

Cultural Adaptation and Sustainability: Political Ecology of Akha People in Xishuangbanna, Southwestern China

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February 2009



The Sustainable Mekong Research Network

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ACKNOWLEDGEMENTS

This research project supplements and benefits from my PhD dissertation research, which was also funded by various grants including:

- 1) The Graduate Dissertation Research Grant, Graduate Division, University of California at Riverside in 2007
- 2) The Subaltern-Popular Dissertation Grant, the Subaltern-Popular workshop, University of California at Santa Barbara in 2007
- 3) The Pacific Rim Research Grant, the President Office, University of California in 2006
- 4) The Humanities Graduate Student Research Grant, the Graduate Division, UCR in 2004

SUMMARY

Background

Akha societies have adopted various economic systems with different natural resource management strategies as they have adapted to various social (including political, economic, and cultural) and natural environments at different places and time. Social and natural environments have been two sets of force/pressure with which Akha societies have to deal.

China went through massive political, social and economic upheavals in the latter half of the twentieth century. Environmental crises, and overpopulation, have become big challenges for China's sustainable development. This study tries to address these questions through examining the dynamic changes of natural resource management by the Akha people in Xishuangbanna, Yunnan Province, Southwest China in response to these challenges over the last 60 years.

This case study investigates Akha "political ecology" and attempts to integrate cultural ecology into current political ecological studies and demonstrate that traditional societies are not merely passive victims of national and/or international development projects and of a global capitalist market economy, as conventionally held. Rather, they change their resource management strategies as they adapt to new social, economic, and political environments of modern nation-states.

Xishuangbanna is a good place and Akha are good subjects for such a study as both of them have undergone significant sociopolitical, economic, cultural, and ecological transformations in the last 50 years or so. Lying at southern tip of Yunnan province, it is a strategic gateway to Southeast Asia. Aside from a wealth of biodiversity and ecological resources, Xishuangbanna also has strategic importance to modern China in another sense: it is one of only a few tropical places in China where natural rubber can be produced.

Akha Stewardship Role

This study demonstrates that, contrary to perceptions of traditional shifting cultivators as deforesters, Akha people (the largest group of swidden farmers in Xishuangbanna) contributed quite significantly to conserving forests and biodiversity in this region through their sustainable natural resource management system prior to 1950. About 70-80% of Xishuangbanna was covered by natural forests and forest resources before 1950 (Gao, 1999). Akha people were actively managing, developing, maintaining and improving these resources through a cultural and belief-based system of "sacred ecology"¹, and the "sacred ecology" system of natural resource management was prevalent in most Akha villages in Mekong region 50 years ago.

¹ The term "sacred ecology" is used by the cultural ecologist Fikret Berkes (1999) to describe interactions between ecological knowledge and belief systems in resource management by traditional societies.

Furthermore, I present a case for far greater involvement of Akha communities in managing these natural resources and in decisions that impact locally (e.g. land allocation, mining, dams).

History since integration into the People's Republic of China (P.R. China)

Akha societies have needed to respond to the natural forces from their physical environments; However, in recent times their fate has been more determined by social and political forces from low-land China since 1950, when *Sipsongpanna* (Xishuangbanna) was integrated into P.R. China in the early 1950s.

Modern China's collectivisation process, followed by the "Great Leap Forward" and the "Cultural Revolution" caused serious ecological, socio-economic, and cultural consequences to the Akha societies in Xishuangbanna. Ecologically, local ecosystems were destroyed and local biodiversity was threatened, along with huge deforestations in Xishuangbanna. Even though China's rural reform started in the early 1980s, practices such as large-scale "slash-and-burn" agriculture continued and destroyed many non-farming protected forest areas, including most sacred groves and sites in the traditional swidden areas.

An issue currently threatening the ecology in Mengsong is mining - kaolin mining has commenced and this is causing further loss of forests and polluting water sources for local people. Other major issues threatening the environment and traditional agriculture in the region include dam construction (*Naci* River), unsustainable exploitation of rattan resources at *Sangpabawa*, the logging ban (that prevents swidden farming) and logging authorised and conducted by outsiders.

This research aims to provide an understanding of Akha people's cultural adaptation mechanisms to respond to such changing social and natural environments, and to explore how a sustainable natural resource management regime could be established. This includes determining Akha traditional natural resource management systems before 1950 (including swidden agricultural practices), and their natural resource management systems evolved dynamically (cultural and ecological) since. The study will also explore the impacts of various national and local policies in Xishuangbanna through P.R. China's Mao Era (1949-1977) and Post-Mao Era (1979-today).

In particular, this study will examine the role cash crops such as tea-trees and rubber on Akha people's welfare and sustainability, including the long-term social and environmental impacts and include an analysis of the potential roles for empowered Akha societies in achieving sustainable development in Xishuangbanna and neighbouring regions.

Key messages

Akha Sacred Ecology

- Contrary to the common perception of shifting cultivators as deforesters, the Akha had sustainably managed their natural resources and played an undeniable role in

conserving local biodiversity until the onset of Mao's modernisation programs in the 1950's.

- Akha societies have adopted various economic systems with different natural resource management strategies as they've adapted to various social (including political, economic, and cultural) and natural environments at different places and time.
- Akha people explain modern changes to the socio-political-ecological environment within their own animistic worldview.
- Traditionally, the Akha people sustainably and responsibly managed their natural resources (especially forests and forest-related animals and plants) based on forests and swidden lands.
- Akha societies had accumulated a rich body of traditional ecological knowledge (TEK) (oral culture, stories, myths) through empirical observations.
- Akha TEK is also represented into their belief system and worldview as environmental taboos and rules integrated into their moral system as environmental ethics. Those taboos and rules are observed in their practice of natural resource management and enforced as religious rituals that are repeatedly conducted.
- The family home-gardens that are usually present around established homes, especially in older Akha villages, preserved a high level of plant diversity from collective forests. Family home-gardens offer a very high level of biodiversity with plant species drawn from natural forests. Managed correctly, home-gardens could become an effective method of *ex situ* conservation of plants.

Political Ecology

- Government approved activities have not only destroyed local forests/ecology, but also broken local people's hearts as their generations-long investments were easily reaped by unrelated others without any compensation.
- Almost half of Xishuangbanna's forests disappeared as a result of new ways of natural resource management promoted by the Chinese government under the name of development. The state has been most responsible for deforestation and loss of biodiversity in Xishuangbanna. The commune system, destruction of the Akha traditional natural resource management system and rubber plantations have all contributed to the deforestation and loss of biodiversity in Xishuangbanna.
- Sacred forests were destroyed intentionally in the "anti-superstition" campaign. All those religious rituals and related cultural activities were forbidden. Much Akha TEK and its sacred ecology was lost during this period.
- Land/forest tenure conflicts between households and households, households and villages, villages and villages have become a big issue as a consequence of the Chinese-led transformation from swidden farming to cash-cropping.

- Collective forests have titles, but the tea trees plantations in them have not been granted titles. Therefore, compensation for these tea trees is not secured as ownership of these tea trees is not acknowledged officially by the government.
- The Natural Forest Protect Project and the Land Conversion Project have ecological goals, but in practice local officials pursue economic goals first, ahead of ecological and social benefits. Thus, the ecological benefits of the projects are largely lost by the ways the projects are perceived and conducted.
- The main species used in the Land Conversion Project were commercial plantations of rubber, tea, and Chinese fir, yet 90.7% of the plantations are identified as ecological forests.
- Re-forestation techniques focused on commercial plantation may optimise short-term economic benefits of the reforestation, but minimise ecological benefits.
- Local governments particularly, Menglong Township government, are also responsible for significant depletion of bio-resources (particularly rattan) and degradation of state forests in Mengsong.
- Kaolin mining in Mengsong is causing trees and topsoil at mining sites to be stripped, and water supplies threatened. The mining company should properly compensate the Mengsong community directly.
- Outsiders (mostly Dai people from lowlands) came to log in Mengsong state forests with logging permission granted by the Menglong Forestry Station, but no compensation is provided to the Mengsong community.

Cash cropping

- The whole of Xishuangbanna has experienced fast economic growth and improved living conditions (better houses, health care and vehicles) in recent years.
- The economic boom has stemmed largely from rubber or tea plantations, at the expense of forests and biodiversity.
- The recent economic boom has widened social stratification and created new social problems such as gambling, alcoholism, economic burdens from competitive feasts, and prostitution.
- Many Akha communities (especially those lower than 1000 masl, like Baka) have abandoned swidden agriculture and adopted rubber plantation. Their culture and lifestyles have also adapted to rubber plantations.
- Intensified cropping rubber has transformed natural landscapes with profound economic (income, rice production, pig husbandry, and fuel supply), socio-cultural (living standards, belief system, and cultural traditions), and ecological (biological resources) impacts in Xishuangbanna.
- Rubber plantations have contributed to increased socio-economic differentiation among Baka households.

- Household income in Baka village has increased many-fold recently due to rubber production. Living standards of Baka villagers have improved substantially from the increased income in recent years.
- Rubber trees are the favoured cash-crop for most people in Xishuangbana, because they produce not only unprecedented income, but also other important resources for rural livelihood such as firewood, timber and animal fodders.
- Households are more vulnerable as rubber farmers than as swidden farmers to unfavorable weather conditions (such as cold winters and storms), pests and diseases, and to fluctuations in global rubber prices.
- Replacement of local forests with rubber plantations in Baka area has reduced availability of NTFPs for collection, not to mention the disappearance of wild animals and loss of agricultural biodiversity.
- Drinking water has been polluted by chemical pesticide and herbicide applied to the rubber plantations in Baka village.
- Tea plantation is an alternative to cash-crop at altitudes above 1000 masl.

Policy recommendations

- International organisations/societies should create favourable conditions that allow local communities to adopt ecologically friendly strategies.
- Economic activities should be diversified to reduce the high risk created by the monoculture of cash-crops, like rubber trees, are subject to fluctuations in the global market economy. Reciprocal social and cultural services, as well as relevant education and vocational training, need to be provided to local communities in order for them to prepare for exposure to modern societies.
- The Chinese government could work to stabilise and protect the prices given to growers for their organic tea.
- The Chinese government and Natural Forest Protection Project should pay Mengsong communities for their contributions to forests conservation; instead of providing incentives for them to replace natural forests (swidden lands in fallow) with tea plantations.
- As one of key water sources to Menglong Basin, Mengsong should be compensated for their contributions to forests conservation.
- The Chinese government should also discourage commercial mining and logging from outsiders in such ecologically important areas like Mengsong. especially where local communities got little economic benefits.
- The Chinese government at all levels should give greater respect to local people's culture and give them rights to manage and use their own resources. Allow them to contribute to the management of natural resources with their traditional ecological knowledge and wisdom

- Greater inclusion of local communities in decision-making processes would give better sustainable development outcomes.
- The Chinese government should implement effective measures for protection and conservation to protect TEK and agro-biodiversity, in cooperation with local communities and traditional managers.
- South-East Asian governments, particularly those of Laos and Myanmar who are eagerly opening up lands for rubber plantations under influence of China, should take the lessons from Xishuangbanna. In particular, a substantial proportion of forests should be preserved for animals as well as local people's livelihoods.

1. BACKGROUND AND RATIONALE

The World Commission on Environment and Development (WCED), in their report titled *Our Common Future* (1987:43) defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” A common view of sustainable development is that the three domains of nature, economy and society including culture must all develop but not at the expense of each other. In other words, sustainable development is about how to make balances between these three domains as well as increase equity among all stakeholders over time. However, various stakeholders will always prioritise their agenda for their own benefit under any given circumstance, and take various strategies when they come to interact and negotiate. Not all activities and strategies will lead to sustainable social and economic development. For instance, Elizabeth Economy (2004) and Kristen Day (2005) point out that great economic development of China² was achieved at huge environmental expenses—overdraft of resources, devastation of whole ecosystems, loss of species, water and air pollution, to name a few.

These environmental crises, and overpopulation, have become big challenges for China’s sustainable development. Therefore, some key questions we need to answer here are:

- Why do societies prioritise certain activities over others in their agenda?
- What are the major factors that influence decision-making by various stakeholders?
- Under which conditions would a society take a strategy more likely to lead to sustainable development?
- How could various stakeholders, especially those with power and influence such as governments and international organizations/societies, create these favorable conditions?

In this study, I am trying to address these questions through examining dynamic changes of natural resource management by the Akha people in Xishuangbanna, Yunnan Province, Southwest China in last half century or so.

Natural resource management studies are a very good entry point for studies of sustainable development. This is because a sustainable natural resource management regime is a prerequisite for sustainable development and likewise cuts across the three dimensions of nature, economy, and society (including culture). Among the scholars who study natural resource management, two groups are outstanding: cultural ecologists and political ecologists.

Cultural ecologists’ studies focus on interaction of traditional ecological knowledge and belief systems (including worldviews) in natural resource management by traditional

² Throughout this report, the term “China” should be considered to refer to the “People’s Republic of China” unless otherwise stated or clear from the context. The full term or the abbreviation “P.R. China” may also be used where appropriate, such as in citations and official titles.

societies (e.g. Anderson 1996; Berkes 1999; Nelson 1983; Strang 1997). They argue that these traditional societies have sustainably managed their natural resources through religious representations of their traditional ecological knowledge (e.g. Berkes' notion of knowledge-practice-belief system, or Anderson's conservation ethics).

However, these traditional management systems, along with their biodiversity, are disappearing as these societies integrate into modern nation-states and global market economy (Pei 1996). Consequently, those cultural ecological studies of "isolated traditional societies" have been criticised for lack of attention to power and inequality and for exclusion of the dynamics of colonialism and the encroachment of a global capitalist economy, as "ecology without politics" (see Peet and Watts 1993). As an alternative, studies under the name of "political ecology" (Blaikie and Brookfield 1987; Wolf 1982) have appeared since the 1980s, examining relationships between patterns of resource use and political-economic forces. However, current political ecological studies - claiming to be a combination of cultural ecology and political economy - often focus on the latter, neglect the former, and have consequently been criticised as "politics without ecology" (Vayda and Walters 1999).

