area. Three decades ago a trip from Mae Chaem Town to the village required a four-wheel-vehicle on a 45-kilometer dirt road. Then passengers dismounted for a 6-9 hour hike on an 18-kilometer trail to Ban Phui Neua (United Nations/Thai Programme for Drug Abuse Control in Thailand, Vol. 1, 1973: Annex I:4).

Another main growing area was centered on the Hmong village of Mae Tho which extends throughout the southern border region of Hot and Mae Chaem districts.[3] (United Nations/Thai Programme for Drug Abuse Control in Thailand, Vol. 1, Annex 1, 1973: 11).

Remote and largely inaccessible, Mae Chaem was part of an historic initiative to replace opium as the crop of choice among highland farmers (Renard 2001:80, Williams 1979:2). The first major project from 1972 through 1979 was

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[2] A U.S. Agency for International Development (USAID) document from that same year challenged the extent to which Mae Chaem contributed to the Kingdom's overall opium production: "opium production in the [sic] Mae Chaem represents only a small fraction of the total output of North Thailand and relatively few of the watershed's inhabitants are engaged in opium-poppy cultivation." (Thailand--Mae Chaem Watershed Development Project 1980:9).

[3] Mae Tho was the field site of anthropologist William R. Geddes' landmark study of the Hmong, *Migrants of the Mountains: The Cultural Ecology of the Blue Miao (Hmong Njua) of Thailand* (1976), according to Renard (2001:61).

the US$3.5 million Thai/UN Crop Replacement and Community Development Project (CRCDP), also reported to be among the first efforts to research and promote substitute crops for opium (Renard 2001:80, Williams 1979:2).[4] The project actually covered 30 villages across northern Thailand, among which were Ban Phui Neua and Mae Tho (United Nations/Thai Programme for Drug Abuse Control in Thailand, volume 1, Annex 1, 1973: 4-7, 9-11).

The CRCDP did not directly suppress opium. It was an extension pilot program that used demonstration plots and on-farm trials to educate farmers about cropping alternatives (Renard 2001:80-1, Williams 1979:15-17). Williams (1979:16) reported that replacement crops included "upland rice (new varieties), kidney beans, navy beans, coffee, wheat, off-season vegetables (lettuce, carrots, etc.), off-season potatoes, peaches, passion fruit, field corn, etc." The program also included a social welfare component to address education, health, and drug addiction treatment and rehabilitation (Renard 2000:82, Williams 1979:35-43).

2. Highland Agricultural Marketing and Production Project (HAMPP), 1979-84

The CRCDP approach lacked market development for the newly introduced crops (Highland Agricultural Marketing and Production Programme 1980:3). Once farmers harvested the new crops, there were no outlets for selling them. A second shortcoming was the lack of credit for poor producers to switch

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[4] Whether CRCDP was the first in the world might be questionable as His Majesty the King, Bhumipol Adulyadej included opium crop substitution as an objective of The Royal Project program launched in 1969. In fact, The Royal Project director, Prince Bhisadej Rajani, was named CRCDP project manager, and "cooperation was so strong between CRCDP and the Royal Project that they functioned almost as one," according to Renard (2001:80-1).

over to alternative cropping systems (Highland Agricultural Marketing and Production Programme 1980:3). A follow-up $8.2-million Thai/UN Highland Area Marketing and Production Project (HAMPP) addressed these shortcomings from 1979 through 1984 (Highland Agricultural Marketing and Production Programme 1980:5, Renard 2001:82). HAMPP also built roads, introduced domestic water systems and established health centers. In Mae Chaem, HAMPP ran concurrent to an early phase of a major U.S. Agency for International Development (USAID) project, a poverty-alleviation program that extended beyond the Hmong opium villages.

In the end, though, HAMPP's results were disappointing. The four-year program reduced northern Thailand's opium production area by 6.1 percent. Opium production area declined from 39,2000 hectares in 1980 to only 36,800 hectares in 1984 (Renard 2001:85-86). Farmers were still not attracted to alternatives to opium despite HAMPP's concerted efforts to improve marketing channels and infrastructure.

3. Issues of Inequity

Working in the multi-ethnic cultural environment of Mae Chaem, the Thai-UN programs caught criticism for leaving non-opium growers out of the development process, i.e. non-Hmong groups. CRDCP program director I.M.G. Williams (1979:8-9) reported that lowland Khon Muang wanted to know why opium growers "breaking the law" were getting help compared to themselves,

"who were law abiding."[5] The result was that "Seeds of discontent and friction were being sown" (Williams 1979:39). Williams (1979:39) also pointed out that in early days of the program, an addict admitted to the program's detoxification center in Chiang Mai also received medical treatment for other health problems, while non-addicts went untreated back in the village where health care was lacking. Renard, Prasert , et al. (1988:63) also argued it was unfair to allocate a large share of development money, which "has in many ways given opium growers an advantage over non-opium growers." For example, the Karen comprised of about half of Thailand's upland groups, but they received only 13 percent of governmental assistance, according to a Ministry of Education task force survey quoted by Renard, Prasert, et al. 1988:63). Countless Christian missionary projects might have offset the difference somewhat, as the Karen is the largest Christian group in the Kingdom. But the fact remained that Mae Chaem's Karen in were so steeped in poverty that a Royal Thai Government-U.S. report found it was "critical they receive meaningful assistance soon" (Thailand-Mae Chaem Watershed Development Project 1980:E3).

C. Royal-Sponsored Initiatives

The Royal Family of Thailand has been active in Mae Chaem's development by sponsoring irrigation projects, which directly affect lowland Khon Muang people, and through projects designed to improve the livelihoods of non-

[5] It is unclear how many Khon Muang grew opium in Mae Chaem at this time, but figures from a few years later, 1986/87, attributed 33 percent of the district's production to them, or about 1,218 rai (197 ha) (Kampe 1989:38). Production reported by other ethnic groups was: Karen, 33 percent, or 1,218 rai (197 ha); Hmong, 31 percent, or 1,144 rai (185 ha), and Lua, 3 percent, or 110 rai (18 ha).

lowland Khon Muang ethnic groups. The latter include projects known as “The King’s Project” or “Royal Project,” (*Khrongkan Luang*) now under the administration of The Royal Project Foundation, and The Queen Sirikit Reforestation Project, or *Suan Pah Sirikit.*

The King’s Project engaged non-Thai upland people into the Kingdom’s development well before major donor agencies became aware of their social and economic problems. A United Nations’ mission report alarmed the King about the large amount of opium production in the Kingdom (Renard 2001:73). He was then determined to find socially and economically viable alternatives to opium production. His concern also extended to armed conflicts between cultivators and police units enforcing anti-drug laws.

The King pioneered “participatory” approaches by studying their cultures and learning about their needs through direct contacts with them. His first trip to the north in 1958, and subsequent construction of the northern palace, facilitated continued contacts through to the present (Renard 2001:73).

The Royal Project is a “vertically integrated, ‘full-cycle’ approach” that extends from research, extension to processing and marketing (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:23). The “full-cycle” approach overcomes the narrow focus development programs that introduce new crops without doing the marketing groundwork, as previously discussed about the Thai/UN Crop Replacement and Community Development Project,1972-79 (Renard 2001:82). The Project has researched temperate fruits, vegetables and cut flowers as economically viable crops for

upland farmers. End-products are sold under the *Doi Kham* brand name in urban areas.

A Royal Project success story in Mae Chaem District is the Karen former opium village, Mae Hae (K. Rerkasem, B. Rerkasem , et al. 1994:76-84). The Project began operations there in 1978. By 1992, one-third of 65 households were growing fruits and vegetables, while poorer residents were earning cash as wage-laborers for the larger growers. Vegetables included cabbages, lettuce, onion, pepper and parsley, while the fruits are Japanese apricot, pears, persimmon, plums, mangoes, lychee, tea and coffee. Flowers included gysophylla, statice, carnations, gladiolas, lilies and roses.

An unintended consequence was that the initiative generated demand for produce beyond The Royal Project channels, according to K. Rerkasem, B. Rerkasem, et al. (1994:80). Non-project sales exceeded those made by The Royal Project, as buyers came from Chiang Mai and Bangkok, and villagers with transport sold products to markets as far away as Bangkok. K. Rerkasem and B. Rerkasem, et al. (1994:80) gave this report:

> The emergence of an independent and unsupported market for vegetables and fruits in the highlands is a promising sign of the future viability and sustainability of this production system, should support and subsidies prove economically impossible to maintain in the long run.

Foreign competition challenged the successes of the King's program. Farmers in Kunming Province, China, could grow temperate fruits and vegetables more profitably than those supported by The Royal Project (K.

Rerksaem , et al. 1994:80-82). A second challenge was farmers' overuse of unapproved agricultural chemicals sold by company representatives, overcoming The Royal Project's strict restrictions on chemical use. "This is a common problem in all project areas," according to K. Rerkasem, B. Rerkasem , et al. (1994:82).

Another development effort of the Royal Family is the Queen Sirikit Reforestation Project (*Suan Pah Sirikit),* which seeks to control rapid deforestation in the wake of the Royal Thai Government-U.S. Agency for International Development (RTG-USAID) Mae Chaem Watershed Development Project that ended in 1989. The RTG-USAID project was said to have introduced some "useful innovations but was unable to have a lasting positive impact on watershed management" (Northern Mountain Area Agroforestry Systems Research and Development Project (2001:22). *Suan Pah Sirikit* is based on effective participatory and integrated methods used in the highly recognized 1987-94 Sam Mun Highland Development Project (SMHDP), one of the last internationally sponsored opium substitution projects (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:21).

D. Mae Chaem Watershed Development Project, 1980-89

Up until the 1980s, development programs in Mae Chaem were concerned about either reducing opium production or were mainly targeted toward social and economic issues of non-Thai highland groups. Missionary activities fell into the latter category, but were highly localized to have an overall effect on the district. The large Thai-UN projects, on the other hand, focused on

opium substitution over a wide area across northern Thailand, but they were targeted toward non-Thai minority groups in the upper reaches of the watersheds.

There were also questions about whether Mae Chaem was a big opium producer at all. One sector of development experts thought that “a large infusion of financial assistance at eradicating a not-so-large [opium] crop may not be the wisest course” (Kampe 1989:1). It was argued that money would be better spent on improving the desperate social and economic conditions among all ethnic groups, whether or not they were growing opium. The U.S. Agency for International Development (USAID) reported that more than 75 percent of Mae Chaem’s population was below the poverty line, compared to 25 percent for the Kingdom, as defined by World Bank criteria (Thailand-Mae Chaem Watershed Development Project 1980:4-5). More than half of Mae Chaem’s population lived below minimum subsistence levels, as the typical household grew enough rice for seven months’ consumption. In sum, USAID reported, “Mae Chaem is one of the most impoverished areas in Thailand” (Thailand-Mae Chaem Watershed Development Project 1980:4).

USAID proposed a holistic project to improve the standards of living of Mae Chaem’s residents. The proposed approach was “integrated” because it would address the interrelated shortfalls of food production, lack of infrastructure and social services, and it was proposed to span across all ethnic boundaries (Kampe 1989). This plan would seek to launch Mae Chaem on the way to “self-sustaining” development with the intent to increase income, improve access to

social services, and “reversing the deterioration in environmental quality” (Kampe 1989).

The ensuing Mae Chaem Watershed Development Project was a turning point in the district’s social, economic and environmental history. On one hand, the project would succeed in meeting “hard targets,” or quantitative goals to improve rice yields, to build or rehabilitate roads, and improve irrigation and construct terraces. These targets turned Mae Chaem from a rice-deficit area to rice self-sufficiency. After that, farmers could concentrate on growing cash crops to increase their incomes. The road rehabilitation/construction improved transportation, communications and hence the marketing of agricultural products within and outside the district.

However, the Mae Chaem Watershed Development Project begged the question of social inequity across ethnic boundaries. USAID’s “pragmatic stance” largely benefited the lowland Khon Muang who were most accessible due to geography, language and culture (Kampe 1989:36). In fact, the project was extended for two years in order to make a determined effort to reach non-Thai upland people (Roth, Liou , et al. 1987).

Although rice self-sufficiency was a hallmark of the Mae Chaem Watershed Development Project, it did not eliminate poverty. Environmental damage also accelerated after it ended (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:23). The project put new technologies into the hands of farmers, but did not train them to manage their natural resources. Consequently, lowland farmers expanded soybean and maize

production up the hillsides resulting in “a surge of deforestation” (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:23). At the highest elevations, farmers converted forests into permanent cabbage fields, with environmental consequences of soil erosion and downstream pollution.

The project did change farmers’ view of their relationship with the world beyond the mountains. The project introduced them to participating government ministries and also to the concept of international development organizations, i.e. USAID and CARE-Thailand. Farmers learned that government could provide resources for development rather than drain away income through taxation. It was predicted that villagers would increase their demands for government services as they became aware that these services existed in the first place (Kampe 1979:52).

The Mae Chaem Watershed Development Project socialized farmers into the development process by using participatory methods that opened lines of communication with them. The boldest, and perhaps historical, participatory approach occurred when USAID demanded that the Royal Thai Government issue land-use certificates to guarantee farmers permanent rights to live and work on lands in the watershed. The logic was that farmers would “participate in project activities and assume continuing responsibilities” if they had legal protections to use the land (Kampe 1989:2). The Royal Thai Government agreed in principle, but later backed down when the Royal Forestry Department (RFD)

argued that it would violate official forest use policies (Renard 2001:93). USAID then halted funding for about one year until the Thai Cabinet exempted the project from RFD's requirements. The government issued a total of 4,172 land-use certificates, exceeding the USAID goal by 4.3 percent (Kampe 1989:1, 37-39).

Another participatory method involved "interface teams" of highly motivated and educated young adults who lived in villages to train farmers, collect data, and to try to find out their needs (Kampe 1989:41, Renard 2001:93, Thailand-Mae Chaem Watershed Development Project 1980:25-26; Zinke, Kunstadter and Drew 1979:5-6, 36). The Thai-German Highland Development Programme, borrowed the concept for its large development project in Chiang Rai and Mae Hong Son provinces.

Another effort to build participation involved the contracting of local people to build bench terraces to expand rice areas on hillsides (Harper 1986:383-6; Zinke, Kunstadter and Drew 1979:4). This approach put cash into the hands of local people and intended to show them the "immediate and perceived benefits" of a development project, which would "build their cooperation for future, perhaps, more complex undertakings" (Zinke, Kunstadter and Drew:4).

The following sections will discuss some of the major accomplishments of the Mae Chaem Watershed Development Project based on official documents. Naturally, USAID officials had a personal interest in putting the best face on the multi-million dollar effort. On the other hand, the documents are sometimes forthright in the project's shortcomings, mainly dealing with intangibles, such as

leadership development, that weakened its sustainability into the long-term future (Kampe 1989:2).

1. Rice Self-Sufficiency

On the eve of the Mae Chaem Watershed Development Project, USAID reported the district's agricultural production was in dire straits: "There is no doubt that most farmers are at or near the bottom of the scale of agricultural productivity in Mae Chaem" Thailand-Mae Chaem Watershed Development Project 1980:D1). Compounding low productivity was the stated Malthusian dilemma of too many people for too little land. Health care improvements resulted in a natural increase of survivable births over deaths, plus the district saw in-migration of non-Thai ethnic groups seeking out the benefits of opium substitution development programs (Zinke, Kunstadter and Drew 1979:21-4). Population pressure on the land, then, left up to one-half of the Thai and non-Thai "legally landless," and they cut forests for subsistence plots, or else they took infrequent wage labor jobs to make money to buy rice (Thailand-Mae Chaem Watershed Development Project 1980:11).

Within four years of implementation, or by 1984, the Mae Chaem Watershed Development Project brought rice production up to "parity." After that, the intensive Accelerated Impact Program (AIP), 1985-87, introduced high-yielding seed packages that boosted production to surplus levels (Kampe 1989:23, 36; Research and Development Center 1989:178, Thailand-Mae Chaem Watershed Development Project 1980:D2). Paddy yields tripled from 450

kg/rai (30 thang/rai)[6] in 1983 to 600 kg/0.16 ha (40 thang/rai) in 1987 (Research and Development Center 1989:178). One of the new varieties, *Khao Muey Nam 62M,* yielded as high as 664 kg/rai (44 thang/rai). Project data (Kampe 1989:36) indicated the total production went from a 10 percent deficit in 1981 to a 10 percent surplus in 1987 (Table 5).

Year	Rice Requirement (tons)	Rice Production (tons)	Difference (tons)	Difference (percentage)
1981	12.15	10.95	(1.2)	(9.8%)
1984	13.95	13.80	(.15)	(0.1 %)
1987	15.72	17.54	1.82	10.3%

Table 5. Rice Requirements vs. Production, Mae Chaem District, 1981-87 (Kampe 1989:36)

Project planners also believed improvements to irrigation, rated as "generally unreliable" could double rice yields regardless of the introduction of high-yielding seeds. (Thailand-Mae Chaem Watershed Development Project 1980:D1-D2). The reported unreliability contradicts the literature of northern Thailand's indigenous irrigation technology, or *muang fai* system. Tanabe (1994:310) asserted that the local *muang fai* made northern Thailand the most productive rice-growing region of the Kingdom. Whatever the case, the 132 irrigation projects favored the lowland Khon Muang in comparison to the non-Thai ethnic groups. Of 77 projects, 58 percent, were in Chang Khoeng and Tha

[6] One thang is equivalent to 15 kilograms, while 1 rai equals 0.16 hectares.

Pha subdistricts, areas largely inhabited by the lowland Khon Muang (Research and Development Center 1989:183).

Irrigation improvements (Table 6) were intended to increase dry-season water supply in order to set the stage for expanded cash cropping in paddy lands after rice harvest. In fact, the "small number of farmers with a reliable water supply" were already doing that (Thailand-Mae Chaem Watershed Development Project 1980:D3). A Kasetsart University study cited in the project document showed that cash crops already grown, in the order of preference, were: soybeans, garlic, shallots, sesame, peanuts and tobacco.

Project Type	Weir	Reser-voir	Pond	Diversion Stream	Canal	Pipe Sys-tem	Lay-ing Pipe	Retain-ing Wall	**Total**
Num-ber of Activi-ties	33	4	4	56	16	11	7	1	**132**

Table 6. Irrigation Development Projects, Mae Chaem Watershed Development Project, 1980-89 (Research and Development Center 1989:183)

The project's third method for increasing rice production was to make more arable ground available in the mountainous district (Ministry of Education 1991:1). The Thai Land Development Department projected that improved irrigation could develop 1,280 ha for paddy production, while another 2,240 ha on non-irrigable slopes could be developed into bench terraces for annual cropping or orchards (Thailand-Mae Chaem Watershed Development

Project 1980:14). The end result, then, would “provide most, if not all, land-short households with enough land to produce subsistence rice and begin to participate in the cashcrop [sic] market” (Thailand-Mae Chaem Watershed Development Project 1980:14).

In sum, the Mae Chaem Watershed Development Project raised rice production through high-yielding variety packages, irrigation improvements and land development programs. Food security was the first step in launching agriculture toward a full-fledged cash economy, as well as toward continued environmental deterioration. Each step—particularly irrigation improvements—was designed to promote an agricultural infrastructure that supported cash cropping, which in turn, required a larger land base to satisfy the wants of the people. Farmers then looked to the forested mountainsides for new field sites, and environmental deterioration continued. The project’s technology-transfer approach then, ignored the ramifications of natural resource management. Today’s government and development agencies have designed catch-up strategies to make up for the shortcomings of the Mae Chaem Watershed Development Project.

2. Environmental/Conservation Enhancements

The Mae Chaem Watershed Development Project’s planned to raise agricultural productivity at the same time “reducing environmental damage in the watershed” (Zinke, Kunstadter and Drew 1989:5). Project planners cast the district’s environmental problems in the context of northern Thailand’s reported 4-7 percent annual forest loss, which reduced the Kingdom’s forest cover by about

one-third between 1961 and 1973 (Thailand-Mae Chaem Watershed Development Project 1980:7). Less than 40 percent of Thailand remained forested, even though the reports did not provide any specific data for Mae Chaem, which might or might not have been similar to the northern trend. At any rate, intervention in Mae Chaem was considered necessary to slow the rate of destruction.

Although project documents reported "environmental deterioration," it is hard to judge the extent to which subsistence agricultural practices contributed to it (Thailand-Mae Chaem Watershed Development Project 1980:4-5, 19-20). The record is vague and mixed. On one hand, Thai researchers Manu Srikhajon , et al. (1985:1-2) and Thani and Rauechai (1984:1-2) attributed it to shifting cultivation practices. USAID planners and consultants also reported that population increase was pressuring the environment (Thailand-Mae Chaem Watershed Development Project 1980:4-5; Zinke, Kunstadter and Drew 1979:22).

On the other hand, a project consultant, Grahame Keen (1979:17) argued that it was a "misleading stereotype" to assume that shifting cultivators were destroying Mae Chaem's forests. Keen (1979:17) noted that lowland Khon Muang were cultivating lower slopes, but he deemed it not a serious environmental problem. In addition, Zinke, Kunstadter and Drew (1979:35) cautioned against assuming that unused swiddens were abandoned wastelands. Rather, the cleared sites were fallow fields in the process of regeneration as part of farmers' rotational practices.

In evaluating these contradicting comments 30 years later, one must keep in mind the “blame the victim syndrome” that is a mindset of some development practitioners (Agunga 1999:107). This is an attitude that blames environmental problems on traditional agricultural practices, as well as on farmers’ resistance to change them. In other words, the basis for development may be based on outsiders’ misperceptions about the extent to which traditional practices disrupt the environment. In Mae Chaem then, some development experts might have believed that shifting cultivation was more destructive than it was actually. They might have made the same assumption about population growth too. Keen (1979:17) countered that argument by defending shifting culitvators, “In Mae Chaem, swiddening has not, as yet, anyway created a situation requiring urgent means to protect the watershed.”

Interestingly enough, a project document reported that improper road-building was a “primary source of erosion” (Thailand-Mae Chaem Watershed Development Project 1980:20, also Zinke, Kunstadter and Drew 1979:13). The Project planned an ambitious road rehabilitation program. All roads were to conform to conservation standards that would prevent erosion. If improper road construction was a major environmental problem, the questions remain about who had built the roads and for what purposes? In a poor district such as Mae Chaem it would be unlikely that farmers had the resources to build roads, and less likely they would have vehicles to drive on them. However, commercial logging requires roads, although the documents mention nothing of logging operations. Renard, Prasert, et al. (1988:57) wrote that Thai logging companies

were active in the Doi Inthanon range from the 1970s on, but did not specify any sites in Mae Chaem. The writers (1988:67) also wrote that government projects built roads that "have now entered almost all the hill villages in the Doi Inthanon Range." The new roads opened inaccessible forested areas to lowland northern Thai who collected firewood and cut timber for construction materials, according to Renard, Prasert, et al. (1988:70).

Thus the Project's purported assertion of "environmental deterioration" raises more questions than project documents answer. At that time, it might have been all too convenient to attribute it to "traditional factors" of farming practices and population growth. But there may have been a complex of factors that contributed to the district's environmental deterioration.

Regardless of the cause of environmental deterioration, the effects were high sediment loads in the Mae Chaem River (Harper 1986:191, Thailand-Mae Chaem Watershed Development Project 1980:5). A doctoral student in geography, David E. Harper (1986:191), reported the river carried an annual average sediment load of 180,000 m^3, ranging as high as 1 million m^3 annually. According to Harper (1986:191): "These sediment loads are symptomatic of the high rates of erosion in much of Mae Chaem....Environmental deterioration is cited as one of major reasons why Mae Chaem residents are among the very poorest in Thailand."

To control soil erosion, the Mae Chaem Watershed Development Project proposed the construction of bench terraces for cropping on steep lands (Harper 1986:77-80). Bench terraces reconfigure the hillside into step-like features in

contrast to intermittent terraces that keep a portion of the hillside intact between terraces (Harper 1986:80). In all, the Mae Chaem Watershed Development Project put 15,832 rai (2,533 ha) into bench terraces, or 1.5 percent above the target of 15,600 rai (2,496 ha) (Kampe 1989:41).

One drawback was cost. In mid-1980 prices, a one-hectare area of 4-meter-wide bench terraces cost US $625 (Harper 1986:78), out of the range of three-fourths of Mae Chaem farmers whose annual was US $90 or less in 1975/76 prices (Thailand-Mae Chaem Watershed Development Project 1980:4). A second shortcoming was maintenance (Harper 1986:384). Farmers degraded the terraces by planting crops on the vertically sloped riser, whereas only the horizontal “bench” was appropriate for growing crops. Harper (1986:384) found:

> Farmers in both villages [studied in Mae Chaem] seem to either not understand the need for maintenance, expect the project to pay them to maintain their structures, or do not feel the terraces are worth the effort of maintenance. Unless these damaging phenomena are corrected, the soil conservation component...will be transitory rather than permanent.

The long-term sustainability of bench terrace construction is unclear, despite the immediate resounding success in reducing soil losses (Harper 1986). Annual erosion rates dropped 78 percent from 155 tons/ha to 34 tons/ha (Harper 1986:387, Harper and El-Swaify, 1987, as quoted in Kampe 1989:41).

