THAILAND REPORT

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Project Description:

TUL-SEA (Trees in multi-Use Landscapes in South East Asia) is a regional project of the World Agroforestry Centre (ICRAF-SEA) that aims to improve and develop national capacities to use available cost-effective, replicable tools and approaches for helping to improve agricultural productivity (new technology and/or new market access) and environmental services in multi-use landscapes with trees.

In Thailand, three tools are expected to improve understanding of factors affecting change in land use systems; to evaluate socio-economic changes associated with changing land use, livelihoods and environmental conditions; and to analyze stakeholders and their potential use of participatory tools for improved understanding of poverty, livelihood and environment dynamics in Mae Wang Watershed, Mae Win Sub-district, Mae Wang District, Chiang Mai Province.

Introduction

TUL-SEA (Trees in multi-Use Landscapes in South East Asia) is a regional project of the World Agroforestry Centre (ICRAF-SEA) that aims to improve and develop national capacities to use the TUL-SEA set of available cost-effective, replicable tools and approaches for helping to improve agricultural productivity (new technology and/or new market access) and environmental services in multi-use landscapes with trees.

In Thailand, colleagues at Chiang Mai University's Faculty of Social Science and Faculty of Economics collaborated in conducting a study to test application of three of these tools in a coordinated manner in the context of upper tributary watershed conditions in northern Thailand. This study sought to test the ability of the approach and methods packaged in the rapid appraisal tools to (a) improve understanding of factors underlying and driving change in specific local land use systems; (b) conduct effective participatory appraisals of evolving local multi-functional agroforestry landscapes; and (c) provide participatory assessments of stakeholder understandings of poverty, livelihood and environment dynamics. The following sections summarize the wider context and specific location of project study sites and the general methodological approaches employed, followed by study findings and conclusions.

Wider Thailand Context

Since 1954, most upper tributary watersheds in Northern Thailand have seen a decline in forest cover, accompanied by increases in agricultural cover and population density. There has also been increasing concern about the implications of forest loss and fragmentation for biological and cultural diversity, sustainable resource use, and longer-term economic conditions of the region. Outcomes of individual land use decisions have been linked with measures of landscape fragmentation and change to illustrate the hierarchy of temporal and spatial events that, in summation, result in wider biome changes (Fox et al, 1995). Since local conditions and populations vary, however, patterns of land use change are not uniform over space and time.

Upper tributary watersheds have historically been among the most marginal areas in Thailand. Changes that have taken place in agricultural systems over the past 30 years are associated with a variety of forces: concerns about national security and national campaigns against communist insurgency, policies to stop opium production and shifting cultivation, government economic and social development (pattana) programs, demographic transitions, growing perceptions of environmental deterioration, increasing competition for control of water and land resources, and other factors.

Traditional land uses that included various forms of shifting cultivation have been largely transformed into fixed field types of cultivation with various levels of cropping intensification. Choice among alternative land uses depends upon available opportunities, local capacities, and both internal and externally imposed constraints, as well as cultural preferences of local communities composed mainly of Karen, Hmong, Lahu, Akha, Lisu, or Yao

ethnic minority groups. Expansion and even maintenance of agricultural lands is increasingly constrained by national policies to further strengthen state control and management in areas declared to be protected forest lands and critical watershed zones.

Substantial population increases associated with both internal growth and in-migration occurred in many mountain areas, especially in Chiang Mai province, before declining population growth rates and demographic transitions came to these areas. In Chiang Mai, people adjusted to population increases by moving to new settlements, where possible, as well as by altering their household livelihood strategies. Three groups of outcomes have been associated with these adjustments: (1) overall declines in income together with forest and land degradation; (2) cash cropping with especially medium to longer-term success or failure dependent on associated types and extent of land degradation; and (3) land use that is economically viable and considered an environmental success. Study of the third alternative suggests that diversity is one key factor in developing sustainable land use patterns: diversity of both livelihood activities and biological agrodiversity. Farming systems in seven such villages were found to include 6-10 interrelated farming activities. Intensification and diversification of mountain agriculture has reduced land use pressure by increasing yield per acre (Rerkasem K., 1996). But state policies and agro-industrial production incentives all tend to reward livelihood, land use, and landscape simplification over diversity.

Northern Thailand continues to experience rapid change in rural areas, where most all villages are experiencing various degrees of integration into national and international market economies (Vanwambeke et al, 2007). New opportunities are linked to market demand both for on-farm production of cash crops, and for off-farm industrial jobs or provision of services outside of agriculture, such as ecotourism. Households differ substantially in their aspirations and capacities to respond to market opportunities, resulting in growing socio-economic disparities within and among villages and relative to more well-endowed and connected mainstream populations in lowland areas. Market integration and poverty are both important issues for efforts to develop sustainable livelihoods in the GMS region, and both relate to a range of inter-related processes occurring at multiple levels (Thomas et al, 2008).

Given the increasing complexity of livelihood and landscape dynamics in this region, the research team decided it was most appropriate to test all three of the complementary TUL-SEA rapid assessment tools for initial appraisal of agroforestry in multifunctional landscape mosaics. Moreover, the studies should be coordinated to help assure efficiency and quality control, and applied at a common site where major dynamic processes of livelihood and landscape change in northern Thailand appear to be occurring.

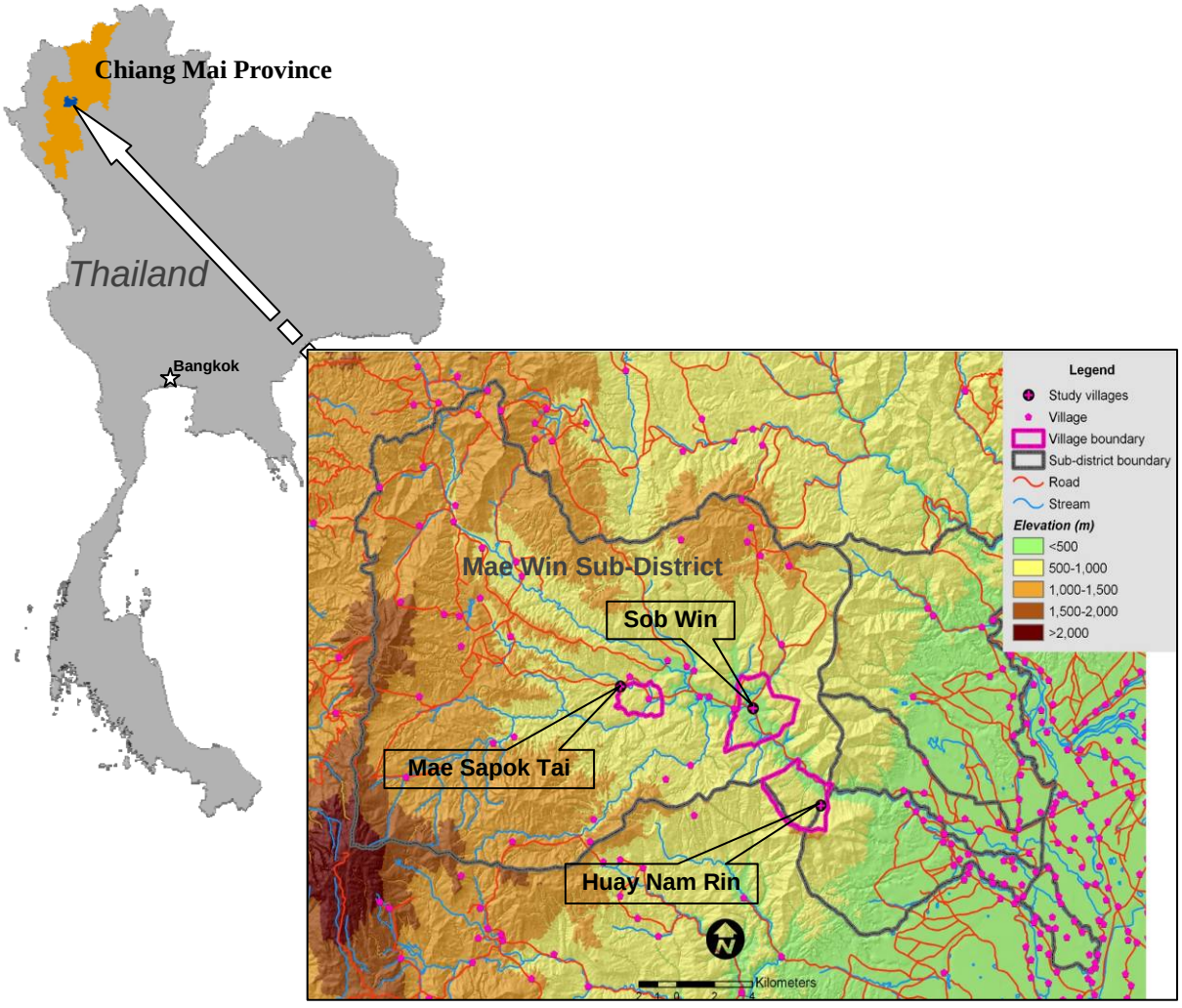
Location of Study Sites

In order to provide a useful test of TUL-SEA initial appraisal tools in the context of upper tributary watersheds in northern Thailand, a study area was selected in an upper portion of the Mae Wang sub-basin of the Ping River Basin. Two nested levels provided both sub-district and village level study sites (Figure 1).

Mae Win Sub-District

Mae Win Sub-District (*tambon*) is located about 52 kilometers south of Chiang Mai City in a mountainous area covering approximately 442 sq km in the Mae Wang Sub-Basin of the Ping River Basin. Sub-district boundaries include almost the entire local watershed, where the annual rainfall is only about 600-800 mm. While only a very small portion is not legally classified as reserved forest land, about 70% of its area is locally considered public forest land while 24% is seen to be agricultural land holdings.

Figure 1: Spatial context of study areas in Thailand



Most households and about 60 percent of the population are engaged in agriculture. Production of subsistence crops has increasingly expanded or shifted into commercial production of onion, maize, soybean, longan and

various vegetable crops, for sale in local and regional markets. Other increasingly important occupations include off-farm employment, home-based industry or handicrafts, tourist operations, and trade (Mae Win Sub-District Administrative Organization, 2007).

The total sub-district population of about 12,000 is distributed among 19 village communities inhabited by three major ethnic groups: Karen (11), Hmong (3) and northern Thai (*Khon Muang*) (5). This diversity of ethnic back-ground and culture should presumably be reflected in people's livelihoods and land use patterns. Village lands of the northern Thai are located mainly in lowland areas, while lands claimed by the Karen and the Hmong are usually in higher mountain areas where road access is often more limited, especially during the rainy season. Some northern Thai communities have now also moved up into middle zones of the uplands, resulting in areas with mixed settlements of *Khon Muang* and Karen communities, while Hmong lands are usually in highland areas at elevations above 1,000 masl.