This case study is a response to the call for integrating cultural ecology into current political ecological studies (see Paulson *et al.* 2003). I argue that these traditional societies are not merely passive victims of national and/or international development projects and of a global capitalist market economy, as conventionally held. Rather, they changed their resource management strategies as they adapted to new social, economic, and political environments of modern nation-states. Therefore, I call this a study of "political ecology" in the sense that it combines approaches of political economy, which examine the relationship of patterns of resource use to political-economic forces, with those of traditional cultural ecology, which emphasise cultural adaptations to local environments (e.g. Grossman 1998; Sheridan 1988).

Xishuangbanna is a good place and Akha are good subjects for such a study as both of them have undergone significant sociopolitical, economic, cultural, and ecological transformations in the last 50 years or so. Economically, Xishuangbanna is one of the fastest growing regions in Yunnan province. However, its recent economic boom stems largely from rubber plantations, which have been achieved at the expense of its rainforests and biodiversity.

Rubber plantations were first introduced in state farms in Xishuangbanna by China's central government and the Yunnan provincial government in the 1950s. These state farms appropriated the most fertile lands that had been used for swidden agriculture by the indigenous groups in this area, which forced them to farm on less desired lands. Those indigenous people—such as Akha, the biggest ethnic group of swidden agriculturalists in Xishuangbanna— have been further pushed to become cash-crop farmers, as a result of series of national policies—such as the Economic System Reform in 1978, the Household Responsibility System in 1983, the Natural Forest Protection Project (also known as the "logging ban") in 1998, and the Land Conversion Project (also known as "Grain for Green") in 1999, among others.

2. OBJECTIVES AND RESEARCH QUESTIONS

Through documenting and analysing the dynamics of natural resource manage systems by Akha people in Xishuangbanna, the overall goal and purpose of this research is to 1) understand the mechanism of cultural adaptation by the Akha to changing social and natural environments; and 2) explore how a sustainable natural resource management regime could be established. More specifically, this research aims to:

- discover the traditional natural resource management system by the Akha people as swidden agriculturalists in Xishuangbanna prior to 1950;
- trace dynamic changes of natural resource management strategies by the Akha people in last half century;
- examine the roles of national policies, in reaction to which Akha people have become cash-crop farmers who focus more and more on monoculture of rubber or tea trees from traditional swidden agriculturalists;
- examine the cultural and ecological consequences of those social and environmental transformations; and
- explore the potential roles of empowered Akha societies in achieving sustainable development in Xishuangbanna and neighbouring regions.

This study will answer the following questions:

- How did the Akha people in Xishuangbanna manage their natural resources (including forests, lands, and individual plants and animals) prior to 1950?
- How have their natural resource management systems evolved since 1950? What cultural and ecological consequences have followed-on from these changes in management? Which changes have been sustainable and which not? Why?
- What are the roles of national and local government policies in these changes? How do the Akha people respond to various policies?
- How do the Akha people talk about the cultural and environmental changes? What are their concerns regarding these changes? How do they cope with these changes?

3. STUDY AREA AND SUBJECTS

Xishuangbanna is located between north latitudes 21°08'~22°36', east longitudes 99°56'~101°50' (see fig. 1), covering a total area of 19,125 km² (square kilometers) (Xishuangbanna Prefecture 2008), which is divided among one municipality (Jinghong), two counties (Menghai and Mengla), and ten county-level state farms (Jinghong, Dongfeng, Mengyang, Ganlanba, Dadugan, Liming, Mengla, Mengpeng, Mengman, and Mengsing). Administratively speaking, Jinghong Municipality, Menghai County and

Mengla County are governed by Xishuangbanna Dai Autonomous Prefecture of Yunnan Province, while the ten state-farms are governed by Agricultural Reclamation Bureau of Yunnan Province, of the P. R. of China.

Fig.1 Geographic location of Xishuangbanna



Xishuangbanna is a very special place to China in three ways. First, it is a biodiversity hot spot at a transitional zone between the tropical and the subtropical in China and in the world. Due to its unique geographic and climate aspects, it contains the highest level of biodiversity in China. Although the area occupies less than 0.2% of total national land area, it comprises 4,000 vascular plant species, 102 mammal species, 400 bird species, 63 reptile species, 38 amphibian species and 100 fish species—which accounts for one fifth of vascular plant species and one fourth of animal species in the whole of China. In addition, more than 90% of China's wild elephant population is living in this region (UNESCO 2007). Therefore, it was given the titles of “Kingdom of Animals” and “Kingdom of Plants”. Most of these plants and animals are protected in the Xishuangbanna Nature Reserve, one of the earliest established national natural reserves. It comprises the largest and most comprehensive area of tropical forests in China. However, many of these plants and (especially) animals are in very small populations or even in danger of extinction, comprising 12.5% of first-class, 32% of second-class, and 37% of third-class protected animals in China (Yunnan Provincial Government 1990). Having realised its ecological and cultural significance and fragility, UNECSO has designated Xishuangbanna as a biosphere preserve area under the Man and the Biosphere Programme (MAB) since 1993 (UNESCO 2007).

Second, Xishuangbanna is a strategic gateway to Southeast Asia. Lying at southern tip of Yunnan province, Xishuangbanna borders with Laos at its east and southeast and with Myanmar at its west and southwest along 966 km of borderline. The Mekong River (known as Lancang Jiang in China) runs across Xishuangbanna from its northwest through to the southeast. Historically, this region was run by a Dai state, known as *Sipsong Panna*³—literally meaning “twelve thousand-paddy-fields” in Dai or Tai Lue language. Rulers of Sipsong Panna paid tributaries to both Chinese and Burmese states, and maintained a kind of brotherhood relationships with other ancient Tai states in today’s Laos, Shan state of Myanmar, and Northern Thailand (Hsieh 1995). As this region was officially integrated into the China, Xishuangbanna⁴ Dai Autonomous Prefecture was established in 1953 according to the Region Autonomous Law of China because Dai people were the majority in this area at the time.

Xishuangbanna is a mountainous area where flat and slightly sloped lands can be found only at various basins—which make up only 5% of its total land area. Such basins are called “Meng” in Dai or “Bazi” in local Chinese. Historically, Dai people had settled at these basins and turned these flat lands into irrigated paddy fields, while the remaining vast mountainous areas were occupied by other ethnic groups such as Akha (identified as part of Hani Minority Nationality in China), Lahu, Bulang, Yi, Jinuo, Yao (known as Mien in Thailand), and among others whose economy was mainly based on swidden agriculture. Many of these highland groups are living trans-boundarily in mainland South-East Asia today.

Though the historical political relationships of this region and its peoples have been changed fundamentally, its economic and cultural connections have been maintained and even enhanced recently. The latter has been demonstrated through the rubber boom in Luang Namtha, northern Laos, which was boosted along by influence and investments from Xishuangbanna (Shi 2008) and establishment of the Xishuangbanna Jinghong Industrial Zone—a cooperative development between the Chinese local government and Thailand’s companies in Jinghong, capital city of Xishuangbanna in 2006 (Xishuangbanna Prefecture 2008).

Third, Xishuangbanna is one of a few tropical places where natural rubber is produced from plantations of *Hevea brasiliensis* in China. Rubber, steel, coal, and petroleum were defined as four strategic materials for national industrials and defenses by the new born People’s Republic of China in 1949. These materials were embargoed to China by the United States-led capitalist countries in 1950 as a direct result of China’s decision to involve in the American-Korean war. Though there were some rubber plantations in southern China, mainly in Hainan Island and Guangdong Province at that time, they produced too little rubber to meet the huge demand driven by national industrialisation and defence constructions. In order to break the US-led economic blockage and embargo policies, the central government of China made a decision to expand rubber plantations

³ *Panna* or “thousand-paddy-fields” is an administrative unit of the Dai feudal state.

⁴ Xishuangbanna is a Chinese translation of *Sipsong Panna*, and both names are pronounced the same way.

at every possible places within its territories at the 100th session of Government Affairs Council of Central People's Government of China in 1951 (Yunnan Agricultural Reclamation Cooperation Ltd. and Yunnan Association of Tropical Crops, 2005). Xishuangbanna, as the second biggest tropical national frontier in China (following Hainan Island), was targeted by this policy. Consequently, numerous state rubber farms have been established in Xishuangbanna since 1956. These state farms were incorporated into today's ten county-level farms by early 1980s. Consequently, Xishuangbanna has become the second biggest basis of rubber production in China after Hainan Island. The total area of rubber plantations in Xishuangbanna is said to reach 173,133 hectares in 2004 (Statistics Bureau of Xishuangbanna Prefecture, 2005), which takes up about 9% of its total land (this number is too low to be true, I estimate this number should be doubled by now). An important concomitance of the establishment of rubber plantations in Xishuangbanna was a demographic shift in its ethnic makeup (see table 1). There were only 5,000 Han Chinese in Xishuangbanna in 1949, which was 2.5% of its total population. However, the Han population soared to 17,905 in 1956, 185,894 in 1982, and 289,181 in 2000, which made up 6.9%, 28.3%, and 29.1% of the region's total populations respectively. Most of them were recruited as workers in the state farms from other parts of China. As a result, Han Chinese have become the second biggest ethnic group from a small minority in Xishuangbanna. In contrast, the proportion of Dai population dropped from 52.1% in 1949 to 34.3% in 1982 and further to 29.9% in 2000. Although they are still the biggest group, they are in equal numbers to the Han and are no longer the majority. If this trend continues, Han Chinese will soon surpass Dai to become the biggest group in Xishuangbanna.

Table 1: Populations of Xishuangbanna (1949—2000)

Ethnic groups	1949	%	1956	%	1982	%	2000	%
Dai	105000	52.1	128700	49.8	225485	34.3	296930	29.9
Han	5000	2.5	17905	6.9	185894	28.3	289181	29.1
Hani-Akha	30000	14.9	46514	18.0	129198	19.7	186067	18.7
Lahu	13000	6.5	16203	6.3	33336	5.1	55548	5.6
Bulang	15000	7.4	19368	7.5	27664	4.2	36453	3.7
Yi	4500	2.2	6365	2.5	16495	2.5	55772	5.6
Jinuo	4000	2.0	5491	2.1	12405	1.9	20199	2.0
Yao	2500	1.2	6519	2.5	10958	1.7	18679	1.9
Others	22440	11.1	11575	4.5	15890	2.4	34568	3.5
Total	201440	100	258640	100	657325	100	993397	100

Sources:

1949 data is from Yunnan Provincial Government 1990 (p.141).

1956 data is from China's first national census.

1982 data is from China's third national census.

2000 data is from China's fifth national census.

Xishuangbanna has been caught between contradictory national policies of economic development (particularly rubber plantations) and natural reserves since the 1950s because of its special location in China (as laid out above). These two contradictory goals could be achieved only through appropriating huge areas of forested lands used for swidden agriculture by the indigenous peoples, and redirecting it to rubber production. This process transformed the Akha into cash-crop farmers.

I have chosen Akha people as my study subjects for the following reasons. First, national policies like the shifting cultivation ban have brought more profound impacts on the highlanders than on the lowlanders (Dai). Akha have been the biggest highland group whose economy was based on swidden agriculture in Xishuangbanna for centuries. Second, a substantial population of Akha people lives trans-boundarily in the Greater Mekong Region. It is difficult to get exact number of Akha populations in this region, but reasonable estimations are that there are 250,000 Akha in China⁵ (about three quarters of them are in Xishuangbanna), 300,000 in eastern Shan State of Myanmar⁶, 70,000 in northern Laos⁷, 70,000 in northern Thailand⁸, and 1,000 in Northwest Vietnam.⁹ The majority of the Akha in Xishuangbanna have become rubber farmers, and also many Akha in eastern Myanmar, northern Laos, and northern Thailand have started in rubber plantations recently. Experiences and teachings of Akha in Xishuangbanna could be passed onto those in neighbor countries. Third, being born and raised in an Akha village in Xishuangbanna, I have personally experienced and witnessed socio-cultural, economic, and ecological transformations of Akha societies in the last three decades. My membership of the Akha community, knowledge of Akha culture and language skill allowed me deep insights into Akha societies and provided a comprehensive understanding of those changes from an insider's perspective.

⁵ The Akha people in China are identified as a branch of Hani Minority Nationality. The fifth national census shows there were 1,424,990 Hani in Yunnan in 2000, which includes about 186,000 Akha in Xishuangbanna and 60,000 Akha in Lancang and Menglian counties of Pu'er (previous Simao) Prefecture.

⁶ This number is provided by Mr. Atse Ghoelan, an Akha expert from Kengtung, Shan State, Myanmar, August 8, 2008.

⁷ When I was doing some fieldworks in Northern Laos in 2002, I was informed by the governmental officials from Phongsaly and Luang Namtha provinces that there were about 36,000 Akha in Phongsaly, 28,000 in Luang Namtha, and about 6,000 in Udomxay and Bokeo.

⁸ According to an Akha expert Ms. Chutima Morlaeku from Chiang Mai, there are at least 70,000 Akha in Thailand.

⁹ According to Mr. Yang Youyi from Cultural Department of Lao Cai province of Vietnam, there are about 26,000 Hani in Lai Chau and Lao Cai provinces, Northwestern Vietnam. I was informed by some Akha villagers and officials in Phongsaly of Laos that there are some Akha villages in Lai Chau province of Vietnam along the border with Laos. Based on the information, I estimate that there might be at least 1,000 Akha in Vietnam.