To curb the erosive effects of poor road construction, the Mae Chaem Watershed Development Project planned to rehabilitate 100 kilometers of road,

later increased to 224 kilometers when the economic benefits became apparent.[7] Although road building shifted from an environmental objective, all roads were built according to soil erosion control standards (Thailand-Mae Chaem Watershed Development Project 1980:20).

The economic benefit of roads is evident by the fact that the original proposal called only for rehabilitating existing roads, while the resulting 224 kilometers actually included new construction (Thailand-Mae Chaem Watershed Development Project 1980:20). In fact, the soil erosion benefit was all but forgotten in a post-project summary that described roads as a "key requirement in the provisions of services and economic development…." (Kampe 1989:39).

3. A Participatory Paper Tiger?

The Mae Chaem Watershed Development Project performed well in achieving "hard targets" of higher crop yields, irrigation improvements and road construction (Kampe 1989:32). It failed to develop the local "human resources" so the people could take control of their future development. In other words, the project did little in training the locals on how they could help themselves once USAID pulled out. In a reflective critique, a project advisor, Kampe (1989:50-1) recognized the project had gone about a "reversed order," by pushing for material targets first, whereas it should have begun emphasizing human skills in self-reliance.

On paper, USAID planned a "bottom up" approach (Thailand-Mae Chaem Watershed Development Project 1980:13), which meant it was intended to get

[7] Kampe (1989:1) wrote the initial goal was to rehabilitate or build 159 kilometers of roads.

farmers' input about the direction of the project. Kampe (1989:1) described some of these activities as "innovations" or "creative approaches to tough problems…." As discussed earlier, these included the deployment of interface teams to villages, and also the employment of local people on construction projects. In one instance the effort paid off when a survey showed that villagers would appreciate "small projects with immediate results" Renard (2001:143). USAID soon set up a fund to improve irrigation and the village water distribution systems.

Despite the fact that USAID built participation into the project design, it was difficult to achieve due to bottlenecks in the Thai national bureaucracy that could override local initiatives (Kampe 1989:28). In addition, non-Thai groups were largely left out of the participatory process in spite of the "integrated" approach intended to involve them. In 1987, USAID extended the project for two years for the sole purpose of reaching out to non-Thai groups (Kampe 1989:32).

The Mae Chaem Watershed Development Project ended in 1989, but other projects in northern Thailand continued to state participation as goal in their efforts. In a reflective critique of development in northern Thailand, Kampe (1992:160) complained that the extent of participation in those projects was fiction more than fact. Kampe (1992:162) argued that development practitioners were imposing "righteous materialism" that prioritized economic output at the expense of the expressed needs of people living in highland communities. The result was a self-serving development bureaucracy that "can continue in the guise of developing others while actually developing ourselves" (Kampe

1992:164). Those were harsh words for one who counted himself as among the development practitioners.

E. CARE –Thailand in Mae Chaem, 1982 to Present

CARE-Thailand's development work is an offshoot of CARE International's relief efforts to Cambodian refugees in eastern Thailand border areas starting in 1979 (Research and Development Center 1989:193, Maseekaew 2002a). CARE soon expanded into proactive, anti-poverty interventions in Thailand's interior in order to alleviate human suffering before it reached crisis proportions. CARE's work in Mae Chaem began in 1982 when it conducted pilot projects as part of the Royal Thai Government-USAID Mae Chaem Watershed Development Project.

CARE-Thailand's approaches in Mae Chaem have evolved from specific interventions to stated participatory actions intended to strengthen local organizations to promote self-development. This is known as enhancing "community organization capacity" for natural resource management (Raks Thai Foundation and CARE-Thailand 2000). During the Mae Chaem Watershed Development Project, CARE promoted cash crops and "improved home gardens for better nutrition" (Northern Mountain Area Agroforestry Systems Research and Development Project 2001:23) among selected non-Thai highland communities. By the late 1980s, CARE carried on the Mae Chaem Watershed Development's work when USAID pulled out of the district (Renard 2001:107, 133, 164). CARE focused on food security by promoting agroforestry and soil and water conservation, while also working on mother and child care, and health and sanitation (Maseekaew 2002 a and b, CARE-Thailand n.d.). In the mid-1990s

CARE-Thailand gave the impetus to create local organizations to carry on the work of natural resource management, a grave flaw left untended by the Mae Chaem Watershed Development Project. CARE-Thailand helped to establish Village Forest Conservation committees to regulate local forest use and for forest fire control, and Watershed Management Network Conservation Committees, based on indigenous irrigation management organizations, which provide a higher level of oversight to natural resource conservation and conflict resolution between communities (CARE-Thailand n.d.:9). CARE-Thailand supported its organization-building with "sustainable land management" programs that provided credit and cost-sharing for farmers to improve their land. This phase also expanded CARE-Thailand's work from selected highland villages to a more pervasive presence among all ethnic groups in four of Mae Chaem's 10 subdistricts.

Since 2000, CARE-Thailand expanded to provide technical and consultative assistance to local subdistrict governments, or *tambon* administrative organizations (TAO) with the desire to give people more participation in local affairs (Maseekaew 2002a and b, Raks Thai Foundation and CARE Thailand 2000; Renard 2001:51). The title of this project is "Collaborative Natural Resources Management in Mae Chaem District." The Thai government's devolution of national power to TAOs gives CARE-Thailand an opening into the local governmental apparatuses for natural resource management. CARE-Thailand asserts that TAOs fail to prioritize natural resource management (Maseekaew 2002a, Raks Thai and CARE-Thailand 2000). As such, CARE-

Thailand will help TAOs “to plan and facilitate community-based natural resources management in 8 sub-districts of the Mae Chaem District” (Raks Thai and CARE-Thailand 2000). The collaborative effort will also draw upon the expertise of major governmental departments, such as the Royal Forestry Department, academic institutions and other non-governmental organizations. In sum, the project fosters communication between communities, local government and specialized organizations to address natural resource management and sustainable land development. “This project is really complex, complicated,” was how a CARE-Thailand representative described the effort (Maseekaew 2002a).

CARE-Thailand is positioned for a collaborative role as it has learned from the weaknesses of previous development activities. A case in point is that the Mae Chaem office employs field workers from among the various ethnic groups inhabiting the district (Maseekaew 2002b). This breaks down cultural barriers as CARE-Thailand personnel know local languages and customs of the people. CARE-Thailand also takes into account cultural characteristics of kin groupings and social organizations when working with local people, and also tries to consider their cultural management practices for natural resource use. In addition, CARE-Thailand has worked to involve women into local resource management by requiring female members of local committees.

CHAPTER 5

METHODOLOGIES

This dissertation combines an historical analysis with ethnographic description. Mae Chaem District is an ideal location to apply this approach because various development project reports record its history of agricultural practices. These reports provide descriptions of “traditional” modes of subsistence prior to the development interventions. These data provide a basis for comparing this study to the past in order to come to terms with the changes in the district.

The most useful historical data come from documents produced for the Royal Thai Government-United States-funded Mae Chaem Watershed Development Project, 1980-89. These documents are located in libraries at Chiang Mai University and at various universities in United States. Cornell University, known for its pioneering anthropological studies in Thailand, has several project documents in its library collection. Among all of these reports, one of the most useful is Pichit Thani and Venus Rauechai’s (1984) socioeconomic study, which disaggregates agricultural data by ethnic group.

Understanding the present requires more than just comparing recently collected data to past records. Mae Chaem provides an excellent opportunity because development records also explain the processes that were implemented in order to effect agricultural change. Thus we can understand how the current conditions of agricultural productivity are rooted in past interventions, and we can also evaluate the effectiveness of those efforts. Development projects introduced technologies that prepared Mae Chaem farmers for cash-cropping, which eventually led to their participation in the global economy through multinational enterprises. These days, multinational firms offer contracting programs to farmers who have experience in employing high-input agricultural practices to grow crops such as maize or potatoes. These multinationals include Charoen Pokaphand Group and Frito-Lay, Inc.

Finally, I was interested in agricultural change in northern Thailand due to the recent geographical literature regarding environmental deterioration there. This study sought to examine whether environmental change was the result of a "particular development dynamic" (Hirsch 1987:29). Mae Chaem's development history and more recent involvement in global networks of exchange provide the ideal setting for studying Hirsch's thesis. The geographical literature was also not too specific about the local processes entailed, however, other than just attributing it to agricultural expansion. I wanted to know what kind of crops were involved, the motivations of local farmers, and I also desired a closer look at the ecological implications. Mae Chaem affords this opportunity due to the rapid

expansion of cash-cropping in the past decade, which of course, can be related to the stated objectives of development projects.

I. Institutional Arrangements

This project involved human subjects, so I obtained the necessary clearance from OSU's Institutional Review Board in accordance with appropriate university guidelines and policies. In addition, I obtained authorization from the National Research Council of Thailand, which was necessary for securing an extended visa to conduct this project.

The official sponsor for this research is the Tribal Research Institute (TRI), Chiang Mai, Thailand. The institute is a governmental agency established in 1964 to conduct social and economic research on ethnic groups in the highland areas of northern Thailand. In late June 2001, I reported to the TRI in Chiang Mai, and an assistant director, Mr. Mongkol Chantrabumrong, referred me to Dr. Pornchai Preechapanya, of the Royal Forestry Department, who had prior experience in working with the Khon Muang for his doctoral dissertation research (1996) through the University of Bangor, Wales, UK. Dr. Pornchai, in turn, introduced me to the staff of the International Centre for Research in Agroforesty (ICRAF), which maintains a research presence in Mae Chaem as its benchmark study site. ICRAF has a field office in Mae Chaem Town, where I lodged with two ICRAF field assistants for the duration of the project.

II. Community Selection

A key requirement was to find a lowland Khon Muang community because I was interested in agricultural change in a northern Thai ethnic community.

Another key requirement was that the community should be in an intermontaine basin and served by the indigenous *muang fai* irrigation system for rice production. These characteristics are typical of northern Thai agriculture as described by Walker (1989:3-4,1992 6-10), so the field site should be as representative as possible of the typical characteristics. Finally, I was guided by Marlowe's (1969) admonition about the diversity of northern Thai agricultural practices that extend beyond irrigated rice cultivation. In that regard, I needed a community that also cultivated homegardens as well as crops in hill areas, possibly by employing shifting cultivation methods. This research showed, however, that shifting cultivation is rarely used because all hill fields are in permanent crops.

During a reconnaissance trip to Mae Chaem on July 21-23, 2001, Dr. Pornchai suggested a lowland Khon Muang village about 4 kilometers from Mae Chaem Town. The village is located on both sides of an intermontaine basin, where households grew irrigated rice in the valley bottom. Dr. Pornchai was aware that residents there cultivated homegardens, which I confirmed in a walk-through of the community on a rainy day. I also observed some maize fields in plots cut out of the forested hillside. Farmers wearing backpack sprayers were walking the fields to apply chemicals to the crops. Although hillside production was important for this study, I would later learn the most extensive hillside plots were about 5 kilometers away. Also during the walk-through, the local residents confirmed that they were lowland Khon Muang, which is the ethnic group I wanted to study.

In addition to the farming practices, I was interested in cultural change. In that regard, I wanted a community that had a Buddhist temple, or *wat,* which is the traditional center of ritual and social life in rural Thai communities (Walker 1986:5). A temple is important for assessing cultural change because residents' support and participation there reveal intangible aspects of the community, such as residents' attitudes and general outlook on life. Fortunately, this community has a small Buddhist temple, *wat*, at the outskirts.

In summary, then, this site has the representative characteristics of a northern Thai multi-cropping community as described by Marlowe (1969). The fact that it conformed to northern Thai characteristics would be important in studying agricultural change because I would be able to compare it to a known quantity described in the literature. In other words, I would be able to study how farmers' land uses differed from what was reported in the past. During the reconnaissance trip, I also visited other areas of Mae Chaem to familiarize myself with the landscape, cultural features, and other non-Thai ethnic communities.

In the early phase of the fieldwork a few weeks later, I decided the village was too large to manage for a lone researcher. At this time, I delimited the field site to a hamlet of 30 residences separated from the main part of the village by the valley bottom drained by a river. A concrete bridge connects the hamlet to the larger community across the river. The hamlet itself extends along a 1-kilometer road running the length of a hillside, which is a typical Thai settlement pattern (Walker 1986:4). As most homestead sites were alongside this road, it was convenient for me to keep track of each residence, its occupants and activities. In

contrast, the residences in the other part of the village were scattered in clusters, making it potentially more difficult to keep track of each household. Finally the small temple happened to be located on the edge of this hamlet, which was fortuitous for studying the social life of this community.

III. Data Collection Techniques

This project utilized standard ethnographic techniques common to cultural anthropological research. To be specific, the techniques employed were formal interviews, household census, informal interviews and participant-observation. These techniques were relevant to the stated research objectives regarding agricultural change. Below, I elaborate how these methods accord with the objectives.

A. Formal Interviews

At the beginning, I needed to develop rapport as soon as possible with local officials and leaders so they would be aware of my study, and hence I could draw upon their expertise in the course of the fieldwork. For this purpose, I constructed a formal interview questionnaire consisting of 18 open-ended questions (Appendix I). Formal interviews also served to acquaint me as rapidly as possible with the community. This would give me a chance to learn as soon as possible important issues that could open fruitful lines of inquiry unanticipated before the fieldwork started. Some of the questions were tailored as needed in the course of the interview, but the general subject matter remained the same for each question.

The interviews were recorded on tape, and later transcribed in a standard word-processing program in the field for later use. As these interviews were exploratory in nature, I did not formally analyze them with qualitative research analysis software. However, important viewpoints generated from these interviews are incorporated into the dissertation where appropriate in order to illuminate either quantitative findings or else my personal observations. Furthermore, officials' responses also provided a contrast with farmers' responses in later informal interviews that allowed me to judge differing viewpoints and opinions.

The formal interview schedule follows:

- Aug. 15, 2001, *pu yai ban* (village chief)
- Aug. 20, 2001, tambon (subdistrict) official
- Aug. 23, 2001, watershed network representative
- Aug. 27, 2001, farmer from the hamlet (referred by the watershed network representative)
- Sept. 5, 2001, farmer from the hamlet (randomly chosen)
- Sept. 6, 2001, senior and junior monks at hamlet temple
- Sept. 13, 2001, abbot of major temple near the hamlet
- Sept. 21, 2001, retired school administrator

In the course of the study, I also interviewed the district's extension agent, the chief civil officer of the district, *nai amphur,* an official of CARE-Thailand's office in Mae Chaem, as well as exit interviews with the *pu yai ban* and tambon official (listed above) at the close of fieldwork. Officials for the local office of the Charoen Pokaphand Group declined to be interviewed for this research.

A second round of formal interviews began in December 2001, when this research project shifted into the study of homegardens. I chose to use a formal interview technique because homegardens are the least-studied aspect of Thai

agricultural systems. Formal interviews allowed me to develop a systematic body of knowledge by addressing specific topics regarding homegarden management. The homegarden questionnaire is in Appendix II. My areas of interest concerned the kinds of plants and uses, indigenous ecological knowledge, and general management. Following each interview, I and my research assistant inventoried each homegarden to identify species of plants and location in the plot.

We intensively studied 10 homegardens. For the interviews, we chose the eldest five men in the hamlet, assuming their experience would provide a depth of knowledge as well as the historical changes in production. The average age of these men was 69 years old. We also attempted to contact the eldest women, but they were reticent to participate. So we interviewed five middle-aged women in order to get at women's knowledge in homegarden management. The women's average age was 48 years old.

B. Household Census

The quantitative data from this research were collected through a household census from September 21, 2001, through December 9, 2001. The census form is shown in Appendix III. As this study addresses demographic issues, each household was enumerated for its occupants, relationships to each other, ages/gender and birthplace. This information was then compared to historical demographic data reported in development project reports. Educational level and occupations of each resident were collected in order to describe the social and economic change, and also for comparison to historical data.

An important objective in agricultural change is to document the kinds of crops grown, and on which land forms, in order to determine differences and any expansion from the historical record. The household census accounted for the data according to field size, reported in the Thai unit of area measure, *rai* (equivalent to 0.16 ha), the fields' distance from the homestead, and crop rotation for the past five years.

Past development project reports described Mae Chaem's low agricultural productivity as evident by an annual rice deficit and very little cash cropping. The census asked households for data on current productivity of their crops. This included data on yields, as well as information on percentage used for subsistence, sales, or as feed to livestock. This portion of the census also asked about fertilizer use, in order to evaluate the intensification of production, as well as prices received for crops.

To round out the farm production data, the census inquired about fruit tree production, homegarden production and livestock husbandry, which have often been slighted in ethnographic studies of rural Thailand. The census sought the main species of trees, and the extent to which produce was used for household consumption or commercial sales. The livestock census also collected data on type of feed and usage of manure for fertilization.

The remaining sections of the census questionnaire concerned social aspects and development activities in the hamlet. Questions were asked about the distribution of household labor in agricultural fieldwork and between households, in order to relate demographic change to labor availability.

Questions about agricultural development were intended to capture current trends in mechanization, role of media as source of agricultural information, and involvement in current development programs. A section on land tenure rounded out the questionnaire in order to examine social issues that might have influenced the patterns of agricultural practices.

C. Informal Interviews and Participant-Observation

Through the formal interviews and census, I became better acquainted with the hamlet and its residents. Through these contacts, I learned about agricultural work in fields, as well as of rituals at the temple, and other kinds of important activities, such as a funeral, in the hamlet. In order to immerse myself into the daily life of the hamlet, I made trips to fields during agricultural work, and I also participated as much as possible in temple rituals. During these sorts of activities, I followed up on questions that emerged from formal interviews, the household census, and also from other informal interviews in the field.

The timing of this field project coincided with rice and maize harvests in November. The rice harvest was followed by field preparation and planting second crops. These agricultural tasks provided ample time for meeting work crews in the field to discuss farming in an informal, unstructured manner. In addition, I could verify quantitative information, such as field sizes and distances from the house, collected in the household census.

Field visits did not involve much participant-observation because I did not want to interfere with farmers busy at their seasonal tasks. However, visits to temple ceremonies allowed me to participate in the ritual life of the community in

order to assess culture change from what I had studied about life in Theravada Buddhist communities in Thailand. This fieldwork began while the Buddhist Lent, or monks' rainy season retreat, was in progress. The lent had begun on July 5, 2001. During the annual rains, monks confine themselves to the *wat*, or limit their outside travel to only necessary trips. It was at this time, I attended several ceremonies on the Precept Day, a sort of Buddhist Sabbath, held about every week based on the phases of the lunar calendar. The Buddhist Lent ended on October 2, with the *Ok Pansa*, or end of rainy season retreat ceremony. In addition to *Ok Pansa,* I attended the annual rice donation ceremony at the temple on December 29. At this time, households presented rice to the local temple. The rice is sold, and the proceeds go to support the temple.

Two other major rituals in this hamlet were a funeral October 6-8, 2001, and a Buddhist healing ritual for the temple's ill, elderly monk on January 26, 2002. The funeral was for a single 48-year-old farmer who had died of an unspecified illness. The funeral involved rituals at his house, the disposal of the remains at the cremation grounds, and final ceremony at the temple. As for the healing rite, *subchata*, it was the beginning of the last days for the old monk, who eventually died at the end of February. He had taken ill during the fieldwork, and was later admitted to a Chiang Mai hospital at the end of 2001. The doctors had exhausted all treatments and returned him to the hamlet to wait out his final days with his family and neighbors. The *subchata* occurred in the main temple building, and was officiated by a monk from a neighboring *wat*.

An important, but non-Buddhist rite, was the hamlet's annual propitiation to the Guardian Spirit, *Jao Tee*, on February 1, 2002. The ceremony to the Guardian Spirit occurred at a hillside shrine, at which residents offered fruits, rice and wine in reciprocity for the spirit's protection in the coming year.

The above are the main rituals in which I participated. It is not an exhaustive list of ritual life in a rural Thai community. I missed some major events because I had not known about them. I also became aware of household ceremonies after the fact. In addition, I was unable to witness some of the rituals to guardian spirits of the fields during certain farm work activities.

IV. Fieldwork Timetable

To summarize, the fieldwork occurred in four general phases:

1. **August**: gradual introduction to the community, interviews with local officials and key farmers.

2. **September-early December**: household census, and observation of rice and maize harvests.

3. **Early December-late January**: homegarden inventories and interviews; observation of second-crop plantings in harvested rice paddies

4. **Late January-February**: follow-up interviews with farmers.

V. Limitations of the Methods

The methods employed in this study were limited by practical considerations experienced by the researcher in attempting carry it out as a full-fledged ethnographic inquiry. I was aware of those shortcomings during the study

and made every attempt to compensate for them. The limitations are discussed below.

A. Length of Study

The hamlet study occurred from July 31, 2001, through February 23, 2002, which is less than a typical one-year stay that is performed in ethnographic research. The study fell short of the one-year minimum primarily because of funding constraints. Except for a small travel grant awarded by the OSU Office of International Studies, I financed the study through my personal savings and by taking out a student loan. Even if I had had sufficient financial resources, I would have had to cut short my time in the field in order to meet a dissertation deadline required by OSU's Graduate School. This stems from the fact that I had originally wanted to do my study among an ethnic Thai minority in Vietnam. However, after years of effort, I was unable to secure the necessary approvals for a visa. That unsuccessful effort consumed valuable time from the Graduate School deadline. So I switched my project to Thailand at the last minute, and had to plan my time in the field accordingly.

Several factors mitigate the fact that this study was less than a one-year project. First, I am no stranger to Thailand, its peoples or cultures. I served in the U.S. military at small air base in the Central Plain during the waning years, 1973-74, of the Vietnam War. I befriended Thai civilians and traveled extensively with them throughout rural areas during my off-duty time. Secondly, I had done academic research on the culture change of Tai Dam refugees in Central Iowa, in partial fulfillment for my master's degree requirements in anthropology at Iowa

State University (Zolvinski 1993). The Tai Dam are culturally and linguistically related to the Thai peoples who populate southern China, northern Mainland Southeast Asia, and Thailand. The current project, then builds on my past research experience by studying another Thai subculture, but in their indigenous rural context. Finally, I received intense academic training on Thai cultures at Ohio State University with Dr. Anthony R. Walker who is a seasoned Southeast Asianist and an original research associate of the Tribal Research Centre, a forerunner to today's Tribal Research Institute (TRI) in Chiang Mai. Dr. Walker has since left OSU. As of this writing he a member of the Faculty of Arts and Sciences at Universiti Brunei Darussalam. During the research, I consulted with Dr. Walker through e-mail.

B. Language Factors

A major limitation of this project was the language barrier in data collection. I am fluent neither in Central Thai nor the lowland Khon Muang dialect.

My interpreter, who was also my research assistant, was a then-unemployed 50-year-old schoolteacher who was also a former Buddhist monk. He had completed formal English training at a Chiang Mai institute several decades ago. He helped in the very early and late phases of this project, as he was gone for all of October on a family holiday. In the interim, I hired a 27-year-old man who had formerly worked in serving foreign tourists at hotels in Chiang Mai and Bangkok. He assisted with the household census and trips to observe rice and maize harvests from September through early December.

My formal language training in Lao, which is a Thai language, was useful in carrying out the research. I studied Lao during at the 1996 Southeast Asian Studies Summer Institute held at Arizona State University. I familiarized myself with Central Thai and its script through self-study. Although I used local interpreters for this project, the language training was useful in helping me to verify figures on cropping practices provided by household members during the community census. In that way, I was able to confirm the interpreters' translations of the quantitative data.

Whereas anthropologists strive to get the "insiders" view of the culture, this aspect was relatively inaccessible to me. It is even more crucial in terms of understanding the local categories of knowledge about farm management and the environment. I overcame this limitation by steeping myself in the academic literature of the region, and I observed nothing out of character with published accounts of rural Thailand. My research assistant was crucial as he had grown up on a Thai farmstead, and had much knowledge of Thai farming practices. In addition, as he was in the middle-aged years, he was well-received by the hamlet residents, many of whom were in the same age category. Finally, having been a Buddhist monk, he provided a wealth of knowledge of rituals in the community and provided the theological rationales for them.

C. Non-Immersion in the Community

A third limitation was that I did not live in the hamlet. As a sudden visitor in the lives of the residents, I did not personally know anyone comfortably enough to seek lodging there. I also did not have the funds to build a house there. I lived

at the ICRAF field office about 3 kilometers away. As a result of the living arrangements, I did not fully immerse myself in the day-to-day life of the hamlet, as much as I tried. As my project did not cover an entire year, I was not privileged to observe events and activities from March through July. I made up for this time lapse by keeping in touch with my research assistant after I completed fieldwork in order to keep abreast of happenings in the hamlet. In fact, several times I sent him disposable cameras in order to capture various activities after my departure, which he then forwarded to me for processing in the United States. At the time of this dissertation writing, we continue to maintain regular contact.

Despite the above limitations, I feel this study contributes to our knowledge of contemporary change in Thailand, particularly the northern region. The literature search in this dissertation showed that geographers have done extensive work on the causes of environmental degradation in northern Thailand, particularly as it relates to commercial cropping and contracting programs. This study draws on those strengths in order to put these issues into an anthropological context, and it will provide a pivital point for future ethnographic inquiry into these issues.