Differentiations among settlement locations frequently distinguish between upstream and downstream communities, especially when there are problems or conflicts related to competition for resource use. Upper watershed communities are usually the ones being blamed or accused of resource abuse that is seen to be causing forest destruction, downstream water shortage and other environment impacts. Such claims are often superficial and self-serving, however, and in need of further investigation of important roles played by many stakeholders in natural resource use and management.

Sample Study Villages

To provide sample sites for collection and analysis of more detailed primary data needed in rapid appraisals, three villages representing the three major ethnic groups in the Mae Wang watershed were selected for case studies.

1. Ban Huay Nam Rin – This is an ethnic Hmong village situated in a mountain valley inside reserved forest lands at an elevation of only about 500 meters above sea level. In 1976, Hmong families moved into this area from a nearby village (B. Mai Sawan) where the government had allocated plots of land to them, but the land was found to be very arid and too small for their agricultural practices. In addition to agriculture, in 1985 tourists started coming to this village for nature tours (elephant riding and trekking) that built on its attractive landscape and location near Inthanon National Park. These activities were discontinued in 2003, however, after problems forced the elephant camp to move elsewhere. Household livelihoods in the village have been changing accordingly. The forest remains an important source of foods used in daily life.

2. Ban Mae Sapok Tai – This ethnic Karen village is located in uplands at an elevation of about 800 masl and surrounded by mountain ranges. After the settlement was established more than a hundred years ago, their traditional practices included rotational forest fallow shifting cultivation employing various conservation techniques, in addition to terraced paddy along narrow valleys. Most Karen households are farmers with incomes mainly from agriculture. About 40% of households now grow upland cash crops for the Royal Project and 60% grow rice. The village's scenic and serene landscape and Karen culture are drawing attention of outsiders promoting eco-tourism and land investments. Although various households in this village started obtaining some income from selling handicrafts and souvenirs to tourists about six years ago, most households feel they have gained relatively few benefits from tourism through home-stays, handicrafts and souvenirs.

3. Ban Sop Win - Also established over a hundred years ago (1897), this Northern Thai (*Khon Muang*) village is located at elevations of 300-500 masl, in a mountain valley where two streams (Mae Wang and Mae Win) merge. About 23 years ago, a former village headman and a prominent local Karen were inspired by eco-tourism ideas to start elephant rides and bamboo rafting along the Mae Wang River. Both activities are now popular tourist attractions. Although most households are still engaged in agriculture, a significant number of villagers (about 10%) are now totally involved with tourist operations and services, and many more have some degree of involvement. As more and more tourists come to visit this area, eco-tourism activities have expanded to accommodate their interests and needs, including home-stays and other services. Wood products of an emergent local home-based wood industry have also become popular with tourists and even export markets.

Research Methods

Three TUL-SEA rapid appraisal tools were field tested by researchers of the Chiang Mai University Faculty of Social Sciences and Faculty of Economics, under this project. The roles of these three particular tools within the TUL-SEA 'toolkit' of rapid appraisal tools are to provide the tools recommended for initial exploratory assessments of the roles of trees and agroforestry in multi-functional landscapes with mosaic patterns of land use and land cover.

Each of these tools takes a somewhat different approach to initial appraisal of landscape processes and patterns and their functional relationships with communities, societies and the wider environment. Thus, in order to better test and understand their complementarities and potential applications, CMU researchers decided to test all three at the same location in space and time.

1. *Rapid Appraisal of Drivers of Land Use Change (DriLUC)* was applied to improve understanding of factors underlying and driving land use change and its impacts in specific local contexts;
2. *Participatory Landscape Appraisal (PaLA)* was applied to better understand local patterns of land use change and villager perceptions of land use patterns and practices in relation to its landscape.
3. *Participatory Analysis of Poverty, Livelihoods and Environment Dynamics (PAPOLD)* was applied to improve understanding of poverty, local livelihood strategies and environmental linkages in specific areas.

Since both efficiency and multidisciplinarity are assigned high values in TUL-SEA appraisal processes, separate teams with somewhat different disciplinary composition and focus were formed to test each tool, but all remained part of the overall collaborative process of the project. Initial research approach and methods were in line with the information supplied by documents for each TUL-SEA tool. Teams then assessed research needs to identify activities where cross-team collaboration could eliminate duplication and where data sharing could build on the relative strengths of each team while improving both efficiency and quality of analyses at the required multiple levels.

Thus, research teams collaborated in gathering and analyzing two different types of data consistent with the rapid appraisal approach of TUL-SEA tools:

- Analyses of broad data from secondary sources were used in testing and elaborating components of the overall conceptual framework of the project and testing, refining and articulating its 3 major periods of change and development in the larger study area. Sources of this data are primarily from the highest resolution available in national statistical, rural development, and spatial databases that would be accessible by similar types of studies and analyses conducted anywhere in Thailand.
- More in-depth analyses built on primary data acquired by the project to explore in more detail dimensions and processes of social and livelihood change in the 3 sample villages, and associated impacts on local landscapes, governance and natural resource management

institutions, political economy, and poverty. Study teams conducted a questionnaire survey, focus group sessions, in-depth interviews, and participatory mapping.

More specific methods and steps used by each study team include:

DriLUC Methods and steps employed in case study areas:

Assessment of the major drivers of land use change is based on analysis of survey, focus group and interview data, supplemented by broader data from current and historical secondary sources. Linkage of these drivers with actual patterns of land use change across our general study area was further explored through analysis of a time series of land cover based on remote sensing data at the level of the whole sub-district.

Table 1: Rapid appraisal approach for Drivers of Land Use Change (DriLUC)

Tools	Activities	Expected results
1. Secondary Data -National village-level rural development databases (2009) (จปฐ ปี 2552ม กชช2ค)	- Searching for disaggregated data from various components of national database systems	- Historical background of community settlements in Mae Wang watershed - Characteristics of economic and production systems of study communities
2. Maps -Topographical maps (scale 1:50,000) -Aerial photos (2002, 1954) -Satellite data (2007)	*In collaboration with PaLA:* - Using maps with clear overlay sheets to identify self-defined village boundaries - Analysis of land use change based on analysis of maps, aerial photos & ASTER satellite data - Villager participation in interpreting land use change and distinguishing periods of land use transition	- Comparison of land use data - Trends of change in proportions of each land use type (increase/decrease of percent in forest, agriculture, residential); crucial events and periods of change - Refined and articulated historical periods of land use change in Mae Wang & most important transitions during each period
3.PRA - Local perceptions of historical background of local settlements, events & change in Mae Wang watershed	-Interview community/local leaders and village stakeholders involved in land use change, using village forums with open-ended questions to get heartfelt answers from participants	- Village perceptions of crucial events & periods of change - Reasons for change in agricultural, farming practices, migration and eco-tourism management in local areas - Problems related to land use conflicts
4.In-depth Interview Views of stakeholders involved in land use change, including representatives of key actors associated with conditional and outside factors identified in previous research steps	- Interview community/local leaders & stakeholders involved in land use change by organizing groups to discuss issues & answer questions identified by researchers related to internal & external factors affecting land use change, including govt policies, economic expansion & diversification, eco-tourism, community adaptation & problem solving	- Identification of problems associated with land use conflicts and comparison with relevant data on land use change - Reasons for changing agricultural patterns, farming practices and cropping calendars, migration patterns, and eco-tourism management in study areas - Land use change resulting in conflicts between lowland/downstream and highland/upstream communities

PaLA Methods and steps employed in case study areas:

Participatory landscape analysis focused on detailed field work by graduate students in the CMU SLUSE program that included use of detailed base maps and GPS techniques to help record local perceptions and demarcation of sample village boundaries. Local landscape dynamics have been put into broader context by assessment of land cover change at the overall sub-district level in collaboration with DriLUC. Field surveys conducted in collaboration with villagers provided local information and insights for the land use update mapping process.

Table 2: Participatory Landscape Analysis Methods and Steps (PaLA)

Step	Tools	Activities	Expected Result
1	**Secondary Data** - Documents & Websites - National village-level development database (กชช 2ค) - Research/Thesis	Searching for data from relevant agencies such as TAO	- General landscape, village history, population, occupation & income, etc. - Land holding and land use
2	**Primary Data** 1. Topography Maps (scale 1:50,000) 2. Aerial Photos (1954 & 2002) 3. ASTER data (2007)	1. Identify village-defined boundary of study villages 2. Interpreting aerial photos 3. Interpreting satellite images	1. Village boundary of study areas 2. Village land use in 1954 and 2002 3. Sub-district land use in 1954 & 2007
3	**Field survey**	Actual field survey of change from 2002 reference air photos -Overlay clear plastic sheet on aerial photo & draw land use boundary of each type in 2010	Village land use patterns in 2010
4	**GIS assessment**	Digitize data & use GIS soft-ware to make land use maps	Compare land use maps of 3 periods to quantify & analyze land use change
5	**Local perceptions** 1. PRA with villagers and stakeholders 2. Focus Groups 3. Interviews	1. Conduct focus groups (by occupations, leaders, elders, farmers, house wife etc.) including PRA techniques 2. In-depth semi-structured interviews – community leaders and key stakeholders	1. Land use patterns (past – present) - land use change - Problems & solutions - Deterioration of natural resources 2. Government policies - Basic infrastructure development - Establishment of the national parks 3. Eco tourism/ OTOP enterprise - Development & management - Land selling & buying - Ideas & plans for future
6	**Presentation of data analysis and findings**	PowerPoint & poster presentations & discussion with villagers, local government (e.g. TAO) & local government agency officials	- Corrected and approved data by local people in communities - Suggestions and recommendation of local people in communities
7	**Workshops-** representatives of various orgs & institutions such as universities, district/sub-district, Tourism Authority, the Royal Project	Evaluation of using tools	- Pros/Cons & limitations of using tools - Recommended additional tools

PAPOLD Methods and steps employed in case study areas:

Livelihood and poverty dimensions of land use change and their links with environmental conditions place considerable emphasis on the political economy of how policies, institutions and other conditions have been evolving in the three study villages, as local groups and communities have tried to improve their livelihoods, institutions and landscapes in response to emerging opportunities and changing constraints connected both to external policies and events and to local initiatives and innovations. Field research and analysis were conducted by students and their supervisors in the Faculty of Economics.