The research have been conducted thoroughly in two Akha communities, Baka (low-land villages whose economy has become almost dependent on rubber plantations) and Mengsong (highland villages whose economy is more diverse but becoming more dependent on tea plantation), with supplementary field trips to other Akha villages in this region for comparison.

Administratively, both communities belong to Menglong Township, Jinghong Municipality, Xishuangbanna Prefecture. Jinghong Municipality governs one district and ten townships, covering a total area of 7133 km² with a population of 380,000 people in 2006. Five out of the ten state farms are located within the municipality. Located at the southern tip of the municipality, Menglong borders with Myanmar at its east and south and is the biggest township in the municipality with an area of 1,216 km² and a population of 90,600 people in 2006, taking up about 17% of total area and 24% of total population of the municipality (Yunnan Provincial Government 2006). Topographically, Menglong Township comprises two basins (Menglong and Mengsong) and surrounded mountains. Menglong Basin is the third biggest basin in Xishuangbanna and Mengsong Basin is the highest one at an altitude of 1660 meters. One of the three biggest state rubber farms in China, Dongfeng State Farm, is located around Menglong Basin. Menglong town is 60 km and Dongfeng town is 40 km south to Jinghong City.

Menglong Township governs twenty Administrative Communities. Mengsong and Baka are two of them. Mengsong Administrative Community is located at the southwestern tip of Menglong Township, governing eleven villages—eight Akha (Xianfeng, Dazhai, Hongqi, Dongfanghong, Hongxing, Guangming, Bengban, and Huishala. The last two villages were separated from Guangming, Dazhai and Hongqi respectively in early 1980s), two Ake (Yakou and Ake), and one Lahu (Lahu), with 2594 people in 2007. These villages cover an area of 100 km², which altitudes range from 800 to 2000 metres above sea level (masl). About three quarters of the Mengsong population are living in six Akha villages (i.e., Xianfeng, Dazhai, Hongqi, Dongfanghong, Hongxing, and Guangming) around Mengsong Basin (see Pic.1), the centre of Mengsong area. As they represent the core community of Mengsong Akha, these six villages will be my major research sites in Mengsong, while others will be mentioned for comparison. Mengsong is about 37 km away from Menglong Town and 97 km away from Jinghong City.



Left - Mengsong basin and surrounding mountains.



Right - Baka village surrounded by rubber plantations in the dry season.

Baka Administrative Community is located at the northeastern corner of Menglong Township, consisting of eight villages—four Akha (Baka, Bohe, Pisha, Bahanhuang), three Han and Hani (Nasha Yidui, Nasha Erdui, Nasha Sandui), and one Buxia (Buxia Huixian). Baka village will be my major research site here. Baka village is located at northeastern corner of Menglong Basin at an altitude of 650 masl (see Pic.2). It has 549 people in 121 households in 2008. In terms of land use, Baka village consists of 10,000 mu^{10} rubber plantations, 3000 mu collective forest, 280 mu paddy fields, 70 mu tea garden, and 150 mu residency area. Baka village is 5 km away from Dongfeng Town, 25 km away from Menglong Town, and 45 km away from Jinghong City.

4. KEY ASSUMPTIONS

This is a study of social and ecological changes through examining dynamics of natural resource management by the Akha people in Xishuangbanna in last half century or so. In order to understand these changes in such a relevant short period of time, we have to put them within the long-term trend of historical changes. In other words, we need to look into Akha history in order to understand their current situation. As an oral culture, however, it is difficult to find many written records of Akha history. Yet Akha societies have developed and maintained very rich body of oral heritage including, but not limited to, history, genealogies, legends, stories, anecdotes, and songs. These oral records can be assumed to contain important historical facts. I also assume that official written records of history are factual as well. All these various kinds of evidence, through careful examination and cross-checking with each other, can be used to construct/understand Akha history.

Please note that this research is based on two thorough case studies in Mengsong and Baka Akha communities, with visits to other villages (Akha and other ethnic groups), state

¹⁰ mu is a Chinese unit of area, 1 mu = 666.7 m^2 .

or collective farms in Xishuangbanna and in Mekong Region. I assume that generalisations from the case studies can be validated through careful cross-checks with other case studies (either done by myself or others or both), experts' workshops and conferences, and logical reasoning with literature and theoretical references.

A technological challenge here is to measure sustainability of a natural resource management regime. Natural resources are too broadly defined for meaningful study - in this study I will focus more on renewable natural resources including biological resources, land and water, while also paying attention to mining activities. Since biodiversity at ecosystem, species, and genetic levels is usually used as the key criteria to measure the health and sustainability of an ecosystem (Zhang 1995), I assume that a natural resource management regime is more sustainable than others if the former creates and maintains higher biodiversity at all three levels than the latter. I will use both natural and agricultural biodiversity as variables for this measurement.

Purpose of this research is to generate policy related knowledge on sustainable development issues in the Mekong region, which will be used to influence the public policy of the region. I hope that it is possible to influence the public policy of Mekong Region governments by providing reasoned information and argument that presents more sustainable and alternative options for "development" in the mountains, through examining the impacts of China's national policies and development programs on the local economy, culture, and ecology in Xishuangbanna.

A risk for most researchers would be that they are unable to access mountain people's knowledge, for example Akha people, in various Mekong Region countries due to linguistic and cultural barriers. This 'research risk' should be considered negligible for me as I grew up in an Akha community as a member of it, with a long history of engagement with different communities. Another risk for researchers who conduct researches in their own communities, like I am, is any potential bias of the researchers that might favor their own communities, or even against other communities or ethnic groups. As a holder of several higher degrees (that is, Masters of Sciences in Ethnobotany from Kunming Institute of Botany, the Chinese Academy of Sciences in 1998, and Masters of Arts in Anthropology from University of California at Riverside in 2003), I have been trained formally as both a scientist and a social scientist. I assume that my academic disciplines would prevent or minimise any potential bias from affecting this research.

5. METHODOLOGIES

This is a participatory action research. Methods used in this research include:

- 1) mining government archives and interviewing relevant officials regarding changes of national policies and their impacts on local societies and environments;
- 2) collecting second-hand data and maps about the social and environmental/climatic changes in Xishuangbanna since 1949;

- 3) interviewing village-based key informants/specialists for information on Akha traditional ecological knowledge, resource management systems, institutions, and worldviews;
- 4) interviewing focus groups (based on gender, age, among other factors) to examine general community knowledge including how they talk about themselves, their environments, national policies, how these issues change over time (from their point of view) and how their management strategies change accordingly;
- 5) observing and participant observing all major resource management activities and keeping full field note records of what I hear and see;
- 6) using questionnaires and statistical analyses to collect and analyse data on economic variables, knowledge distribution and transmission links;
- 7) engaging in (and recording) ordinary conversations with villagers about relevant issues;
- 8) collecting botanical specimens and getting specialist help in their identification;
- 9) taking photos (especially of ecologically relevant scenes--both scenes that I identify and local people point out as particularly illustrative or significant) and videos (especially of ceremonies);
- 10) encouraging people to draw their agricultural calendar and maps;
- 11) collecting Akha origin myths and stories about plants, animals, and humans by using a tape-recorder;
- 12) collecting life histories of some key informants; and
- 13) organising a villager workshop to share knowledge.

Most work has been done during my PhD dissertation research fieldwork in 2006 and 2007. About five month long fieldwork was done under the Sumernet fellowship program, from February through April, June through July, in 2008. Please see the detailed work in my progress report.

6. MAIN FINDINGS

6.1 Dynamics of Akha Politics

Governments in the Mekong region such as Thailand, and some western anthropologists (e.g. Tooker 1988), usually portray Akha societies as “hill tribes” with poor understanding of polity extending beyond villages. My own study shows, however, that Akha society has survived through frequently shifting politics, from tribes to chiefdoms to statehood, then reversing back to chiefdom and further to villages, as adaptive mechanisms in response to shifting frontiers between surrounding ancient and modern states of Chinese, Tai, Burmese, and Tibeto-Burman groups at various places and times. The formation of the Akha people as a distinguished ethnic group,¹¹ from their closely related linguistic groups

¹¹ Here I use the term “ethnic group” to refer to an ethno-linguistic group whose members not only share certain sets of cultural traditions, values and (religious) beliefs, but also can communicate mutually in their own mother tones. Though the Akha people have been identified as a branch of the Hani Nationality in China, and though the Akha people share a lot of cultural traditions, religious beliefs and vocabularies with many other Hani subgroups, it is evident that Akha people and other Hani subgroups can not mutually communicate with each other in their own mother tones.

such as the Hani, is a direct result of their political struggles to establish and defend themselves against the *Jadae* petty-state Kingdom upstream along the Red River (in today's Yuanjiang County of Yunnan and its neighboring areas).¹² It was recorded that there was a small state called "Luo Pan Dian Guo" at the same place at the end of Song Dynasty of China and Dali Kingdom of Yunnan in middle 13th century. I suspect that "Luo Pan Dian Guo"¹³ was referred to *Jadae* State. *Jadae* was defeated by the Mongol army in 1276. *Jadae* collapsed following the annexation of Yunnan province into the Yuan Dynasty of China in late 13th century, forcing Akha people to migrate south to *Sipsongpanna*—a Dai state then, and today's Xishuangbanna of P.R. China—and gradually to the less populated highlands of Mainland Southeast Asia.¹⁴

In Sipsongpanna and neighboring Southeast Asia, the Akha had managed to maintain relatively independent polities at much smaller scale as chiefdoms in the form of villages or village clusters by centering in the peripheral mountains of lowland states until 1950s (Sturgeon 2005). In Sipsongpanna, a dual political structure has been co-existed in Akha societies for centuries as they adapted to the frontiers of the Dai state.

On the one hand, there was a religion-oriented internal government led by *Dzoeqma*¹⁵—an inherited village chief who led annual collective religious and agricultural rituals—whose task was to maintain a healthy relationship between the village and its natural environments as well as among individuals, families, and lineages within the village. A *Dzoeqma* performs his task under the name of various spirits: 1) *aqpoeq*—ancestral spirits who are sources of blessings; 2) *yawsanr*—a spiritual lord of any living organism or physical entity who attaches and animates the latter; and 3) *naef*—free spirits of the dead or ghosts who act as the watchful lawmen of the world.

On the other hand, as Akha societies were somehow officially registered in the Dai state, a new village head *jawrbax* and a treasurer *naqngeq* were appointed in each registered village by the authority of the state. Their job was to collect taxes for the lowland state and act as liaisons between Akha societies and the state. A great Akha chief *pyaflo* was also appointed in each administrative region (Meng or Panna) of Sipsongpanna where Akha were major highlanders. A highlands *pyaflo* in equivalent to a Dai mayor or prince of a lowland town, but also acted as a sheriff. These two political structures (*dzoeqma*-led internal government and externally-added *jawrbax-pyaflo* system) had co-existed to deal

¹² This part of Red River is called "Yuan Jiang" in Chinese, meaning Yuan River. Hani/Akha people call the river as "*Lasha Lawba*," meaning Lasha River. In fact, prior to the Mongolian empire Yuan Dynasty, the ancient Chinese name of the river was "Lishe," which was obviously from Hani-Akha word "*Lasha*", but it was renamed as "Yuan Jiang" at the beginning of the dynasty.

¹³ "Luo Pan" was from "(Lasha) Lawba," "Dian" was from "*Jadae*," "Guo" was "Kingdom" in Chinese. "*Jadae*" means "long flat valley" in Akha. So "Luo Pan Dian Guo" means "the Kingdom of Lasha River Valley."

¹⁴ This will be elaborated in a separate paper titled "Genealogy, *Jadae* State, and Formation of Akha People," abstract of which is attached as an annex at the end of this report.

¹⁵ I have decided to use a common Akha orthography, adopted by Akha representatives from China, Myanmar, Thailand, and Laos in their meeting at Mae Sai, Chiang Rai, Thailand in August, 2008, to spell all Akha terms in italic so that the pronunciations of the terms would stay authentic which would be easier for other interesting scholars and researchers to check the validity of my research findings in the future.

with two basic challenges/forces faced by the Akha societies. On the one hand, Akha societies needed to respond to the natural forces from their physical environments; on the other hand, they had to deal with the social forces derived from the political pressures of the lowland state.

Sipsongpanna (Xishuangbanna) was integrated into the People's Republic of China in early 1950s. The externally-added *jawrbax-pyaflo* political system of Akha was recognised by the Chinese government, while the *dzoeqma*-led internal government was abandoned. Indeed, most Akha *pyaflos* became first generation of Akha officials in the People's Government of Xishuangbanna.

6.2 Dynamics of Natural Resource Management by Akha Societies before 1950

Akha as rice cultivators in irrigated paddy fields in Jadae

In *Jadae*, there seemed co-existed various agricultural systems among different Akha subgroups/tribes. Irrigated rice cultivation seemed to be the major agricultural form, for core population of the Akha occupied the flat valleys or terraced paddy fields, while others practiced swidden agriculture on uplands. This conclusion is supported by the following evidence and arguments:

First, the famous Tang historian Fan Chuo, in his History of Barbarians, or *Man Shu*, recorded that "the barbarians" in the Red River area had developed sophisticated knowledge and skills in rice cultivation at irrigated fields including terraces. Now most historians agree that "those barbarians" were ancestors of today's Hani/Akha people. Rice cultivation at irrigated terraces is still the major agricultural form for the most Hani subgroups in the Red River area today.

Second, water buffalos are the most valuable animals in Akha society as sacrificing a water buffalo at a funeral ceremony is regarded as the highest honour for the deceased. This custom had been well developed in *Jadae* according to Akha oral texts. The most reasonable cultural explanation for this custom is that water buffalos used to be very significant in Akha economy. Water buffalos importance stems from their (continued) use as the main plowing labor on irrigated paddy fields in this region.