CHAPTER 6

SOCIOCULTURAL FINDINGS FROM THE HAMLET

The name of the hamlet is Baan Lek[1] located within a 5-kilometer radius of the district's seat, Mae Chaem Town. Most of hamlet is strung out along an approximate 1-kilometer road that runs roughly parallel to a river that drains one of the district's four main watersheds. Eventually that river drains into the Mae Chaem River. The road is cut into the base of a forested hill situated in a northwest-southeast direction. The hillside descends from the road and stretches out into rice paddies that form the valley bottom drained by the river. Most houses are on the lower side of the road, which is served by an irrigation channel, compared to the few homesteads without irrigation on the upper side. The watershed's *muang fai* system irrigates the rice paddies, providing the subsistence base for communities along the valley. The farmstead arrangement closely resembles the drawing in Figure 1 from Ungphakorn, Preechapanya, et al. (2001) unpublished paper on homegardens.

[1] The name for the hamlet is a pseudonym in order to maintain the confidence of the residents. This is accordance with a protocol submitted to and approved by the Institutional Review Board, Ohio State University, prior to the study.

I. A Natural Hamlet

Baan Lek is a natural hamlet, as dictated by the hillside topography. It would be difficult to put houses anywhere else except at the base of the hill. A. sign at the entrance indicates the place, and residents speak of the hamlet by its name. Another indicator that demarcates the hamlet as a natural unit is that it has a Guardian Spirit that protects the hamlet. The shrine is on the hill overlooking the hamlet. At the beginning of the calendar year, villagers gather there to participate in an annual ceremony to thank the Guardian Spirit for its protection and to ask for continued help in the coming year.

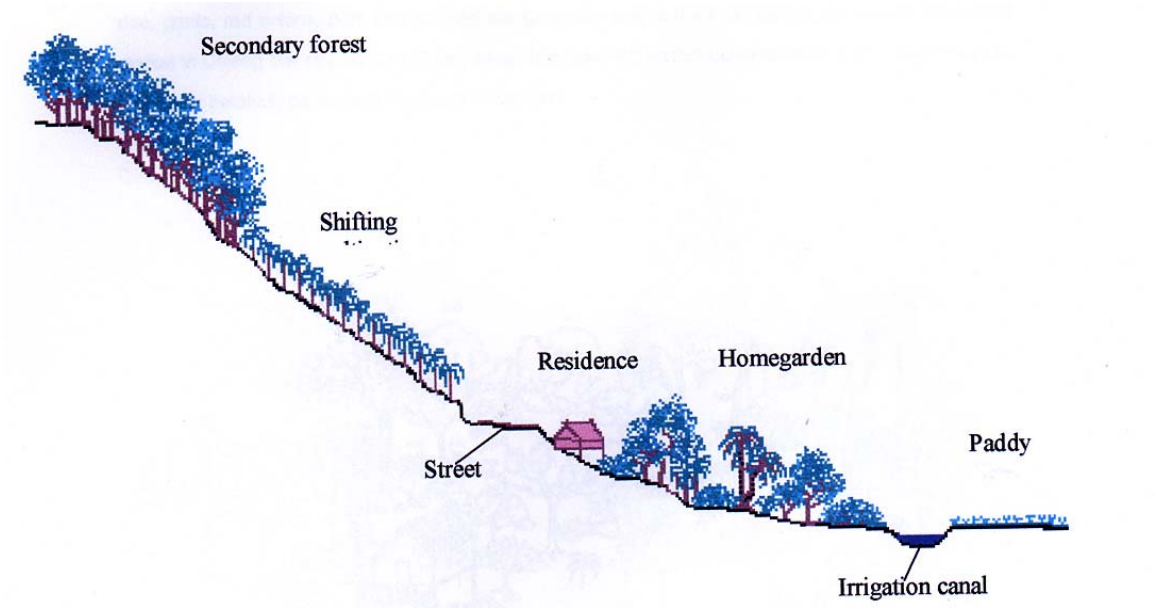

Figure 1. Typical Khon Muang Farmstead (Ungphakorn, Preechapanya, et al. 2001, used with permission of the authors)

Although a natural hamlet both geographically and ritually, Baan Lek is not a separate administrative unit in terms of the district's governance. The hamlet is part of Baan Yai Village, located on the other side of the valley. A concrete bridge across the river connects the communities. This administrative fact means that the hamlet's data is aggregated with Baan Yai Village's, making it difficult to sort out information for Baan Lek. The district provides population figures for the entire unit, lacking separate data for Baan Lek. Another outcome of this arrangement is that both communities share the same village chief, or *pu yai ban*. The *pu yai ban* at the time of this research was a lifelong Baan Yai resident of 47 years who ran a large farm operation. He was serving a second five-year term, having been re-elected in May 2001. As the political leader, the *pu yai ban* conducts monthly meetings for the community at the Baan Yai School. He also comes to Baan Lek for temple ceremonies on Buddhist holy days, as well as serving as a funeral officiant. It is the *pu yai ban* who performs the last ritual on the deceased by igniting the fire to cremate the corpse at a public ceremony. He is also present at numerous public activities in and around the hamlet and in the district.

The major center of social activity in Baan Lek is the Buddhist temple located at the edge of the hamlet about 100 meters from the first house. The temple serves a total 44 households, which includes all residents of Baan Lek as well as 17 residences in Baan Yai.

The temple grounds are among the smallest compared to others in Mae Chaem District. There is no school here. Only two monks lived here until the

younger one in his 20s was reassigned, leaving just one, an elderly resident in his 70s from the hamlet. The buildings include a worship hall, *viharn,* where the congregation gathers for ceremonies before statuary of the Buddha and a picture of the King; a small enclosed shrine dedicated to the Buddha's footprint, a pavilion, or *sala*, for public gatherings, and the monk's residence.

To an outsider, the temple grounds seem isolated from the daily routine of the hamlet. During the day, the doors of the worship hall, the *viharn,* are often shut, giving an abandoned appearance. As a farming community, though, ceremonies are held at the din of dawn so farmers will have time to do fieldwork during the greater part of the day. The elderly are the last people to lag after a ceremony, to eat, socialize and clean up. Typically the last person leaves by about 8:30 a.m. when the doors are bolted shut until the next ceremony.

The only commercial establishment in Baan Lek is a store located in the center of the hamlet. The shopkeeper, a 33-year-old woman, and her husband, 39, employed by the police force of the Royal Forestry Department, live on the upper floor of the two-story house that contains the store. The store sells everyday items, processed foods, snacks, soft drinks, household items, and fish from a pond, and re-sells garden produce purchased in Mae Chaem Town's main market.

Many houses in Baan Lek are situated at ground level, constructed out of concrete and wooden materials, and topped with roofs of corrugated material. As an indicator of poorer economic conditions, only three houses had roofs thatched with dried leaves from a local tree species. The predominant concrete house

construction compares to the traditional wooden northern Thai houses built on large posts, and requiring people to climb upstairs to access the living quarters (cf. Walker 1995:25). In former times, the draft animals, water buffalo, were harbored under the living quarters of the traditional house. These days northern Thai farmers no longer use water buffalo, so they are not present at the homestead. Although I did not make a formal count of housing styles, a few of the traditional northern Thai houses still existed in this hamlet. Underneath the living quarters, it is typical to find a loom for weaving, as well as wooden planks on which residents gathered to perform various homestead chores.

Residents said Baan Lek has had electric service for about 10 years; telephone service has not reached the town. All houses are equipped with electric lighting, while more than two-thirds of the residences have television sets, and about one-third have radios. A few residences even have refrigerators. Residents get their water either from wells, or else from a town water system that charges a 20- baht (US$.47) monthly service fee. The people associate their homegardens with water quality and availability in their wells, i.e. the tree and vegetation roots are said to slowly release water to the wells through the dry season. According to Lawrence S. Hamilton (1985:682), the process, known as the “sponge” effect” is not scientifically valid. However, this belief is part of the indigenous ecological knowledge repertoire found in other parts of northern Thailand (Preechapanya 1996). The hamlet water system’s supply is not potable. To drink it, residents filter the water through one or two jars containing charcoal, sand and stone. A source of water for homegardens is an irrigation channel that

runs parallel to the road and through the house properties. The channel is a year-round source of water. Villagers clearly understand that a reliable water supply is one of the ecological services of the watershed. They often pointed to the forested peak Doi Inthanon, in clear view of the hamlet, as the source of their irrigation water.

Transport from the outskirts of Baan Lek and Mae Chaem Town is via paved road, making a comfortable 10-minute trip by motorized vehicle. Until the last months of fieldwork, the main road through Baan Lek, though, was a dirt surface, which got rutted and muddy during the rainy season. Residents said the road was due to be paved within two years, and partial luck prevailed as 400 meters got paved in early 2002. That achievement left the local people speculating about when the remaining 600 meters would get paved. One year after the completion of fieldwork, I received word the remainder was still unpaved.

Although Baan Lek shares a *pu yai ban* with the rest of the village, hamlet residents do exercise their leadership through various other organizations and positions in the community. The fact that local organizations exist at all contradicts Embree's (1950) impression that Thai society is "loosely structured," a view that has colored social science research in the Kingdom, although now to a lesser degree. In fact, the positions that will be described are structured according to age and gender. The individuals in these positions are all male and at least 60 years old.

An organization organic to the community is the temple committee, which oversees temple finances among other administrative duties. The title of the layman who heads this committee is the *gaa wat,* which was filled by a 60-year-old farmer who was also a respected maize producer. Another important figure in religious life is the temple's lay leader, or *ajan wat*, or literally "temple teacher," who leads the congregation in services at the temple. A retired farmer in his 70s filled this position. A third kind of leader in the community is the keeper of the hamlet's Guardian Spirit shrine. His duties are confined to setting the day for the annual ceremony and preparing the shrine for the service. A retired farmer in his 70s also filled this position.

The above positions and committee are truly indigenous to northern Thai culture. The nongovernmental organization, CARE-Thailand, fostered the creation of the Village Forest Conservation Committee (VFCC) to regulate forest use and to prevent/suppress fires. The latter is a big problem when farmers burn off fields in the dry season. Baan Lek's VFCC is headed by a 55-year-old farmer who is generally active in other aspects of community life. The committee consists of six people, including several women as required by CARE-Thailand. The VFCC cannot be considered truly "indigenous" as it is an imported idea and did not initiate from the local community. However that is not to say the VFCC is ineffective, or else it would have ceased to exist by now. For example, in 2001, the Baan Lek VFCC suppressed forest fires on 800 rai (128 ha), according the committee head. In 2002, the area suppressed was about 200 rai (32 ha), according to data collected by the research assistant in the post-fieldwork phase.

II. Demographic Characteristics

Baan Lek consists of 30 residences, of which 28, including the monk's residence at the temple, are occupied year-round. Professors from Chiang Mai University owned the other two houses, which are substantial structures compared to the farmers' houses. A steel fence enclosed one of the professor's houses, compared to farmers' homesteads that may be enclosed by either a wooden fence or a hedge. One of the professors' houses was visible from the road, but I had never seen anyone there. The neighbors said the professor paid them 600 baht (US $14.11) per month to take care of the place. Trees hid the other professor's house, which was at least 100 meters from the main road, so it was not visible to the daily traffic. The data collected for this study comes from the 28 residences whose inhabitants are involved in the daily life of the hamlet and who were available for the census and interviews. However, all agricultural data comes from 27 farm households, which excludes the monks' residence as they are not involved in agricultural production.[2]

A. Population Structure

The census shows a hamlet population of 118 people consisting of 60 (50.8 percent) males and 58 females (49.2 percent). The district's records reported that Baan Yai's village population is 277 residents consisting of 137 males (49.5 percent) and 140 females (50.5 percent). Assuming the District's figures are accurate, we can subtract Baan Lek's census data from Baan Yai's

[2] The elder monk is a retired farmer from the community. We asked him questions about historical changes in the hamlet's agricultural life and issues concerning the environment.

to approximate Baan Yai's population (Table 7). The results show Baan Yai's population of 159, which includes 77 males (48.4 percent) and 82 females (51.6 percent).

HAMLET	MALES	FEMALES	TOTAL
BAAN LEK*	60 (50.8%)	58 (49.2 %)	118
BAAN YAI**	77 (48.4%)	82 (51.6%)	159
TOTAL**	137 (49.5%)	140 (50.5%)	277

* researcher's census data
**district's administrative records

Table 7. Population Structure, Field Site, Mae Chaem District

The household composition was confirmed in random follow-up visits, which also afforded the opportunity to note any changes. However, this researcher observed that any census can never be entirely accurate for long because Thai household composition is in a continual flux. The census was largely conducted over a 2-1/2-month period (September 21-December 6). Enumeration of a final residence was delayed until the end of fieldwork as not to unduly disturb a family that had performed a funeral for a household member. During the time of the census, there was enough time for relatives to move in, and others to move out, which would change the original enumeration. The only way to get an absolutely accurate count would be to survey all houses on the same day, which was impossible for a single researcher.

Two examples of household fluctuations will illustrate. The first house surveyed (September 21) contained a 55-year-old man and 55-year-old wife, with

an unmarried son, 40, and widowed daughter, 34, with her daughter, 11. A later visit two months later revealed that a son and his family moved in from Lampang, a town about 110 kilometers to the southeast on the other side of the mountain range. The move increased household size from five to eight. In another house, the occupants were a 58-year-old man, 47-year-old wife, and a 27-year-old daughter. The daughter actually lived in Uttaradit about 200 kilometers to the southeast. She had returned to her family after getting an unspecified illness. She recovered by the end of the fieldwork period and had returned to Uttaradit.

Another factor that affects census data is disposition of children of adult offspring who move from Baan Lek, get married and then divorce. In two cases these relatives sent their children to the care of grandparents in the hamlet. The data then shows children, ages 8 (female), 7 (male), 5 (male), 4 (female), whose parents returned them to the hamlet. Further frustrating an accurate count is that after the census, grandparents later sent the 4-year-old girl back to live with their adult son in Chiang Dao, about 136 kilometers to the northwest.

The fluidity of Thai household composition may frustrate social scientists seeking precise data. But the flexibility is a well-known dynamic of bilateral kinship systems that is documented in the literature of Thai rural life. It was Lucien Hanks (1972:81) who observed “the continual changing of the membership living in a single dwelling,” in order to meet labor demand or to provide social support. As kinship relationships are voluntary and reciprocal in the Thai household formation, Hanks (1972:87) penned the well-known phrase, that kinship “is psychic rather than physical.” Hanks (1972:87) related Thai

kinship patterns to Buddhist doctrine that attaches importance to the non-material world of the soul, rather than to blood relationships. According to Hanks (1972:87), “What is registers as amiable by two souls binds them together.”

Hanks’ statement does overstate the case for Baan Lek. All households contain only consanguineal and affinal kin, except, of course for the monks in the temple residence. In no case did we document any non-blood or non-affinal relatives living in a single household. Thus household composition in Baan Lek is not purely a mental construction, as blood relationships are the key feature in all residential patterns.

For the purpose of this study, then, the census only included individuals residing in the household at the time of enumeration. Due to time and manpower limitations, it would have been impossible to re-survey at the end of the research. The survey is also limited in that it does not necessarily capture all of the outmigration of children from the hamlet. This is a shortcoming of this research that was not anticipated in the project design. I did not count out migration because the original study was conceived only to examine the distribution of hamlet labor available for daily household production at a particular period of time. In retrospect, I realize that offspring living away from the hamlet could theoretically return later to contribute to the labor pool, and they may also conceivably send monetary remittances to support relatives back in the hamlet. Unfortunately this research did not investigate those factors.

B. Age/Gender Analysis

To analyze the population structure, I disaggregated the age groups into 10-year categories, starting from 0-10 years up to 61 years-plus as the oldest category (Table 8). This contrasts to Warren Hern (1995:135-137), who suggested 5-year increments in order to standardize cross-cultural comparisons. However, the 10-year breakdown is consistent with demographic analyses conducted during the Mae Chaem Watershed Development Project in the 1980s (Thani and Rauechai 1984). Although we have no specific data on the hamlet for that time, the 10-year increments allow for a rough comparison between the hamlet to long-term demographic trends in the district.

Age Group	Males percentage (no.)	Females percentage (no.)	Total percentage (no.)
61+	10.0 (6)	12.07 (7)	11.02 (13)
51-60	15.0 (9)	10.35 (6)	12.71 15
41-50	21.67 (13)	17.24 (10)	19.50 23
31-40	10.0 (6)	15.52 (9)	12.71 15
21-30	18.33 (11)	13.79 (8)	16.1 19
11-20	18.33 (11)	13.79 (8)	16.1 19
0-10	6.67 (4)	17.24 (10)	11.86 14
TOTAL	100 (60)	100 (58)	100 (118)

Table 8. Age/Gender Structure, Baan Lek, 2001

The results (Table 9) show a rough, non-pyramidal age structure, in contrast to the pyramidal structure that Thani and Rauechai (1984:12-14) reported 17 years earlier for three subdistricts in Mae Chaem District's. A pyramidal structure indicates a largely young population typical of developing countries (Hern 1995:136-137). During their study in Mae Chaem, Thani and Rauechai (1984:12) observed a decrease in northern Thai fertility rates as "the number of people who were 11-20 years old were more than the number of people who were 0-10."

Age Group	Males (1984)	Males (2001)	Females (1984)	Females (2001)
61+	3.14 %	10.0 %	2.91 %	12.07 %
51-60	4.82 %	15.0%	6.02 %	10.35 %
41-50	7.96 %	21.67 %	6.02 %	17.24 %
31-40	9.85 %	10.0 %	8.48 %	15.52 %
21-30	17.61 %	18.33 %	15.17 %	13.79 %
11-20	24.94 %	18.33 %	27.67 %	13.79 %
0-10	31.65 %	6.67 %	33.70 %	17.24 %

Table 9. Age/Gender Structure Comparison, Mae Chaem District 1984 (Thani and Rauechai 1984) and Baan Lek 2001.

It is evident that family planning began to take hold in northern Thai households at the time of the Mae Chaem Watershed Development Project. Thani and Rauechai's (1984:38) report showed 47.2 percent of northern Thai surveyed were using contraception, while 52.8 percent were not. These percentages compared to much higher rates of non-contraception among Karen, 89.14 percent; Lua, 95.55 percent, and Hmong, 65 percent. For the northern Thai, contraception practices included oral pills, injection, intrauterine devices,

female sterilization, male sterilization, condom use and others according to the report (Thani and Rauechai 1984:38).

C. Household Structure and Composition

The household structure in Baan Lek follows a two- and three-generational pattern, which is consistent with Shigeharu Tanabe's (1994:106-107) findings three decades earlier in both northern Thailand and the Central Plain. Baan Lek's households, like those in Tanabe's study, are arranged according to a stem family model consisting of three generations, or a nuclear family model consisting of two generations. The term "model" is apt because actual membership shows a lot of variation based on practical circumstances of the household. For example, children in a two-generational household may not be the progeny of the senior couple, as is typical in a nuclear family situation. The senior couple may be taking care of a divorced son's or daughter's children. In no case, though, did I find joint-family households consisting of two or more adult marred siblings, their spouses and children.

In Baan Lek, 10 residences (36 percent) consisted of three generations, while 17 residences (60 percent) had two generations. The temple residence (4 percent) had two monks, of whom the older, a 74-year-old man, was from the hamlet. Under normal circumstances, the hamlet also has a single-generation household. This consists of a 58-year-old man and 47-year-old wife. They were joined temporarily by a 27-year-old daughter who had returned from an out-of-town job to recover from an illness. No other cases existed of a one-generational

household. As for the monks, there was a generational disparity in their ages. The older cleric was 74, while the younger one, who was from outside the district, was 20. During the fieldwork, the younger monk was reassigned, leaving the older monk to live alone, although he was within convenient walking distance of his family in the hamlet.

Briefly then, here is a discussion of the residential patterns in Baan Lek Hamlet:

Three generations: The typical stem family arrangement consists of one or both elderly, retired parents living with the family of a married adult offspring. The offspring adult and spouse, in turn, have children of their own who live in the house. The census showed four males, averaging 71.8 years living in stem family households, and six females, averaging 77 years. For the second generation, the ages range from 21 years to 56, whereas the males' average age is 46.9 years, while the females' average age is 41.9 years, well beyond the child-bearing years. The consanguineal relationships between generations are not always so clearcut. For example, one household actually spans four generations although one of the generations is missing from the house. In this case, the eldest resident's granddaughter, a 31-year-old woman, is working as a waitress in Bangkok. She is divorced and sent her 8-year-old girl to live with her mother and grandfather in the hamlet. So four generations are associated with this household, although three were actually living there.

It would be erroneous to assume that three-generational households always include retired farmers as the senior members. Baan Lek's variable

household structure includes two cases where the senior members are active farmers living with a married offspring adult and their children. One household includes husband and wife, age 55 each, living with a single son, 40, a widowed daughter, 34, and her 11-year-old daughter. The son actually lived at the household's orchard about 5 kilometers away where he tended the trees, while the daughter lived at the main residence with her parents where she wove and helped out with farm chores.

Another case is a 64-year-old widower living with his daughter and her husband, plus their 8-year-old daughter. In this case, the son-in-law provided labor in the fields, and the married couple will likely support the senior male after he reaches retirement.

Two generations: Seventeen households (63 percent) consist of two generations in a typical nuclear family arrangement. The ages of the parents range from 28 to 60, whereas the mean age of the males is 46.9 years, and the mean age for the women is 43.1 years, just beyond the prime child-bearing years. The mean age of their offspring is 16.1 years for the boys and 13.8 years for the girls. In all cases, all school-age children attend school during the day. There is a noticeable lack of children working in fields as well as at temple ceremonies as they attend school during the day. A 52-year-old woman described the situation this way: "young teen-agers have education. They don't know how to grow rice. They want a comfortable job."

Not all two-generation households are composed of a typical nuclear family. A 55-year-old widow moved in with her divorced brother. They shared a

house with his three adult children, one of whom was attending school in Chiang Mai. The flexibility of Thai residential patterns as a social support mechanism is reflected in this example.

D. Future Household Dynamics

As children reach the college-aged years, they are taking advantage of post-secondary educational opportunities in Chiang Mai. These include university education or trade/vocational school training. This poses the question about the future of farming in Baan Lek and the consequences for land ownership. Presumably the educated offspring will not return to work the fields as they pursue careers in the chosen paths. Will they continue to hold the land and become absentee landlords?

A second issue concerns the less-educated who will stay to continue on in farming. As the availability of household labor diminishes, it appears that agriculture will become increasingly mechanized to make up for the labor shortage. During this research, every household had access to a power tiller to prepare fields for planting, whereas planting and harvesting were done by hamlet labor exchange. Another option might also be to hire non-Thai laborers, notably the Karen, who now do wage labor in lowland Khon Muang hill maize fields.

Finally, there is the issue of old-age support when the current generation of farmers reaches retirement. Will future retirees live alone in the hamlet until their dying days, or will they move in with their adult children working at some distant city? Another pressing question is what will happen to their vast

storehouse of local knowledge about care and management of plant resources? Will local knowledge die with them?

The sheer existence of Baan Lek and the availability of local knowledge for future generations hinges on the answers to these questions. The context of Thai cultural history shows that farming communities can grow from nothing and then easily disband depending upon the circumstances they encounter. Hanks (1992[1972]) presented this model in discussing the cultural history of Bang Chan in the Central Plain, initially settled in the mid-1850s. By the 1970s, farming declined by one-third as disease devastated the rice crop, and as young people sought wage labor in the rapidly expanding Bangkok metropolis. Bang Chan residents did not mourn the passing of agriculture as new opportunities arose in the urban sector (Hanks 1992 [1972]:149). “The decision to abandon rice growing was relatively painless in Bang Chan,…” are enduring words from Hanks’ classic (1992 [1972]:149).

III. Occupational Structure

Farming is the backbone of Baan Lek’s economy, although off-farm employment has also made inroads into the hamlet, making for a mixed occupational structure. All households have access to land either for paddy production, or for growing dry rice (upland rice) in the hills. In addition, nine households have at least one adult working full-time in the non-farm sector, while the other spouse tends to fieldwork in the hamlet. Therefore, the occupational structure is very diverse and reflects change from a primarily subsistence mode

of production at the inception of the Mae Chaem Watershed Development Project in 1980.

A. On-Farm Employment

The largest farm occupation category is owner-operator, consisting of 13 households or 48 percent of the hamlet. However, that figure should not lead one to believe that access to paddy land is not an intractable problem. There are seven households, 26 percent, that have no access to paddy land whatsoever. Four households, or 15 percent, are in a “part-tenant” category, that is, they rent paddy land and also farm in the hills. A remaining three households, 11 percent, either rent out all or part of their holdings. Combining the “no access” and “part-tenant” categories, there is a total of 11 households, or 41 percent without ownership to paddy land. To reiterate, though, those who do not own paddy and are not necessarily denied access to means of production, as some of these households can clear plots without title in the hills where they grow rice and cash crops.

Despite the intractable land ownership situation, a landlord class has not emerged in Baan Lek. Only two households (7.0 percent) rent out all their paddy land, and the average plot per household is 2 rai (0.32 ha). This contrasts to Tanabe’s (1994:105, 113) Chiang Mai Village where 3 percent of households were landlords, but their average landholdings were much larger, or 17.6 rai (2.72 ha). Of course, Tanabe’s (1994:113) Chiang Mai Village had a larger land base of 632.75 rai (101.24 ha) and larger population, 931 people, compared to Baan Lek.