Table 3: Application of tools to issues and anticipated results

Step	Issue	Tools	Result
1	What are the causes of poverty? Poverty line	Focus group Focus group In-depth interview Secondary data	•Self-defined poverty in view of local people in the village •Distinguish lines of poverty and better-off or wealthy •Overall picture of households that are likely to get out of poverty •Important incidents affecting livelihoods and poverty
2	Tourism information (who, what, why, where and when)	Interview and brainstorm Ranking maps	Access to data/ information on eco-tourism (Society and individuals) Understand economic situation, its impact and management
3	Value added	Focus group Crop calendar	The goal is a group of people who probably need assistance Public relations Needs for assistances Develop agricultural sector and tourism
4	Support from other institutions	Workshop/ meeting Preliminary findings List of organization	Opportunities and limitations Participation and awareness of agencies Sustainability

Research Findings:

1) Rapid Appraisal of Drivers of Land Use Change (DriLUC)

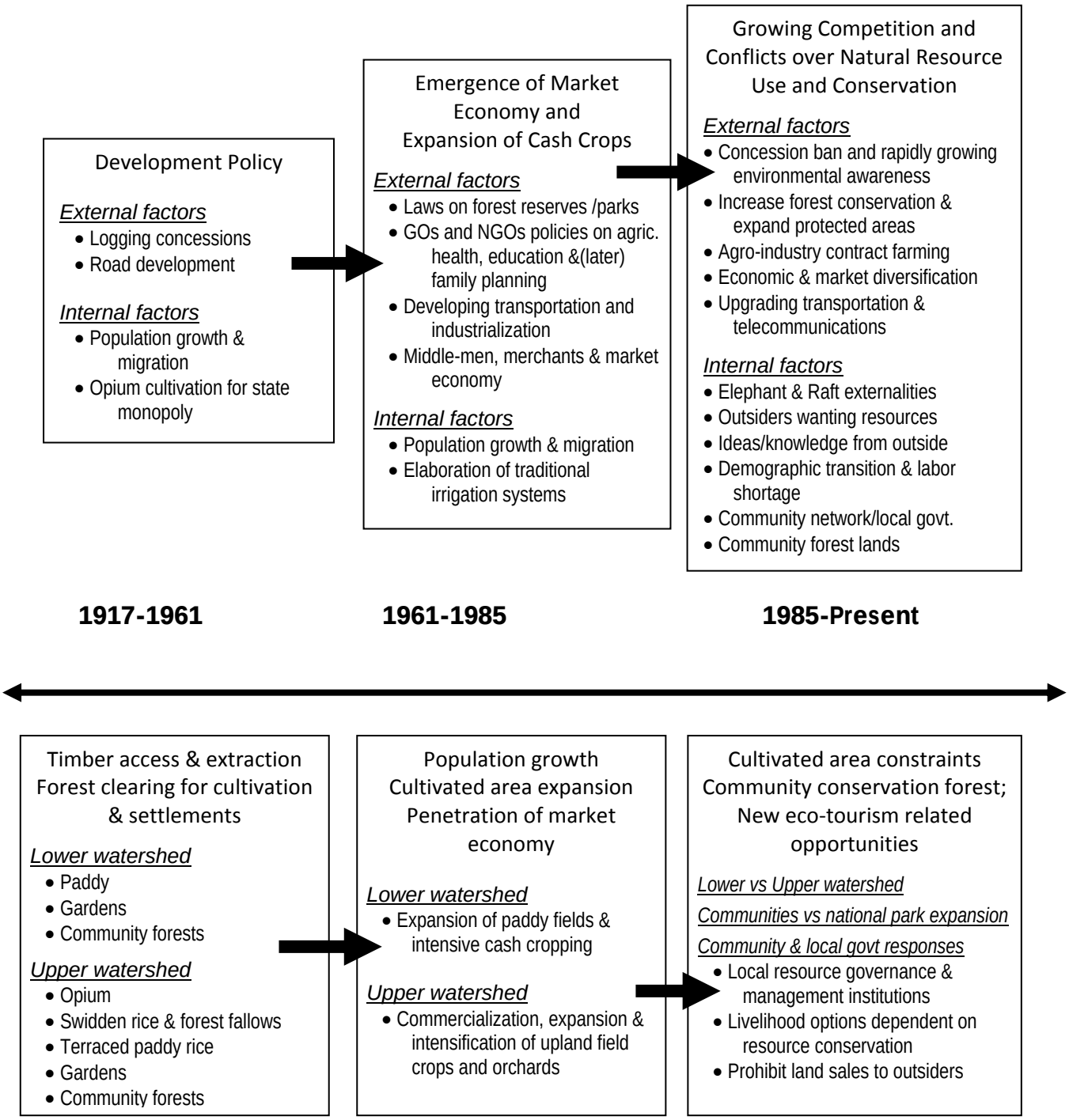
Changes in land use and agriculture that have been occurring in Mae Wang watershed areas for several decades were found to have resulted from several key factors or driving forces. Government policies concerned with economic development and natural resource control and management have been especially important in this regard, as well as periods of increasing population pressure. Substantial areas have been converted into agricultural land and settlements. In upland and highland areas, traditional land uses with components that include shifting cultivation practices and are primarily associated with ethnic minorities have largely changed to more permanent forms of land use due to state restrictions on land use expansion and prohibitions imposed under forest laws. Agricultural practices have changed from primarily subsistence to more market-oriented and intensified forms of cropping. Some significant differences in how people's livelihoods and land use-related activities have changed over time appear to have emerged in various communities due to different circumstances and factors influencing change. Study findings on the nature of land use transitions in Mae Wang watershed can be grouped into 3 key historical periods, as discussed below and summarized in Figure 2 and Table 6.

Period 1. **Logging concessions and opium (1917-1961)**

During this early period, people usually settled along valley hillsides and lived simply on a subsistence basis. State logging concessions began having impacts as operations of the Bombay-Burma company of England entered Mae Wang watershed in 1917, followed by the British Borneo company in 1941. Results included massive logging of teak trees in middle and lower parts of the Mae Wang watershed, with logs destined for export transported along Mae Wang river down to Mae Khan and Mae Ping rivers. Meanwhile, by 1937 Hmong began cultivating opium in some highland areas for state opium monopoly operations based in Chomthong District, and after World War II opium fields expanded during the 1950's to cover more forest lands in upper watersheds. Ethnic Karen and Khon Muang communities were also drawn into opium cultivation and trade because it provided a good source of cash income. But in response to pressure from western countries, opium production and trade was legally prohibited in 1959, although illegal opium production continued. During1952-1957 state concessions for logging of non-teak species were granted to Thai companies, and after concessionaires left the area their operations were replaced by illegal logging. Thus, the Mae Wang watershed is said to have experienced a rapid decline in forest quality and cover, although 1954 air photos indicate there was still about 85 percent overall forest cover. Logging appears to have been the major cause of natural resource and environmental destruction during this period. Moreover, logging roads constructed by the government through Mae Win sub-district became access routes for Northern Thai (Khon Muang) to expand their lands into

middle parts of Mae Wang watershed, where they established permanent settlements that are still there today.

Figure 2 : Drivers of change



Period 2. **Expansion of market economy and cash crops (1961-1985)**

During this period, external factors played increasingly important roles in people's livelihoods. As the first 5-year plan began under the national socio-economic development planning process, major programs were launched to improve basic infrastructure for water, electricity and roads. For rural economic development, cultivation of commercial crops in both upland and lowland areas was promoted and supported by government agencies, agricultural cooperatives, banks and groups of merchants. Another pressure on land use was from growth of the local population from about 59,800 in 1970 to 96,600 in 1980 – a 60 percent increase in one decade (Table 4) primarily in lower Chiang Mai Valley areas (Figure 3). As a result of these pressures, subsistence-based production was transformed into commercial crop production and the area of agricultural lands expanded, especially during the 1970's. The subsequent growing demographic transition has also been most dramatic in lower Chiang Mai Valley areas (Table 5).

Table 4: Population by district, 1970-2008

District	*Year*				
	1970	*1980*	*1990*	*2000*	*2008*
San Pa Tong	59,784	96,560	80,954	78,935	60,542
Mae Wang	*Part of San Pa Tong*		30,287	30,924	26,220
Total:	***59,784***	***96,560***	***111,241***	***109,859***	***86,762***

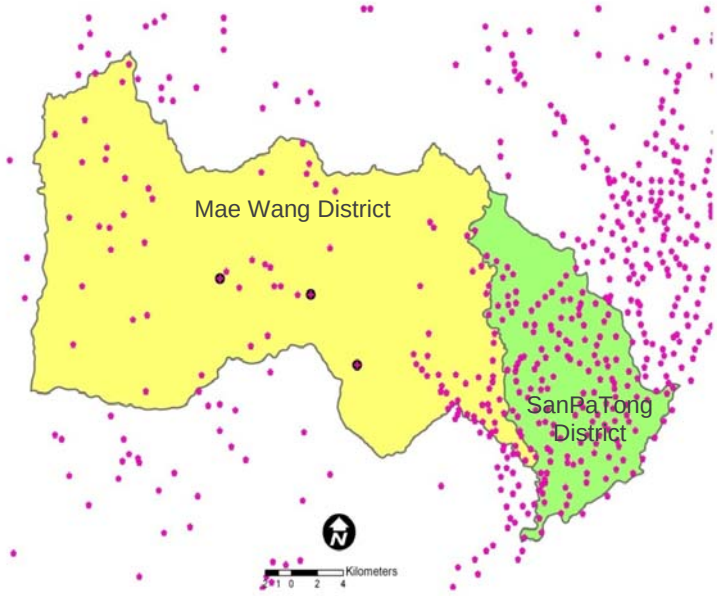
Source: Department of Provincial Administration, 2009.

Table 5: Population by district and sub-district, 1993-2008

District *- sub-district*	*Year*				
	1993	*2000*	*2002*	*2007*	*2008*
San Pa Tong	**80,954**	**78,935**	**62,922**	**60,843**	**60,542**
- Yu Wah	*13,881*	*13,932*	*10,665*	*10,212*	*10,362*
- San Klang	*4,385*	*4,446*	*4,442*	*4,462*	*4,507*
- Ta Wang Phaw	*4,095*	*3,897*	*2,060*	*1,959*	*1,921*
- Ma Kam Luang	*12,636*	*6,694*	*5,400*	*5,236*	*5,198*
- Mae Ka	*8,153*	*7,852*	*7,756*	*7,486*	*7,456*
- Ban Mea	*7,486*	*7,155*	*7,056*	*6,754*	*6,677*
- Ban Klang	*10,323*	*10,109*	*4,243*	*4,014*	*3,995*
- Tung Sa Tok	*6,964*	*6,850*	*6,764*	*6,592*	*6,475*
- Tung Tom	*7,959*	*7,556*	*5,963*	*5,735*	*5,639*
- Nam Boa Luang	*5,072*	*4,933*	*4,920*	*4,859*	*4,807*
- Ma Khun Wan		*5,511*	*3,653*	*3,534*	*3,505*
Mae Wang	**30,287**	**30,924**	**26,059**	**26,066**	**26,220**
- Ban Kad	*5,888*	*6,011*	*2,996*	*2,742*	*2,772*
- Tung Pee	*5,021*	*4,727*	*4,680*	*4,561*	*4,567*
- Tung Ruang Tong	*2,889*	*2,722*	*2,687*	*2,608*	*2,567*
- Mae Win	***9,350***	***10,252***	***10,491***	***11,049***	***11,192***
- Don Pao	*7,139*	*7,212*	*5,205*	*5,106*	*5,122*

Source: Department of Provincial Administration, 2009.