Third, a lot of Akha communities like Baka have continued to conduct an annual ritual in which a rice seedling nursery bed is made in each swidden field of upland rice prior to sowing, just like they were preparing rice seedling for transplanting in the irrigated paddy fields, even though they did not have any until 1950s. This ritualised practice is called *o panq o chaev chaev-eu*. I was told that they did this because their ancestors used to cultivate rice in irrigated paddy fields in *Jadae* and they continued to carry on their ancestors' traditions as a form of ritual. However, there are other Akha communities, like Mengsong, who did not conduct this ritual. The explanation for this could be either that these Akha tribes/subgroups did not practice irrigated farming in the past due to their peripheral locations in the mountainous areas of *Jadae*, or that they simply decided not to

carry on that ritual. But the first explanation seems more reasonable because diverse agricultural forms would be more realistic and differences would be expected between lowlands and uplands then as it is today.

Transitions in early settlement history of Akha people in Sipsongpanna

In their early settlement history in Sipsongpanna, a substantial population of Akha continued to cultivate rice in irrigated paddy fields and lived side by side with Dai people in lowlands, especially in Menglong—the third biggest basin in the area. However, as populations of both the Akha and the Dai increased, tension and conflicts over lands between them accumulated and resulted in a war. As the loser, the Akha were forced to move up to mountains and adopt swidden agriculture.

This could be supported by a well-known Akha story called “*Padae dai Pana ha*” in which it says that Menglong basin once was occupied by the Dai and the Akha. They lived side by side, growing rice in the irrigated paddy fields. The Dai, as earlier dwellers, always wanted to chase the newer comers the Akha away from the basin, but the former were not able to defeat the latter in a war. Then, the Dai conspired to kill the Akha chief and his soldiers when they got drunk in a banquet. So, the Dai invited the Akha chief and his soldiers to a banquet, and let them drink and drink until they could not distinguish between “*Padae*” and “*Pana*”—Dai names for two different kinds of fish that could be easily recognised—a signal that the Akha were drunk. Then the Akha chief and his soldiers were all killed. As a result, the Akha people were forced to move up into the mountains where they adopted swidden agriculture for their livelihood.

Akha as swidden agriculturalists in highlands of Sipsongpanna

Sacred ecology of Akha people

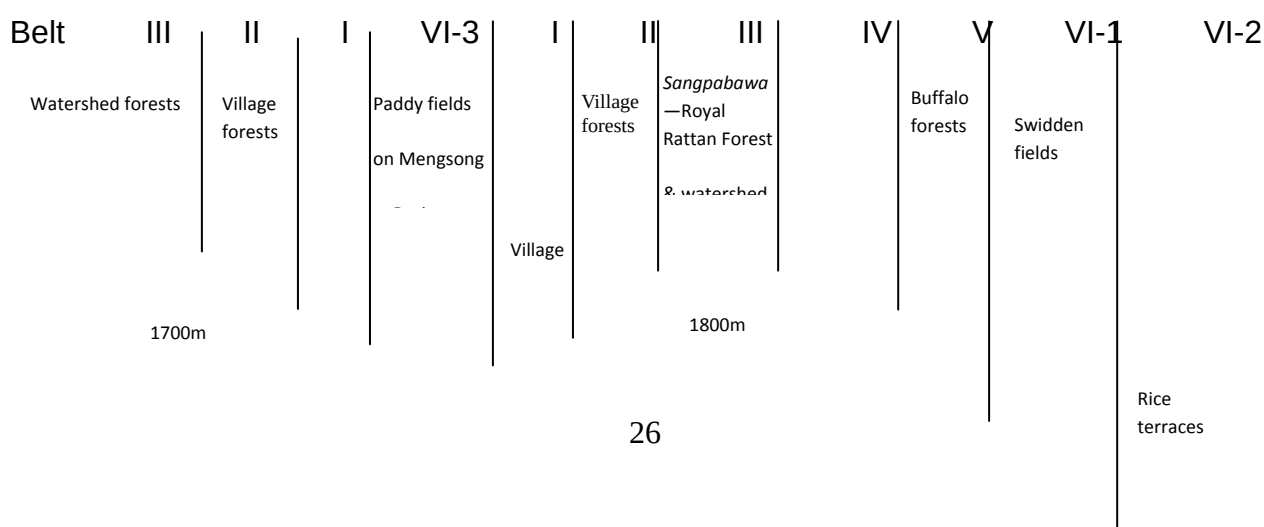
The term “sacred ecology” is used by the cultural ecologist Fikret Berkes (1999) to describe interactions between ecological knowledge and belief systems in resource management by traditional societies. I use it here as a synonym of religious representation of natural resource management. As animists, Akha people believe that the world is full of *naef* (a kind of spirit). Accordingly, they divide their world into two parts: people’s world (inside) and *naef*’s world (outside). The people’s world is centred in villages, while that of *naef* is centered in forests. All domesticated animals and cultivated crops belong to people, while all wild animals and plants in the forests belong to *naef*; day time is of people, while night time is of *naef*. They should not disturb one another’s world; otherwise the lawbreaking side will get punished.

A typical Akha village is built on the middle of a hillside with a slight slope (Belt I in Fig.2). The village is considered the safest place for Akha people, who believe that one is always potentially exposed to some kinds of danger outside of it, physically and spiritually. Akha communities manage their natural resources through religious representations, and a typical Akha village would divide its homeland into six areas/belts:

- 1) *pu*-villages;
- 2) *putsanq*-village forests;
- 3) *ghaqtсанq*-protected forests;
- 4) *miqhaeflafghaw aqganq*-firewood forests;
- 5) *nyoqjawrkmrtuiv aqganq*-fenced buffalo forests; and
- 6) *yarmrjawqxm q aqganq*-“arable” lands.

Ideally the village is the centre of its homeland, while other areas/belts radiate from the centre with the arable lands laying outer most of the circles. In reality, these areas/belts need to be arranged practically according to landform of the terrain, and thus are rarely symmetrical. There are twelve major types of land uses distributed in these belts: residency, home-garden, protection/scenic forest, holy water stream, cemetery groves, watershed forest, firewood/timber forest, agroforests, sacred groves and sites, pasture lands, permanent paddy fields, and swidden lands. I will illustrate this through the case study of Mengsong land uses (see Fig.2).

In an old Akha village, each family usually has one or two home-gardens surrounding their house. A very high level of biodiversity is usually present in home-gardens. For example, 227 species plants have been recorded in home-gardens of Mengsong (Wang *et al.* 1999). These plants include not only daily consumable vegetables and spices, but also those used for medicine, fiber, fodder, ornament, religious purposes, and even for timber. Many gardens are set up by imitating the local natural forest system. Many plants have been introduced by local men or women from the local forests. Some are in a process of domestication. Akha people set up home-gardens in order to reduce their exposing to potential danger by getting those resources from natural forests (*naef's* domain). Plants from the local forests (such as rattan) are usually important and scarce. Plants introduced from other villages (of Akha or other groups) are also planted in home-gardens. Therefore, home-gardens serve as a research and development centre for domestication and *ex situ* conservation of economic plants.



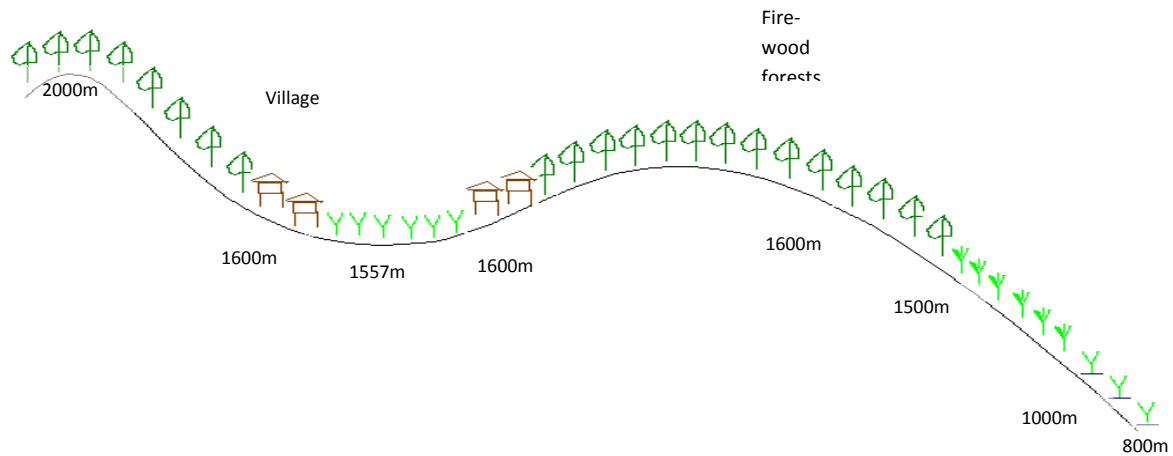


Fig. 2 Mengsong land use cross-section (simplified for better illustration)

A typical Akha village is always surrounded by forest, which represent a physical as well as symbolic boundary between people's (inside) and *naef's* (outside) worlds. This surrounding forest is called *putsanq* (Belt II in Fig.2), meaning village forest, serving as both protection and scenic forest. It is believed that the spiritual lord of the village lives in it. *Putsanq* is a sacred forest in which any trees are forbidden to cut.

Next to the village forests is *ghaqtsanq*—protected forests (Belt III in Fig.2). The lower part of *ghaqtsanq* (lower than the village) is usually set aside for a village cemetery *lawqbymr*, while the upper part is usually preserved as watershed forests *hmqmaer aqtsanq*. The village cemetery is also called “*nyirpu dzanrghar*,” meaning “the village of ancestral spirits.” The cemetery grove is a sacred place in which any human activities other than funeral ceremonies are forbidden. Except a few locations, the watershed forests are not sacred - hunting, fishing and collecting non-timber forest products are allowed. Those sacred locations include a stream where holy water *uirshawr lawrkhawf* is fetched and a grove of the Earth Lord *Mirsanr*. Any offering or sacrifice needs to be purified by the holy water before it was offered to great gods/spirits. Each village also chooses a big tree in the protected forests as a habitat of *Mirsanr*, the Earth Lord. Each village sacrifices a pig annually to *Mirsanr* in front of the tree. One such protected forest in Mengsong is *Sangpabawa*—Royal Rattan Forest, which serves as watershed forest as well (the management of *Sangpabawa* will be elaborated in the section 2.3.4).

The next area of the land (Belt IV in Fig.2) is *miqhaeflafghaw aqqanq*—firewood forests where firewood as well as timbers are collected. These forests tend to become agroforests as the understory is often cleared and planted with crops such as tea trees, indigo plants, bamboo, and even rattan in some places like Mengsong. Tea agroforests are outstanding among this type of land use. The tea agroforest may not be an invention of Akha people, yet dozens of such tea gardens under forests, hundreds of years old, can be found in Akha villages in Mengsong, Nannuo, Bulang, and Daheishan Mountains in

Xishuangbanna. It is one of the oldest agroforests in the world that are maintained very well and still under good use today (Long 1997).

Another area (Belt V in Fig.5) is *nyoqjawrkmrtuiv aqganq*-fenced buffalo forests. Water buffalos have been the most valuable animals in Akha societies. It is not only because water buffalos are employed as the sole plowing labor in irrigated paddy fields (where it is practiced). More importantly, in Akha culture the highest honour for the deceased at a funeral ceremony is to sacrifice a water buffalo for him/her. Each village also sacrifices a water buffalo collectively for their ancestors at a festival called *ghawla aqpoeq* in summer every year. So, no matter whether there are irrigated paddy fields that need water buffalos, Akha people love to raise water buffalos whenever their economic and environmental conditions are allowed. They usually keep those animals in a fenced hill or two with pastures and bushes. These pastures are usually the fallowing lands of their previous swidden fields, and thus rotated as their swidden agriculture does.

The outer most belt of the land is *yarmrjawqxm q aqganq*—"arable" lands (Belt VI-1 in Fig.2). I put the term "arable" in quotes because there may be many sacred groves and sites—*yawkhawr* in this belt which are taboos for farming. These sacred groves and sites include, but not limited to:

- 1) Habitats of sacred animals and birds such as lorises, wild buffaloes, rhinoceros, pangolins, peacocks, eagles, hornbills, crows, wild geese, and among others. These animals and birds are believed to belong to *naef* or to have powerful spirits themselves. It is a taboo—*dawr* to encounter or kill these animals and birds. Certain animals (like lorises) and birds (like hornbills) only live in undisturbed primitive forests.
- 2) Habitats of monkeys—*myofyaf*. Monkeys tend to nestle and sleep in primary forests.
- 3) Groves where sacred fig trees grow. These sacred trees are characterised as being capable of parasitise other trees or even kill the host eventually (according to a botanist Prof. Wang Hong from Xishuangbanna Tropical Botanical Garden, the Chinese Academy of Sciences, there are more than twenty such species like *Ficus curtipes*, *F. virens*, *F. hookeriana*, *F. altissima* Bl., and *F. religiosa*). These fig trees are lumped in a name *nyawr-dzanr* in Akha (which can be further distinguished as *nyawr-nav*, *nyawr-kawr*, etc.). These trees are believed to be homes of *naef*. These kinds of sacred groves are termed *nyawrdzanr tsaqlauf* (when these trees grow from the ground independently) or *nyawrdzanr nyoerdawf* (when these trees parasitise other trees) in Akha.
- 4) Groves where a *loqkawv* tree (*Terminalia myriocarpa* Heurck) or a *uirnmq* tree (*Salix tetrasperma* or *S. araeostachys*) grow. These trees are also believed to be homes of *naef*. They only grow along with streams in tropical forests.
- 5) Groves where a *shirsav* tree (*Schima argentea* or *S. wallichii*) or a *tsuifganq* tree (*Betula alnoides* var. *pyrifolia*) is attached by epiphytes or parasitised by other plants. This phenomenon only occurs in a primitive or old-aged forest. It is called *shirsav nyoerdawf* or *tsuifganq nyoerdawf* in Akha.
- 6) Springs—*cuq*, swamps—*lanyaq*, and natural lakes/pond on mountains--*danrlan* where the spirits of water are believed to live. Particularly those where wild animals drink and bath.
- 7) *Tsaqdzaq*—a special place where wild animals eat dirt, clay or salt.