In terms of landless laborers, Baan Lek has three households reporting that members hire themselves out to farming operations elsewhere in the district. None of these households owns any paddy land, but all have access to hill land where they grow cash and subsistence crops. The average amount of hill land worked is 6.3 rai (1.013 ha) for these households. Only one of these households is a classic case of landless laboring as reported as a trend in northern Thailand in the last few decades (Tanabe 1994:105). The case in Baan Lek involves a household head and two grown sons. The other two cases are different, as the field laborers, women in these cases, contribute to the household budget supported by husbands in non-farm wage occupations, i.e. forestry police officers. Thus farm laboring is not the sole source of income in these latter two cases.

B. Non-Farm Employment

The occupational structure of Baan Lek reflects the hamlet's continued gradual immersion into the non-agricultural employment sector. Nine (33 percent) households (excluding the monks in the temple residence) reported at least one spouse (9 males, 1 female) working full-time in various non-farm positions. The gradual transformation to non-farm occupations is due to the improved road situation rather than proximity to the administrative seat, Mae Chaem Town, because some of these job positions are located elsewhere in he district. Of these, five men are on government payrolls. One man is an administrator with the subdistrict's government, the *Tambon* Administrative Office (TAO), while four others are police officers for the Royal Forestry

Department. Four others work in the private sector. One is a weighing clerk for farmer's cooperative, while three are involved in construction.

As for females, there are very few involved in nonfarm wage labor in contrast to the men. However, women are involved in gainful nonfarm activity in the hamlet as weavers of the traditional northern Thai fabric and its emblematic *tin chok* design. The women sell the textiles to local shops located on the main road leading into Mae Chaem Town. The shops are lined along the route frequented by tourists to and from Doi Inthanon National Park, but there is no overt effort to market the products to the tourists. The ages of Baan Lek's weavers range from 31 to 69, with the mean age of 45. Considering the age of the active weavers, the long-term future of the traditional craft remains uncertain, as there are no younger women learning the techniques, at least in Baan Lek. That is not to say younger women are not learning the *tin chok* techniques elsewhere in Mae Chaem District.

Although steady wage labor is making inroads into Baan Lek, younger men and women have sought nonfarm employment outside of the district. As indicated earlier, the household census was not intended to capture out-migration. In fact, the constant flux of household composition would have presented methodological problems in getting an accurate count. But several households indicated that sons or daughters were working in unskilled service or construction jobs either in Chiang Mai or Bangkok. Two households reported that each had a son, both in their 20s, who worked in the construction trades in Chiang Mai during the farming off-season, about April, and then returned to

work in the fields for the rest of the year. We also learned that a current resident, a middle-aged woman, had worked as a domestic servant in Kuwait several years ago. She showed pictures of her time spent in the Middle Eastern country.

Paddy Access Type	Paddy Land, rai, (ha)	No. of House-holds (%)	House-hold Populat-ion	Adults Employed Off-Farm	H/H Farm Workers	Farm Workers Avge. per H/H
Landlord	4 (0.64)*	2 (7.0)	7	2	0	0
Landlord-Operator	4 (0.64)	1 (4.0)	4	1	1	1.0
Owner-Operator	35.5 (5.68)	13 (48.0)	58	3	29	2.2
Part-Tenant	10 (1.6)	4(15.0)	17	2	9	2.25
None	0(0)	7 (26.0)	30	2	16	2.28
TOTAL	**53.5 (8.56)***	**27** (100)**	**116** (100)**	**10**	**55**	**2.03**

*one household rents 2 rai to another household, so total the hamlet's paddy land in production is 51.5 rai (82.4 ha)
**excludes the temple residence for monks

Table 10. Household Labor Structure, Baan Lek Hamlet

The trend just described appears to be common throughout the district, as local officials spoke about young men and women in their 20s working in Chiang Mai, Bangkok, and even overseas in Singapore and Taiwan. I also learned that the district's residents have relatives who have started Thai restaurants in England and Switzerland, and some longed to take advantage of those connections for overseas employment. This is another example of how residents from remote Mae Chaem are actively participating in the global economy. It is unclear how much of the proceeds from these jobs are remitted back to Mae

Chaem. A future study should examine the significance of such remittances to the overall economy in the district.

C. The Elderly and Children

According to Tanabe (1994:107), elderly and/or children are "mobilized for the periods of intensive labour demand and for light casual tasks." My research found that these "marginal labour units" are never utilized for intensive field tasks at all, which is another indicator of social change in northern Thailand in the three decades since Tanabe's initial study. This could also be evidence of extended life spans as residents are living into their physically frail years and are unable meet the demands of agricultural fieldwork. While the elderly stay home during the day, the children are in school when the able-bodied adults work the fields.

The elderly and the young do participate in "light casual tasks" around the homestead, notably working in the homegarden. On any given day, one can observe retired farmers sweeping leaves, burning the litter and tending to other gardening details. Children, on the other hand, return from school to feed farm animals raised in the homegarden, which amounts to their only participation in farm work. Thus, "marginal labour units" (Tanabe 1994:107), are a negligible factor, if at all, in terms of field tasks, although they do play a part in productive activities close to home.

D. Occupational Structure in Historical Perspective

Tanabe's work (1994:253) in northern Thailand, and John Kleinen's (1999) study of a Red River delta village in Vietnam, both bring home the point that peasantries are not a homogenous and undifferentiated lot, if ever they were.

Tanabe (1994:250) attributed the differentiation to a growing “socio-economic stratification”, based on changing land tenure arrangements that favored a few rich landlords who rented their landholdings to increasing numbers of landless peasants. In fact, the land tenure situation in northern Thailand once seemed ripe for large-scale social unrest-- even revolution--that never fully materialized. Taking a Marxist approach, Turton (1976:278) predicted that class structure would polarize into rich and poor segments as an undifferentiated middle class disappeared. Or as Turton (1976:267) put it: “the agricultural sector is shown to be increasingly dominated by capitalist relations of production.”

Later Turton (1989:58) recanted; “there has not been a marked overall trend towards a polarization between large landowners and a correspondingly large class of landless agricultural laborers,…” But Turton did decry a continued mixture of inequalities, including the concentration of land in the hands of a few owners, disappearance of small farms, and poor farmers’ lack of access to good quality land and technological farm inputs.

Twenty years ago, Mae Chaem District’s fit the model of Turton’s and Tanabe’s undifferentiated peasantry. A socioeconomic survey showed that 88 percent of Mae Chaem’s lowland Khon Muang made their livings primarily from agriculture, while the remainder worked in petty trade and government employment (Thani and Rauechai 1984:170). The alternatives were very limited as the availability of wage labor jobs was “unreliable” in the nonfarm sector (Thailand-Mae Chaem Watershed Development Project 1980:11). Poor farmers could either fire up swiddens in the hills to grow rice for food or to raise opium for

cash, or they could “look for intermittent wage labor whenever he” or she could. (Thailand-Mae Chaem Watershed Development Project 1980:11, E4).

These days, the situation in Baan Lek is similar to what Turton (1989:58) described in his later writings, i.e. social inequality without debilitating class polarization. Only two households rent out all their land, but they have not emerged as a dominant landlord class, as their rental holdings amount each to only 2 rai (0.32 ha), not the remarkable 17.6 rai (2.72 ha) in Tanabe’s Chiang Mai Village (1994:113). In addition, 13 households, or 48 percent, own and work their paddy land. But paddy ownership is still out of the reach of 11 households, or 41 percent, who must either rent it or have no access to it whatsoever.

The data also sheds some light on the neo-Malthusian thesis that poverty causes environmental destruction. The data supports a different view, i.e. that even the better-off residents are engaged in permanent cash-cropping on ecologically vulnerable hill lands. It would be reasonable to assume that households without access to paddy will cultivate hill sites, because they have no other place for growing rice. Our data shows that this is true, as part-tenants and those without paddy access at all, farm 101 rai (16.16 ha) or 41 percent of the hamlet’s 246 rai (39.36 ha) in hill ground. But poverty, as indicated by lack of land ownership, is not the only prerequisite to a deteriorating environment. Farmers who we assume are better off because they own paddy land farm the majority of the hill sites. A total of 12 owner-operator households farm 135 rai (20.76 ha), which is 54.8 percent of the hamlet’s hill ground.

Another point to consider is that households engage in hill production even if they have a full-time wage earner in the nonfarm sector. The data shows that six of nine households (67 percent) in this category had 36 rai (5.76 ha) in permanent hill cultivation. During the maize harvest, I observed that some wage-earners who took time off from their regular jobs to participate in their household's field operations. These facts than have ramifications for development strategies. It might be assumed that a "modern" economy based on increasing nonfarm employment opportunities will draw workers from the agricultural sector and thus relieve humans' pressure on the natural environment. The data shows the converse, that nonfarm wage earners cultivate hill lands as an important role in the household's economic strategy.

Paddy Land Access Type	# House-holds (total in hamlet)	Hill Land in Pro-duction, rai (ha)	Avge. Hill Land per House-hold, rai (ha)	House-hold Popu-la-tion	Adults Work-ing Off -farm	House-Hold Farm Work-ers (avge.)
Landlord	1 (2)	10 (1.60)	10 (1.60)	3	0	2 (2.00)
Landlord-Operator	0 (1)	0	0	0	0	0 (0)
Owner-Operator	12 (13)	135 (21.60)	11.25 (1.80)	53	2	26 (2.16)
Part-Tenant	4 (4)	28 (4.48)	7 (1.12)	17	2	9 (2.25)
None	7 (7)	73 (11.68)	10.42 (1.66)	30	2	16 (2.28)
TOTAL	**24 (27)**	**246 (39.36)**	**10.25 (1.64)**	**103**	**6**	**53 (2.20)**

*Data does not include four households (including monks' temple residence) without fields at hill sites. See next chart for the excluded households.

Table 11. Labor Structure, Households with Hill Fields, Baan Lek Hamlet.

The hills, then, are not just a subsistence safety valve for Baan Lek households; it has become an important economic resource for the community. Thus a projected vision of the Mae Chaem Watershed Development Project was realized in Baan Lek, but in the process, fell short of abating environmental deterioration. The project succeeded in diffusing high-yielding rice varieties, which eliminated lowland Khon Muang hunger, and in turn, allowed households to focus on cash-crop production. However, the Project failed to deal with the environmental outcomes of this transformation, as is evident in Baan Lek. Secure in their food production, Baan Lek farmers continued carving out forested plots in the hills for growing soybeans and now maize. Even the emergence of non-farm employment opportunities has not abated household's desire to cultivate vulnerable hill sites, as 67 percent of these households cultivate hill maize fields

Paddy Land Access Type	# House-holds* (total in hamlet)	House-hold Popula-tion	Adults Working Off-farm	House-Hold Farm Workers (avge.)
Landlord	1 (2)	4	2	0
Landlord-Operator	1 (1)	4	1	1
Owner-Operator	1 (13)	5	1	3
Part-Tenant	0 (4)	N/A	N/A	N/A
None	0 (7)	N/A	N/A	N/A
TOTAL	**3 (27)**	**13**	**4**	**4**

*excludes two monks living in temple residence

Table 12. Labor Structure, Households without Hill Fields, Baan Lek Hamlet

IV. Education

The people of Baan Lek value education and avail their families to all opportunities ranging from nursery school to university. The household census

makes this point clear, as all children are enrolled in school, leaving the hamlet a quiet place during the day. Hamlet residents also expressed their interest in education to me at several points during this research project. They often asked me to help their children with English lessons or try to help their children get into a university in the United States. Although the parents recognize the importance of education, they also realize a widening social/cultural gap between themselves and the younger generation who are no longer attuned to the traditional farming ways in the hamlet. Table 13 provides data on the district's overall public education system.

Educational Level	No. of Sites	No. of Teachers	Student Enrollment
Primary school	68	467	9,935
Secondary school	2	63	1.197
Vocational school	2	51	900
Informal education	45	57	1,602
TOTAL	**117**	**638**	**13,631**

Table 13. Educational Facilities, Personnel and Enrollment, Mae Chaem District, 2001 (Amphur Mae Chaem 2001)

A. Facilities and Educational Levels

All children in Baan Lek attend primary school, grades 1-6, at Baan Yai School. After that, there are several options for further education. They can attend Mae Chaem High School located in the district seat. Boys between 11 and 13 years can opt to become a novice at one of the district's three temple schools where they can receive religious training with a secular education. However, there were no Baan Lek boys studying at temple schools during this research. In

the past, this was the route for peasant families when further educational opportunities were not widespread. A third option is a high school established by the Royal Family in the district. In addition to primary and high school education, parents are also sending children to nursery schools in Mae Chaem Town. In Baan Lek, there are three children attending preschool programs.

For post-secondary education, Baan Lek students attend trade and technical institutes, and even universities in Chiang Mai. One young man and five young women were pursuing post-secondary schooling there.

Table 14 shows the levels of educational attainment in Baan Lek by birth cohorts dating back to 1940. In 1922, Thailand required children to attend four years of school. Achieving that requirement took some time in Baan Lek. As evidence, the chart shows that all males older than 60 averaged two years of formal schooling, compared with 0.57 for females. Baan Lek residents achieved the four-year level in the late 1950s for males, and for the late 1960s for females.

Historically, the greatest strides in educational attainment have occurred in the past 20 years. The current law requires six years for primary education, which all children seem to be achieving. Both males and females aged 11-20, average 8.0 years of schooling. The biggest increase for males occurred between the 1951-60 and 1961-70 cohorts, a difference of 2.5 years schooling. For females, the biggest increase was between the 1971-80 and 1981-90 cohorts, a difference of 4.5 years.

A second aspect in this analysis is that average female education levels have lagged by an average 2.09 years behind males. However, in recent times,

females have made up for the disparity. The 1981-90 female birth cohort achieved educational parity with the males. Both cohorts averaged 8.0 years.

Age (birth years)	Males, Avge. Years	Females, Avge. Years, Difference from Males
61+ (1940)	2.0	0.57 (-1.43)
51-60 (1941-50)	3.4	1.8 (-1.6)
41-50 (1951-60)	4.3	3.2 (-1.1)
31-40 (1961-70)	6.8	4.4 (-2.4)
21-30 (1971-80)	7.1	3.5 (-3.6)
11-20 (1981-90)	8.0	8.0 (0)
0-10 (1991-2001)	2.5	1.5 (-1.0)
TOTAL	**5.25**	**3.16 (-2.09)**

POST-SECONDARY: Males, 1; Females 5
NURSERY SCHOOL: Males, 2; Females 1

Table 14. Educational Levels by Age and Gender, Baan Lek Hamlet

Furthermore, five young women were attending post-secondary schooling in Chiang Mai, compared to just one young man. Whether the cross-gender educational parity continues needs to be monitored in future surveys. But considering that many of the most elderly women never attended school at all, the current situation for females is a vast difference since mid-century.

Even these days, lack of money affects educational quality. In an interview, the village chief, or *pu yai ban*, expressed frustration that students from poorer families could not afford the books for school, even though they are required to attend. Still the lowland Khon Muang children of Baan Lek are probably better off educationally than non-Thai ethnic groups in Mae Chaem. In an interview, Mae Chaem's highest civil official, the District Chief, or *nai amphur*, believed that lowland Khon Muang get a better educational quality than the non-

Thai ethnic groups. The *nai amphur* also felt that lowland Khon Muang are exposed to the mass media, such as television, which helps to reinforce what they learn in school. This is certainly true in Baan Lek, where the household census showed that 70 percent of the households have television sets. The *nai amphur's* comments mirror a point made by anthropologist Conrad Kottak who studied social change in rural communities exposed to the urban mass media. Kottak (1992:282) observed that television "stimulates curiosity, so that many people read more", based on his 30 years of fieldwork in a Brazilian village.

B. Education and Economic Development

Whether one subscribes to a "top-down" development approach or a "bottom-up" one, factors such as reading and simple mathematical abilities are crucial to success. Development communications scholar Robert Agunga (1999:253) made the point bluntly: "Education or communication, therefore, becomes the basis for empowerment." Agunga's (1999:253) view that development should make people "self-reliant" falls squarely into the pedagogical camp of education scholar Paulo Freire. Freire (1973:43) forcefully argued for functional literacy for "awakening the [learners'] consciousness" of the social and political relations that exploit the rural poor and prevents them from taking charge of their development. The process involves teaching illiterates to read by having them discuss the conditions of their existence. Once they make the causal links to their impoverishment, they gain confidence and take action to change the conditions.

The functional purposes of literacy became apparent at several points in this research, but not exactly in Freire's sense. For example, the *pu yai ban* believed that paperwork intimidated less-literate residents when they applied for government programs. During fieldwork, the national government initiated a program that lent 1 million baht to rural communities for self-help activities. It is not clear if Baan Lek's literacy levels affected its application, because the money was awarded to the community in early 2002. Another area requiring literacy is the use of agricultural chemicals and synthetic fertilizers in agricultural production. Multinational agrochemical companies advertise their products on roadside posters in Mae Chaem District. Baan Lek's data indicates that every household uses industrial inputs in their crop production. In fact, the household census showed that Baan Lek residents actively seek out agricultural chemical information from the district's extension service. For their personal safety, then, farmers must be literate enough to comprehend instructions that are labeled on chemical containers. That is not to say that a literate farmer is going to abide by application instructions either. A good step toward reaching compliance, though, is the farmers' thorough understanding of the directions.

Unfortunately, there is no historical data on literacy rates in Baan Lek. We can assume that educational levels discussed in the previous section indicate a gradual increase since mid-century, especially by the fact that young people are going on to post-secondary training, which requires a high literacy level. If that is true, then the hamlet has made great strides since a Chiang Mai Teachers College 1986 survey (1990:19) concluded that literacy "of the people is rather

low" overall in Mae Chaem (Table 15). The report did not specify how it defined "low," "mid," and "high" literacy levels. Complicating matters is that lowland Khon Muang would probably have higher literacy rates than non-Thai ethnic groups as they had better access to schools.

Literacy Level	Literacy Rate (%)
Low	33.73
Mid	56.63
High	9.64

Table 15. Literacy Levels, Mae Chaem District, 1986 (Chiang Mai Teachers College and Department of Teachers Training, Ministry of Education, 1990)

To interpret the teacher's college data, I defer to USAID consultant Grahame Keen (1979:2), who believed that Mae Chaem's literacy levels would be comparable to 1974 literacy data from Mae Sa Watershed development project in another area of northern Thailand. The Mae Sa data roughly corresponded to the Chiang Mai Teachers College results above. In Mae Sa, 31.4 percent of the Thai population had no formal education, which would have corresponded to a 33.73 percent "low literacy" rate in the 1986 Mae Chaem study. In Mae Sa Watershed, 67.7 percent had attained primary school level education, while only 0.9 percent had any secondary school training (Keen 1979:2). That would correspond to mid-and high literacy levels totaling 66.27 percent in the Mae Chaem study. According to Keen (1979:2), "Mae Chaem differs little from other areas of the north."

V. Socioeconomic Indicators

Baan Lek's transition to cash-cropping and trend toward increased nonfarm employment affects the material lifestyle of the residents. As people acquire more disposable income, they can purchase more durable goods, which they perceive can bring more convenience to their lives. The type and quality of manufactured products reflects a change in the district's economy as well as at the household level. At the district level, it means there are shops available to sell consumer items to the people. The change from a subsistence economy to relations based on cash was apparent at the close of the Mae Chaem Watershed Development Project. The project's deputy director, Steven P. Mintz (Research and Development Center 1989:208), remarked, "I noted that the small town of Mae Chaem appeared reasonably prosperous, with shops, restaurants, beauty shops, and even video stores!"

At the household level, change means that residents have money to purchase those kinds of products. The amount of goods in the residence also reflects infrastructure development in terms of electric supply and improved roads. For example, residents must have access to electrical power in order to have televisions. In terms of roads, residents would not likely own a motorcycle or other motorized vehicles if roads were poor or non-existent. For example, elderly residents recalled former times when they had to walk for several days across the mountains to conduct business outside of the district. They also remarked that modern road use brings the perils of vehicle accidents that can harm people.

A. Household Goods

The kinds of durable goods enumerated in Baan Lek's household survey were: radios, bicycles, motorcycles, televisions, and trucks. Two decades ago, David E. Harper (1986:237-9) included the same items in household surveys in Mae Chaem and four other sites in northern Thailand. Harper (1986:237) reported that other northern Thailand sites were materially better off than Mae Chaem. According to Harper (1986:237):

> [Mae Chaem sites] appear to be the poorest in the...sample. Although they own just under one radio per household, ownership of higher-valued items in the survey is quite low, with only about half the number of motorcycles, cars or trucks of other villages.

Table 16 compares Harper's data to the household census data collected in Baan Lek. Harper's data (1986:237-9) is not directly comparable because he did not survey Baan Lek. However, his report provides a basis of comparison because it instructs about the past socioeconomic conditions in the district. In Baan Lek, the most prevalent item was motorcycles, with 77 percent of households reporting ownership. Harper found only 29 percent of households had motorcycles in his study. Televisions were the second most common item in Baan Lek, with 70 percent of households reporting ownership. Harper found no televisions in his villages. One third of Baan Lek reported radio and bicycle ownership. In Harper's data, 95 percent of households owned radios, and only 5 percent had bicycles. Another big change was in car and truck ownership. In

Baan Lek, 14 percent of households reported ownership (of trucks only), while 5 percent were reported in Harper's data.

Durable Good Item	1986 (Harper)	2001
Radios	.95	.33
Motorcycles	.29	.77
Bicycles	.05	.33
Cars or trucks	.05	.14
Televisions	.00	.70

Table 16. Durable Good Ownership Comparison, Harper's Sites (1986:237) in Mae Chaem, and Baan Lek (2001)

It became apparent during the household census that residents owned other kinds of products that indicate a higher level of a material lifestyle. We noticed refrigerators in several houses. Some residents also indicated they were cooking with bottled gas, although they still used firewood on occasions.

B. Observable Indicators

Other indicators of Baan Lek's increased prosperity were visible in December after maize harvests when farmers spent their incomes earned from CP Group maize contracts. A dramatic indicator was one farmer who renovated his house. He was a respected maize producer as other hamlet residents recommended I seek him out for this study. He installed a concrete driveway even though he owned no motorized vehicles. Inside the house, shiny wooden boards were laid over the formerly bare concrete floor. The farmer happily attributed his good fortune to his CP Group maize contract, allowing him to make enough money for the renovations.

In the northern Thai context, ritualistic behavior can indicate relative prosperity, as people perform religious rituals to celebrate their good fortune with friends, neighbors and relatives. These rituals also indicate that people have money to host a gathering and to pay for the expensive ritual objects. A gathering of this type draws friends and relatives from afar, and requires food and alcohol purchases to entertain them, a considerable expense for a rural cultivator.

A northern Thai housebuilding involves various rituals that were apparent in the above farmer's house renovation. Plant leaves are deposited into postholes with the desire to secure the future wealth and health of its inhabitants. For several days during housebuilding, coconuts, bananas and sugar cane are hung from the top of house pillars, a variation from a similar custom reported by Kingshill (1960:192) 50 years earlier in Saraphi District near Chiang Mai. Like Kingshill, neither could I ascertain the significance of the custom. Another custom, affixing a paper written with "sacred words" to a house pillar also occurs in this hamlet, as similarly reported by Kingshill (1960:179). The paper written in the old Lanna Thai script remains in place for the duration of the house's existence. Once the renovation was done, the farmer culminated it with a house-blessing ceremony. He invited seven Buddhist monks to officiate, which was well-attended by local residents and out-of-town guests.

Another farmer's favorable economic situation allowed him to buy a new pickup truck in December 2001 right after maize harvest. The farmer cultivated maize in 18 rai (2.88 ha) of hill ground, which was one of the larger maize plots for the hamlet. The farmer celebrated his good fortune with a *sukhwan*, or

"recalling the soul" ceremony. The Thai subscribe to a Brahmanist belief that misfortune is likely to strike when one's soul, or *khwan* flies away from the body (Kingshill 1960:154). The *sukhwan* involves tying strings to a person's wrists in order to secure the soul to the body, thus preventing soul flight (Phraya Anuman Rajadhon as quoted by Kingshill 1960:194). In theory then, a motorist is protected against misfortune when operating the new vehicle. Buddhist monks officiated at this *sukhwan*, which drew about 50 well-wishers from the hamlet. Accompanying the *sukhwan* was a ceremony for the gods, known as *the-wada*, also derived from Brahmanistic tradition (Kingshill 1960:192). This ceremony requires the ritual apparatus of six small banana-leaf containers, each containing food, candles and small flags for offering to the gods. Five containers each are affixed to a bamboo pole, while the sixth is placed on the ground. Four containers represent the four points of the geographical compass, while the highest one represents the direction pointing toward the heavens, and the lowest one represents the direction pointing toward the earth.