Figure 3: Distribution of village settlements in Mae Wang & San Pa Tong



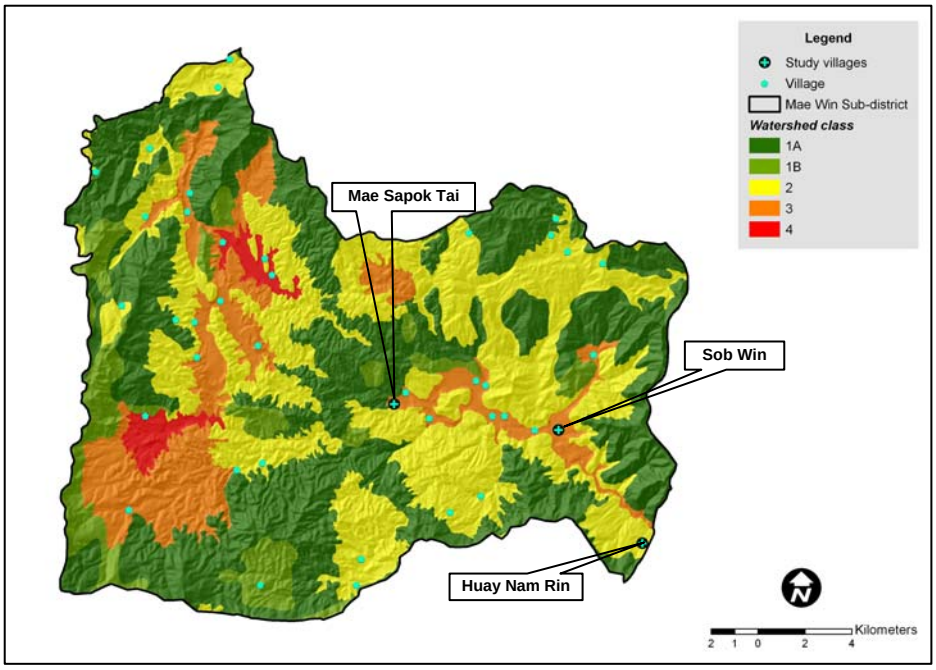
At the same time, a crop substitution program was implemented to replace opium and shifting cultivation in upper parts Mae Wang watershed areas. And in the name of protecting forest cover and managing forest lands, the state enacted the National Park Act in 1961 and the National Forest Reserve Act in 1964. These laws began to have impacts in the study area in 1968 when most of the area was declared national reserved forest land, so that household and community land use could not become legally recognized. Even stronger restrictions were placed on areas located within Inthanon National Park when it was legally established in 1972. Moreover, by 1974 reserved forest land status was extended to vast areas further north, as well as over the ridge to the entire Mae Chaem sub-basin.

In response, land use for cash cropping became more intensified, especially in lower areas of Mae Wang watershed. And in upper and highland areas, the Royal Project began introducing "more suitable" new cash crops in 1972 and providing various types of subsequent support for them. Other investors and merchants provided support for cash crop production by supplying chemical fertilizers, pesticides, etc. Local livelihood activities appear to have been affected by these external factors in various ways and to various degrees. As cash crop areas expanded and intensified, demand for water also increased in both highland and lowland communities. Furthermore, after improved roads to villages in the upper Mae Wang watershed began to be constructed during 1978–79 under several state projects, villagers could access outside communities and urban markets directly without a middle-man, and outsiders gained greater access to local resources. But road construction also resulted in soil erosion and sediment accumulation in streams, weirs, and water resources, particularly in the Doi Mon Ya headwater area.

Period 3. **Natural Resource Conservation and Conflict (1985-Present)**

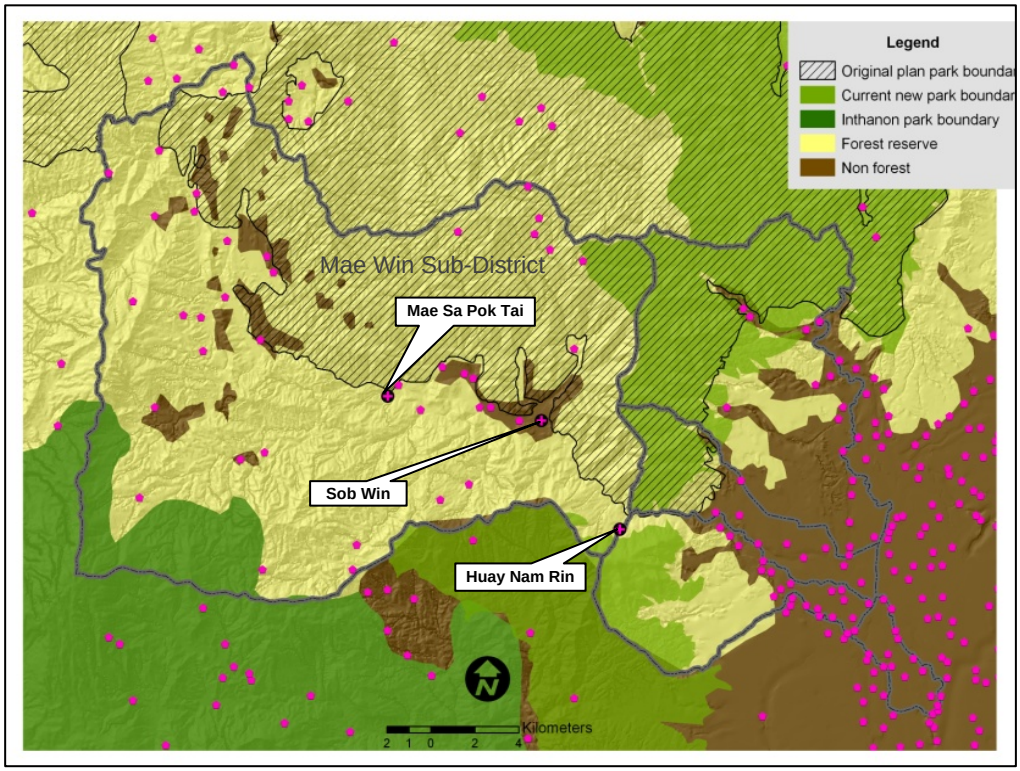
With growing concerns and conflicts related to perceived depletion and degradation of natural resources and the environment, the government formulated numerous laws, decrees and policies governing the management of natural resources, and especially forest land management. In 1985, Thailand's first National Forest Policy was adopted and a National Forest Committee was established to develop a national strategy for forest resource development and conservation. Watershed protection measures also began to be strengthened, especially in the North, and a watershed classification system was adopted for areas including Mae Wang (Figure 4). Subsequent actions further developed land use 'recommendations' for each class, extended the system to the entire country, and officially delineated 25 major river basins and 252 sub-basins for use as resource management units. Moreover, all forest logging consessions were revoked in 1989 after a 1988 natural disaster in southern Thailand was blamed on logging operations.

Figure 4: Watershed classification zones in Mae Win Sub-District



Since 1992, the government's Royal Forest Department (RFD) has cited national forest conservation policy as the basis for their efforts to more strictly enforce forest laws in highland and upland areas of Mae Wang watershed that are currently classified as national forest reserve (Figure 5). Communities settled in these areas have been affected directly by forest laws that reject rights of settlements and traditional forest land utilization. Although this area has not yet been officially declared as national park or protected forest area, much of it is recognized as class 1A protected permanent watershed forest where any other land use is not allowed (Figure 4). As a consequence, villagers who use land in those areas to earn a living are being arrested as illegal forest intruders.

Figure 5: Expansion of protected forests and the national park areas in Mae Win Sub-district, Chiang Mai



Another component of national forest conservation policy since 1992, although not officially announced, has been to use authority under the National Park Act of 1961 to further expand the national park system, especially in protected watershed zones. Accordingly, upper areas of Mae Wang watershed were within lands where preliminary plans were being made for a new national park that would cover areas of several villages and their community forests (Figure 5). As a result, traditional forest land utilization has become more restricted and some villagers have been arrested, creating more conflict between villagers and RFD officials. This change is generating anxiety among some local leaders, who wonder why people are being separated from forests to be managed by a state monopoly. Meanwhile, villagers got together to establish and build a local network for wildlife and forest conservation in Mae Wang watershed, and began collaborating with other local networks to work on forest land use and conservation issues. In 2001, they protested against expansion of the natural park area in Mae Win sub-district of Mae Wang watershed and various neighboring areas (Figure 5), resulting in suspension of further government action. Groups of Karen and Hmong communities also joined together to set up a local network for natural resource management in the upper Mae Wang watershed to maintain forests there.

In terms of overall land use change since 1985, most land is still legally state forest reserves (Figure 5), and analysis of Landsat data (1989-2007) indicates that approximately 84 percent of the total area of the Mae Win Sub-District portion of Mae Wang watershed has remained under forest cover. Non-forest land uses are mainly for agriculture (16%), with only a small portion used for community settlements (0.40%). In both lower and upper areas, land uses based on cash cropping have become more intensified and diversified.

Upper watershed reserved forest lands with forest cover are also now used for eco-tourism purposes, including elephant riding, bamboo rafting, forest trekking and other types of tourist recreation. Eco-tourism has emerged in Sop Win village since 1987 through initiatives by local investors and links they established with businessmen from the city. Because this forest land is still classified as national forest reserve (not as protected national park or wildlife sanctuary), tourism operaters don't have to pay national park fees and pay only a modest fee to Sop Win local government (administration organization).

Changes in land tenure or land ownership began to contribute to land use change during Thailand's economic boom period (1988-97) as various areas of agricultural lands were transformed into resorts and urban estates during 1988-1991. Expansion of community and urban areas then stimulated outside investors to buy local lands in 1994 for real estate development businesses including housing and resorts, which has resulted in water use conflicts between local communities and real estate developers and investors. Many local people facing economic crises continue to be forced to sell or abandon their lands and look for off-farm work.

Regarding trends with particularly important potential impacts in the future, the dramatic demographic transition (Table 5) is consistent with trends across northern Thailand, and is already beginning to constrain available labor supply in the Mae Wang sub-basin, beginning in lower areas in the Chiang Mai Valley. Effects are further exacerbated by very heavy investments villagers in Mae Wang are making in education for their children that are closely linked with changing views and aspirations of younger generations. Local leaders and many villagers are clearly aware that the ability of emerging alternative livelihoods such as those associated with ecotourism to attract younger and more educated generations remains to be seen, especially where security in rights to use land and water resources remains uncertain and urban-based options remain strong.