- 8) *Mirbyav*—a place where a landslide occurred. Akha believe that dragons make landslides happen.
- 9) *Mirboe*—a natural cave.
- 10) *Mirdzmr*—a place where a stream flows through under it, like an earth bridge.
- 11) *Uirpanq*—a place where a stream disappears under the ground.
- 12) *Logur*—a place where huge rocks lie. Huge rocks are believed to have powerful spirits.

All these sacred forests and sites are domains of *naef* or spirits, and forbidden for any human activities including collecting, hunting, and farming. Thus they are maintained almost totally primitive, like core areas of today's natural reserves. Interestingly, all these sacred groves and sites are ecologically significant. For instance, according to a famous Chinese ecologist Prof. XU Zaifu, ex-director of Xishuangbanna Tropical Botanical Garden, the Chinese Academy of Sciences, figs are key species in the ecosystem of tropical rain forests as they play key roles in maintenance and re-establishment of the ecosystem when it is disturbed (Xu 1994), and Akha sacred groves protect these species (e.g.3). Moreover, *Terminalia myriocarpa* is a dominant and representative species in tropical rain forests, which is protected by the Akha (e.g.4).

These sacred groves and sites tend to protect water sources (e.g.4, 6, 10, 11) without which tropical areas would become deserts. Many sacred groves tend to be primitive forests (e.g.1, 2, 5), while other sacred sites contain ecologically fragile locations (e.g.6,8,12). Many of these sacred groves and sites are also animal friendly (e.g.1, 2, 3, 6, 7, 9). These taboos were effective measurements that would minimise any possible harmful damages of Akha swidden agriculture to the ecosystem. Observation of these taboos guaranteed that practices of swidden agriculture could only open some dispersed plots in the forest sea, which was the case in the past prior to 1950.

All the lands outside of the taboos in this belt are allowed for agricultural activities. Traditionally, these lands do not belong to an individual, but are owned by the village collectively. More accurately, these lands are believed to be owned by the spiritual lords, *yawsanr* by the animist Akha. Therefore, even in a place out of these taboos where swidden agricultural activities are allowed, Akha people cannot do anything without respect to the spiritual lord of the land. Anyone willing to farm the lands should ask permission from the *yawsanr* first. Akha people then “sign a lease” with and pay “rent” symbolically by sacrificing animals such as chickens to the spiritual lord, which is called *yarpoeq gaw-eu* or *yarlawr lawr-eu* in Akha. By doing so, the land temporarily becomes domesticated, inside, and thus safe for agricultural activities. After harvesting, they do another ceremony (which is called *banqyoe pave-eu* in Akha) to return the land back to the *yawsanr*; thus it becomes a part of the outside world again. The “lease” is only valid for one year. So, in case a field needs to be used for more than one year, the “lease” needs to be renewed annually, and the ceremonies need to be performed annually.

As swidden fields physically as well as symbolically become the domesticated inside, they also temporarily become the “second village” for the Akha people. Every family builds a *yarcmr* (field house) in each swidden field. Part of the family stays in this shed

seasonally, when intensive labor is needed in the field, such as during weeding and harvesting time. In some cases, some family members go to live in the fields during the whole season of crop growing, or even year-round if there are enough people in the family who can take care of other activities both in their village and other fields. This kind of farming residency is called *yarkhang* in Akha, meaning “field village,” which is temporary. Many *yarkhangs*, however, become bases for a permanent residency, especially when the population in the mother village becomes too large and/or their swidden fields are too far from the village. This is one of the commonest patterns how new Akha hamlets or villages develop, and how Akha people migrated with their swidden fields in the highlands of Mainland Southeast Asia until a few decades ago. This may be the reason why they are called ‘shifting cultivators’.

Though the main crop is rice, a swidden field is another area of high biodiversity. Rice is intercropped with taro, chilli pepper, ginger, sorghum, sunflower, pumpkin, wax gourd, cucumber, muskmelon, Job’s-tears, sugar canes, egg plants, banana trees, and many other crops. I have found 155 species of crops and plants used for food, medicine, entertainment, and religious purposes in Mengsong swidden fields, and many of them are planted in a small garden surrounding the field house, like home-gardens in villages (Wang *et al.* 1999). Akha usually crop a swidden field for one to three years. Many rice varieties are used in rotation for multiple years of cropping. Some 30 rice varieties are grown in a single year by different families in Mengsong village (Wang *et al.* 1999). Rice is usually rotated with cotton, maize, peanut, and soybean, too. Once a field is not good for cropping, then it will be fallowed, ideally for 13 years.¹⁶ But a fallow field is not totally abandoned. Sometimes perennial plants such as tea, rattan, and bamboo are intercropped or rotated with rice. Such a swidden field will become an agroforest as it fallows.

As we can see, in the practices of swidden agriculture, most intensive interactions between people and spirits occur through constant switches between the outside and the inside. Since Akha people believe that any improper conduct may get a punishment from the nature (spirits) and cause a disaster, they prefer to develop those arable lands into irrigated paddy fields wherever it is possible—environmentally and economically, in order to avoid or reduce any unnecessary interaction with the spirits. Being permanent farming lands, these paddy fields are regarded almost completely domesticated, and thus are part of the inside (Belt VI-2 & VI-3 in Fig.2). Indeed, the early settlement history of Mengsong Akha community shows that the reason they moved to Mengsong from Nannuo Mountain in Menghai County was to turn the Mengson Basin to paddy fields (Wang 1988).

¹⁶ This is a culturally lucky and meaningful number for the Akha. There are twelve animals naming different year and every single day. When it goes around a circle and comes back to the beginning animal (year or day), it is 13. The Akha call such a circle as *yae* (*nan-yae* is day circle, *ho-yae* is year circle), and use it as a unit for calculating ages such as one *yae*, two *yaes*, and so on. On the 13th day after a baby born, there is a big celebration in the family: the new parents will bring their baby to the mother’s side of the family, asking for a good fortune for the baby’s future. When s/he comes in his/her 13th year, s/he will be treated as an adult by the society. In sum, the number is associated with an adult, mature being, somebody that can protect him/her from *naef* and other evil spirits. In the same way, the fallow land was believed to become “mature” to be cultivated again in 13 years, and should start another life circle.

The land uses of an Akha village are thus represented in term of distance from humanity (inside) to wilderness (outside). From the village with home-gardens—the centre of people’s world—to paddy fields, swidden fields, agroforests, firewood-timber forests, watershed forests, village protection and scenic forest, cemetery, and finally to various sacred forests and sites—the centres of the *naef’s* (spirits) world. This distance is not physical, but cultural, on the Akha’s mental maps, reflecting various extents of density of Akha people’s interactions with their environments. One more interesting phenomenon needs to be pointed out here is that an Akha community will always put their farming lands, especially swidden lands, at the outermost circle of their homeland. The reason for this is very practical. It is not only an effective strategy to protect their villages from the fire used in the swidden agricultural activities, but also an effective strategy to expand and protect their territory because the *de facto* use of the land was the most effective way of establishing a legitimacy of the ownership in the traditional land tenure system of this region in the past.

Though it is demonstrated through a case study of Mengsong, I argue that the system of “sacred ecology” of natural resource management was prevalent in most Akha villages in Mekong region 50 years ago.¹⁷ This was discussed and confirmed by 40 Akha experts (most of them are knowledgeable elders from 12 Akha villages) at the Akha villagers’ workshop in Mengsong, Menglong Township, Jinghong Municipality, Yunnan Province, China, on February 20-25th, 2008. Though variations might exist in different villages according to their locations, all of those elements should be expected in all traditional Akha villages. This is further confirmed by many Akha classic poetic songs in which the landscapes of Akha homelands are always portrayed exactly as I described above. For instance, a classic song that has to be sung in a wedding ceremony depicts a journey passing the groom’s village’s *putsanq* (village protection forest), *ghaqtsanq* (protected forests), *miqhaeflafghaw aqganq* (firewood forests), *nyoqjawrkmrtuiv aqganq* (water buffalo forests), *yarmrjawqxm q aqganq* (arable lands with agricultural fields), and *mirma cerganq* (vast wild forests), then entering the bride’s village’s homeland with the same landscapes in reverse order. This kind of landscapes can be still seen in some old Akha communities in Xishuangbanna (e.g. in Mengsong and Nanpen in Jinghong Municipality and Nannuo, Bulangshan, and Bada in Menghai County) and in Myanmar (eastern Shan State) and northern Laos (e.g. in Phongsaly) (My personal observations). However, these kinds of landscapes, along with the associated sacred ecology, are disappearing in most Akha villages in Mekong the region for various reasons. These changes will be addressed through case studies of Mengsong and Baka in Xishuangbanna in section 3.

¹⁷ The exception would be the Christian Akha villages in eastern Shan State of Myanmar, who were converted by American Christian missionaries in 1940s. There have been more and more Akha communities converting into Christians (either Baptists or Catholics) in Myanmar and Northern Thailand since then. Since they regard Akha traditional beliefs as of evil religion, we should expect changes of natural resource management by the Christian Akha. But the questions that how these changes would occur and what the ecological consequences of these changes are beyond the scope of this study, though they remain as a very interesting topic for future studies.

Akha traditional hunting and fishing

Hunting and fishing had been important means of acquiring animal protein to Akha diets (Wang 1998), supplementing swidden agriculture. The most common tools of Akha traditional hunting were various traps and crossbows. They could purchase handmade power-driven guns from the Dai people, but the guns were still a luxury possession of a few rich families prior to 1950, and firing the guns were subject to weather conditions and other chances, especially as exposed gunpowder needed to be lit by striking a flint stone. Being mostly passive in nature (except crossbows and a few guns), killing from these hunting methods was limited and not destructive in nature.

The most common fishing methods were using plant poison, fish nets and hooks, or draining a portion of a stream. Though fishing methods were more active in nature, they were not destructive either. The plant poisons were mild and usually not able to kill fish but only made them faint temporarily. These poisons were diluted by the flowing water soon and they were easily broken down (they needed to be used when fresh). Draining a portion of a stream was only conducted where the course of the stream could be diverged shortly—usually within one hour, so that a portion of the stream—usually ranging from a dozen to a few dozen meters—could be drained and fish in that portion of drained stream could be caught.

Moreover, Akha people chose certain seasons to hunt and fish. They tried to avoid animals' reproductive seasons. Akha's seasonal hunting and fishing behaviors were regulated by the moral codes based on their belief of *lanq* and *dawr*. *Lanq* can be translated as "luck" while *dawr* is opposite to it. They believed that it was the "luck" that made their hunting successful (actually, this belief was not limited to hunting but was applicable to anything). A person could get luck only through his/her appropriate behaviors. Any behavior that would cause a bad luck was labeled as a *dawr*. So, a *dawr* was a taboo to Akha people. For instance, it was a taboo or *dawr* to encounter any mating wild animals. It was also a taboo to kill pregnant games. These taboos prevented the Akha from hunting during reproductive seasons.

Additionally, any Akha person was limited to kill no more than nine big game animals, called *khawqkhe shaq*¹⁸ in Akha, in any given year. Similarly, this rule was regulated by the belief of *lanq* and *dawr*. It was believed that excessive killings in a given year (a successful kill was a sign of good luck) would lead to bad luck in future hunting as excessive *lanq* (luck) could turn into *dawr* (bad luck). This was especially effective in preventing from killing pregnant animals since all the unborn fetuses were counted as separate individuals in this regulation.

¹⁸ *Khawqkhe shaq* refer to games that need to be announced publicly by a specific bamboo musical instrument called *khawqkhe* when they are killed. These games include, but not limited to, red deer (*haqtsaev*), wild boars (*ghaftef*), bears (*haqghmr*), and antelopes (*yaq*). In a traditional Akha village, when a *khawqkhe shaq* was killed, a front leg of it had to be given to the village chief *Dzoeqma* as a tribute.

Furthermore, Akha people only killed as necessary and paid respect to the game animal. Akha people conducted a ceremony to ask permission from the spiritual lord of the animals before they went out for hunting. The ceremony was an augury. Whether they could conduct the hunting next day or not was determined by the result of the augury. A killed game animal needed to be announced by certain musical instruments¹⁹ to show respect to the killed and a ceremony needed to follow to comfort the spirits of the killed. The spiritual lord of the killed was thanked for his/her permission to kill the animal by being offered with a slice of raw meat from each part of the animal as well as with a slice of cooked meat from each part of the animal before it allowed to be eaten by people.

Last, but not the least, certain animals and birds were not hunted by Akha people due to their sacredness. It was taboo or *dawr* for the Akha to even see some sacred animals and birds like lorises, pangolins, wildcat, and wild geese. There were other sacred animals and birds were forbidden to be killed, including wild buffaloes, elephants, rhinoceros, tigers, leopards, hornbills, crows, swallows and peacocks. If some these animals were killed accidentally by the traps, or had to be killed for the purpose of defense or protection, certain ceremonies would need to be conducted to pacify the spirits of the killed and ask forgiveness. This would make sure that the spirits of the killed will not seek revenge on the killers and the consumers.