Another indicator of Baan Lek's economic situation occurs at funerals, which are said to be more elaborate than in former times. Lowland Khon Muang place the coffin in a pink and gold wooden superstructure, which is translated as "castle." Community members then pulled the castle, placed on a wagon, from the deceased's home for final disposition at the cremation ground, a shaded roadside setting about 1 kilometer from the hamlet. In former times, only higher-ranking families could afford the castle, and bodies of lower-ranking people were transported in only a coffin or else in a blanket. The castle costs 3,000-10,000

baht (US$70.58-235.29), a considerable expense especially for the poorer households. In addition, there are no castle makers in Mae Chaem District, so survivors have to get one from major trading centers on the other side of the mountains. I did witness one funeral in the hamlet, which involved many of the ritual activities as reported elsewhere in northern Thailand (Anusaranasasanakiarti and Keyes 1980).

After completing the fieldwork, I was informed that hamlet residents were planning to build a bell tower for the temple. My research assistant reported the residents felt prosperous enough to build it due to income from their maize contracts with CP Group. The bell tower was a work-in-progress for more than a year while residents donated money as they earned it in their farming operations. As of mid-2003, the bell tower was finished. The community planned to celebrate with a *poy luang* ceremony, a tradition that is held to dedicate new buildings or renovations at a temple. The monk at the hamlet's temple described the *poy luang* as the most popular of temple ceremony when compared to annual Buddhist festivals. The *poy luang* draws visitors from far away to share in the good fortune of the temple and the community.

CHAPTER 7

FINDINGS ON HAMLET LAND USE DATA

The crux of this dissertation is about agricultural change in a northern Thai hamlet in Mae Chaem District. Farming has been in the state of transition from subsistence production to immersion in the national and global networks of exchange through cash-crop production. To analyze that change, this chapter will provide land-use data from Baan Lek. The transition into cash cropping necessarily involves land use changes as farmers either intensify production on subsistence plots through double-cropping, or else by expanding production beyond subsistence plots. The last section of the chapter will compare the hamlet's situation with the district's historical data from various sources.

Although subsistence rice is still the staple of lowland Khon Muang agricultural production, Baan Lek farmers have devoted most of their land use to cash crop production. In particular, most of their cash cropping is maize grown under contract to the agroindustrial multinational, Charoen Pokaphand Group (CP Group). The large amount of hill land in maize production contrasts to ethnographic accounts that center on the importance of rice production in Thai agriculture. Hanks' classic (1992 [1972]), "Rice and Man" and Yoneo Ishii's edited volume (1978), "Thailand: A Rice-Growing Society" both described an

agrarian culture based on rice production. Of all that has been written, Marlowe's (1969:16) words written three decades ago are the most prophetic and apt to Baan Lek. She cautioned that lowland Khon Muang are not merely rice growers. To characterize them as such, would give an "unrealistic picture of the lowland economy and the points of articulation between it and that of the hills,…" (Marlowe 1969:16).

I. Agricultural Land Use Forms

The farming system of Baan Lek consists of three major land-use forms for crop and livestock production. These are irrigated paddies in the intermontaine valley bottoms, the formerly forested hill lands converted into permanent fields, and homegardens located around the household compound. In all, the households farm a total area of 337.75 rai (54 ha), which averages to about 12.5 rai (2.0 ha) per household. The range per household ranges from 1 rai to 25 rai (0.16 ha to 4.0 ha).

Table 17 summarizes the area of land-use forms for Baan Lek. The largest percentage of agricultural land—76.1 percent—-is in permanent fields in the hills, or 257 rai (41.1 ha). The second largest category, or 15.2 percent, is in irrigated paddy, or 51.5 rai (8.24 ha). The third category, homegardens, is 8.7 percent of the total area, or 29.25 rai (4.7 ha). This distribution does not necessarily reflect total productive output, as paddy lands are also double-cropped after rice harvest. The *muang fai* system provides a reliable year-round water supply, allowing farmers to various cash crops through the dry season.

Land Type/Use	Area, rai (ha)	Percentage
Hills, permanent fields	257 (41.1)	76.1
Paddy, wet-rice	51.5 (8.24)	15.2
Homegardens	29.25 (4.68)	8.7
TOTAL	**337.75 (54)**	**100**

Table 17. Land Uses, Baan Lek Hamlet

The land use data also does not reflect the distribution among households. This is important because the data in Table 18 shows the importance hill farming in the hamlet's commercial agricultural economy. Eighty-nine percent of households are farming in the hills, whether or not they farm in irrigated lowland paddy. About two-thirds of the households with irrigated paddy also farm in the hills because of availability of land and opportunities for cash cropping. However, the extreme pattern of land fragmentation in the valley bottoms leaves one-fourth of the households without access to paddy land at all. households would continue in agricultural production. This is an issue that would provide a fruitful line of inquiry for future research. But it does illustrate that a "modernizing" economy as defined by non-farm employment is not necessarily a substitute for household involvement in agricultural production.

These households subsist totally from hill lands where they can grow rice and also engage in cash cropping. In these cases, the hill lands are a "safety valve." Farmers, who lost out on inheriting land, or else those who are too poor to purchase it outright, can always clear plots in the hills for growing upland rice and also cash crops (cf. Wijeyewardene 1973:107).

Household Land Use*	No. of Households (%)	Area,rai (ha)
Paddy land only**	2 (7.7)	6.5 (1.04)
Paddy & hill fields	17 (65.3)	228 (36.48)
Hill fields only	7 (26.9)	74 (11.84)
TOTAL	**26 (100)**	**308.5 (49.36)**

*All households engage in homegarden production at their farmsteads.
**One of these households actually rents all of its paddy land (2 rai) to another household in the hamlet, so it is not included in this category

Table 18. Distribution of Paddy and Hill Land Uses, Baan Lek Hamlet

Also Table 18 does not reflect that six of nine households with wage-earners also farm in the hills. This is an important consideration for policymakers who assume that shifting employment to the nonfarm sector will relieve pressures on natural resource use. It is unclear why Baan Lek wage-earning Converting hills into permanent fields reflects also a change in agronomic practices. Traditionally Mae Chaem's land-short lowland Khon Muang farmers resorted to slash-and-burn practices in the hills (Keen 1979:17). But with the advent of widespread commercial cropping, farmers have cultivated the hills into expansive permanent fields, rather than into small subsistence plots, which were shifted after soil fertility declined. Maintaining fertility then becomes a major challenge to farming in the hills, as fields are no longer shifted as under the former rotational system. The household census showed that all farmers use fertilizers on hill lands, while a few better-off farmers also apply processed chicken manure purchased from Lamphun. It is unclear if the permanent cropping has mined hill soils. A future line of inquiry should investigate whether application levels are on the increase, and the environmental effects if a trend is apparent.

A. Hills, Permanent Fields

The most dramatic land use change in Baan Lek is the conversion of hill forests into permanent fields for cash cropping. The hamlet's farm households have five times more land in hill production than in irrigated paddy on the valley bottoms. They have 257 rai (41.1ha) in hill lands compared to 51.5 rai (8.24 ha) in paddy. Most of the hill lands cultivated by the hamlet's farmers are located about 5 kilometers from the hamlet itself. The slopes of a secluded mountain valley are a sea of maize plants rustling in the wind. Getting there requires a rough trip over rocky dirt roads around the mountainsides. Once there, one finds shelters and small houses scattered along the valley bottom where residents stay during the busy fieldwork periods. Some of these shelters even have garden plots and even orchards that this research did not systematically study. In fact, one resident stays here permanently to tend the household's orchard.

A total of 204 rai (32.64 ha) is in maize production, of which all but 4 rai, (0.64 ha) are under contract to CP Group. Farmers who farm both paddy and hills have an average of 9.35 rai (1.49 ha) in maize in the hills, whereas farmers who farm hill lands only average 6.42 rai (1.02 ha) in maize fields. Not all maize production is at the 5-kilometer site described above. The non-contracted 4 rai (0.64 ha) are on hillsides at Baan Lek. The maize is sold at a lower price through local marketing channels.

The diversity of hill production in Mae Chaem District, though, is reflected by the fact that two households are raising non-maize crops at sites located away from the main hill ground just described. Two households had substantial plots all

totaling 17 rai (2.72 ha) at locations 23 kilometers from the hamlet. One site had been converted from contract potatoes the previous season to sweetcorn; the other site was in pumpkins. Thus farmers are keenly aware of marketing opportunities as they change crops depending on prevailing or anticipated circumstances.

Other non-maize crops grown in the hills include soybeans, which a farmer was testing at a newly cultivated site several hundred meters from the hamlet. Some other farmers said they planted shallots on hill lands, and we observed some of these plots during field inspections. Random trips to the hills also revealed cabbage plots. Thus farmers grow a variety of cash crops, although to a much lesser degree, than maize, which is highly impacted by the CP Group contracting program. Future research on lowland Khon Muang hillside practices need to specifically identify these crops and their economic impact on the community.

In addition to cash cropping, the hills continue to be a major source for subsistence, as 13 households, or 48 percent, raise rice there. There is a total of 31 rai (4.96 ha) in hill rice. Of these, seven households with wet-rice plots in the valley bottoms raise 12 rai (1.92 ha) for an average plot of 1.71 rai (0.27 ha). Six households with no wet-rice fields have 19 rai (3.04 ha), for an average field size of 3.16 (0.5 ha). The differences between the household types reiterate the fact that hill lands are a “safety valve” for subsistence purposes. Farmers with no wet-rice land rely entirely on hill fields for their household subsistence. Without hill

lands, then, these farmers would have little choice but either endure hunger or else migrate from the hamlet for jobs in urban centers.

B. Rice Paddy Lands

The second largest land-use form in Baan Lek is irrigated paddy land. The hamlet faces out over rice paddy fields that straddle along the river draining the sub-watershed basin, forming a valley that separates the hamlet from Baan Yai. The setting can be typified as “alluvial soils along the floors and valley sides” (Keen 1979:5), which corresponds to northern Thailand’s intermontaine basin physiography that soil scientists described as “complex and varied” (Takaya 1971:378). In this physiographic region a high catchment/paddy area ratio allows for efficient water use for irrigation, as direct rainfall itself is variable and often insufficient for seasonal rice production (Takaya 1971:378).

Baan Lek households only grow glutinous, or “sticky” rice. Glutinous rice congeals into a mass, which is stored in a rattan container that is handily available for meals. The glutinous rice zone of Southeast Asia stretches from northern and northeast Thailand to include all of Laos and western Vietnam, as well as including parts of southwestern China and northeastern Burma (Watabe 1976:98).

In all, there are 19 households that either farm outright or have access to paddy lands in Baan Lek. The total amount of paddy land under production is 51.5 rai (8.24 ha), which averages to 2.71 rai (0.43 ha) per household.[1] Fourteen households—74 percent—have access to paddy in the hamlet itself, while three

[1] One household rents 2 rai (0.32 ha) to another household in the hamlet.

households—16 percent—cultivate paddy outside of the hamlet. Two households—10 percent—have access to land both in and outside of the hamlet. Based on a farmers' self-report, the average distance from the house compound to in-hamlet rice paddies is 336 meters, while average distance to out-hamlet paddies is 2.25 kilometers.

After rice harvest in November, the paddy ground bursts forth with activity as farmers prepare fields for a second crop. After rice straw is gathered, farmers burn the stubble leaving a black ashen cover over the fields. The burn, farmers said, is a fertilizer for the soil, and it also helps to control weeds in the coming crop. It is also known that a second crop also improves the productivity of the next rice crop (Keen 1979:10-11). Farmers know this by experience, but it also provided USAID with further initiative to promote cash cropping in the Mae Chaem Watershed Development Project two decades ago. Agronomic advantages of cash-cropping are residual fertilizer available for subsequent wet-rice, increased organic content, soil aeration, higher dry-season soil moisture, and improved soil structure from the latter three factors (Keen 1979:10-11). Given the economic benefits plus agronomic advantages, then, it is with little wonder that all farmers in this hamlet plant paddy fields with a second crop (Table 19). The major second crops planted in 2001 were shallots, 28 rai (4.48 ha); soybeans, 18.5 rai (2.96 ha), and other crops, 5 rai (0.8 ha). "Other" crops included cabbage and sweetcorn, and in other years farmers have also planted garlic. Still another field was idled when a farmer tried to convert it to longan trees that died out. The crops grown in this hamlet are part of a wider diversity

throughout the district, and it is unclear why Baan Lek farmers confine their production to a few crops. As one travels Mae Chaem District, one can observe other kinds of cash crops grown in harvested paddy fields. These included rice, as well as watermelons and carrots.

Second Crop	Area, Rai (Ha)	% of Paddy Land
Shallots	28 (4.48)	54
Soybeans	18.5 (2.96)	36
Other	5 (0.8)	10
TOTAL	**51.5 rai (8.24)**	**100 %**

Table 19. Second (Cash) Crops, Irrigated Paddies, Baan Lek Hamlet

It is not surprising that soybeans are a second choice to shallots, as farmers continually complained about the low price situation for soybeans. In fact, soybeans were the main crop in the hills until about recently when CP Group's maize contracts became available. On the other hand, some households still use soybeans for subsistence. Some farmers said they keep a small percentage of the crop, perhaps 20-30 percent, and they sell the rest.Soybean prices, as quoted by farmers, were 8.5 baht (US$.20)/kg while the average yield was 253 kg/rai. Shallot prices, on the other hand, were 5 baht (US$.11)/kg, and average yield was 3000 kg/rai. A limiting factor for shallots, though, is labor. A group of workers is required to work the ground for 10 days in preparation for planting. The process involves working in commercial chicken manure purchased from Lamphun and other fertilizers into the soil. There is no labor exchange for cash cropping, so farmers have to pay wages at the standard rate of about 100

baht (US$2.35)/day for each worker. On the other hand, field preparation for soybeans is negligible and can be accomplished by just two workers, commonly a husband-and-wife team. Soybean planting involves the use of a bamboo pole to poke a hole through the ash-covered soil and depositing seed.

During my fieldwork, the CP Group started offering maize contracts for dry-season production in paddies. This presented another second-crop option for the hamlet's farmers. Farmers reported his new program while we were in the midst of household surveys, and we did not have time to follow up on planting intentions. However, seven farmers offered that they were going to take advantage of the new contracts. The total area intended was 17.5 rai (2.8 ha), about one-third of available paddy area. Although based on an incomplete survey, that amount of area is impressive, and is undoubtedly even larger because we did not capture all the participants in the new program.

Much has been written about "plot scattering," by which farmers locate their fields in various ecological zones in order to minimize natural risks to crop production (Goland 1993). The logic is that crops can escape adverse natural threats, such as drought or disease, if fields are located at different places of the landscape. Farmers also have the added benefit of taking advantage of microenvironmental factors that can help specific crops and crop varieties. However, farmers in Baan Lek do not scatter their wet-rice plots as their fields are usually located at one spot. One reason is the limited amount of arable land in mountain valleys. Farmers cannot simply pick and choose sites, as someone else already owns the rest of the land. This is indicated by an average plot size of

1.98 rai (0.31 ha), which is too small to break into smaller parcels to be economically viable.

The lack of available wet-rice land came up in household surveys, indicating it is an intractable problem. Seventy-four percent of farmers said they wanted to own more paddy land, while the remainder said they had enough land. The farmers said that land prices were too high, indicating a shortage by law of supply-and-demand. A few farmers also said they did not have enough labor to work additional fields, or else they did not have enough time to tend more land. If they could afford it, these farmers said they would purchase anywhere from 2-5 rai (0.32-0.8 ha) of additional paddy land. The price given for paddy land ranged from 60,000-100,000 baht (US$1,411-2,352)/rai.

Finally, even if land were affordable, it might not be available because non-resident farmers own it. Oftentimes, I observed that farmers from nearby communities were working lands right next to the hamlet. I do not know the extent to which outsiders own land near the hamlet, but it is a factor to keep in mind when considering the lack of available land for wet-rice production. The pattern of land ownership reflects the bilateral inheritance system, whereby land can be passed on to an heir from either side of the family. Land is not kept in an impartible corporate trust as in a unilineal descent system. The evidence from Baan Lek illustrates this point. Non-resident men married in to 14 households, or 51 percent of the hamlet. Of the remainder, non-resident women married into six households, or 23 percent of the hamlet, while both spouses were from Baan Lek in seven households, or 26 percent of the hamlet. The lack of a strict post-marital

residence rule would theoretically, at least, present the possibility that a non-resident spouse may still inherit land located in the natal hamlet.

C. Homegardens

Homegardens occupy 29.25 rai (4.68 ha), and are the smallest area devoted to a particular land use type. Homegardens average 1.12 rai (0.18 ha) in this hamlet, but are richest in diversity. Inventories of 10 homegardens revealed 185 plant species, which averaged 54 species per homegarden studied.

In this hamlet, we can characterize homegardens into two types. The smaller homegardens, averaging less than 1 rai (0.16 ha), are on the upper side of the main road, where a steep slope restricts the amount of land for cultivable use. These gardens are all rainfed. Homegardens averaging more than 1 rai are on the lower side of the road, a land-use form that stretches down into the paddy ground in the valley bottom. A significant feature is an irrigation canal that runs parallel to the lower roadside and through the homesteads, offering year-round water for those homegardens. Vegetation is most lush in these latter gardens as plants almost surround the houses with a thick forest-like setting, compared to the upper roadside houses that have sparser vegetation and present an open appearance to passers-by on the road.

In this research I tried to discern if Baan Lek residents applied ecological principles of their surrounding forests to their understanding and management of homegardens. This reasoning is in line with Geertz (1970[1963)], who applied ecological principles of the tropical rainforest to analyze the structure and function of swidden plots in the Outer Islands of Indonesia. In several interviews,

it became clear that residents recognized the diversity of plants in both spaces. In fact, some said they experimented with cultivating plants collected from the forest. On the other hand, they also sharply distinguished between the natural characteristics of a forest and the human-manipulated landscape of the homegarden. As one resident put it: “A forest has a lot of useful trees, but you can’t use all of them for eating. In the homegarden, you can grow plants and sell them.”

The distinction between nature and purposeful human cultivation may seem trite, but it does follow Hirsch’s (1987:137) discussion of Thai cultural meanings ascribed to the word “forest” or *paa.* The forest is a wild place that is forbidding to human habitation, according to this logic. On the other hand, human cultivation practices are an exercise in making the landscape “civilized.” In this way, then, I refer to Lansing’s (1991:9,1993:98) concept of an “engineered landscape” that expresses the cultural meaning of the society that people want to create. In the northern Thai context, then, a good homegarden also reflects a landscape transformed to reflect what is a good and proper society. In fact, this cultural meaning even has a religious significance. The temple’s lay teacher, *ajan wat*, mentioned that he enjoyed the peaceful atmosphere provided by his homegarden, one of the more lush homegardens in the hamlet. In interviews, hamlet residents also said that Buddhist monks preached an ascetic value to homegardens in that it allowed people to save money that they could use to support their families. Any future development work on homegardens might

consider the importance of these intangibles in order to build on the monks' efforts.

In formal interviews, we tried to determine indigenous categories for the soils that support homegardens. We were unsuccessful in developing a local classification system of soil types, but three main ideas surfaced concerning soil quality. One is associated with soil color. Some farmers said black soil is the best. A second idea was a practical observation that plants do better in some soils than others, a trial-and-error conclusion that reflects the ongoing experimental aspect of homegarden production. The third idea was the ecological interaction between plants, animals and soils. Farmers said trees produce leaf litter that decays into humus, thus contributing to soil quality. A good tree stand is associated with good soil. Enriching the humus is manure from chickens that free-range, and from pigs that are raised in the homegarden. Farmers value the soil enrichment value of humus. Every morning it is common to see elderly people sweeping up leaf litter that is strategically distributed in the homegarden, or else burned and mixed with animal manure for its fertilizer value.

II. Livestock

The literature on northern Thai agriculture gives passing attention, if any to livestock husbandry, as if it is an afterthought. As Kingshill (1965:41) put it: "Animals play a relatively minor role in the village economy." Even a study as late as Ukrit Aparast's (2001), which was in Mae Chaem District, did not enumerate livestock numbers in household surveys. As wet-rice production is the nutritional staple for northern Thai households, the earlier literature about livestock was

mainly concerned about raising water buffalo as draft animals for field preparation (Keen 1979:27-29, Kingshill 1965:41-42). These days, the hamlet's farmers no longer use water buffalo, as all field preparation is mechanized. In fact, that appears to be a sign of progress for the hamlet's farmers. They often said that mechanization is one of the major changes from former agricultural practices, and they expected it to intensify in the future. Among the advantages of mechanization is the time savings in field preparations, farmers said. Plowing and harrowing one rai of ground with water buffalo took two weeks, whereas it takes only two hours with a power tiller. However, farmers also said water buffalo techniques were more thorough and also provided manure to enrich the soil. So quality of field preparation has diminished somewhat with mechanization.

The household census showed that four farm households (15 percent) own a Kubota power tiller, while the remaining 22 (85 percent) households rent a power tiller for about 800 baht (US$18.82) per rai. Even though not all households own a power tiller, all households do use it for paddy preparation for the rice crop. For second-cropping, some households prepare the ground with a power tiller, while others use manual labor. In the hill plots, employing mechanical preparations can vary year by year, and six households reported using manual labor every year.

Undoubtedly, another reason for the paucity of historical information about livestock husbandry is that fish were an important protein source in the northern Thai diet. Kingshill (1965:31) reported that "fish abound and are caught in great quantities" in irrigation canals and flooded wet-rice fields" (cf. Judd 1962:112-

114). This is no longer the case in Baan Lek, as agricultural chemical use has destroyed the fish habitat in irrigation channels and in paddies, although some people still cast nets in streams. People still consume fish, but it is pond-raised or bought in the market in Mae Chaem Town. The village chief, or *pu yai ban*, has an impressive fish-raising operation at his hill fields. It consists of four ponds that produced several hundred thousand fish annually, he said. In the hamlet itself, the primary fish producer was the store owner and his wife who marketed to the local residents. So fish is still available in the northern Thai diet, but it is not procured from irrigation waterways.

Even if fish were available in irrigated waterways and fields, farmers would not have the time to catch them due to changes in seasonal fieldwork. As Kingshill (1965:31) reported four decades ago, “villagers go fishing nearly every day” during the slack fieldwork season of September and October when “rice grows by itself.” Times have changed in Baan Lek, though. The rice is indeed growing “by itself,” and needing little human intervention in September and October. However that period is a busy time in hill fields where farmers tend to the maize crop. Therefore, the increased commercialization of farming has eliminated the traditional sources of fish in irrigated waters, as well as usurped the amount of time for fishing.

As for other animals, the household survey showed a total of 24 households, 89 percent, were raising pigs and/or chickens. The household survey indicated that 13 households--48 percent--raised chickens only. The average number of chickens was 19.5 per household, which compares to 10.3

per household in Thani and Raeuchai's report (1984:209) for the Mae Chaem Watershed Development Project.[2] Chickens free-range in the homegarden, but household members also feed them rice and corn. The household survey found that 11 households--41 percent--had both chickens and pigs. The average number of pigs was 2.2 per household, unchanged from Thani and Raeuchai's report (1984:209). There are no households that raise pigs only. One household had a cow, or 4 percent of the hamlet households. This compares to a household average of 4.5 cows, aggregated with water buffaloes, reported two decades ago (Thani and Rauechai 1984:209). There are no horses in Baan Lek, although Thani and Rauechai (1984:209) recorded one in their study.

Baan Lek households raise chickens mostly for household consumption, corresponding with Kingshill's study (1965:42) 40 years earlier. Households raise pigs for cash marketing, which also corresponds to Kingshill (1965:42). In no case did any household report that pigs were raised for home consumption.

Pigs are raised in a sty, and they consume processed feeds that farmers buy in the market. The availability of affordable processed feeds for both pigs and chickens seems to have been limited a generation ago (Keen 1979:29-32). These days, a few farmers also said they boiled homemade mixtures of banana, rice and papaya to feed to pigs, but these were very rare cases, probably due to time limitations in preparing it.

[2] Thani and Raeuchai's report (1984:209) aggregated ducks with the chickens, so the actual average of chickens alone is less than the 10.3 figure.

The lone household with a cow was taken care of by the senior male resident in his 70s. The man sold the manure to a local resort that used it to fertilize its landscaped gardens of flowers and local vegetation. Farmers said they did not raise cattle because this hamlet lacked sufficient grazing area. That may very well be the case, as one can observe other villages with numerous cattle that grazed in the limited open areas of the district.

The animal-plant interactions in the homegarden do not constitute a closed ecological system. Farmers provide outside inputs in terms of feeds, so the system is not self-sustaining, and certainly not self-regulating. But the interactions that do occur benefit both animals and plants. For chickens, they free-range on vegetation in the household compound, and their manure fertilizes plants (cf. Kingshill 1965:42). Some farmers say chicken manure is the best fertilizer because the chickens eat a variety of insects and plants that enrich the manure, compared to pigs that generally eat feeds processed from rice. However, chicken manure is considered to be ‘”salty” and damages the soil if too much is applied, according to the farmers.

For pigs, the homegarden trees provide a shady cover, because the animals do not have sweat glands to cool them off. Farmers value pig manure to fertilize both rice paddies and their homegardens. Six households raising pigs said they applied pig manure to gardens only, while another five said they applied it to rice paddies.