Table 6: Major factors affecting changes of natural resource utilization in the Mae Wang watershed

External factors	*Impacts/Changes*	Internal factors	*Impacts/Changes*
***Period 1 (1917 – 1960):* Logging concessions and opium**			
- Economic development plans	- Logging concessions and opium trade laws	- Changing agricultural practices including livestock & intensified shifting cultivation	- Intensive land use and clearing new areas for agriculture
- Logging began: Bombay-Burma Co 1917 & Borneo Co 1941; transferred to local companies 1952	- Deterioration of forest ecosystem and water in Mae Wang watershed	- More forest lands being converted into opium fields	- Rapid forest depletion and creating conflicts among upland communities
- Opium cultivation began 1937	- Converting head-water forest areas to opium fields supported by local government officials and entrepreneurs (buying opium and setting up opium factory in Jomthong district, Chiang Mai)		
- Forest Act of 1941	- Law to control timber production and non-timber forest products collection; and to prohibit forest clearing, burning or destroying and occupying forest lands except for lands classified as agricultural lands or land uses permitted by government officials		
- Govt logging roads built in 1952-1957 up to Mae Sapok village	- Constructed roads resulted in surface soil erosion and sediment accumulations in many streams		
***Period 2 (1961 – 1984):* Expansion of market economy and cash crops**			
-1959 govt policy on opium control & elimination	- Gradual decrease of opium fields & replacement by other crops	- Population growth & community expansion	- Limitation of agricultural land as compared to plentiful lands in the past
- Forest plantation projects, especially pine tree plantations in Doi Mon-ya areas during 1975-1976	- New forest plantations to replace old forest began affecting wildlife, amounts of surface water in streams and limiting areas for traditional rotational shifting cultivation of the Karen	- Changing of subsistence crop cultivation to commercial crops	- Intensive land use resulted in land degradation and clearing new lands for agriculture
- New road construction & improvement of old roads (1978-present)	- Roads opened access for expanding settlements & outside access into middle and upper areas of Mae Wang watershed	- Expansion of irrigation systems	- Increasing competition for water & related conflict
- Roads for security (up to Nong Tao village in Sop Win sub-district in 1974)	- Roads turned out to be key link enabling land use change to cash crops and markets in Mae Wang watershed areas		
- Various development projects and the Royal project (1978-present)	- Expansion of agricultural lands for commercial cropping in upper & lower zones of Mae Wang watershed, resulting in more conflicts over water use & complicated water use management among communities		
- National Park Act of 1961	- National park areas declared for conservation or study of natural resources with laws enforced rigorously to prohibit activities causing change or damage to natural conditions or ecosystems in parks		
- National Forest Reserve Act of 1964	- Once lands were declared as national forest reserves, prohibited by law to occupy lands for utilization or dwelling, to clear or burn forest, to cut timber or gather non-timber forest products, or any other activities damaging forest reserve conditions, unless permission for such activities are granted according to the Forest Act of 1941 and this law		

External factors	*Impacts/Changes*	Internal factors	*Impacts/Changes*
Period 3 (1985 – present): **Natural resource conservation and conflict**			
- All logging concessions in national forest lands revoked (aka 'logging ban') in 1989	- People & elephants associated with logging concessions become unemployed & begin searching for new forms of employment	-Eco-tourism initiative in Mae Win by former village headman & prominent Karen elephant owner begins 1987	- Elephant rides and bamboo river rafting bring new livelihood options & environmental impacts
- Expansions of urban communities, government offices/areas, large agricultural lands and resorts, particularly starting in 1988	- Obvious land use change & increasing water use demand, along with growing water use conflicts in some communities; particular surge in outside investor activities in 1994	- Establishment of Mae Wang watershed networks, and watershed & environmental conservation group in 1987	- Natural resource and environmental conservation began to be reflected in local natural resource management
- Cabinet resolutions on principles and methods used in watershed classification, recommendations & measures for land use in Mae Ping-Wong watersheds (28 May, 1985)	- Established principles and methods for 5 classes of watershed classification including recommendations and measures of land use in each watershed class.	- Establishment of the network of Northern farmers in 1993.	- Collective action by villagers in the Northern region who are affected by state forest conservation policy.
- Wildlife preservation and protection Act of 1992	- To control hunting, propagation, possession, trade or import/export of wildlife and its products, and occupying wildlife sanctuary and protection areas.	- Villagers protested the elephant camp business because elephants destroyed crops grown in the area (14 May, 2001)	-1) Five elephant camps reduced numbers of elephants from 56 to 46 and owners must prevent elephants from destroying crops and provide enough space and food for their elephants. -2) Elephant camps must be fenced to prevent elephant disturbance. -3) Entrepreneurs establish central fund to help villager victims of impacts.
-Forest Plantation Act of 1992	- Permission of land registration as forest plantation to plant and maintain restricted tree species for trading purpose.	-Network of Mae Wang watershed community organizations began in 2004.	-To manage water resource & join the network with muang fai traditional irrigation groups in upper areas & set up villager 'college' to cooperate & share knowledge among communities in Mae Wang watershed areas

Research Findings:

2) Participatory Landscape Analysis (PaLA)

Application of the general PaLA approach resulted in assessments of patterns of change in landscapes at both sub-district and case study village levels.

Local landscapes and livelihoods

Our case study villages are situated in mainly forested upland portions of mountain valleys in the Mae Wang watershed at elevations of 500 to 1,000 meters above sea level. The Northern Thai or *Khon Muang* village also occupies some lowland areas below 500 masl where the Mae Wang River flows through the village. In the past, local populations practiced shifting cultivation of upland rice, maize, and opium in the uplands, and grew wet-rice in the lowlands for household subsistence consumption. Terraced rice paddies are found along valleys in the Karen village, while no paddy fields are found in the Hmong village due to landscape limitations, insufficient water supply, and cultural differences. Today, opium fields have disappeared, shifting cultivation has drastically declined, and land use patterns and practices reflect transformations from subsistence-based farming to more market-oriented cash cropping.

People's livelihoods and activities have been changing in response to factors that shape opportunities to make a living and earn more income. Agricultural land use has become more intensified and diversified with cash crops such as vegetables, flowers and fruit trees. In addition, local public forest lands have come to be used for eco-tourism activities that now include elephant rides, rafting, forest trekking and other tourist recreation, particularly in Sop Win village where access is good the landscape is very suitable for such activities.

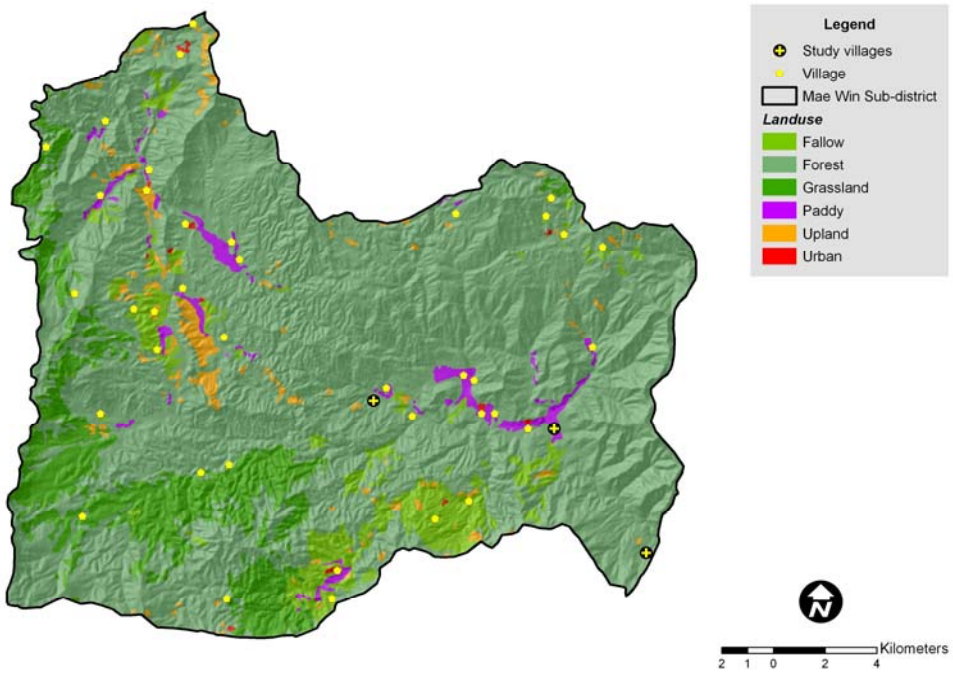
Overall landscapes of all three of these villages appear to be quite attractive to tourists and outside investors. As a consequence, some plots of lands are being transformed into resorts and residential housing estates. Although, eco-tourism seems to generate considerable income for a substantial group of villagers, these activities also tend to have various negative impacts on the village landscape that result in degradation of natural resources (land, forest and water) and other environmental problems that will require additional management if they are to be sustainable.

Land cover change in the Mae Win sub-district-level landscape

Overall land cover change for the entire Mae Win sub-district was assessed by comparing 1954 data from aerial photo interpretations with 2007 satellite data obtained from ASTER. The land cover pattern in 1954 was dominated by forest (84.7%), with only small areas of cultivated land (4%), settlements (0.2%) and other land uses (11%) (Figure 6). By 2007, the proportion of forest land declined only slightly to 83.6%, while cultivated land quadrupled to 16.0% and settlements doubled to 0.4%. This implies a net change over this 53-year period wherein the category of 'other land' (which is mainly 'idle' land

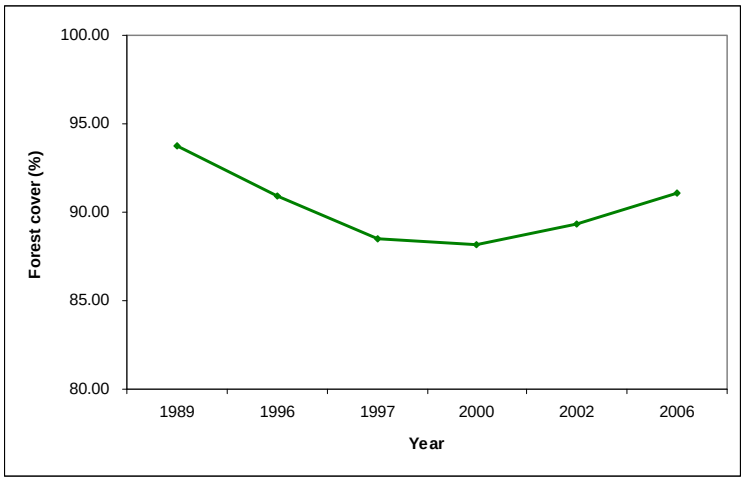
and grassland areas) along with a very small proportion of forest area were converted into cultivated land and settlements. These results are somewhat different, however, from information obtained from Mae Win Sub-District Administrative Organization.