Commercial cropping and private properties of the Akha

Commercial cropping and market economies are not modern things to Akha people. A lot of Akha oral poems, created when their ancestors lived in *Jadae* back to about a thousand years ago, depicted how Akha people sold gingers and bought salt and other goods in the big market of their capital town *tmqlanr*. After Akha people migrated into Sipsongpanna and finally settled in its numerous mountains, tea and cotton became two major commercial crops. Most Akha people in villages located at higher altitudes like Mengsong—that is, higher than 1000 masl—grew tea as their major commercial crop; while those located at lower altitudes (like Baka) grew cotton as their major commercial crop. They exchanged tea or cotton with salt, silk threads and cloth, beads, and other goods in barter trades; or exchanged them with food stuffs (especially rice when they did not produce enough rice in their swidden fields, as upland rice cultivation was more subjected to weather conditions) and cotton cloth in barter trades with lowland Dai people; or sold them simply for cash (various silver coins).

Influenced by the colonial economic policies of French Indochina and British East India, poppy opium cultivation gradually replaced tea to become the major commercial crop in many Akha villages at higher altitudes since late 19th century. However, most profits from opium were captured by the traders, not by the growers. Therefore, the opium traders became the richest families in Akha societies. They purchased and accumulated more and more private properties, especially irrigated paddy fields and tea gardens, with the

¹⁹ Killings of different kinds of animals were announced by different instruments, besides the *khawqkhe*, for instance, killing of a muntjac deer needed to be announced by a *laejaq*, a clarion made of water buffalo's horn.

profits generated from opium trading. Meanwhile, families with opium addicted members became the poorest as they lost assets private properties to purchasing opium.

This could be well demonstrated by examining the resource distribution among the six Akha villages around Mengsong Basin. For instance, Dongfanghong villagers were the newest arrivals (in 1930s) among the six, coming to Mengsong almost two hundred years later than the first comers (in middle 18th century), and yet they were the richest in terms of lands (such as paddy fields and tea gardens) owned by early 1950s, because most of them came to Mengsong as traders and many of those were involved in opium trading. In contrast, Hongqi villagers were among those first comers, but accumulated a lot of debts to the opium traders of Dongfanghong village due to opium addiction. They then gradually lost most of their paddy fields and tea gardens to Dongfanghong village in paying their debts, and finally became the poorest village in terms of private properties owned by the early 1950s. In other words, uneven production, trade, and consumption of poppy opium accelerated socio-economic differentiation among and between Akha villages in some places like Mengsong where some of their population involved in trading opium while others involved in consuming it.

However, in other places like Baka where there were no opium traders but more and more people became opium addicted, but socio-economic differentiation tended to be leveled. For instance, Baka village was once one of wealthiest Akha communities in Menglong area. Since it was located lower altitude—almost all of their lands are below 1000 masl, food production (particularly rice) from their swidden agriculture was more secured in Baka than in Mengsong, so, cotton could be sold for more income (silver coins) for Baka villagers than tea could do so for Mengsong villagers. It was the major reason why Baka villagers could accumulate wealth prior to opium introduction to this area. It was said that the Baka's wealth even surpassed that of lowland Dai villages. Of course, since wealth accumulation was uneven among families, socio-economic differentiation was obvious, and this was reflected in types of houses different families lived. The rich lived in *nymrgor* (two-story houses, usually covered with tiles) while the poor in *nymrawv* (one story houses, covered with grasses).

There were no places in Baka where opium poppies could be grown, but also there were no opium traders in Baka. When more and more Baka villagers had become addicted to opium, their cash wealth (i.e., silver coins) was soon depleted from opium purchase. The rich also became poor like the poor. Therefore, the previous differentiation of socio-economic structure disappeared along with opium introduction in Baka village.

In terms of input-output ratio, poppy opium cultivation was more economically rewarding than any other traditional crops in Akha societies. The cultivation technique was very simple. The seeds just needed to be broadcast sown on cleared fields in winter. The fields were usually the harvested corn or rice swidden fields that did not require much work to be cleared. The rewards were very high due to its high price in market compared to other crops. Thus, it became easier and more economic for the Akha people (and other highlanders) to grow poppy opium, sell opium, and then buy foodstuffs (particularly rice) from the lowland agriculturalists (especially Dai people).

This is not the only main reason why poppy opium cultivation was so prevalent in the highlands of mainland South-East Asia, including Yunnan province of China. Opium was also used as omnipotent medicine in this area, but it was so easily abused. A lot of opium consumers became addicted since there were no any effective social or cultural measures, to prevent them from becoming so. Since opium addicts became too lazy to work in their rice fields or perform other economic activities as they used to before, it was easier for them to grow a smaller plot of opium instead. However, often the opium produced was insufficient for their own consumption. Many opium addicts had to deplete their previously accumulated wealth, if any, to purchase opium and food. It was a hard and vicious cycle to break. This is one main reason why the opium growing mountainous areas in SEA have remained among the poorest regions in the world for so long. While this vicious cycle was already broken in Yunnan in early 1950s, it continued in some other parts (especially in Myanmar and Laos) until recently, when various opium replacement projects sponsored by China were initiated (Shi 2008).

Management of Sangpabawa by Mengsong Akha community

Because of its economic and political importance, the Mengsong community established a rattan conservation area called *Sangpabawa* about 150 years ago. The term *Sangpabawa* is a combination of Akha and Dai words—*sangpa* means “ruler” in Akha, *ba* means “forest” and *wa* is from *wai* meaning “rattan” in Dai. So *Sangpabawa* means “Royal Rattan Forest”. The development of the term and existence of the “Royal Rattan Forest”, managed by Mengsong Akha community, reflects the political and economic relationship between upland Akha societies and the lowland Dai state in Sipsongpanna. In the past, rattan was one of the major tributes paid by the chief of Mengsong to the *Sangpa* rulers of the lowland Dai state, in order to avoid political and military conflicts.

Rattan is a multi-functional resource. As a necessary material for making many productive tools and furniture, rattan has been one of most valuable natural resources to Mengsong Akha community. Also, its young stem and leaves are a tasty vegetable, and its fruit are rich with nutrition.

Before *Sangpabawa* was established, the forest had been called *Naqmui Sanqkhav*, meaning “forest of *Naqmui*.” *Naqmui* is the name of the stream running in the forest from which five out of the six Mengsong Akha villages get their drinking water. *Nawmui* is also one of two streams (another is *Navciq*) from which Mengsong Akha irrigate their paddy fields on Mengsong Basin. Therefore, the forest had been protected as watershed. It also happens that there are abundant sources of rattan in the forest. There are four species and five varieties of rattan well preserved in *Sangpabawa* by Mengsong Akha community. These species and varieties are, respectively, *Calamus nambriensis*, *C. nambriensis* var. *alpinus*, *C. nambriensis* var. *menglongensis*, *C. nambriensis* *sishuangbannaensis* (all varieties of *Calamus nambriensis* species are called *dahm* in Akha), *C. obovoideus* (*shawlaw* in Akha), *Plectocomia himalayana* (*hachiv* in Akha), *C. yunanensis* (*lae-laenyu* in Akha), *C. yunanensis* var. *densiflora* (*lae-laeshui* in Akha), *C. yunanensis* var. *intermedius* (*lae-bawlae* in Akha) (Wang et al. 1999).

Good management is essential in order to preserve this valuable resource. Rattan grows slowly and can't be harvested until after at least 15 years of growth. Also, the ability of rattan to sprout is very poor: *lae* cannot sprout at all if its top is cut; *dahm* can only sprout from roots, so a stem will stop growing if the top of the stem is cut; only *hachiv* can sprout from stems, but this species is of the poorest quality for weaving material. The importance of rattan can be illustrated from the name of the forest in Mengsong. There are six regulations known by all villagers to manage *Sangpabawa* (Wang 1998):

- 1) Nobody can cut any trees in the forest, but wild fruits and medicines can be collected.
- 2) Nobody can collect the tender rattan leaves for vegetable. The stem is also forbidden to use individually. Only the fruit can be used for private cultivation and food.
- 3) However, before the plowing, every family can harvest rattan, one stem of approximately 20 m long for each household, which is used in making tools for plowing.
- 4) Every year in late July or early August there is a festival called *Yaerkuq*—the swinging festival. Each village can harvest several stems (2 to 4) for making the rope of the swing. It is an opportunity to show the beauty and the unique knowledge of Akha people. This festival takes place right after the tedious farming work of transplanting rice seedlings. There is a folktale to explain the origin of the festival. It tells that all the spirits of animals and insects killed during rice cultivation accused the Akha of these crimes to the supreme God *Aqpoeq Miqyaer*. The God promised to punish the Akha by hanging them one by one. However, because of his preference of Akha people over the animals, the God cheated the spirits by asking Akha people to swing one by one instead of hanging one by one. Swinging looked like hanging from distance, so all the spirits of the killed animals were happy with the “punishment”. This story reveals an Akha philosophy that cultivation requires “destruction” but within the extent that harmony with nature and supernatural beings can be restored.
- 5) When a family prepares to build a house, they can harvest about 25 Kg of rattan as binding stuff during building. In the past houses lasted only 10 years, now they are bigger and better built and last around 30 years.
- 6) If a villager breaks one of these rules, the family punishment is to sacrifice a large pig and offer a bottle of rice wine to be cheerfully shared with all villagers.

The regulations were discussed among all villagers, and approved by the Community Elders' Council (which was a loose political organisation composed of the chief and elders from each patrilineage). Every villager is responsible for keeping their eyes on the rattan forests. The punishment for the law-breaker is a big matter in the community. The economic loss may not be important, but loss of face is really a serious matter in Akha society. I have witnessed that some Akha people will commit suicide simply from loss of face. So, they are not only environmental laws, but also, and maybe more to the point, social, moral and ethical standards. The power of the laws is from their cultural value and social institutions act to ensure effective implementation.

Because of its importance and scarcity, Mengsong Akha also started domesticating and planting rattan a long time ago. Most of the families have their own rattan bushes now, either in natural forests or home-gardens or both.

Conclusions and discussions

Contrary to perceptions commonly held by some people in Chinese and elsewhere in the Mekong Region that traditional shifting cultivators are deforesters, prior to 1950 the Akha people (the largest group of swidden farmers in Xishuangbanna) contributed quite significantly to conserving forests and biodiversity in this region through their sustainable natural resource management system. This conclusion is supported by the following evidence:

- About 70-80% of Xishuangbanna's lands were covered by natural forests before 1950 (Gao, 1999).
- One of the best tropical montane rainforests in Xishuangbanna has been preserved by Mengsong Akha community (Wang *et al.* 1999).
- The most important rattan resources in Xishuangbanna have been preserved in the *Sangpabawa* community rattan forest in Mengsong. *Sangpabawa* is about 200 ha in area according to GPS measurement in 1995 (Xu 1997). Some sampling studies show that there are about 15,000 bushes of rattan in *Sangpabawa*, which could produce about 10 tons of rattan per year (Chen *et al.* 1997).
- A lot of local wild animals (such as tigers, leopards, golden cats, lynxes, bears, deer, antelopes, monkeys, loris, among others) and a lot of birds (such as hornbills, peacocks, eagles, among others) were still abundant until 1960s (according to my key informants), and most of them were sacred animals and birds of the Akha people.
- Akha communities had created and maintained very high level of agro-biodiversity in their swidden agriculture and home-gardens. For instance, over 155 species of crops and useful plants and 30 varieties of rice were planted in Mengsong swidden fields, and 227 species of useful plants were planted in their home-gardens in 1997 (Wang *et al.* 1999). Scientific research suggests that planted stands in the home gardens of various ethnic groups in Xishuangbanna are an effective *ex-situ* conservation of wild plants like *Acacia pennata* (Gao and Li 2008).

6.3 Transformations after 1950

We have explored how Akha societies managed their natural resources (especially lands, forests, and wild animals) in Xishuangbanna prior to 1950 in previous sections. Now let us examine how the Akha people have been changing their strategies in natural resource management under the impacts of various national and local policies in Xishuangbanna. The major policies that will be examined here include: the Land Reform Act of P.R. China in 1950; the Commune System under centralised plan in 1957-1977 (impacts of two

significant social and political movements—i.e., “Great Leap Forward” in 1958-1960 and “Great Proletariat Cultural Revolution” in 1966-1976—will be discussed here); the Economic System Reform in 1978; the Household Contract Responsibility System in early 1980s; the Natural Forest Protection Project (also known as the “logging ban”) in 1998; and the Land Conversion Project (also known as “Grain for Green”) in 1999. These can be roughly put into two major historical phases of People’s Republic of China: phase I—Mao Era (1949-1977) and phase II—Post-Mao Era (1979 up to today).

In terms of rural economic (agricultural) policy, Mao Era is characterised by the Commune System under a centralised-plan oriented economy, while Post-Mao Era is characterised by the Household Contract Responsibility System based on a market-oriented economy. Since the commune system was operated quite homogenously in the Akha communities in Xishuangbanna during Mao Era, it will be addressed in section 3.1. However, because the economic reform and the Household Contract Responsibility System have driven the Akha (and other mountainous) communities in Xishuangbanna into different directions in terms of natural resource management according to the altitudes of their locations, I have decided to address them in two separate sections 3.2 and 3.3. Section 3.2 will examine dynamics of natural resource management in Akha communities located higher altitude (higher than 1000 masl), as exemplified by Mengsong community; while section 3.3 will explore those in the Akha communities located lower altitudes, as exemplified by Baka village.