There is one household that is an outlier in the household survey on livestock production. This is the case of an entrepreneurial woman who was

raising 180 chickens for marketing purposes. She said that buyers used her chickens for rituals, particularly to guardian spirits, as northern Thai make offerings to spirits of place. She was also intending to sell the manure as a fertilizer to local farmers. Four months after the household survey, this woman reported a pig crop of 14 animals from the earlier inventory of just four. She had a widespread marketing network that extended beyond Mae Chaem District. In fact, we observed her negotiate a sale with a buyer from the Chiang Mai area, which impressed me about the distance he traveled just to buy pigs. The entrepreneurial woman often employed a middleman in her marketing network. The go-between operated a motorcycle taxi service throughout the district. His daily travels brought him into contact with many kinds of people of whom he referred to her for livestock purchases. The middleman received a certain take of the sales generated for her.

III. Biodiversity Dimensions of Land Uses

The size of the land-use types also contrasts to the biodiversity contained therein. The smallest category of land use, homegardens, can achieve the highest rate of biodiversity, ranging up to different 68 species per household surveyed. The larger land-use types, hill lands and paddy sites, are monocultures dependent on manufactured inputs to maintain yield.

Although hill maize is a monocropping operation, it is common to find various fruit trees scattered throughout the fields, which are commonly harvested to feed fieldworkers during field operations. I often observed a fieldworker slicing a newly harvested fruit to feed other members of the work crew at lunchtime.

These trees are widely spaced and are not sufficient in number to control erosion on steep hill lands. Some of the species were papaya, popular for making a northern Thai salad, and mango. One can also find chili plants growing at scattered locations, which are a staple for the spicy hot northern Thai recipes. At the hill bottom, it is typical to find bamboo stands. There may be ecological principles involved in tree spacing and species selection, which would be a useful study for future research. Researchers should not overlook this aspect if they plan future studies of crop cultivation in hill sites. What is apparent, is that the northern Thai are acutely aware of the diversity plants and their uses in the natural environment, and they are very creative in employing this knowledge for specific subsistence purposes.

The continued use of manufactured inputs on hill lands begs the question of soil quality issues as land is not retired to recover its natural fertility as in shifting cultivation systems. The initial soil quality was apparently of good quality because CP Group tests soils and also considers local microclimates before choosing sites for production. But the current state of the soils' natural fertility is unclear, as Baan Lek farmers have continuously cropped the hill lands for several years. Continuous cropping can mine soil fertility, requiring even higher levels of fertilizers to maintain production levels. Unfortunately this study was not long enough to develop the kind of rapport to investigate farmers' perceptions of the environmental consequences of their production practices. Near the end of the research I was just beginning to develop the kind of trust and confidence to start talking about these issues. However, farmers often said they liked the

income benefits of the CP Group program, which was obvious, or else they would not participate in it. However, their participation also puts them at odds with the environment, as continuous cropping threatens soil fertility and use of manufactured inputs has repercussions for downstream water quality.

IV. Northern Thai Land Use from an Historical Perspective

Baan Lek household's push into hill lands for maize production reflects an unprecedented expansion from traditional land-use patterns that centered on rice production in irrigated paddy or in slash-and-burn plots on nearby hillsides. We can recognize these changes in Baan Lek based on household census data, interviews with farmers, and also by examining past conditions through Mae Chaem Watershed Development Project documents

Twenty years ago, Mae Chaem's lowland Khon Muang land-use system consisted of three topographical areas: 1) lowland wet-rice fields, 2) homegardens around homesteads, and 3) permanent cropping or short-fallow swidden plots on low hillside slopes near homesteads (Keen 1979:5-7, Northern Mountain Area Agroforestry Systems Research and Development 2001:16, Thani and Rauechai 1984:7-84; cf. Keen 1983:294-6, 300-1). At each site, farmers grew, respectively, 1) subsistence rice, followed in limited cases by second-cropping of soybeans, 2) various fruit trees for household consumption, and 3) upland rice and soybeans by slash-and-burn methods. The amount of wet-rice land was limited, so households depended on swidden plots for upland rice to meet their nutritional requirements as much as possible. This is also reflected by a socioeconomic survey (Thani and Rauechai 1984:193) that showed lowland

Khon Muang had 24 percent more land in upland rice (5.61 rai per household, or 0.9 ha) than in irrigated rice (4.52 rai per household, or 0.72 ha).

The current situation in Baan Lek shows an alteration from the traditional pattern in two ways. First, second cropping is no longer a minor activity in lowland irrigated paddies as it was at the time of the Mae Chaem Watershed Development Project. According to Project documents, the second-cropping pattern, in the order of greatest land area, was: soybeans, 50 percent; peanuts, 20 percent; corn, 10 percent; garlic, 10 percent; shallots, 5 percent; tobacco, 3 percent, and sesame, 2 percent (Thailand-Mae Chaem Watershed Development Project 1980:D3, F5). Of course we have no specific data for Baan Lek from those times. These days, the crop of choice is shallots, with soybeans coming in second, and contract maize emerging as an important factor by the end of this fieldwork. Improvements to the irrigation system provide a dependable water supply to second-crop during the dry season. The shift to shallots reflects a higher-value crop available to farmers who can hire additional labor outside their household to grow it.

The second major change has occurred in the hills. The lowland Khon Muang traditionally farmed hill fields close to their residences. At these sites, they used slash-and-burn practices to grow subsistence rice. At the time of our fieldwork, only three households farmed hill lands within several hundred meters of their residences, while a majority of the 21 hill farmers cultivate fields in a mountain valley 5 kilometers from the village, and two other households farm a site 23 kilometers away. The crops grown at the 5-kilometer site are upland rice

and contract maize for CP Group. We will see in the next chapter that upland rice is still essential to meet household subsistence needs. Thus the hills still serve as food "safety valve" as it did in former times when hills were cultivated in a swidden cycle. However, the cultivation of hill ground has expanded to cash cropping, first with soybeans, and now with lucrative contracts offered by the multinational CP Group.

Finally, it would be remiss to discuss changes in the land use type around the northern Thai homestead, the homegarden. We have very little historical data on homegarden production, making it difficult to make comparisons to the current situation. A 250-plus page socioeconomic survey (Thani and Rauechai 1984:86) devoted only two paragraphs to homegardens under the subtitle, "Fruit Tree Gardening," and reported that "products were mostly for consumption in households. There were few sellings [sic] in cash." Interviews with long-time residents of Baan Lek confirmed that homegarden produce was largely consumed in the household or else exchanged with friends, relatives or neighbors in the community.

These days Baan Lek residents say they continue to raise homegardens for household consumption, but they also sell any extra produce in the market in Mae Chaem Town. Consistently, household residents mentioned that longan, betelnut and coconut, in that order, were the three main commercial species cultivated in homegardens, although they mentioned other kinds of fruits and vegetable plants. The household surveys also indicated these species ranked among the top four grown in the hamlet. The number of trees grown in the

hamlet, in order of top five ranking, and the mean number of trees per household in parentheses, are: longan, 248 (10.7); betelnut, 247 (13.0); banana, 114 (6.0), coconut, 101 (5.6), and mango, 85 (4.7). What is interesting is that Thani and Raeuchai's socioeconomic survey (1984:86) two decades ago, did not mention longan, coconut or betelnut at all, indicating a subsequent trend toward commercialization. It is surprising that the survey did not mention betelnut, because it has been a mainstay of rural Thai culture. Older residents said it was a hospitable custom to offer betelnut to visitors in former times. In fact, households used special types of betelnut containers for this purpose. In addition, personal belongings regarding betelnut consumption are displayed at elderly relatives' funerals.

The trend toward commercialization in homegarden production is reflected by the flurry of longan plantings in the past five years. As indicated by the household census, the longan is the dominant species in the hamlet. Many residents indicated the plantings have been within the past five years, and the trees had not yet matured for harvesting. Household residents said they preferred longan for the cash value of the produce. The data showed that a tree might yield 700-800 kg annually, for which the household can sell for 10-20 baht (US$.23-.47) per kilogram. One woman explained that she saw the longan as an investment whose proceeds would support the future education for her 16-year-old son. One problem, though, is that yields are highly variable. In some years, the trees yield very little, while other years produced bumper crops. Residents were at odds to explain the reason for this variability. Because of the interest in

longan, agricultural researchers should investigate this problem in order to maintain a consistent yield for producers.

Another indication of homegarden commercialization is the fact that some residents are starting to apply herbicides to kill weeds, and fertilizers to enhance soil fertility. However, our intensive homegarden interviews showed that not all farmers have gone this route yet. Traditional methods of fertilization involve a combination of leaf decomposition to form humus, leaf burning, or mixing in animal manure. Weeding is traditionally done by hand. With higher value crops, though, it is apparent that households are seeing a benefit to investing in outside inputs in order to manage production at optimum levels. The fact that these species bring in an income, then, puts money in the hands of householders to spend on inputs.

In conclusion, then, the cropping practices in Baan Lek are in a transition toward a cash economy, while maintaining a subsistence base in rice. Rice is grown in either irrigated paddy, and in the hills, whereas the latter land form is available to farmers without access to paddy. At the same time, cash cropping occurs both in the hills and in the irrigated paddies, employing manufactured inputs to maintain soil fertility and to control weeds. Homegardens are also cultivated for subsistence, but also for cash income, particularly evident in the trend toward longan plantings. The defining feature of lowland Khon Muang farming in Baan Lek, then is the immersion into a cash economy, which has changed land-use patterns and agricultural practices.

CHAPTER 8

FINDINGS ON AGRICULTURAL PRODUCTION AND YIELDS

The defining legacies of the Mae Chaem Watershed Development Project were food security and the immersion of the district into the cash economy. The introduction of high-yielding varieties improved rice yields, which turned the district from an annual rice deficit to a rice surplus. Improved rice production set the stage for the expansion of cash cropping. This chapter will discuss these changes in terms of the lowland Khon Muang community, Baan Lek. The data will show that yields have continued to increase from the days of the Royal Thai Government-USAID project, eliminating the annual hungry months once endured by the residents. In addition, cash cropping has become an important feature of the hamlet's agricultural production, requiring almost year-round attention to fields. While hamlet residents appreciate these benefits, there are tradeoffs in terms of biodiversity and environmental quality. The future directions of development are going to have to address these issues in order to maintain its long-term sustainability.

I. Irrigated Rice Production

The household census showed that the hamlet's wet-rice yields ranged from 55 to 100 thang per rai, for an average of 81 thang per rai. The thang is a Thai unit of volume measure that corresponds to 15 kilograms of weight of unhusked rice.[1] The range is also consistent with yield data offered by farmers in informal interviews elsewhere in the district. It may be more instructive to disaggregate yields into two categories based on the median yield of 75 thang per rai. The high range is 80-100 thang, while the lower range is 55-75 thang. The differences are due to microenvironmental conditions such as soil types, climate, etc., as well as seed selection and individual household management. One of the few historic reports of yields as high as 80 thang/rai was reported by Kingshill (1965:36) in Ku Daeng, Sarapi District, near Chiang Mai in the 1950s. However, farmers' intensive cultivation eventually took its toll on the environment, and yields later plummeted "due to over-cultivation of the soil" (Kingshill 1965:37).

Baan Lek's yield average is significant when compared to historic trends in both the district and northern Thailand as shown in Table 20. The two-decade history showed three phases of yield increases. The first phase was pre-1984, the period of rice deficits before the Mae Chaem Watershed Development Project introduced high-yielding varieties and other production technologies.

[1] There is some discrepancy about the actual metric value of a thang. For example, Tanabe (1994:xvvii) and Keen (1972:12-13) define 1 thang as approximately 10 kg, although Keen notes discrepancies my be as high as 14 kg We understand 1 thang to equal 15 kilograms based on hamlet residents' definitions, Mae Chaem Watershed Development Project documents, and most recently by Aparasit (2001:21fn).

Yields were about 29 thang/rai, and got as high as 48 thang/rai. The second phase, post-1984, raised yields to 40 thang/rai, resulting in rice self-sufficiency for the district. The current, third, phase consists of very high yields, which average 81 thang/rai in Baan Lek, or two to three times the yield reported in the pre-1984 phase.

Source/Location	Year	Yield (thang/rai)
Zolvinski (2003), Mae Chaem	2001	81.0
Research & Development Center (1989:178), Mae Chaem	1987	40.0
Roth (1987:154), Mae Chaem	1986	41.0
Thanit & Rauechai (1984:195), Mae Chaem	circa 1984	33.0
Thailand-Mae Chaem Watershed Development Project (1980:Annex D-16), Mae Chaem	circa 1980	28.8
Keen (1979:10-11), Mae Chaem	circa 1979	28.8-48.0
Tanabe (1994:34), Mae Rim	1974	51.8 (glutinous only)
Kingshill (1965:36), Sarapi	1954-64	30-50; as high as 80

Table 20. Mean Irrigated Rice Yields: Mae Chaem District and Northern Thailand Historical Data

Despite the introduction of intensive technologies such as high-yielding seeds and infrastructural improvements, Baan Lek's rate of increase falls far short of agricultural planners' prediction for quadrupled yields during the Mae Chaem Watershed Development Project two decades ago (Thailand--Mae Chaem Watershed Development Project 1980:D16). Agricultural planners expected that the agronomic effects of second-cropping plus irrigation improvements would minimally double the yields. Farmers' adoption of high-

yielding seeds and concomitant chemical use was expected to achieve a second doubling. Despite those optimistic predictions, the project itself raised yields by about 30 percent, while the four-fold increase still remains to be seen.

II. Upland Rice Production

Upland, or "dry rice" yields showed a large range among households, but this is to be expected given the microenvironmental variability at hill sites (Table 21). Farmers reported yields as low as 10 thang per rai on "poor soil" to as high as 105 thang per rai in a rainfed terrace. The average was 60 thang per rai, which reflects a fivefold increase above historical data recorded 20 years ago (see Table 21). Given the yield range due to microenvironment variability, it is more instructive to disaggregate yield into two groups. The median is 60 thang

Source & Location	Year	Yield (thang/rai)
Zolvinski (2001), Mae Chaem	2001	60.0*
Research & Development Center (1989:178), Mae Chaem	1987	19.3**
Roth (1987:154), Mae Chaem	1986	25.6**
Roth (1987:154), Mae Chaem	1985	19.6**
Thani & Rauechai (1984:195), Mae Chaem	circa 1984	21.2*
Roth (1987:154), Mae Chaem	1984	15.0**
Research & Development Center (1989:178), Mae Chaem	1983	12.6 **
Keen (1983:14), Mae Chaem	circa 1983	8.18**
Thailand-Mae Chaem Watershed Development Project (1980:F-6)	circa 1980	1.5-32.46**

*specific to northern Thai
**aggregated data, not specific to any ethnic group

Table 21. Mean Upland Rice Yields: Mae Chaem District Historical Data

per rai, while the lower range is 10-60 thang per rai, and the upper range is 60-105 thang per rai.

One problem with historical data from Mae Chaem District is that it often averages together upland rice yields from different ethnic groups, each of which grow rice according to the differing requirements of their microenvironments (Thailand-Mae Chaem Watershed Development Project 1980:D4). Therefore, yields varied from as low as 20 kg/rai (1.5 thang/rai) to as high as 487 kg/rai (32.46 thang/rai), as reported in the project paper for the Mae Chaem Watershed Development Project (Thailand-Mae Chaem Watershed Development Project 1980:F6). The data would be more meaningful if it was disaggregated by ethnic group. Lowland Khon Muang would be on the lower yield end as they lacked the indigenous expertise of shifting cultivation practices employed by ethnic groups at higher elevations. Thani and Rauechai (1984:81) made this point about it: “In comparing the production of upland rice among each ethnic group,...the Hmongs [sic] had high skill in producing it, although they did not use fertilizer.”

III. Rationale for Rice Yield Increases (Lowland and Upland)

In two decades, Baan Lek farmers increased wet-rice yields by three-fold, and they increased average upland rice yields five-fold, all above historical mean yields reported throughout the district. Of course, we are assuming the hamlet’s yields were consistent with low productivity reported for Mae Chaem District in general. In informal interviews, farmers reported remarkable increases in productivity that have banished hunger from an annual expectation in the months before first rice harvest. Their comments also correspond to Harper’s (1986:304)

comparative yield survey between Mae Chaem and other sites in northern Thailand: “The worst overall performance is in Mae Chaem (which traditionally has been one of the poorest areas in Northern Thailand)....” These days, though, households grow enough rice for their members, so they are able to diversify their farming operation from primarily subsistence into cash cropping for generating income.

For wet-rice, the raised yields can be attributed two three main factors: 1) reliable water supply through improvements to the *muang fai* irrigation system, 2) second cropping, which has residual effects that improve yields in the next rice crop, and 3) technological inputs, including high-yielding seed, fertilizer and agricultural chemical use for weed and insect control.

The first two factors, a reliable water supply and second-cropping, are interrelated. Second-cropping occurs during the driest part of the year, from about December through May. Farmers said the reliable irrigation system provides water through the dry season, although at a reduced flow rate than during the rainy season. The indigenous northern Thai irrigation system, known as *muang fai*, is a cooperative, democratic venture of Thai farmers that makes wet-rice production possible in narrow intermontaine valleys, especially important as variable rainfall can prevent reliable production on a year-to-year basis (Tanabe 1994:14-15).

Traditionally, the *muang fai* required cooperative labor for diverting water from a main stream to canals and channels that feed water to rice fields (Tanabe 1994:29-31, Tan-Kim-Yong 1995:15-16). The user group, or *mu fai*, drove

bamboo stakes into the stream bed to build a weir, which then diverted water into the main irrigation channel. In more recent times, government-funded projects in Baan Lek have built concrete structures that provide reliable year-round water use. The reliable water supply then enhances second-cropping in the dry season, according to farmers. Although cooperative labor is not needed for building a weir in the concrete system, Baan Lek's farmers do form work parties to dredge the canals and channels. In addition, they are required to keep waterways free of weeds. Farmers are levied an in-kind irrigation fee of 2 thang per rai, which is paid to the locally elected irrigation head.

In household surveys, farmers were overwhelmingly satisfied with the *muang fai* organization. The public works improvements to the *muang fai*, then improved upon the indigenous technology that was not efficient enough for second-cropping. This is clearly a change evident throughout northern Thailand, of which Tanabe (1994:130) wrote: "The amount of water supplied to the system from the mountain valleys is clearly deficient for the full development of the dry season cultivation.''

If the new and improved version of the *muang fai* makes for more efficient water use, then second-cropping can provide the agronomic improvements for higher rice yields in the subsequent crop. A compilation of 10 years of research in northern Thailand showed that second-cropping could increase yields of the subsequent rice crop "from at least 30% to almost 100%" (Thailand-Mae Chaem Watershed Development Project 1980:D16). Geographer Grahame Keen (1979:11) attributed the increase to five factors:

- Fertilizers applied to the second crop have a residual effect on the rice.
- The second crop increases soil organic content.
- Root structures of the second crop aerate the ground, benefiting the subsequent rice crop.
- Higher soil moisture in the dry season.
- Improved organic content, soil aeration and moisture improves soil moisture.

The agronomic effects of second-cropping, though, are not the only factor that raises wet-rice yields. The household surveys showed that all farm households unequivocally apply fertilizers, so much so that farmers usually responded with the N-K-P formula, typically "16-20-0," or else, "urea," when asked about their fertilizer use. Two decades ago, only 52 percent of northern Thai households surveyed in Mae Chaem (1984:195) used fertilizer. Now, at least in this hamlet, it is 100 percent, and it is probably the same in northern Thai hamlets throughout Mae Chaem. Some farmers still appreciate the value of organic applications. Five households continued to apply pig manure, and another applied cow manure, but this was *in addition to* synthetic fertilizer applications on their rice paddies.

Farmers also said they used herbicides and pesticides for improving yields. A widely used grass herbicide is Gramoxone, also popular among US maize producers. It is common to see farmers wearing a portable sprayer backpack to apply chemicals to fields. The household surveys also indicated that some farmers actively seek out fertilizer/chemical information from the district's extension office in Mae Chaem Town. Although respondents from most

households said they had not much contact with the extension services for a year or so, there was a small group of six (22 percent) who visited the extension office to seek out the information.

In the hills, the increase rice yields can be attributed to technological inputs, as well as infrastructure improvements concerning terraced fields. Concerning the former, it is the high-yielding rice varieties that increased yields, as well as use of fertilizers to maintain soil fertility. In every case, rice producers in the hills reported they used fertilizer, usually the 16-20-0 formula or urea. This compares to 25 percent of households using fertilizer in upland rice in a survey of northern Thai households in Mae Chaem District two decades ago (Thani and Rauechai 1984:195). In addition, other products, such as herbicides or pesticides are applied for weed and insect control.

A second factor that increased upland rice yields was not apparent in Baan Lek. The Mae Chaem Watershed Development Project funded the construction of bench terraces that offer better water control for growing the crop (Keen 1979:14). According to Roth (1984:184) upland rice responds more favorably to moisture than to fertility, thus providing an advantage to farmers who have the time and money to install terraces. In terms of fertilizer and chemical use, the terraces prevent these inputs from washing away, thus providing efficient use of expensive inputs (Roth 1984:184). However, we did not observe any upland terrace plots. Instead, Baan Lek farmers grow upland rice either in rainfed paddy or else on the hillside alongside other crops in permanent fields.

IV. Rice Subsistence Strategy

As discussed in Chapter 6, I could not discern evidence of plot scattering in order to minimize the risks against rice production. However, there is evidence that farmers choose to farm hill sites as a subsistence "safety valve" because there is not enough wet-rice land available, or else when that land is low-producing, for meeting household subsistence needs. Table 22 demonstrates this by separating households into three rice output categories. Those categories and total rice output are: those growing wet-rice only, 241 thang; those growing wet-rice in paddy and upland rice in the hills, 254 thang; and those growing upland rice only, 257 thang. The result is that households have remarkably similar rice production outputs regardless of the varying amounts of land they cultivate in paddy or in the hills.

PRO-DUCTION TYPE	# HOUSE-HOLDS	AVGE. H/H MEM-BERS	AVGE. RAI PER H/H	YIELD, THANG/RAI	TOTAL PRO-DUC-TION (THANG)	AVGE. THANG PER H/H MEM-BER
A. Wet-rice only	11	3.9	2.8	86.0	241	61.79
B. Wet-rice & upland rice	7	4.7	Wet-rice: 2.4 Upland rice:1.7	Wet-rice: 80.2 Upland rice: 36.4	254	54.04
C. Upland rice only	6	4.3	3.2	80.4	257	59.76

Table 22. Household Rice Production, Baan Lek Hamlet

In fact, the households with greatest overall production are those in the categories that grow upland rice (category C), which is generally considered to be lower-yielding than irrigated rice. This seems counter-intuitive, given that wet-rice yields and a reliable *muang fai* water supply would appear to be most productive. But if we examine average yields by production category, we find that households growing upland rice exclusively have yields as high as households growing wet rice alone (Table 23). The reason is that farmers are able to spend a great deal of time and management on upland plots because they do not grow rice anywhere else.

PRODUCTION TYPE	YIELD RANGE, THANG/RAI
Wet-rice only	60-100
Wet-rice & upland rice	Wet-rice: 65-100 Upland rice: 10-60
Upland rice only	60-100

Table 23. Rice Production, Yield Range; Baan Lek Hamlet

What then are minimal rice subsistence requirements for households, and are they successful in meeting them? According to Tanabe (1994:38), northern Thai rice growers in the Chiang Mai Valley needed 45 thang per household member to meet annual consumption needs. Farmers call this *khao kepwai kin* or “paddy kept for eating” (Tanabe 1994:38). Farmers keep this amount of rice not only for eating, but also to meet other annual needs and obligations. Some of these needs and obligations include irrigation fees, temple donations, and feeding livestock. In fact, using figures calculated from Tanabe (1994:37) and

Judd (1965:91), it appears that 29-31 thang are needed annually for each household member's personal consumption, leaving roughly 14-16 thang for other needs and obligations.[2] Multiplying Tanabe's minimal 45 thang times household size, we find that in all categories of producers, the total annual production is above minimal subsistence levels by 17-27 percent (Table 24).

PRODUC-TION TYPE	# MEMBERS IN HOUSE-HOLD (AVGE.)	ANNUAL SUBSIST-ENCE NEEDS, THANG (column 2 X 45 thang)	ESTIMATED ANNUAL PRODUC-TION (thang)	DIFERENCE BETWEEN NEEDS & PRODUC-TION (thang)	% OF PRODUC-TION ABOVE SUBSIST-ENCE NEEDS
A. Wet-rice only	3.9	176	241	65	27
B. Wet-rice & upland rice (hills)	4.7	212	254	42	17
C. Upland rice only (hills)	4.3	194	257	63	25

Table 24. Household Rice Subsistence Needs and Production, Baan Lek Hamlet

Households with the most members (4.7) are growing both wet-rice and upland rice for a total subsistence requirement is 212 thang per annum. For these households, upland rice is a "safety valve" that ensures minimum subsistence needs. For them, annual wet-rice production alone would be 194 thang, or about 9 percent below the subsistence level of 212 thang per annum.

[2] According to Judd (1969:91), an average household size of 3.5 members needs 100 thang of rice per year, or 28.57 thang per member. Tanabe (1994:37) wrote that a household averaging 5.4 members needs 166 thang of rice, or 30.74 thang per member.