Figure 6: Land Use in Mae Win Sub-District, 1954



Villagers explain that today's remaining forest cover includes areas of former opium and forest fallow fields that have undergone secondary forest regeneration and in some areas reforestation efforts. These local perceptions suggest that at least overall land cover at the Mae Win sub-district level may have been passing through a "J" or nearly "U"-shaped forest transition that is now recovering from lower forest (tree) cover in the fairly recent past. Such perceptions are consistent with a time series of satellite data interpretations extracted from ICRAF-Thailand's spatial database (Figure 7).

Figure 7: Forest (tree cover) transition in Mae Win Sub-District during 1989-2006



Source: ICRAF-Thailand 2010

Current land use patterns: in case study village landscapes

Based on discussions with villagers and other stakeholders and field updates of land use data from air photos, maps were prepared of lands within domains claimed by our 3 case study villages depicting land use patterns in 2002 and 2010 (Figures 8, 9, 10). Note that forest (green), longan (red) and lychee (blue) would all be counted as tree cover under many satellite data interpretations, and then very commonly labeled as 'forest'. Implications are particularly important for 'forest transition' assessments that are frequently based on time series tree cover data like those in Figure 7.

Figure 8: Huay Nam Rin Land use (2002 and 2010)

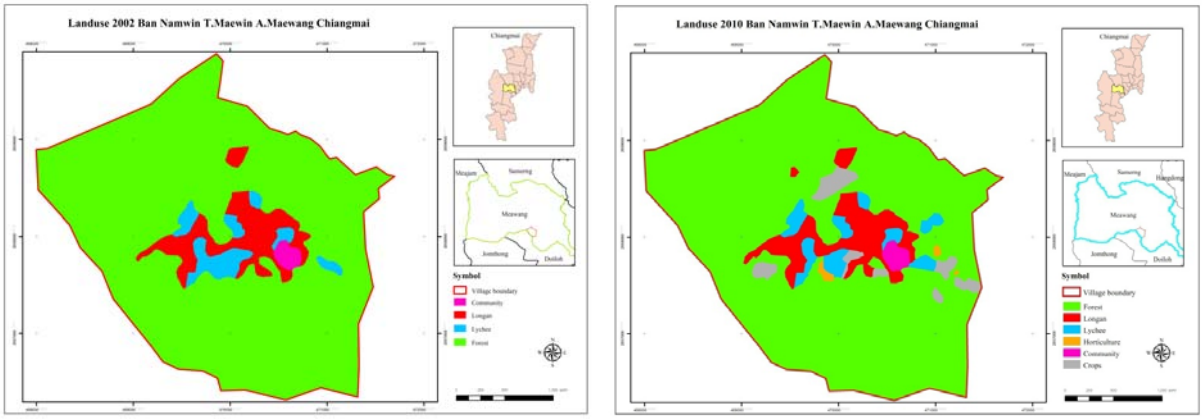


Figure 9: Sob Win Land use (2002 and 2010)

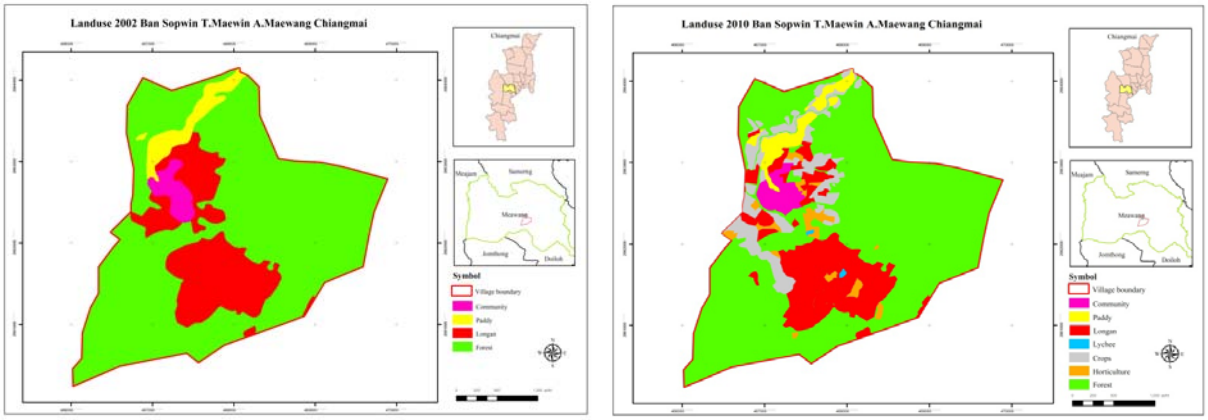
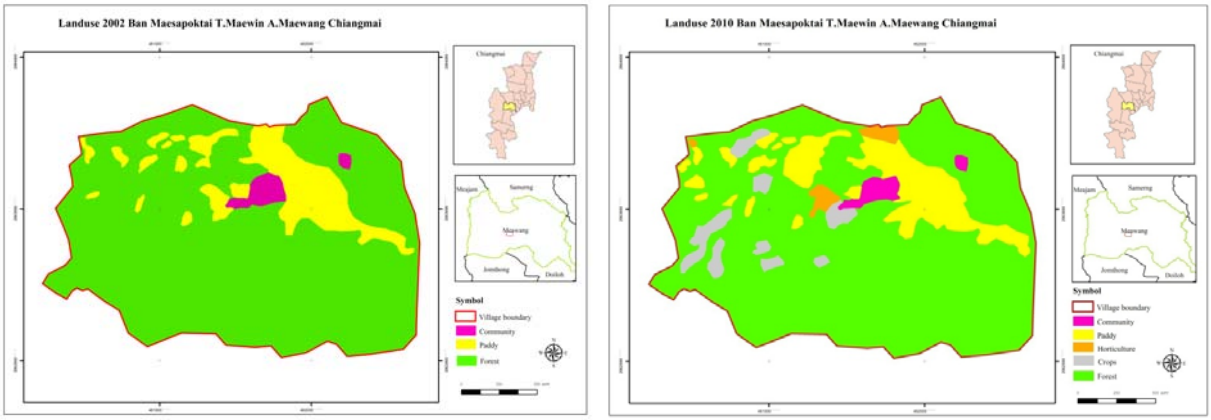


Figure 10: Mae Sapok Tai Land use (2002 and 2010)



Recent landscape change in case study village lands

Building on our village land use change maps, more detailed comparisons of change within locally-defined boundaries of lands under locally-accepted responsibilities of our 3 specific case study villages with different ethnicities are shown in Table 7 and summarized below.

Table 7: Comparisons of land use change in three villages, 2002-2010

Land use types - village *(ethnicity)*	**Land use area (%)**			**Notes**
	Year 2002	**Year 2010**	*Change*	
Paddy				*Total area*
- Huai Nam Rin *(Hmong)*	-	-	-	*784 ha.*
- Sob Win *(Northern Thai)*	3.9	3.2	*-0.7*	*849 ha.*
- Mae Sapok Tai *(Karen)*	12.5	13.9	*1.3*	*326 ha.*
Upland crops (Royal project)				
- Huai Nam Rin *(Hmong)*	-	2.9	*2.9*	
- Sob Win *(Northern Thai)*	-	2.3	*2.3*	
- Mae Sapok Tai *(Karen)*	-	4.2	*4.2*	
Orchards				
- Huai Nam Rin *(Hmong)*	11.4	11.6	*0.3*	
- Sob Win *(Northern Thai)*	19.0	24.0	*5.0*	
- Mae Sapok Tai *(Karen)*	-	1.6	*1.6*	
Forest				
- Huai Nam Rin *(Hmong)*	87.8	84.6	*-3.2*	
- Sob Win *(Northern Thai)*	74.2	67.8	*-6.4*	
- Mae Sapok Tai *(Karen)*	85.6	78.7	*-7.0*	
Settlements				
- Huai Nam Rin *(Hmong)*	0.8	0.8	*0.0*	
- Sob Win *(Thai)*	2.6	2.3	*-0.3*	
- Mae Sapok Tai *(Karen)*	1.8	1.6	*-0.2*	

Note: *Upland crops Northern are cash crops grown in upland areas including vegetables, flowers and some temperate fruit trees under the Royal project.*

- The Hmong village (Huay Nam Rin): In 2010, most of the village self-defined area remains covered by forest (84.6%), representing a loss of 3.2% during the 8 years since 2002. This is compensated by equivalent increases in the combined areas of upland cash crops and orchards (dominated by longan and lychee). There is no paddy rice in this area.
- The Northern Thai village (Sob Win): Forest cover declined by 6.4% during 2002 to 2010, which is largely accounted for by increases in orchards (mainly longan) from 19% to 24% and by growth of upland crops to 2.3% of village land area, while paddy fields decreased slightly from 3.9% to 3.2% due to flooding in the lowlands.
- The Karen village (Mae Sapok Tai): Remaining forest cover in 2010 is 78.7% of total village area, representing a decrease of about 7% since 2002. This loss is compensated by increased cultivated areas under upland crops (4.2%) and orchards (1.6%), which are promoted and supported by the Royal project, as well as by an increase to 1.3% of village area in paddy and terraced paddy fields. This implies that recent forest losses are due to

increases in areas used for upland cash crops, orchards and paddy fields mainly linked to the Royal Project.

Moreover, during the period from 2002 to 2010 settlement residential areas of these three villages did not expand with time as expected. The proportion of village area covered by settlement areas actually decreased in Sop Win (by 0.3%) and Mae Sapok (by 0.2%), which may also relate to our findings that some villagers having financial difficulties sold their lands to outside investors.

Problems related to landscapes and livelihoods

- The Hmong village located on the outermost part of Mae Win Sub-District has not been officially registered as an administrative village. This makes many aspects of village development rather difficult, especially in relation to access linked to key infrastructure such as electricity and decent roads.
- The Northern Thai village (Sop Win) faces a new generation of problems related to eco-tourism activities, such as tourist management, garbage, water quality and water shortage during the dry season.
- Agricultural production in the Karen village is still not sufficient to meet an acceptable standard of living.
- A large proportion of households in these villages do not have official land rights or tenure due because of the manner in which forest laws, whereas some plots of lands have been sold to outside investors who often have connections with officials who can 'upgrade' their land tenure rights.
- And at village and local government levels, forest laws exclude local community forest and other types of community lands from legal recognition, regardless of how long or effectively communities have been providing stewardship, and even the few new community forest programs that do exist cannot recognize any local rights to lands in areas classified as critical watersheds. Thus, local efforts to manage forest lands remain informal and entirely dependent on patronage of government agencies and officials.