Mao Era (1949-1977)

China passed the Land Reform Act on June 28, 1950.²⁰ The purpose of the Act was to abolish the feudal ownership of land (or means of production) through confiscating arable lands, agricultural tools, labour animals, and even surplus foodstuffs from the land lords “*dizhu*” and kulaks “*funong*” and then redistributing them among all the peasant farmers, ideally within each township. A land reform was accomplished according to the act in most parts of China by 1953. In the meanwhile, China was undertaking the nation-wide policy of “Socialist Reform of Private Ownership of Means of Production” (i.e. Collectivisation) in industries, which was accomplished by 1956. The collectivization of means of production was the fundamental achievement of the “First Five-Year Plan” (1953-1957) of P. R. China. As a result, the state and collective economy contributed to 92.9% of the total national income in 1957, compared to 21.3% in 1952.²¹ This achievement had paved a path for the Chinese socialist economy under centralised plans.

With a combination of exigent desire for changing the poverty-driven China with an ideology of belief in the superiority of socialist mode of production over capitalist and other modes of production, the Mao-led new Chinese government launched the “Great

²⁰ The act is available on the webpage of the Ministry of Agriculture of People’s Republic of China’s website at http://www.agri.gov.cn/zcfg/t20030624_94255.htm.

²¹ Sources come from Xinhua News Agency at <http://www.xinhuanet.com/report/16j5zqh/index.htm>.

Leap Forward” in 1958, claiming that the economy of China would surpass that of the United Kingdom in five years and would catch up with that of the United States in ten years. It was believed by Chairman Mao and some other leaders of China that the nation would accomplish its socialist development in five years before moving to a communist society. In rural China, collectivisation occurred soon after the land reform was finished; and by 1958 most parts of rural China were organised under the commune system, in which all the means of production (e.g., lands, crops, livestock, fish ponds, forests, etc.), agricultural production activities, and even consumption of the products (e.g. food) were collectivised *en masse*. “The larger the scale was, the greater the commune economy would contribute to the construction of socialist-communist society!” With no exception, all the Akha communities in China had become part of the people’s commune system by 1958. Ironically, contrary to the intention to leading the national economy to a take-off, the “Great Leap Forward” movement under the commune system triggered the biggest famine in the history of P. R. China in 1959. Deteriorating situations forced the Chinese government to abort the movement in 1960, but the famine continued until 1962. The famine is referred as the “Great Famine” in China, which caused numerous deaths. It is impossible to know the exact number of the dead in the famine as China is still trying to cover the fact up to today, but it is widely believed that the “Great Famine” is one of the most severe catastrophes caused by misconducts of a government in the human history. The last national disaster from the Mao Era is the “Great Proletariat Cultural Revolution” (1966-1976), which destroyed much of the cultural heritage and traditions of both the majority Han and minority nationalities. It was launched by Chairman Mao under the name of “protection of the proletariat government”. However, the real reason seemed to be his personal fear that his dictatorship in the government was becoming threatened as he aged.

The Akha traditional natural resource management system, including their swidden agriculture, was not significantly affected by the land reform as the means of production controlled by those few rich families were not significant for the Akha economy as a whole.²² However, their management system was totally dissolved during the “Great Leap Forward” and the “Cultural Revolution” movements.

First of all, the Akha traditional land tenure system and ownership system of other resources were abolished. Most natural resources (i.e. swidden lands, forests, etc.) were common properties in traditional Akha communities, while other certain properties such as permanent paddy fields, livestock, tea gardens, bamboo and rattan bushes, and other crops were subject to private ownership. All these common and most private properties (e.g., paddy fields, tea gardens, and big livestock such as water buffalos, cattle, horses,

²² Here I am referring Akha societies in general where collective ownership of means of production, especially arable lands and forests, were still prevailing in most Akha communities. Please note that there were some Akha areas in which feudal economy had been well established and substantial portion of arable lands (particularly irrigated paddy fields) were the private properties of a few landlord families such as in Xiding Township. In the latter cases, the Land Reform did bring significant impacts on local Akha communities, which forced some of the rich families to flee into Myanmar or even into Thailand.

goats, or even bamboo and rattan bushes) were confiscated and became communal properties in 1958.

There is an essential difference between the common and the communal properties. As it is showed in previous sections, the common properties (e.g. swidden lands, forests, etc.) were co-managed by the whole community, in which households had the rights to choose where and how much to farm in the allowed swidden lands and individuals had the rights to choose when and where to hunt and fish, as long as they observe those taboos and regulations agreed by the whole community; and the products generated from those activities still belonged to the households and individuals.

In contrast, the commune system deprived people/households of the political and economic independence, and severely restricted individual freedoms; decisions were made by the central government and orders were issued from top to down; the whole commune carried out their activities according to the orders from the above; products generated also belonged to the commune, subject to redistribution of the state. In other words, a commune is like a working unit of the state, which was under total control by the state.

Therefore, the commune properties were more like the state properties than anything else. Moreover, the Akha land use system based on their sacred ecology was abandoned. As an alternative, “slash-and-burn” agriculture²³ at large scale without observing those Akha land use taboos and regulations was promoted, under the slogan “Requiring Foodstuffs from the Uplands” during the “Great Leap Forward” movement. Furthermore, the traditional governing body of the *Dzoeqma*-led Village Elders’ Council was replaced with the people’s government led by the Communist Party and commune leaders who had no concerns about the environment, caring only about the production.

The commune system’s collectivisation, followed by the “Great Leap Forward” and the “Cultural Revolution” caused serious ecological, socio-economic, and cultural consequences to the Akha societies in Xishuangbanna. Ecologically, local ecosystems were destroyed and local biodiversity was threatened, along with huge deforestations in Xishuangbanna. The large scale “slash-and-burn” agriculture not only destroyed most sacred groves and sites in the traditional swidden areas, but also extended into the traditional non-farming protected forest areas.

Since the sacred forests/sites were regarded “superstitious” and labeled as parts of “Four Olds” (Old Thoughts, Old Culture, Old Traditions, and Old Habits) that needed to be eradicated during the “Cultural Revolution,” many Akha sacred forests and sites (including cemetery groves, watershed forests, the Earth Lord groves, and springs

²³ Though many people (including scholars) use the terms “swidden agriculture,” “shifting cultivation” and “slash-and-burn” interchangeably, I do want to distinguish them in my own way as demonstrated in this report. I use “swidden agriculture” as not only a technological term, but also a cultural term, which refers to a rotational farming (technologically)—rotations of both crops and lands—that is a part of the sacred ecology (culturally) with those taboos and rituals described in the last section. Though “shifting cultivation” is also a both technological and cultural term, it doesn’t automatically imply the cyclic nature of the system, and it also often implies “migrating along with their fields”. “Slash-and-burn” is just a simple technological term to me.

reserved for animals, and others) were destroyed either for agriculture where it was suitable, or just for the sake of the movement if the sites were not suitable for agriculture. In fact, all indigenous groups in Xishuangbanna practiced sacred ecology and each had their own holy hills or sacred forests. For instance, there were more than 1000 holy hills/forests preserved by the Dai people in Xishuangbanna, which took up about 5% of its total lands. Similarly, most of these holy hills and sacred forests were destroyed by the “slash-and-burn” agriculture under the revolutionary slogan “launch a battle against ghost mountains (referring to holy hills); ask for food from sacred forests” during the same time (Gao 1999; Pei 1984). Moreover, immeasurable areas of forests in Xishuangbanna and in all over the country were also cut down to fuel the nation-wide movement of steel-making during the “Great Leap Forward,” which marks as the most severe deforestation in the history of P. R. China.

As a result, big predators like tigers and leopards began coming to prey on livestock in the villages at a very high frequency, or even attacking people more often in Xishuangbanna in 1950s and 1960s since their habitats and natural food chains had been destroyed. Baka village unprecedentedly caught eight tigers and leopards in their traps around the village during that period of time. According to the Akha informants I interviewed most big wild animals such as tigers, leopards, bears, monkeys, deer (except muntjac) and antelopes had disappeared in most Xishuangbanna areas, except in natural reserves, by the end of 1970s. They attribute this to two major reasons: on the one hand, a substantial number of wild animals were killed by the state farm workers in their organised hunting; on the other hand, the remaining populations had fled to neighboring Burma and Laos as a result of loss of their habitats, destruction of their natural food chains, and threats of human predators.

Please note that the nature of the organised hunting was substantially different from those traditional ones conducted by the indigenous peoples like the Akha. First, the methods were different. The state farm workers were equipped with modern weapons (i.e., semi-auto or fully auto loading rifles) and trained hunting dogs, making their hunting more active, aggressive, effective, and destructive in comparison to traditional hunting methods. Second, the purposes were different. As supplement to their swidden agriculture products, hunting and fishing had been part of Akha’s traditional livelihood. However, although the workers of the state farms also consumed the meat of the killed, they had another mission in their organised hunting because many wild animals (such as tigers, leopards, bears, and boars) were labeled as “bandits” who came to steal people’s properties such as livestock and crops, or even threaten people’s lives, and needed to be eradicated along with those bandits who were active along the border with Burma in the 1950s and 1960s. Please note that many state farm officials were transferred army officials and many state farm workers were veterans who had multiple missions. Third, the extents of the killings were different. Unrestricted by those taboos and regulations, the state farm workers killed any animals and birds on protected lists, without restraint and in any season. Some of Akha’s sacred animals such as pangolins were even their favourite games because of their medical value in Chinese medicine system. Similarly, more

destructive fishing methods such as using chemical poisons as well as electric shocking machines were introduced by the state farm workers.

Socio-economically, Akha people in Xishuangbanna experienced the most serious and longest famine in their history—as far as their cultural memory could remember—during the “Great Leap Forward” in particular and through the whole commune system period in general. A lot of Akha informants from Mengsong, Baka, and other communities have told me that they dug up edible tuberous roots of plants such as *Dioscorea spp.* (or wild yam, *manq* or *arziv* in Akha) and peeled off the bark of certain plants such as *Phyllanthus emblica* (*ciqcaq* in Akha) in the forests for food during the famine time.

In some places like Mengsong, the famine was simply a result of their failure to produce enough food during the commune period. There were three major reasons. First, too many laborers were sent to build the Mengsong reservoir and the road to Menglong, which left too few for agricultural activities. Second, the commune economy did not motivate people to do their best. When the people worked and ate together, the reward did not respond to the effort. Third, as the large scale “slash-and-burn” agriculture did not follow the well established ecological rules embedded in those taboos, it resulted in low yields.

However, in other places like Baka the famine simply resulted from a systemic failure of redistribution and allocation of foodstuffs throughout the commune economy. It so happened that there were large areas of fertile forested lands in Baka and it was located at much lower altitude. This allowed the large scale “slash-and-burn” agriculture that produced very good yields in the short-term. Baka commune actually produced much more grain (rice) than they could consume, and yet most families were starving due to the principle of “redistribution according to work” (“an lao fen pei” in Chinese). As most Baka families had more children than adult laborers, they were not redistributed enough food.

For example, in my family there were six children and only two adults (parents). My family could only get food rations (mainly rice) for to two labourers’ work, and the food was only enough for half a year. My father was endlessly weaving baskets during evenings and had been exchanging them for some rice from some better-off Dai people throughout the whole period. My father made close life-long Dai friends through these exchanges. My mother also dug wild yams when not working at the commune farming, even if that meant evenings. I was told that when I was still a baby, my mother was cooking a vegetable soup while holding me. I peed into the cooked soup, but the soup was eaten by my whole family without wasting a drop, because the soup was the only dish with rice available. I personally remember that this hungry time continued until 1979, when private farming was allowed again. Ridiculously, most grain produced by the Baka commune was not redistributed within the commune, but expropriated by the state or sent out to other communes like Mengsong where food was more wanted. Many Mengsong Akha told me that they transported rice on cattle-back from Baka, a two-day journey.

Culturally, almost all Akha cultural traditions were forcibly abandoned for over two decades, and have not recovered since. The Akha were forbidden from conducting any of

their traditional cultural festivals, religious practices and agricultural rituals, or even wearing their traditional costumes, as all of these were regarded as “time wasting” and “burdensome” to production activities during the “Great Leap Forward.” These were further labeled as part of the “Four Olds” that needed to be eradicated during the “Cultural Revolution”. Those who dared to carry on any such cultural traditions would get a severe punishment. Village gates were destroyed and religious apparatus were burned. As a result, cultural identity (except language) was erased and cultural values were suppressed. Though most of the bans have been lifted since middle 1980s, only one cultural festival out of a dozen has been recognised by the local government. The fact that Akha people did not get punished from the spirits for destroying those sacred forests and sites (as they believed before), but do get punished by the state for not following its orders, had forced them to believe that the forest spirits were disappearing, or at least that their power was weakening, and that the Han Chinese (which is interchangeable with the state to the Akha people) were the wondering spirits with which they had to deal. They also came to believe that Chairman Mao was the supreme God who governed all creatures, including people and those spirits. Therefore, Akha people started believing that they would be blessed and not punished as long as they followed and listened to Chairman Mao.

Another effort to increase agricultural yields during commune period was to create more irrigated fields. In Xishuangbanna, this was done through creating a lot of irrigated paddy fields in numerous, not-yet-cultivated small valleys or making terraces on hillsides. In order to irrigate these new fields as well as to generate hydropower at some places in mountainous areas of Xishuangbanna, many reservoirs were constructed during commune period. Meanwhile, a lot of mountain-dwelling villages were forcibly relocated closer to valleys in order to make and cultivate paddy fields. Many of smaller villages were also ordered to settle down together in order to form larger communes. In Mengsong, aside from expanding the existed paddy fields on Mengsong Basin, many terraces were also made on hillsides - even though many of them were abandoned as the soil was not suitable for irrigation (the soil was too loose to hold water and landslides could not be prevented once irrigation was introduced).

The road connection between Mengsong and Menglong was completed in 1964 and a small hydropower station was established in Mengsong in 1965. However, soon Mengsong decided to build a bigger one, so building on the Mengsong Reservoir and hydropower station was commenced in 1970 and completed in 1978.