Rather than risk a shortfall in paddy production to unforeseen circumstances, they grow rice in hills in order to make sure they have enough rice for the year.

As for the other categories, households that grow wet-rice exclusively, and those growing upland rice exclusively, both have slightly lower household membership sizes, 3.9 persons and 4.3 persons, respectively. Wet-rice producers' subsistence requirement is 176 thang per year, or 27 percent more than estimated annual production. Upland rice producers' subsistence requirement is 194 thang per annum or 25 percent above estimated annual production. Under these circumstances, then, the wet-rice producers assuredly grow enough rice in their paddy, and they do not have to maintain a site for production in the hills. As for the upland rice-only households, their only option is to grow rice in the hills, as they do not have access to expensive paddy. In their case, they can put all their time and management into upland production, and thus they achieve almost the same percentage of production above subsistence as do the exclusive wet-rice farmers. Again, the hills are a safety valve for subsistence needs. Farmers without irrigated paddy lat all are forced to farm in the hills in order to feed their families.

V. Cash-cropping

This section will discuss cash-cropping in Baan Lek, which was just a minor enterprise 20 years ago. Now it is a major activity as farmers grow permanent maize fields in the hills, and various second crops in harvested irrigated paddy. In addition, homegardens are taking on a more commercial aspect.

A. Permanent Fields, Hills

As discussed earlier, 89 percent of Baan Lek households cultivate rainy season crops in the hills, and the total amount of land in hill production is five times the amount in paddy land alone. Hybrid seed maize is the major hill crop, and this is attributed to an attractive contract program offered by the Thai multinational corporation, Charoen Pokaphand (CP Group), which ranks among the world's 10 largest agroindustrial conglomerates (Falvey 2000:2).

In the year of this fieldwork, the CP contract offered farmers 11.75 baht (US$.27) per kilogram of maize harvested, subtracting costs of seed, fertilizers and chemical inputs. Some farmers said they would prefer 12 baht/kg ($.28), but CP has held fast to the lower price. Although I do not have profitability data, I can say the amount of profit is not dependant on farmers' individual management skills. CP Group determines the kind and amount of inputs that farmers apply to their fields. Company representatives visit the fields to dictate planting dates, amounts and types of fertilizers, and the need for chemical applications. The company also determines the harvest date based on moisture content of the grain. The farmer bears the costs of field preparation by renting a power tiller, labor costs at planting and harvest, as well as harvest transportation costs from field to the farmers' cooperative in Mae Chaem Town.

In contrast, farmers not in the CP contracting program sell maize either to the farmers cooperative or to a middleman in the district for 2.2-2.5 baht (US$.05-.06) per kilogram. A few farmers who own a pickup truck can get a

slightly better price, 4-5 baht/kg ($.09-.11), by transporting the crop to buyers in Lamphun about 80 km. to the east over the Doi Inthanon mountain range.

Yields for maize grown under CP contract ranged from 700 kg-1,375 kg/ rai, but the upper figure is an outlier, given its distance from the median, 900 kg/rai among 23 households contracting maize seed to CP.[3] Removing the outlier from the data set, the mean is 903 kg/rai. It is unclear if this is a high level of production as most published yields are for maize as a feedgrain, which agronomically yields higher than maize seed (Dr. Peter Thomison, personal communication, Jan. 5, 2003). For example the 1995 Thai national maize yield (feedgrain) was 527 kg/rai, and China's was 787 kg/rai (Falvey 2000:176). A factor that complicates comparisons is that published figures reflect the shelled maize only, whereas farmers harvest the crop on the cob, which adds 30 percent to the weight (Thomison, personal communication, Jan. 5, 2003; Machan, interview, Jan. 30, 2002). Maize seed is harvested at 30 percent kernel moisture, which is about twice the level of maize harvested for feed. Nevertheless, the hamlet's seed maize yield is consistent with, although a little more than the district yield of 864 kg/rai for the 2001 seed crop handled by the Mae Chaem District farmers' cooperative. According to the cooperative information in Table 25, the district's average maize yield for feedgrains was 1,141 kg/rai. The cooperative figures obviously include the cob with the weight. In all, CP Group's

[3] Actually another household grows maize, but not under a CP contract. Therefore there are 24 households (out of 27, or 89 percent) growing maize in this hamlet.

contract seed maize program is available in four of Mae Chaem subdistricts: Mae Na Chon, Baan Tub, Kong Khaek and Tha Pa. The maize for feed program is available in Pang Hin Fon, Mae Suk, Kong Khaek, Ta Pha and Chang Khoeng districts.

In addition to annual hill crops, eight households (29 percent) reported growing orchards of longan (*Dimocarpus longan*) in hill areas. The household survey indicated that eight Baan Lek households 29 percent) grew 469 longan trees in hill orchards. The number of trees per orchard ranged from 25 to 135 for a mean of 58.5 trees. Other significant species in these orchards were banana, *Musa sapientum Linn.*, rattan, *Calamus rotang Linn.,* orange, *Citrus reticula blanco,* and litchi, *Litchi chinesis Son* .

UNIT	MAIZE FOR SEED	MAIZE FOR FEED
Production	5,962,214.9 kg	2,158,566 kg
Area	6,903 rai	1,891 rai
Yield	864 kg/rai	1,141kg./rai

Source: Mae Chaem Farmers Cooperative

Table 25. 2001 Maize Production, Mae Chaem District

Although longan orchards are common in northern Thailand, there has been a recent flurry of new plantings as orchards and in Baan Lek homegardens in recent years. Farmers often said they had planted the trees four or five years ago, and the trees would begin fruiting in another two years or so. We could not ascertain the reason for the interest in new plantings. One influence has been CARE-Thailand, which has been supporting the plantings with cost-share

programs. A total of six households (22 percent) reported that CARE-Thailand gave them help in establishing longan orchards. In addition, a few farmers said they received CARE-Thailand help for planting rattan, which can be harvested young for food and later for basket-making material.

Historically, longan was introduced to Mae Chaem District quite recently. The mid-1980 socioeconomic report on fruit tree production does not mention the species at all (Thani and Rauechai 1984:86). The species mentioned, “mangoes, jack fruits, bananas, pomeloes [sic] and sour oranges, etc.”, were grown in homegardens mostly for household consumption (Thani and Rauechai 1984:86). In those days, longan stands in northern Thailand indicated the wealth of the landowners, as they established trees on land repossessed from debtor farmers: “it is exceedingly rare to find peasant-owned orchards in the northern region. They belong exclusively to the local rich, or wealthy people from Bangkok, who use them as rural retreats as well as investments.” (Keen 1983:296). The CARE-Thailand assistance then, is a positive step toward income security in the district, as it attempts to provide resources to poorer people.

However, the household surveys provide only a glimpse of the activity of orchard and garden crops grown in hill areas. Visits to hill areas frequented by Baan Lek householders revealed an assortment of trees scattered throughout maize fields as well as tree stands around household shelters. We observed that one longan orchard included numerous fruiting species intercropped with vegetables. Fruiting species included custard apple, *Annona squamosa L.*; tamarind, *Tamarind indica L.*; papaya,. *Carica papaya L.*; mango, *Mangifera*

indica L., and orange, *Citrus reticula blanco*. Pumpkin and cucumber plants were intercropped within the rows. Other species at this site were ginger, *Zingiber offinale Roscoe*. green beans; sugarcane, *Saccharam officinarum Linn.;* taro, *Colcasia esculenta (L.) Schott.,* and rattan, *Calamus rotang Linn.*

B. Lowland Cash-Cropping

In Baan Lek, shallots are the crop of choice for second cropping in harvested wet-rice fields; the second choice is soybeans, while remaining households grew either sweet corn or cabbage. Shallots are a popular ingredient for traditional Thai dishes, and farmers said that two decades ago, they grew just enough for household consumption (cf. Judd 1969:118, 178-9). However, the improvement of roads gives buyers access to Mae Chaem growers, and the higher price relative to dismal economic situation for soybeans is a factor in farmers' decision making. Another factor in choosing shallots is labor availability. Extra-household labor, hired on a wage basis, is required to work the ground into a suitable planting bed, as well as for harvesting the crop. The ground has to be worked for 10 days, which involves incorporating commercial chicken manure into the soil. After the ground preparation, the planting operation takes 10-20 workers for a two-day period, while harvesting the same ground takes 10-35 workers for two days. In addition, the data shows that slightly larger households raise shallots, undoubtedly due to the greater availability of labor compared to soybeans (Table 26). The average number of household members available for shallot production is 2.4 compared to 1.83 for soybeans. Another key point is that

households with an off-farm laborer are less likely to raise shallots due to the time requirements and management.

Second Crop(s) Type	Total Households	# Members per Household (avge.)	# Farm Workers per Household (avge.)	Off-Farm Laborers
Shallot	10	3.9	2.4	2
Soybeans	6	4.5	1.83	4
Other	2	4.0	2.0	0
R. Onion & Soybeans	1	5	4.0	0

Table 26. Labor Distribution, Second-Cropping in Lowland Rice Fields, Baan Lek Hamlet

Baan Lek's shallot production follows the1990's trend toward increased production in northern Thailand, the Kingdom's main producing region (Falvey 2000:204). From 1992 to 1997, the area planted in shallots grew by 20 percent to about 100,000 rai (16,000 ha) in northern Thailand. Falvey (2000:204) counted Chiang Mai Province among the major northern producers of shallots.

As for soybeans, farmers continually complained of low prices so they chose other crops, either maize in hills or shallots in the lowlands. Soybean prices, as quoted by farmers, were 8.5 baht/kg (US$.20), while the average yield was 253 kg/rai. Shallot prices, on the other hand, were 5 baht/kg (US$.11), and average yield was 3000 kg/rai. Yet a sizeable proportion of the paddy land—36 percent—was planted in soybeans, despite farmers' complaints. Evidence collected from farmers in the fields and data supplied from household surveys indicate that soybeans are the less labor-intensive than shallots. Field

preparation for soybeans is negligible and can be accomplished with as little as two workers, commonly a married couple working as a team. As we observed, soybean planting usually involved a bamboo pole to poke a hole through the ash-covered soil and depositing seed. Otherwise, our household data shows that planting a 2.5-rai field takes 2-8 workers, while harvesting it requires 4-10 people over two days, or roughly about one-third of the labor required for a similar size plot of shallots. Most of the labor for soybeans are wage-paid, although there were a few instances where labor was exchanged either for the harvest or planting, but not both.

Although labor is a local issue, soybean price volatility is related to world supply-and-demand, according to the district's extension service officer. He explained that processors can buy imported soybeans cheaply due to huge worldwide supplies dominated by major producing countries like the United States and Brazil. In fact, Thailand's soybean production does not meet the Kingdom's production demands, according to Falvey (2000:205). Baan Lek farmers' statements correspond to Falvey's (2000:205) analysis that "planted area appears to vary with price;..."

Thani and Raeuchai's (1984:195) socioeconomic study is the only historical source of soybean yields in Mae Chaem, reporting 132.75 kg/rai without distinguishing production by ethnic group. Only 3.12 percent of households surveyed used fertilizer on soybeans (Thani and Rauechai 1984:195). These days, all Baan Lek farmers use fertilizer, which with improved

seed varieties, has almost doubled yields from former times to the hamlet's average yield of 253 kg/rai.

Historically, the Baan Lek farmers said that soybeans were grown in the hills as a rainy-season crop, although throughout the district there were some soybeans grown as a dry-season lowland crop (Thani and Rauechai 1984:82). In fact, the extension service promoted soybeans as a rainy season upland crop, while commercial suppliers promoted soybeans as a dry-season crop in irrigated lowlands, the farmers said. In current times, most soybean production has shifted to irrigated paddies as a second crop, although one household had planted 4 rai on the hillside near the village. The farmer explained she was testing the site for future planting. After a disappointing harvest, the farmer decided to discontinue planting there.

VI. Homegardens

As discussed earlier, residents viewed their homegardens as sources of subsistence products, mainly food, even though some species, such as longan and betelnut (areca palm) were appreciated for their commercial value. In fact, Ungphakorn and others (2001) reported that some Mae Chaem villagers even export betelnut to Taiwan, although we did not confirm this in Baan Lek. Singling out plants for "marketable yield," as Ungphakorn and others (2001) argued, is only part of the rationale for homegarden production. One can frame the homegarden in the context of an ecological system that provides various services and benefits to the homestead and its residents. The ecological system is based

on a mixed cropping model that provides numerous benefits to plants, water, soils and humans (Chambers 1983:86).

Some of these ecological benefits of homegardens became apparent in intensive interviews with household residents. We have already discussed the animal-plant relationships that provide manure to plants, and shade to the animals. The ecological relationships also involve the value of humus from fallen leaves to soil quality. Another common topic that came up was that residents associated a good homegarden with the quality and quantity of water in wells. Some residents reiterated a northern Thai belief that tree roots gradually release water to other plants and to wells, which would theoretically supply water in dry-season months. However, it is unclear if this principle is scientifically valid (Preechapanya 1996).

Lowland Khon Muang farmers also appreciate plants for their multiple uses, in addition to the endproduct they can consume or sell. One can say the lowland Khon Muang appreciate the value-added qualities to their plants, and these factors should be considered in terms of promoting homegardens in community development programs. The longan is a typical example of this point. Although farmers consider it as a high-value crop, they also appreciate its dense canopy that shades the residence from the tropical sun, as rural houses are not air-conditioned. They also appreciate longan as firewood; the burn is slow and maintains heat. Farmers did relate a challenge in managing longan in their homegardens. Windy weather can easily break the branches that then fall and damage the house exterior.

The banana is another example of a multiple-use species. The fruit is used for food, as well as a common offering at temple ceremonies. It is also commonly offered to visitors, as it is easy to harvest on a moment's notice. Banana is an ingredient in a northern Thai sweet, *khanom*, also made of coconut and sticky rice. The *khanom* is frequently offered at temple ceremonies. The banana leaf is used for many material functions. It is folded into a container that contains ritual foods and items at Buddhist and non-Buddhist ceremonies. We also observed the leaves are used to cover the ground on which field workers sit when eating lunch. Finally the dried leaf is used for rolling the northern Thai handmade cigarette, which is common in the district.

Ban Lek residents also fashion their homegarden production into specialty operations that provide additional income to the household. An elderly resident harvested the fronds from coconut, out of which he made brooms that he sold to hamlet residents. Another man, harvested the fluffy filling of the silk cotton tree, *Bombax ceiba L.*, which is used to stuff pillows and mattresses. At another residence, a man propagated longan seedlings for distribution to other hamlet residents, while other residents propagated coconut seedlings. The former individual was also interested in plant remedies, and sold the vine species,*Tinaspora crispa (L.) Miers ex Hook f. and Thomson* to a village chief for its reputed qualities as a human and animal medicine. Two residents also sold animal manure, which is indirectly a product of the plant-animal interactions in the homegarden. One of those residents, as discussed earlier, raised the hamlet's lone cow and sold the manure to a resort. The other resident was the

entrepreneurial woman who raised chickens and pigs for marketing. She said she sold the manure to other hamlet residents.

The plants cultivated in homegardens also have aesthetic and spiritual uses as well, whose usefulness cannot be measured quantitatively. In this respect, a good homegarden enhances the quality of life of rural residents and serves to maintain the northern Thai culture. As mentioned earlier, the *ajan wat*, or lay leader of the local temple, said a good homegarden provides a pleasant atmosphere that enhances the mood and mental outlook of household members.

From an aesthetic standpoint, a common boundary marker of the Baan Lek homestead is the hedge, *Carallia euryoides Ridl. that* secludes the residence from passers-by. Within the residential compound it is common to find potted and cultivated flowers usually growing at the foot of the stairs to the house. A popular potted flower is the *Euphoriba Milli Des Moul.* The seven-clustered flower is a sign of good luck. Another “good luck” flower is the fire lily or *Hippeastrum puniceum (Lam.) Urban*.

From a spiritual standpoint, homegarden plants make their ways into the lowland Khon Muang ritual life during ceremonies at the temple. In Baan Lek, residents observe the Precept Day, during the Buddhist Lent, which occurs during the rainy season. The day is set roughly every eight days according to the lunar calendar. In the early-morning darkness, the faithful gather at the local temple to honor the Buddha and also to make offerings to deceased relatives. Offerings include numerous flowers harvested from the homegarden, as well as plates of food items also raised from the homegarden, or homemade products,

such as the sweet, *khanom.* Afterwards, the foods are gathered and redistributed to poor people. At larger temples, the amount of food can be quite large, requiring novice monks to sort the items for redistribution. In this way, the Buddhist ritual serves as a redistribution mechanism for the district's poorer residents.

The intangible value of homegarden products cannot be overemphasized. Peoples' participation in temple ceremonies is a way to "make merit," or *tahm bun*, which is an article of faith in the Theravada sect of the Buddhist religion. If such deeds are practiced over time, merit accumulates and secures one's position in the next life, as the northern Thai follow a doctrine of reincarnation. Thus homegardens provide more than the material needs, i.e. food, medicines and materials for a good life, but also provide a means for achieving salvation in the sense of the Buddhist theological doctrine. For residents with limited means, the homegarden produce allows them to participate in merit making ceremonies. At larger temples, however, I noticed that commercial products, such as processed drinks, were included in the offerings. This is evidence of Mae Chaem's immersion into the cash economy, which presumably requires less need for homegardens for household subsistence.

In conclusion, then, homegardens are an epitome of diversity in the lives of the lowland Khon Muang. Ecologically, the array of plants form a system that benefits soil, water, plants and animals. In terms of individual plants, each species serves multiple functions other than merely providing food or a marketable product. Finally, the homegarden provides many non-material

benefits that concern the quality of life, including the aesthetic appearance of the homestead as well as being a source of ritual products that are offered in Theravada Buddhist ceremonies.

CHAPTER 9

DISCUSSION AND CONCLUSION: DYNAMICS OF CHANGE

This dissertation has documented the agricultural and sociocultural changes in a lowland Khon Muang hamlet, Baan Lek, by drawing upon data collected from the community and putting it into the context of the historical record of major development projects. Obviously this study is hampered by the fact that we do not have any recorded baseline data for the field site itself, Baan Lek, thus leaving a question mark about past conditions there.

Using ethnographic interviewing techniques, however, I have concluded that past conditions in the hamlet were not much different from those for the lowland Khon Muang in the rest of Mae Chaem District as described in reports of the Royal Thai Government-USAID Mae Chaem Watershed Development Project in the 1980s. The record and evidence show that agricultural productivity was low as evidenced by several hungry months prior to rice harvest, and that cash-cropping, if it occurred at all, was at a minimum. These days, the introduction of high-yielding seeds and industrial inputs has tripled yields, resulting in an annual rice surplus. As the hunger problem has been resolved,

farmers have intensified their cash crop production in lowland rice paddies and have expanded production to the hillsides where they grow contract maize.

Homegardens were once cultivated mainly for home consumption and for exchange within the community. These days, households still consume the produce, but they sell the surplus. Homegardens are also taking on a commercial character. Formerly, the areca palm was the main commercial species cultivated in homegardens. Now households have expanded into longan production for cash marketing purposes.

Meanwhile, the community data shows that the economy is more diversified as evident by participation in the off-farm employment sector. Not only are non-farm jobs available in Mae Chaem District, but residents have also taken on either temporary employment in the farming off-season or permanent jobs in urban centers of the Kingdom. As for the future, young people are preparing for employment opportunities by completing secondary education, compared to their parents who only attended primary school for the minimal educational requirements. Young people are already training for specialized careers at post-secondary training centers in Chiang Mai.

The improved road system is a common thread that sews together the above changes. Cash crops are more easily shipped to lowland markets due to road construction that makes travel more accessible outside of the intermontaine valley. Roads also make the district more accessible to middlemen who come to buy produce grown in Mae Chaem. The roads make CP Group's contracting program possible. The Group's diesel-powered long-haul trucks have adequate

roads for transporting harvested grain to processing sites outside of the district. Roads also link the remote district to employment opportunities in the urban sector. A system of minibuses links Mae Chaem Town with daily trips to points beyond the district. During the fieldwork, it was not unusual to find young people leaving town to search for jobs in Chiang Mai. Nor was it unusual to come across people who had just returned from doing business in Chiang Mai or from visiting a relative in some distant district. The road system has fully integrated Mae Chaem into the daily life of the Kingdom. As early as the mid-1980s, the economic impact of an improved road system was apparent. A consultant's (Roth 1987:2) report stated:

> Now that a decent road links the area with Chiang Mai, Mae Chaem has begun to participate more fully in Thailand's economic and political life. This shows most clearly in the main town, which has grown considerably since the early 1980s and now has shops selling televisions and refrigerators.

I. Cultural Change

Baan Lek residents have had to make cultural trade-offs as they incorporated the above-described changes into their community. Community life centers on the Buddhist temple, and residents continue to regularly attend ceremonies and contribute rice and homegarden produce as dictated by the liturgical calendar. In fact, the ritual life of the temple is a barometer of the economic conditions of the communities that support it. Farmers support the temple with rice donations that are sold for its upkeep, and they have homegarden produce to offer at Precept Day rituals. They have also been able to

contribute cash to expand the physical facilities by constructing a bell tower. Residents make more than just material contributions to the temple, though. They also contribute communal labor in keeping up the grounds, as well as take a common interest in caring for the resident monk. A good example of the latter was when they publicly nursed the sick, elderly monk in the temple worship building for about one month before he died. In addition to temple ceremonies, residents have held rituals at their homes, such as to dedicate the purchase of a new truck or a house renovation. Thus the ritual life is inseparable from the economic life, as one reflects upon the other. Without a viable economy, Baan Lek's would have fewer resources to divert to the community's rich array of ritual activities.

The cultural cost of change has quickened the pace of life in the hamlet, for better or for worse. During this fieldwork, residents were very busy coordinating field tasks between rice paddies and hill maize fields where they must meet production deadlines dictated by the CP Group. Writing about an earlier time, Walker (1992:7) described this time of year as the "agriculturally slack" period when northern Thai farmers tended to home crafts or fishing. Judd (1961:185) also wrote about the northern Thai farmer as hard-working, but for whom there was "seldom any sense of rush."

It is clear that householders adjusting to an industrial time sense. For example, one farmer said he schedules work in rice fields according to the traditional northern Thai calendar, which is based on cosmological principles that allocate "auspicious" days (Davis 1976:3). However, in hill maize fields, the

traditional calendar has no utility. It is the CP Group field representative who dictates field operations based on a rational production schedule. This was evident at maize harvest. CP Group delayed the harvest by one day to allow more time for corn to dry down in the field. Some farmers were somewhat anxious the delay might interfere with their scheduling of hired labor (which it did not), because maize harvest requires extra-household help.

An industrial time sense is also apparent by the fact that the hamlet is almost deserted during the day except for the elderly whose physical limitations prevent them from doing farm fieldwork. During the household survey from September through December, we found it best to conduct interviews after 5 p.m. when people came home from work. A 77-year-old resident of the hamlet acknowledged that people seemed to have more time in the former days. He attributed their current busy-ness to economic development. People need money for manufactured products and processed goods that were once made at home, like clothes, for example. Another sign of economic development is the availability of electricity that allows them to have conveniences such as a fan or television, he said. In the opinion of this elderly man, not all changes are for the better. Some aspects of modernization, such as use of automobiles, have shortened peoples' lives if they die in an accident.

The busy schedule may also have other social ramifications. Some locals said the hamlet had a methamphetamine problem, although I could not verify this claim. One resident was adamant that every farmer in the hamlet was taking

drugs. Even if drug use is not an actual problem, residents' concerns about it do reflect their perceptions about the social costs of change in the hamlet.

Another cultural cost concerns the enculturation of young people into the farming way of life. The availability of formal education is certainly a positive development, but it also means the young people are not learning the day-to-day local knowledge of farm management from their elders. The loss of local farming knowledge is regrettable, but it may also be irrelevant for the future of the young people. First, the use of industrial inputs means local ecological knowledge will not be an important factor in managing a crop to harvest. In regards to homegarden products, I suspect there is a storehouse of plant-use knowledge that is being forgotten. Secondly, increased educational opportunities are preparing young people for employment off the farm and away from the farming life in the hamlet. This situation may have implications for the future patterns of land ownership as well as for the extent labor availability for farming in the hamlet. Households will either have to mechanize their operations even more, or else increase their demand for Karen labor.

The loss of local ecological knowledge might not be totally lost to the younger generation, however. Children often tend to the homegarden as an after-school chore. I also observed some children doing some chores, such as sweeping leaves, under the supervision of grandparents. It is unclear if homegarden ecological knowledge is being passed to children during these encounters. This would be a fruitful line of inquiry by employing anthropological

and communication methodologies. In its essence, enculturation involves communication of cultural knowledge from one generation to the next.

Another point about enculturation concerns the future ritual life of the hamlet, particularly ceremonies concerning the various guardian spirits that residents propitiate on a regular basis. Among these are the guardian spirits of the field that are propitiated at planting and harvest. Another is the Guardian Spirit of the Village, which is propitiated annually. The knowledge of these rituals may be lost to children as they are in school when family members perform them during fieldwork activities.