Research Findings:

3) Participatory Analysis of Poverty, Livelihood and Environment Dynamics (PAPOLD)

Researchers testing application of the general PAPOLD approach focused on explorations of how local livelihoods and institutions and their links to the environment have been evolving and affecting comnunity well-being.

Self-defined poverty

Representatives of all three local ethnic groups living in Mae Win Sub-district (Karen, Northern Thai, and Hmong) see poverty as a dynamic problem driven by economic systems that have altered subsistence agriculture and driven transformations into commercial agriculture of various forms and eco-tourism in order to generate income required for living under today's conditions. In principle, the definition of poverty from villagers' point of view is not based only on income and varies by ethnicity due to centuries of different culture, traditions and ways of life. Overall, however, most people agree that as long as they have sufficient food to eat and are able to live simply and happily, they are not poor.

Crucial incidents affecting livelihoods and poverty

(1) *Infrastructure development* under government programs and projects (especially electricity, paved roads, tap-water and telephone) provided people better access to opportunities for commercial production, trade and urban jobs, as well as access to upper Mae Wang areas by outside interests.

(2) After *forest concessions* were revoked in 1989 (the 'logging ban'), a number of lowland (Khon Muang) and mountain minority people migrated into Mae Wang watershed areas during Thailand's 'economic boom' period seeking agricultural land they could occupy without legal land rights, resulting in increasing numbers of people competing for land and resources.

(3) In 2001, local people resisted further increases in state control by *organizing protests* against the expansion of natural park areas in Mae Win Sub-District that resulted in suspension of those activities.

(4) Since 1997 *eco-tourism* has gradually expanded and become quite popular among tourists, particularly in Sop Win and to some extent in Huay Nam Rin and Mae Sapok Tai villages. It stopped at Huay Nam Rin, however, in 2003 after the elephant camp closed down and moved to Sop Win village.

Household incomes and livelihood s

This study found off-farm income to be greater than on-farm income in two villages - Sop Win and Huay Nam Rin (Figure 11). Most households in Sop Win are now involved in various activities related to eco-tourism operations and gain varying shares of the income it generates (Figure 12). Huay Nam Rin villagers often work off-farm as their agriculture is mainly orchards (longan

and lychee) and they have no paddy lands. In Mae Sapok Tai village, however, where a Royal project development center encourages villagers to grow cash crops for the project, village income from agriculture still exceeds income from off-farm sources. Moreover, many Karen traditions are linked to nature and traditional forest fallow shifting cultivation systems; caring for elephants has been their main source of off-farm work since the days of active forest logging concessions, and even today there are few Karen working in other types of off-farm jobs.

Figure 11: Income share in 3 villages

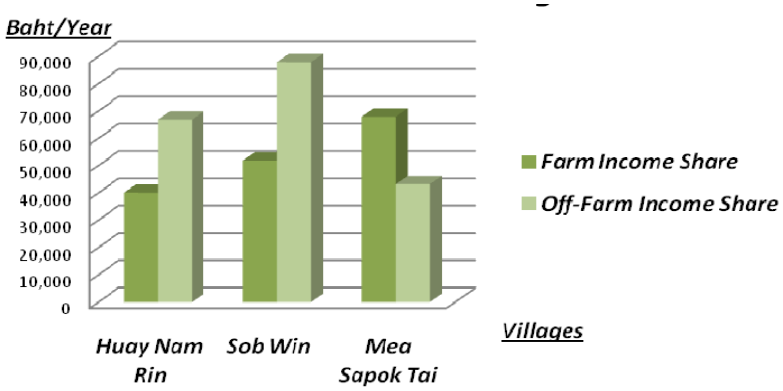
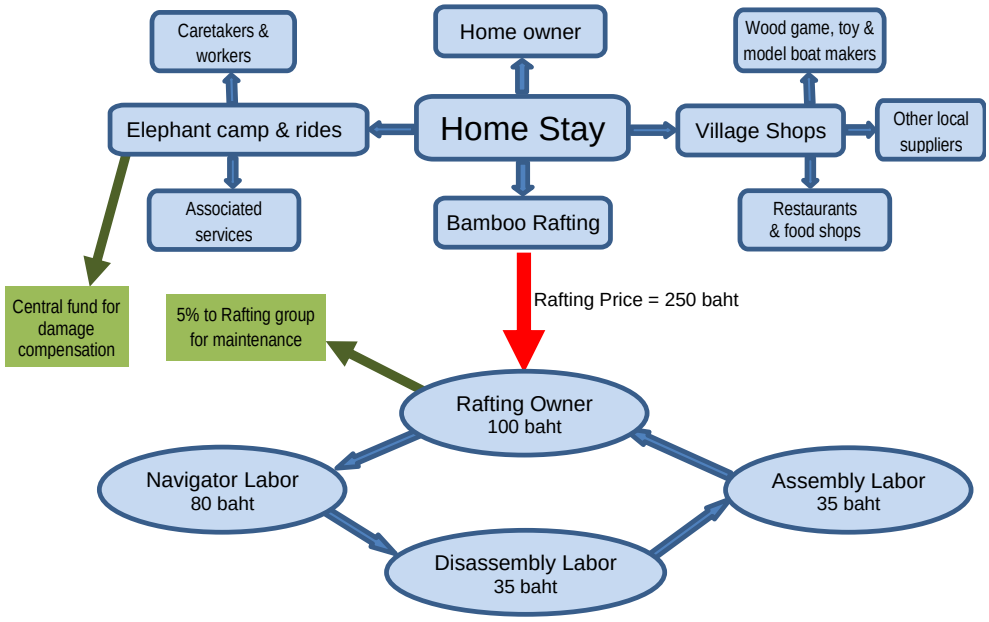


Figure 12: Example of local enterprise and jobs linked with ecotourism



While average monthly household income levels in all 3 study villages during 2007 were well below averages at national and more privileged regional levels (Table 8), average household incomes were greatest in Sop Win, followed by Mae Sapok Tai and Huay Nam Rin. This suggests that eco-tourism is now generating substantial amounts of income for people in Sop Win village. Most of these benefits, however, go to only about 10% of local households who own and operate key enterprises (Figure 12, Table 9), while others appear to gain much less income from eco-tourism due to variation of

characteristics among village locations and landscapes. Moreover, overall income distribution is still linked primarily to agriculture since most households have their own orchards (longan, lychee, banana, *etc.*) or gardens that provide marketable products from season to season.

Table 8. Average monthly incomes in local, regional & national context

2007 Domain of grouping	*Average monthly household income (Thai Baht)*	*Percent difference from national average household income*
Whole Kingdom	**18,660**	**0 %**
Greater Bangkok	35,007	+88 %
Central Region	18,932	+1 %
Northern Region	13,568	-27 %
Northeastern Region	12,996	-30 %
Southern Region	19,716	+6 %
Chiang Mai Province	**14,386**	**-23 %**
Huay Nam Rin Village	*8,910*	*-52 %*
Sob Win Village	*11,644*	*-38 %*
Mae Sapok Tai Village	*9,259*	*-50 %*

Source: The 2007 Household Socio-economic Survey, National Statistical Office

Access to eco-tourism information

Eco-tourism activities are now clearly generating substantial amounts of income for many local households. Sop Win village serves as the center for eco-tourism operations that provide services for both Thai and foreign tourists, including elephant camps, elephant riding, bamboo rafting, and places to eat and shop for goods including locally produced handicrafts (Figure 12, Table 9). Access to the information that is critical for successful operation of these services is closely linked to cooperation with tour agencies in Chiang Mai city. Mae Sapok Tai villagers are also beginning to provide services like home-stays that include trekking for one-day or for 3-4 day trips along the mountain ridge that includes Inthanon National Park, basically replacing former eco-tourism services that were based at Huay Nam Rin before 2003.

Table 9: Eco-Tourism business in Mae Win

Business Operation	*Huay Nam Rin*	*Sob Win*	*Mae Sapok Tai*
Hmong Village (Ban Huay Nam Rin)	1985 - 2003		
Elephant Camps (Pang Chang)		X	X
Bamboo rafting		X	
Rubber Boat rafting		X	
Homestays		X	X
Shops *(food, drinks, souvenirs, handicraft wooden games, model ships, textiles, clothing, accessories, etc.)*		X	X
Karen Village (Ban Mae Sapok Tai)			X
Mae Wang Waterfall			X

Source : Research Data

Management and environmental impacts

Livelihoods of households and individuals living within these communities have obviously been changing, especially in Sop Win village. With more and

more tourists coming to visit, new types of environmental management problems are emerging. Various aspects of natural resource degradation are becoming issues and the focus of concerns, such as garbage and waste problems, as well as new management challenges, such as traffic and parking areas that are beginning to become serious problems if they are not well managed, especially during high season.

Overall picture of households getting out of poverty

Based on their education and livelihoods, Sop win villagers are seen as not poor through the eyes of other villagers. Better-off households are considered to be hard working and diversified into various businesses such as rafting, home-stays and shops, which helps increase their overall income. In contrast, villagers of Huay Nam Rin look upon themselves as poor because of their lack of access to basic infrastructure such as electricity and decent roads, although most households also own cars, motorbikes and mobile phones. In addition to their on-farm activities, they also try to gain more income from off-farm employment elsewhere, despite cultural preferences for self-employed entrepreneurship. Most village households in Mae Sapok Tai grow crops for the Royal Project, but not year-round due to climatic conditions. Profits they receive from eco-tourism business like home-stays seem to them to be unfair and not worth doing. Thus they also look for other jobs as laborers, but still don't have enough income. Overall, each of these three villages appears to have its own pathways and approaches for efforts to improve household and individual livelihoods.

Key livelihood improvement opportunities and constraints

The location and landscape characteristics of Sop Win (Northern Thai) village, including its accessibility, appear quite suitable for eco-tourism business. Situated in Mae Wang watershed next to Inthanon Natural Park, Mae Wang River has a year-round flow through the area that is usually sufficient for passage of bamboo rafts. Mae Sapok Tai (Karen) village is a beautiful area for trekking that is also accessible, whereas Huay Nam Rin (Hmong) village has only a few tourists despite its scenic landscape because the elephant camp moved away and infrastructure is poor. Overall, eco-tourism provides opportunities for many people to earn income in these villages. This provides incentives for local efforts to strengthen their stewardship of natural resources and landscapes to maintain environmental services like water, biodiversity, and scenic beauty that are the basis for attracting tourists to their services.

One limitation on eco-tourism is that most tourist activities areas take place on forest lands being occupied by known persons in the village. Under local customary institutions (since very few legal rights exist), persons who are the first to occupy the areas establish local rights to conduct their operations and prevent others from having opportunities to do so. Thus, due to location advantages of their informal land use claims, a relatively small group of households actually gain considerably more benefits than others when considering the total number of people living in the area. Other alternatives

are not very clear, however, other than allowing open access that would very likely result in complete destruction of the landscape characteristics that attract tourism in the first place. There are community discussions, however, about approaches that may help broaden participation in eco-tourism activities to as many interested households in the area as possible.

Table 10 : Linkages among poverty, livelihood strategies & natural environment

	Huay Nam Rin *(Hmong)*	***Sop Win*** *(Khong Muang)*	***Mae Sapok Tai*** *(Karen)*
1.1. Perceived (absolute) poverty			
• Rich • Poor • Proportion of rich, middle & poor in village	• Not worry about money & use it to do things • Not enough rice for all year; poor clothing • Majority- middle class (food to eat but fairly little money to spend)	• Not worry about money & use it to do things • Most are lazy or unable to help themselves • Majority are self reliant	• Not worry about money & use it to do things • Insufficient rice, indebted, no land rights. • 70% are poor, 30% are middle class & self reliant
1.2. Importance of Environment	Land/forest is food source to reduce expenses & to sell (e.g. bamboo shoot).	Nature (stream, forest) is attractive to tourists.	Settlement attracts tourists and land attracts investors & businessmen
2.1. Access to public services and markets			
• Electricity • Roads by government • Networks of tourism entrepreneur promotion • Ensured markets	No No No No	Yes Yes Yes (BAAC & industry) No	Yes Yes Yes Yes (Royal project)
2.2. livelihood strategies	Eco-tourism stopped but minor impact; Fruit price (lychee) too low so villagers shift to • grow vegetables (chili, egg-plant, garden pea) or flowers; • rent paddy in lowlands • work off-farm.	• Eco-tourism includes elephant riding, rafting, home-stays and home-based wood industry (model boats & games). • Paddy rice grown as single crop, but yields not enough for consumption needs.	• Paddy rice grown but not enough for consumption • Cash income from farm labor outside village or as elephant caretakers. • Expenses more than income so increasing formal & informal debt forcing land sales (>2/3 of village lands)
3.1 Environmental effects on livelihoods	Natural products reduce expense of food & subsistence needs	Provides tourist attractions for village entrepreneurial activities	Culture & environment attract tourists & investors, but few local entrepreneurs
3.2 Livelihood effects on environment	Limited to area within boundaries permitted by the government forest department (landmark stakes).	Indirectly reduced tree cutting & forest conversion; still gather non-timber forest products and hunting.	More pressure on environmt due to agric intensification (Royal Project); potential conservation measures not yet applied.
4. Variation, risk and vulnerability of environment and natural resources	Lack of water for domestic consumption in dry season (piped water system).	Insufficient water for domestic consumption and for tourists during high seasons	Rice growing on steeply sloping land produces low yield.
5. Institutional & Administrative issues or government policies	• No household registration numbers. • No investment in basic infrastructure	• Successful protest against national park expansion. • Majority have no legal land rights or tenure. • Some occupations & products attracted govt promotion & support	Need assistance and support for education and development of occupations and entrepreneurship

Study Conclusions

This package of three rapid appraisal tools was found to be an efficient approach for initial systematic explorations of land use and livelihood change, with each of the tools providing complementary findings important for improving understanding of local conditions, issues and context.

Drivers of land use change

This study found that government policies concerned with natural resource conservation and with economic development were the primary forces driving land use change and conflicts. Land use transitions over three periods of time reflect influences of the numerous factors involved. In addition to periods of increasing population pressure, economic expansion appears to have been an important factor stimulating change in land use and other natural resources use. Underlying problems of natural resource (land, forest and water) degradation have been related to management of forest lands by state agencies in ways that reflect mismanagement, misunderstanding and lack of people's participation or participatory approaches, particularly in areas where communities already existed prior to declarations under forest laws. Although the concept of peoples' participation appears to be incorporated into laws, decrees and policies, many problems remain unclear, and especially land rights and processes for clarification of forest boundaries.

Participatory landscape assessment

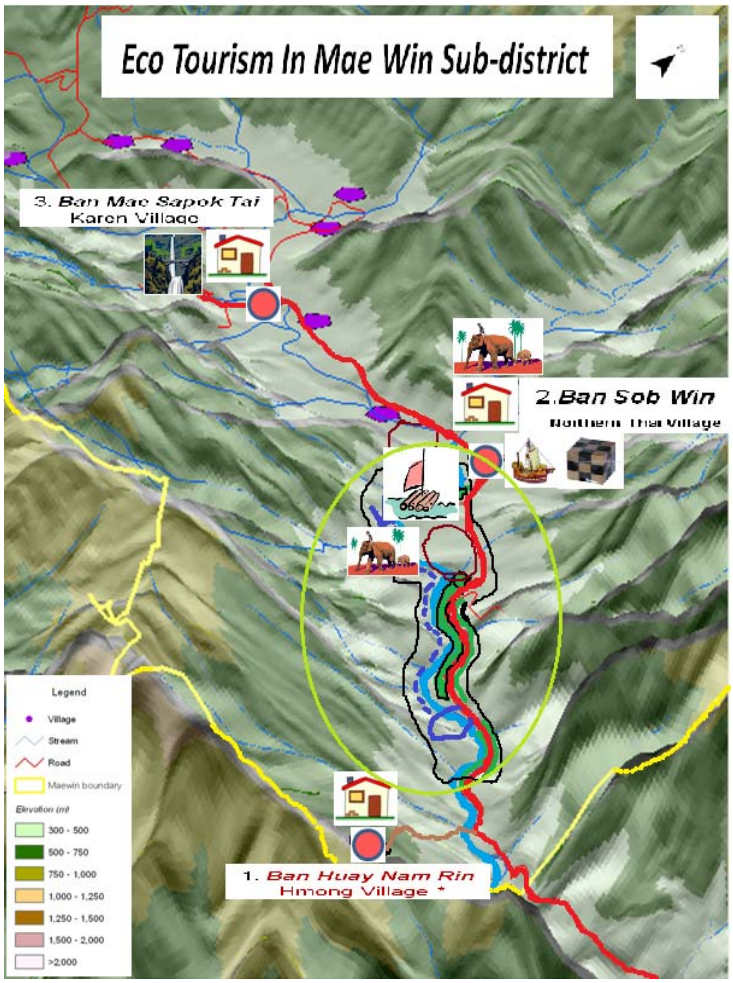
Land use patterns and practices of villagers in the case study areas have changed during recent decades in response to several key factors, including population growth, economic expansion, forest laws and policies, support and promotion by government agencies and development projects, as well as outside investors. Villagers have tended to adapt and utilize their lands in ways that respond to such influences within the context and limitations of their existing biogeophysical, socio-economic, institutional and ethno-cultural landscapes. At present, forest remains by far the most prominent component of overall land cover at both sub-district and village levels, although some forest has been depleted during the past decade. Shifting cultivation in the uplands has declined, while previous fallow fields and some forest lands have been converted to tree orchards (longan and lychee) and upland cash crops promoted by the Royal Project, including vegetables, flowers and some temperate fruit trees. Terraced paddy fields are found mostly in the Karen village, while lowland paddies are found in the *Khon Muang* or Northern Thai village, and no paddy is found in the Hmong village. Land use for cash cropping continues to become more intensified, resulting in soil deterioration, increasing demand for water use, and associated downstream water shortage. It appears that eco-tourism activities are potentially very important alternative sources of income, but such activities need careful monitoring and innovative management to address a new generation of impacts on landscapes and environmental conditions.

Participatory appraisal of poverty, livelihoods & environment dynamics

Our study has helped clarify linkages among people's livelihoods, the natural environment, and poverty at different locations within Mae Win sub-district.

People's livelihood strategies are strongly influenced by the opportunities and constraints they face, including their resource endowments and their motivations, skills and aspirations. We have seen how a number of important external and internal factors have changed in these study villages during recent decades, resulting in both pressures and incentives for transformation of traditional livelihoods into various forms of commercial crop and craft production, into providing mostly tourism-related services, and into employment or wage labor. Some effects have been general across the area, such as state forest land and conservation polices to which communities were able to respond by mobilizing a broad-based protest. Other effects have differed among villagers, such as access to infrastructure or natural resources with particular characteristics, which appear to have combined with and perhaps further amplified cultural differences among local ethnic groups or factions within villages.

Figure 13: Eco-Tourism in Mae Win Sub-district



Linkages with the natural environment include competition over access to, control over, and use of natural resources as people respond to changing market opportunities and constraints imposed by state land policies and investment programs, as well as the resulting impacts of overall patterns of land use on local landscapes at village and watershed levels. While our 2-point time series suggests forest (tree) cover has remained fairly constant, villagers insist patterns of change have been more complex, leading to a tree cover transition that may still be in progress. Local institutions have also been evolving in response to new needs related both to state conservation policies and to new types of management issues related to eco-tourism.

Moreover, effects, impacts and capacities to respond are not uniformly distributed, and new patterns are also evolving in terms of winners, losers, and relative abilities to capture benefits and overcome challenges that change is bringing. These rural communities appear to retain their common perception of poverty as an inability to meet basic needs for a simple lifestyle, but notions of relative differences and perceived inequities appear to also be emerging. Examples include lack of access to infrastructure in the Hmong village, and lack of entrepreneurial skills and impacts of increasing debt in the Karen village. And even in Sob Win, where progress seems most impressive, parents are investing heavily in education for their children and are uncertain whether the new generation will carry on with the livelihoods they are building, or if they will move elsewhere where prospects may appear better.

Overall experience with TUL-SEA tools

During implementation of these studies it became clear that TUL-SEA tools provide approaches and example methods and analytical tools that need to be further adapted to applications within contexts of different societies, cultures, languages and local conditions. We found that guidelines and suggestions provided in the TUL-SEA tools are very useful in establishing a general framework and an initial set of methods and analytical tools. Our experience suggests that further articulation of the TUL-SEA tools should probably not seek to develop more detailed procedural rules. Rather, it should continue to place more emphasis on the case study approach and articulation of how tools were adapted for useful application in different contexts, under different conditions, and for different purposes.

In the context of conditions in northern Thailand, DriLUC is seen to be quite useful in suggesting a multidisciplinary approach to both technical and participatory identification of underlying factors driving land use change. The PaLA tool was modified considerably to make it viable in the context of both the research team and local conditions, but the team also sees a need to further explore development of participatory techniques for integrating local views and knowledge into understanding of landscape-level processes. And the basic approach of PAPOLD is also seen as promising enough to deserve further development and refinement so that it may become a tool that can more directly assist stakeholders involved with these important processes.

Thus, we thank the TUL-SEA project for providing us with the opportunity to test these initial assessment tools, and hope that further collaboration may be able to help us test rapid appraisal tools for more specific processes and issues identified as important during this initial appraisal stage.

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