II. Ecological Consequences

The changes in the sociocultural environment also come with a cost to the ecological landscape. This study has documented that 76.1 percent of the hamlet's agricultural land is in permanent fields on once forested hill sites. The total hill area in permanent cultivation is 257 rai (41.1 ha). Forests provide important services to watershed ecology, namely the management of soil erosion and enhancing the water-holding capacity of soils (Walker 1986:15). Baan Lek residents farm a hill site 5 kilometers from the hamlet, so it is unlikely that the land use transformation directly affects the river flowing past the hamlet. However, a true watershed ecology takes into account that other areas of Mae Chaem District are affected by these land use changes. Vice-versa, the hamlet’s paddy lands are susceptible to the potential effects of deforestation by non-hamlet residents.

In this manner, one must think of the Mae Chaem River Watershed as a single ecological unit where human activity in any place can affect residents' livelihoods in another place. All are connected in a common relationship. Extending that argument further, the activities in the watershed have consequences for the national ecological system. The Mae Chaem Watershed provides 40 percent of the stream-flow into a major northern waterway, the Ping River, which flows into the Kingdom's main waterway, the Maenam Chao Phraya that drains into the Gulf of Thailand (Walker 1986:1, Srikhajon et al. 1984:1). This means that upland land uses have significant outcomes for downstream residents in a national ecosystem. The Mae Chaem Watershed and the national ecosystem are one in the same thing.

Some of these upstream-downstream effects can be positive. Sediment runoff from northern mountains provides valuable nutrients to the Central Plain's rice fields, which is a major rice production area of the Kingdom (Hanks 1972:33-38). On the negative side, deforestation in highland areas can disrupt the natural functioning of upland watersheds, which degrades their ecological services both locally and nationally in terms of soil and moisture conservation (Walker 1986:15). The effects can become obvious within local watersheds in terms of flooding and reduced dry-season water levels (Hamilton 1985:684). In the rainy season of 2001, floodwaters closed Mae Chaem Town on the Queen's Birthday, August 12. The flooding also forced the evacuation of nearby villages. The chief civil officer of the district, *nai amphur*, reported that flooding damaged approximately 210 hectares of farmland. Hundreds of residents turned out for a

flood relief program at the district government's office on September 7. The "relief" included a bag of foods and public apologies from provincial and district officials. In Petchabun, located in another watershed 375 kilometers to the northwest, the same storm brought flooding that took lives and caused extensive damage, all shown on Thai television news. After I left Mae Chaem, my research assistant informed me of similar flooding in the 2002 rainy season. This time floodwaters damaged rice lands adjacent to Baan Lek, although I do not have an accurate assessment of the extent of the damage. In 2003, ICRAF's field office informed that the district escaped flooding due to a decreased precipitation during the rainy season. The variability of precipitation between years is consistent with the climatic patterns of the intermontaine basins of northern Thailand (Tanabe 1994:14-15).

III. Agricultural Change Models Applied to Mae Chaem

The low agricultural productivity and food shortages in Mae Chaem's past are an antithesis to Boserup's demographic theory of agricultural growth. It is instructive here to review Boserup's (1993[1965]:47) definition of intensification as "the gradual change towards patterns of land use which make it possible to crop a given area of land more frequently than before." In contrast, she defines expansion as "the creation of new fields" (Boserup 1993[1965]:12). According to Boserup, population growth should stimulate farm households to intensify cultivation on a single plot to grow more food. At these times, household members are supposed to draw upon their cultural memory of practices to change from long fallow systems to shorter fallow systems requiring plow,

manure fertilization, leguminous crops, and in Asia, the use of irrigation techniques. According to Boserup, these practices can coexist as households adjust their agricultural systems to the long-term trends of demographic change.

Although not as reductionist as Boserup, Hanks (1992[1972]) studied Thai agricultural change in terms of "energy requirements," which translates into the amount of human labor available to the household for rice production. The concept of a fixed carrying capacity for a plot is irrelevant, as additional labor allows households to adopt more intensive practices that produce more yield per unit area of land. At the risk of overstating Hanks' then, the assumption is that the natural capacity of the land is unlimited as long as human beings know how to manipulate it for optimal results. Hanks (1992[1972]:58) put it this way: "We are accustomed to asking how many people a given acreage supports. Rarely does the obverse thought lead us to ask how many people are required to raise a crop of rice." Hanks' assumptions may be appropriate for the broad sweep of the Central Plain, but they may not apply in the narrow intermontaine valleys of northern Thailand where the amount of arable land is limited for irrigated rice production. Robert McC. Netting (1993:14) posed the same question in regards to the Boserupian thesis: "Were there environmental limits to agricultural intensification beyond which population could not grow, and could stability be achieved by social means or only through the harsh imposition of Malthusian checks?"

Two decades ago, development consultants' reports described a Malthusian situation in Mae Chaem District. Population growth was reported as

"growing rapidly by natural increase (surplus of births of deaths)" (Zinke, Kunstadter and Drew 1979:6). Adding to the increase was the in-migration of people seeking the benefits of development programs related to opium reduction. (Zinke, Kunstadter and Drew 1979:21-22). The latter were said to include lowland Thai and non-Thai ethnicities. (Zinke, Kunstadter and Drew 1979:6, 17-18). Later figures from various sources have shown a continued population increase from 40,438 in 1980 (Srikajhon et al. 1985) to as high as 67,921 in 2001; so the longer term trajectory has been toward population growth (Northern Mountain Area Agroforestry Systems Research and Development Project 2001). The latter distribution is skewed largely toward the non-Thai highland groups, as the lowland Khon Muang proportion of the district's population has decreased from 46.4 percent in 1980 to 27.2 percent in 2001 (Srikhajon et al. 1985, Northern Mountain Area Agroforestry Systems Research and Development Project 2001). In Baan Lek, it appears that population growth has at least stabilized, following the district's trend for northern Thai ethnicity. For example, the household census for this project revealed an average household size of 4.2 persons, which compared to 5.5 persons recorded in 1984 (Thani and Rauechai 1984:10) in a subdistrict largely populated by the lowland Khon Muang. The average household size for the northern region was 5.4 persons in 1984 (Thani and Raeuchai 1984:10).

If Boserup is correct, then, one would have to predict that Mae Chaem's demographic trends up to the 1980s would have prompted a rise in agricultural productivity, assuming that the consultants' reports gave accurate demographic

assessments. The data from development agency reports, and in field interviews for this project, gave an undisputable assessment that is contrary to Boserup's thesis. Agricultural productivity did not keep up with demographic pressures as was evident by several months of hunger prior to harvest. In fact, the primary goal of the Royal Thai Government-USAID Mae Chaem Watershed Development Project was to alleviate the rice deficit so households could then concentrate on cash-cropping in order to reduce poverty (Thailand--Mae Chaem Watershed Development Project 1980:4,12; Zinke, Kunstadter and Drew 1979:2-3).

In contrast to a neo-Malthusian approach, there is some evidence that Mae Chaem's population "problem" was not necessarily overstressing the environment. One might think that lowland Khon Muang in land-short overpopulated villages would have cleared extensive forests for farmland, just as they are now under conditions of population stability. A USAID document (Thailand-Mae Chaem Watershed Development Project 1980:4-5,19- 20) did assert there was "environmental deterioration." However, the report largely attributed it to improper road construction and uncontrolled burning in the dry season, while making a vague reference to agricultural practices. In another report, project consultant Grahame Keen (1979:17) argued that it was a "misleading stereotype" to assume that shifting cultivation was destroying Mae Chaem's forested ecosystems. Keen noted that lowland Khon Muang were cultivating lower slopes, but he deemed it not a serious environmental problem: "In Mae Chaem, swiddening has not, as yet, anyway created a situation requiring urgent means to protect the watershed" (Keen 1979:17).

Interviews with Baan Lek farmers support Keen's view in that they said slash-and-burn practices were used on nearby hills decades ago. This was also evident from field inspections of hillsides, some of which are overgrown in grasses as the after-effect of cutting and burning. The hillsides have been replanted thanks to a government program so farmers say there is more forested area now compared to the past. As for the current situation, farmers said that slash-and-burn is rare these days, and the *pu yai ban* assesses a fine for any tree that is illegally cut. However, farmers say some illegal cutting still occurs as some farmers harvest trees to sell to homebuilders.

While farmers are well aware that cutting is illegal near their community, they cultivate once-forested hillside tracts for maize fields about 5 kilometers away. To be fair, slash-and-burn is technically not an issue in the hills. The fields are permanent and do not have to be cleared of trees every year, although they were cleared once and are burned off annually. Another issue in this research might have been translating "slash-and-burn" into the northern Thai dialect, and whether farmers understood the question.

District officials taking a more global view of Mae Chaem recollect there was more forest cover in the past decades than there is now. The agricultural extension officer gave a "before" and "after" description of forest conditions. He was recently reassigned to Mae Chaem after having worked here during the height of the Royal Thai Government-USAID Mae Chaem Watershed Development Project. He (Machan 2002) said:

> The forest is destroyed. There was much forest land back then. Now the land is in CP corn or cabbages....I hate to see the forest destroyed. I hate to say it, but if it continues we'll have a desert like in Israel, due to the water shortage it'll create.

It is evident then, that past trends of population growth did not stimulate agricultural production in Mae Chaem, and there are legitimate questions about how much the past agricultural practices stressed the natural environment. Any past deforestation was confined to hillsides near lowland Khon Muang villages due to the lack of an extensive road system that would allow them to go anywhere else. These days, farmers use the improved road system that gives them access to hill sites, which are cultivated in permanent fields. In fact, even farmers who own neither a motorcycle nor a motorized vehicle have convenient access to the hills. A pickup truck driver runs a taxi service between the hamlet and hill fields. The situation in Mae Chaem then, was a world somewhere between Boserup and Malthus, with neither theory having the explanatory power to account for respectively, past food deficits, or the lack of extensive environmental damage resulting from attempts to secure adequate annual food supplies.

III. Alternative Model of Thai Agricultural Development

The lack of Mae Chaem's agricultural growth 20 years ago is not evidence in itself that Boserup's thesis was ultimately wrong. But the evidence presented from Mae Chaem shows it cannot be globally applied to any place at any time. It is unclear why Mae Chaem farmers did not intensify production on their farm plots to make up for rice shortfalls. One factor may have been that land has a

limited production capacity. Another factor may have been limitations in the bank of traditional knowledge of the lowland Khon Muang farming practices. Still a third factor could have been tenurial arrangements that denied households an adequate land base for subsistence. If anything, the evidence shows that lowland Khon Muang farmers in Baan Lek *expanded* their production area by using slash-and-burn practices on hillsides rather than increasingly concentrate their time, labor and effort in irrigated rice paddies. This pattern also counters Hanks' observation in the Central Plain where production practices transitioned from slash-and-burn techniques, which are an extensive system, to broadcasting and finally, to transplanting, which intensifies production in one plot.

Also countering Hanks is the likelihood that intensification may be an anomaly in the Thai cultural experience. As discussed in the literature search of this dissertation, DeKoninck and Déry (1997:15) characterized Thai agriculture as "unique" compared to other Southeast Asian states. The Thai have typically increased agricultural production by expanding into new territories rather than by intensifying production on a given plot of land. We keep in mind the distinction that Boserup (1993[1965]:12, 47) made between "intensification" and "expansion." DeKoninck and Déry (1997:14) cited figures that showed, historically, that agricultural lands expanded at a faster rate than population. Between 1910 and 1990, Thai agricultural land expanded eleven-fold compared to a five- to six-fold increase in the population.

The long historical trend of Thai agriculture also gives evidence that farmers chose to expand to new crop lands rather than intensify cultivation on

existing ground. The agricultural economist, Lindsay Falvey (2000:13), pointed out that even “in recent times up to the 1960s, the majority of Thai farmers in irrigated areas elected to produce only one rice crop per year.” Rather than intensify, Thai farmers devoted off-season activities to crafts production and the participation in the rich ritual life of the community. Traditionally, then, intensification was not part of the cultural repertoire of Thai farmers, according to these sources.

IV. Costs of Development

In the end, the farmers of Baan Lek chose a strategy that involved both intensification and expansion. They intensified their irrigated plots by growing various cash crops after rice harvest, and they also expanded cash-crop production to new sites in the hills by growing maize under contract to the multinational CP Group. They have also shifted some of their homegarden production into commercial cropping, as evident by the expansion of longan plantings. They chose this strategy although population growth has stabilized compared to past trends in the district and in contrast to other developing countries characterized by a largely young population (Hern 1995:136-137, Thani and Rauechai 1984:12-14). Boserup’s thesis has no explanatory power here, because the theory only addresses the increase of subsistence production to feed a growing population, and not the immersion of agriculture into a cash economy. Yet intensification did occur, as evident by the plots of red onions, rows of soybeans and corn grown in harvested rice paddies. The intensification also occurred under rather stable population conditions for the hamlet.

The obverse of Boserup's thesis is that population growth causes environmental destruction, which seems to be the conventional wisdom of Western development programs that implement family planning in the developing world. Larry Lohmann (1993:17) argues this perspective is the "poverty-as-lack-of-development for Northern elites," which is used to justify the developed world's over consumption patterns. Surely, the evidence from Baan Lek shows that environmental protection is no sure thing even when development is rampant and population is under control. I have concluded that so-called population "pressure" is just one of many factors that can cause environmental deterioration. In theory, a community with low population density can still employ aggressive agricultural practices that threaten local soil and water resources compared to community with high population density that continually employs sustainable practices. The former situation is an apt model to apply to rural cultivators transitioning from a subsistence base to a cash economy. Certainly "development" based on a capitalist model can raise material living standards, but its consumptive characteristics can pose serious consequences for upland ecosystems.

The course of agricultural change in Baan Lek in particular, and in northern Thailand in general, is what Hirsch (1987:129) described as "a part of a particular development dynamic." While it is tempting to blame impoverished, overpopulated farmers for overusing their environment, the implementation of development programs and policies has the same, if not more radical effect. It is at this juncture that Hanks' holistic model is relevant, as he considered the

effects government programs and the emerging international capitalist economy on farmers' actions in the rice ecosystem. Throughout its history, Thailand has been steeped in the development ethos, whether it involved infrastructure improvements such as construction of the San Saeb canal in the Central Plain in 1850s, to the recent spate of internationally funded projects in Mae Chaem. In its latest turn, the central government has encouraged the development of the agroindustrial sector in order to level the rural-urban inequities of national development (Burch 1996:340). This policy was intended to quell the political instability that disrupted rural areas with communist insurgencies in the 1960s and 1970s. The advent of contracting programs by a multinational corporation such as CP Group is just another phase of that national process as Thailand attempts to grapple with what it means to be "modern."

While Hirsch wrote in broad terms, the ethnography of Baan Lek shows the processes at the local level. The flexible structure of Thai households is the nexus of the process and the common denominator in any prospect of agricultural change in the Kingdom. Households employed their labor to diversify their production into continued subsistence and cash cropping, while others diversified into off-farm wage labor. Households cooperate in communal labor for critical tasks in subsistence rice production, while they become employers who recruit paid labor in cash-cropping operations. In the hill fields, the lowland Khon Muang hire Karen workers, which integrates a non-Thai ethnic group into the production system. The relevance of a smallholder social type to agricultural development in Baan Lek, then defies any characterization of a "static

subsistence segment," a point well-taken from Netting (1996:9). There is no neat, inevitable or evolutionary development from smallholder production toward so-called efficiencies of economy of large-scale farming. This is also a point emphasized by Falvey (2000:331) who argued that "small-holders are of continuing critical importance to Thai agriculture, and the economy."

However, the Kingdom's development objectives poses considerable risk to the smallholders who are accomplishing it, especially when they are integrated into a contracting system with one of the world's largest agribusiness conglomerates (Falvey 2000:3). I have already addressed the environmental aspects that threaten livelihoods within and without the local ecosystems. Now immersed in the new international division of labor, the lowland Khon Muang farmer competes against similarly low-cost producers in other areas of the Third World (Burch 1996:340). CP Group has shown an interest in low-cost production sites in Vietnam, Laos and Cambodia for supplying raw materials to its global vertically integrated system. In other words, what CP Group gives in economic benefits, it can easily take away. A future CP Group pullout would bring to Mae Chaem the same kind of economic downtown that occurred when the Royal Thai Government-USAID project ceased operations in 1989. Just as then, the viability of the lowland Khon Muang smallholders would again be put to the test, and they would have to find ways to adapt flexible household strategies to diversify into productive opportunities.

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APPENDIX A

FORMAL INTERVIEW QUESTIONNAIRE

1. How has farming changed in Mae Chaem District (or this village) in the past 20 years?

   a. Which changes are good?

   b. Which changes are bad?

2. What are farmers' most important problems in Mae Chaem District (or this village)?

3. What are the most important crops that farmers grow here?

   a. Twenty years ago, what were the most important crops?

   b. Where do farmers sell their crops?

   c. What problems do farmers have when they sell their crops?

4. What percentage of farmers here own their land?

5. Do many people leave their villages here to work at jobs in another town?

   a. Why do they leave?

   b. Where do they go?

6. What can farmers do here to become more prosperous?

7. Who should help farmers' to improve their lives?

   Does the government have any programs to help farmers? If so, please describe these programs, and if you think they are effective.

8. Are homegardens important to the farmers here?

9. Do you think young people want to stay here and become farmers in the future?

10. Are farmers here concerned about the environment?

    a. Is the quality of the environment getting better or worse, compared to 20 years ago?

    b. Does the government have programs to help farmers improve the environment?

11. Is the forest important to this village?

    Today what is the amount of forest here compared to 20 years ago?

12. Why do farmers practice slash-and-burn agriculture here? How does slash-and-burn affect the environment?

13. Please tell me about the quality of water in this village. Is it good or bad?

14. Do farmers frequently use chemicals in their fields? Does this affect the environment?

15. Please tell me about the schools here. Do you think the schools provide a good education to the children? What

16. What kinds of health problems do people have here?

17. Doi Inthanon National Park is very close to Mae Chaem District (or this village). Do you think tourism will affect Mae Chaem District (or this village) in the future?

18. How do you think your villages in Mae Chaem District (or in this village alone) will change in the next 20 years? Will these changes be good or will they be bad for the people here?

APPENDIX B

HOMEGARDEN FORMAL INTERVIEW QUESTIONNAIRE

1. Why is the homegarden important for your family?

2. Which plants (trees, bushes, vegetables) are most important for your homegarden?

3. Do you have animals in your homegarden? Are they important for your homegarden?

4. Do you use any plants for medicines? If the answer is “yes,” for what kind of sicknesses do you use these plants?

5. Where do you sell products from your homegarden? Do you sell them in the market, to friends or to neighbors?

6. Which persons in your family work in the homegarden? How many hours each day do they work? What kind of work do they do in your homegarden?

7. When do you cut a tree in your homegarden? For example, when it is too tall? When it is too old? When it does not produce fruits anymore?

8. How do you decide where to plant a new tree?

9. Are the dead leaves that fall from trees important for your homegarden? What do you do with these dead leaves?

10. Do you use fertilizers on your plants? What about animal manure?

11. Do flowers grow in your homegarden? If so, why do you have flowers?

12. Do you provide any homegarden products for the local temple or ceremonies?

13. Do you have any insect problems with your homegarden? If you do, how do you control them?

14. What about disease problems? If you have any, how do you control them?

15. How do you control weeds?

16. Please compare the soil in your homegarden to the soil in your rice fields and hill fields? What kind of soil is good for a homegarden?

17. Do you ever give water for your plants in your homegarden?

18. In the next 12 months, do you intend to plant any new trees or crops in your homegarden?

19. Do the tall trees help the smaller trees and plants to grow?

20. Do the roots of some trees help other trees? For example, do roots give food or water to other trees?

21. Does the homegarden help water quality in this village?

22. Does the Buddhist religion encourage people to have homegardens? Is the homegarden importan to the Buddhist people? Why?

APPENDIX C

HOUSEHOLD CENSUS FORM

HOUSEHOLD NO._____LOCATION_____DATE_____

NO. MEMBERS IN HOUSEHOLD_____; LANDHOLDING SIZES:

(*rai*): paddy_____hill_____ hg_____

HOUSEHOLD DATA–GENERAL

1. Please name all the people (family members and non-family members) who live in this house. Also please tell me their relationship to the household head (for example, son, daughter, brother or sister), age, gender (man or woman), birthplace, years of school, job (kind of work, occupation, employment), and temple where you go for worshipping the Buddha.

NAME	RELATION-SHIP	AGE/ GENDER	BIRTH-PLACE	EDUCATION (YEARS)	WORK (OCCUPA-TION	TEMPLE
1.						
2.						
3.						
4.						
5.						
6.						
7.						

8.						
9						
10.						
11.						
12.						
13.						

1b. Is anyone in your family:

a. a Buddhist monk?
b. In the army?
c. Studying at college?

1c. In the past 12 months, did anyone leave your house to work in another village or city? What kind of work did they do there?

2. Please tell about your fields and gardens. How far are your fields from your house? What kind of crops (for example, sticky rice, corn, soybeans) do you have in your fields? What kind of crops did you plant there in the past five years? How do you sell the crop, and what price did you receive?

PADDY FIELDS

FIELD/SIZE (*rai)*	HOW FAR FROM HOUSE (METERS, or KILOMETERS)	KINDS OF CROPS/YEAR SUMMER/WINTER
A.		2544_____/_____ 2543_____/_____ 2542_____/_____ 2541_____/_____ 2540_____/_____
B.		2544_____/_____ 2543_____/_____ 2542_____/_____ 2541_____/_____ 2540_____/_____
C.		2544_____/_____ 2543_____/_____

		2542_____/_____ 2541_____/_____ 2540_____/_____

HILL FIELDS

FIELD/SIZE (*rai)*	HOW FAR FROM HOUSE (METERS, or KILOMETERS)	KINDS OF CROPS/YEAR
A.		2544_____ 2543_____ 2542_____ 2541_____ 2540_____
B.		2544_____ 2543_____ 2542_____ 2541_____ 2540_____
C.		2544_____ 2543_____ 2542_____ 2541_____ 2540_____

3. What are the yields (how many *tang* for each **rai**, or kilograms from each rai) for each crop. Do you use fertilizer or animal manure to make your crops grow well? What percentage of crops are for your family eating, for animals eating, or for selling to the market? Where do you sell your crops, and what prices do you receive for your crops?

CROP	PERCENTAGE	SALES/PRICE
PADDY RICE fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
HILL RICE fertlizer	FAMILY_____ SALES_____ ANIMALS_____	
CORN fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
SOYBEANS fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
RED ONIONS fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
CABBAGE fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
POTATO fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
OTHER fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
OTHER fertilizer	FAMILY_____ SALES_____ ANIMALS_____	
OTHER fertilizer	FAMILY_____ SALES_____ ANIMALS_____	

4. Do you have fruit trees? How many trees do you have? How far are the trees from your house? Do you sell eat the fruits at home, or do you sell the fruits for money (marketing)?

5. Is your homegarden important for your family? Why? What are your most important homegarden products? What percentage do you eat at home? What percentage of the products do you sell in the market?

6. What kind of animals do you have on this farm? What do they eat? Do you use these animals for eating by the family, or do you sell them? Do you use their manure for fertilizer?

ANIMAL (what kind)	HOW USED (family food, sell in market)	WHAT THEY EAT	USING MANURE FOR FERTILIZER
Cow			
pig			
chicken			

7. Do you have fish? Where do you raise them? How many fish do you sell in one year? What do they eat?

8. What kinds of disease, insect and weed problems do you have with your crops? How do you control these problems (for example use chemicals to kill them)?

CROP	DISEASE	INSECTS	WEEDS

LABOR/MUTUAL COOPERATION

1. Which members (for example, father, mother, sons, daughters, father's brother) of your family work:

   a. in paddy rice fields?

   b. in hill fields?

   c. in homegarden?

   d. to take care of animals?

   e. take care of fruit trees?

   f. take care of fish ponds?

2. Who helps you with your farm work? Do your neighbors help you? Do you pay them money to help you? How much money do you pay them? If you don't pay them, do you help them in their fields?

   Paddy Rice:

   Hill Fields:

   Homegarden:

3. Do people in your family help other farmers? Who do they help (for example, other relatives, neighbors). Do they receive money for helping other farmers?

AGRICULTURAL DEVELOPMENT

1. Do you use machines on this farm? Do you own these machines or do you rent
them? If you rent them, how much do you pay?

2. In the past years, did you get help from C.A.R.E.? What kind of help did C.A.R.E.
give to you?

3. Do you have a radio? Do you get agriculture information from the radio?

4. Do you have a television? Do you get agriculture information from the television?

5. Do you receive newspapers or magazines? Do you get agriculture information
from newspapers or magazines?

6. Do you own a motorcycle, truck or automobile? How many do you own?

7. Do you ever attend pu-yai-ban meetings? Do you ever attend agricultural extension (kaset) meetings?

LAND TENURE

1. When you married, did you move to your wife's farm? Or did your wife move to your farm?

2. How did you get the land for your farm? Did your family give this land to you? Or did you buy this land?

3. Do you own your rice paddy fields? Do you rent any rice paddy fields? Do you own your hill fields? Do you rent any hill fields?

4. When you become old and retire from farming, who will get your land?

5. Do you have enough land for farming?

6. Do you have any problems with the irrigation (*muang fai)* system? What kind of problems do you have with the irrigation (*muang fai*) system?