In Baka, many paddy fields were made in lowland valleys along three rivulets in lowlands: *Saexgeux*, *Khaqsaer*, and *Ngaqbof* in the 1950s and 1960s. However, the resettlement policy in 1967 forced Baka village to be relocated with a Baka commune, together with *Gawqghor Nyadzanq* village, at *Baqnor* by *Saexgeux* River.

The resettlement forced Baka village to abandon their paddy fields along *Ngaqbof* River because they were now too far away. In order to make more paddy fields, a decision was made to build a dam across *Saexgeux* River and the work was started in 1968. Since Bayi Reservoir (Baka was renamed as Bayi in 1958) was going to flood some parts of

Baqnor, Bayi Commune moved to today's location in 1971. *Bayi* Reservoir flooded 70 *mu* of Baka's paddy fields along *Saexgeux* village when the dam was completed in 1976. It was intended to irrigate 50 *mu* Baka paddy fields at *Dawqgui* and 100 *mu* at *Laersaq Dzanrtav*, but the latter was, more often than not, out of irrigation due to lack of water. Therefore, it is ironic that Baka village actually lost 20 *mu* of irrigated paddy fields due to the construction of the reservoir. Although the ecological impacts of the dam need to be evaluated through further studies, it is already known that the migratory route of the biggest fish (called *Ngaqbolo* in Akha) in *Saexgeux* River has been blocked by the dam. The fish need to migrate upstream for the purpose of reproduction.

It was almost impossible for Baka village to choose a culturally and ecologically appropriate place for its new location, Baka village has been uprooted from its cultural landscapes of sacred ecology through the resettlement, and the sacred ecology knowledge has largely been lost. A long term consequence of the resettlement, therefore, is that loss of traditional ecological knowledge, cultural identity and value attached to sacred landscapes is more serious among the Akha in resettled communities like Baka than for the ones in old settlements like Mengsong.

Mengsong in Post-Mao Era (1978 up to today)

Household Contract Responsibility System

Failure of the commune/collective economic system under the centralised plan has forced the Deng Xiaoping-led Chinese government to carry out a series of open policy reform initiatives since 1978, particularly the Economic System Reform in 1978. The purpose of the reform was to gradually replace the planned economy with a market-oriented economy. Even though China's rural reform did not start until early 1980s, the "wind of reform" and more open policy approaches began to flow into rural areas immediately, allowing commune members to carry out some private economic activities since 1979. Because of this atmosphere, after accomplishing the assigned commune productive activities, most Akha commune members in Xishuangbanna were also allowed to cultivate private rice plots on the so called "Zi liu di" (self-holding fields) or "waste uplands" if there was no "Zi liu di" in 1979. Thanks to these private cultivations, most Akha people in Xishuangbanna were liberated from the two-decade long starvation that year. This kind of experiment was conducted nationwide and its positive result encouraged the second generation of Chinese Communist leaders to carry out a nationwide rural reform in early 1980s.

The purpose of this rural reform was to liberate the forces of production in agricultural sector of China without jeopardising collective ownership of means of production (particularly lands). It was achieved through redistribution of a commune farming lands and other means of production (e.g., livestock, etc.) among its member households proportionally according to population size under a contract system called "Jiating Lianchang Chengbao Zeren Zhi," on the "Household Contract Responsibility System". A

dual tenure system is practiced here, in which the ownership and use rights of the lands are separated. The ownership is still collective, the lands cannot be sold. However, households are granted free-use rights of the contracted lands, including leasing out during the contract period. In return, the households need to pay annual taxes to the state in the form of grains and to the community (the land owner) in a form of cash proportional to the size of the contracted lands. The contract period was set for 15 years in 1984, but was amended as 30 years in 1993.

Agricultural lands and forests were distributed among member households in communes under the “Household Contract Responsibility System”. In China, forested areas are classified into two categories: forested lands (called “you lin di” in Chinese) that are covered by trees (forests) and waste uplands (called “huang shan”²⁴ in Chinese) that are covered by bushes and grasses. According to Chinese forestry policy, there are only two kind of ownership: the state and the community (or collective). However, during the commune period, the demarcation, tenure system and responsibilities were not clear. Therefore, the purpose of the forestry reform was to stabilise (“Wen Ding” in Chinese) the forest tenure system; demarcate (“Hua Ding” in Chinese) state and collective forestry lands; and clarify (“Que Ding” or “Ming Que” in Chinese) forestry responsibility system. In other words, the purpose of the forestry reform was to clarify the rights (ownership and use right), responsibilities, and benefits of the state, communities, and households in the management of national forestry. Therefore, forestry reform is also known as “Lin Ye San Ding”. Here “Lin Ye” means “forestry”; “San” means “three” and “San Ding” refers to “stabilising”, “demarcating”, and “clarifying”.

Another part of the forestry reform was to distribute or contract out a substantial portion of community-owned forestry lands to each household, according to population size within each community or commune. These forestry lands are identified in three categories: “Zi liu shan” (i.e., self-held forested lands, distributed), “Ze ren shan” (i.e., responsible waste uplands, contracted), and “Lun xie di” (i.e., rotational farming lands, contracted). This part of the forestry reform is also often referred to as “Liang Shan Yi Di”²⁵. Please note two things here: first, the rotational farming lands (i.e. lun xie di) are sorted out as “agricultural lands from forestry lands”²⁶; and second, “Ze ren shan” was designed to develop household-based forestry, but in Xishuangbanna’s mountainous areas where its traditional economy was based on swidden agriculture, almost all “Ze ren shan” was identified and/or used as “Lun xie di.” The total contracted area of “Lun xie di” (i.e.,

²⁴ In Chinese, “shan” literally means “mountain” or “hill”. Since most China’s forests exist on mountains, in Chinese forestry vocabulary, the term “shan” is often used to refer to forestry lands, including forested lands and waste uplands (bush or grass lands). Since a dual tenure system is practiced in China, in which ownership of the land and that of the trees are separated, the land ownership is termed “shan quan” while the trees ownership is termed “lin quan.”

²⁵ “Liang” means two, “Yi” means one, “Shan” refers to the forestry lands, “Di” refers to the rotational farming lands.

²⁶ This will be reconverted back to forestry lands later by the “Land Conversion Project” (i.e., “tui geng huang lin” in Chinese, literally meaning “returning farming lands back to forests”) in 1998.

rotational farming lands) in Xishuangbanna was 1,447,800 mu (equals to 96,520 hectares) in early 1980s²⁷, which takes up 5% of its total lands.

Let us examine the impacts of this rural reform on the Akha natural resource management in Mengsong communities (please see dynamics of land uses in Mengsong in annexes A). In Mengsong²⁸, *Sangpabawa* (the community rattan forest) and other watershed forests became state forests, while the remaining forests, particularly those traditional tea forests, were distributed as collective forests (“Ji ti lin” in Chinese) and household forests (“Zi liu shan” in Chinese) among those six Akha villages around the Mengsong Basin. Each village was distributed a collective forest, which would produce timber for the village. Each household was also distributed 5 mu of forest as self-held forest (Zi liu shan), which would provide firewood for the household. Each village’s traditional tea trees were also distributed among its households according to its population size.

However, a very complicated forestry tenure system was established by the forestry reform. Remember that all these forests belonged to the whole community (including those six villages) as common properties, while traditional tea trees were dispersed in the forests as households’ private properties prior to the Commune System. During the commune period, the smallest commune was formed based on a natural village as a basic productive unit, called “Shenchan xiao dui,” while the whole Mengsong community formed a greater commune called “Shenchan da dui”. Accordingly, all these private properties of a natural village were pooled together to form the basic commune’s properties, while those common properties became the greater commune’s properties.

Therefore, when it came to the forestry and agricultural reform in early 1980s, each natural village was distributed its collective forests and household forests according to its population, regardless of the traditional boundaries of natural villages; but tea trees were distributed among the households of a natural village (the basic commune) within its commune’s properties. This resulted in a village’s tea trees being dispersed among other villages’ collective and households’ forests as well as state forests. For instance, Dongfanghong village’s tea trees are dispersed in all those six villages’ collective and households’ forests as well as the state forests. Because of this complicated situation, while the collective and households’ forests were granted ownership certificate, the traditional tea trees were not. In other words, the new forestry tenure system has overwritten the traditional one *de jure* where the latter is still practiced *de facto*.

This has not only caused a lot of conflicts between households and households, households and villages (may be own or other village) in management of the forests and the tea trees, but also made these conflicts unresolvable in both theory and practice. For instance, tea trees of 21 households from Xianfeng village are in Dazhai village’s household self-held forests. Of these, nine Xianfeng households have conflicts with the Dazhai because the former’s tea trees were cut by the latter when they cut firewood in

²⁷ Forestry Bureau of Xishuangbanna Prefecture, 2000, Land Conversion Plan of Xishuangbanna Prefecture.

²⁸ Here, we are particularly talking about the six traditional Akha villages around Mengsong Basin.

their own forests. None of these conflicts have been satisfactorily settled because mediations within the community respect traditional tenure system while those of outside the community (including the Menglong Township government as well as Menglong Court) tend to respect only the official tenure system and neglect the traditional one. These conflicts have become sharpened since 2004 when the market price of the tea soared, culminating in an arson incident on October 2, 2007 (This will be elaborated later as it was related to a dam construction).

Moreover, redistribution of tea trees as well as paddy fields among households within the smaller (not the greater) commune enhanced the socio-economic differentiation among the six villages originally created from uneven poppy opium cultivation and trade, as mentioned in previous section (please see the forest, tea and land distribution among households in Mengsong in Table 2). For instance, households from Dongfanghong village got about two times the number of tea trees per capita, and about three times of irrigated paddy fields per capita, than those of Hongqi village.

As a general rule, that lack of irrigated paddy fields should be compensated by uplands (i.e., Lun xie di, or rotational farming lands, or swidden lands here). Although villagers from Hongqi got the most swidden lands per capita among these six villages, it requires more labour input to cultivate rice in upland swidden fields than that in irrigated paddy fields (Wang 1998). Therefore, swidden agriculture dominated Hongqi villagers are more engaged in subsistence activities; also, their relative lack of capital accumulation (partially from less possession of cash-crops like tea trees), makes them restricted in other business investment. All these factors have put Hongqi villagers in a very disadvantaged position under a market-oriented economy.

Therefore, Hongqi is still the poorest of the six villages, as it was in 1940s. In contrast, due to their special locations, both Dazhai and Xianfeng have gained much income from mining operations and management since the late 1980s, though they have less tea trees per capita than any other villagers. Plus, Dazhai is located at the political (administrative office), commercial (market and shops), educational (school), service (hotels and restaurant), and entertaining (Karaoke etc.) centre of Mengsong area, which provide a lot of business to its villagers. These factors have made Dazhai and Xianfeng better able to catch up with Dongfanghong in terms of wealth accumulation and become among the richest villages with their new money in Mengsong.

Table 2 Forest and land distribution among households in Mengsong under the Household Contract Responsibility System in early 1980s

Village name	Household forest (mu/household)	Tea trees (mu/capita)	Irrigated paddy fields (mu/capita)	Swidden lands (mu/capita)
Guangming	5	1.2	1.2	6
Hongxing	5	1.1	1.6	6

Dongfanghong	5	1.6	2.2	3
Hongqi	5	0.8	0.9	9
Dazhai	5	0.2	1.4	6
Xianfeng	5	0.6	1.1	6

Note:

1. *The number of tea trees is calculated based on data from Mengsong annual statistical book (2007). The absolute number of tea trees is not correct. According to Mr. Lao Er, the current Chairman of Mengsong Administrative Committee, there were about 5000 mu old tea trees but the whole population of Mengsong was less than 2500 in early 1980s, which should give us an average of over 2 mu tea trees per capita. It was not only because it was very difficult to measure, but also because the tea trees were not granted official certificate of ownership, in order to reduce any real or potential taxes, the official data tend to be lower. However, the proportion is relatively reliable.*
2. *Since the paddy fields could be more accurately measured and its ownership certificates were granted, the data was more accurate.*
3. *Different key informants (community leaders as well as village heads) gave me different data on swidden lands, based on a rule of thumb in distribution of swidden lands (i.e., Lun xie di) that in a village where there was less than 1 mu of irrigated paddy fields per capita, it should be given about 9 mu of swidden lands per capita; if there was more than 2 mu of paddy fields per capita, the number of swidden lands should be no more than 3 mu per capita; if the paddy fields were between 1-2 mu per capita, the number of swidden lands should be about 6 mu per capita. In reality, most households in all these villages got more swidden lands than this quota.*

Furthermore, land distribution patterned under the Household Contract Responsibility System, along with market-oriented economy, has accelerated the pace of swidden agriculture practices disappearing from use in Mengsong (and in Xishuangbanna), because the system has not only demarcated swidden lands (i.e., Lun xie di) within limited areas, but also frozen fluidity of the lands within and beyond the community.

Population growth is often regarded as a key factor that leads swidden agriculture to be discontinued; however, this is not the case in Mengsong. First, about 25,000 mu lands (mostly traditional swidden lands) have been identified as “guoyou huanshan” or state wastelands (part of forestry lands), which is bigger than the total area of contracted “Lun xie di” or rotational farming lands²⁹ in Mengsong. This has limited swidden agriculture in a much smaller area, yet it should be enough to have a healthy rotation (ecologically) for swidden agriculture if it would have distributed more reasonably. According to our previous studies (Wang 1998), an ecologically healthy rotational period is about 10-12 years in Xishuangbanna if the lands are cropped no longer than two years continuously, which allows about 8-10 year of fallow. If there is no irrigated paddy field, it usually requires about 3-4 mu upland to produce enough food (particularly rice) for one person

²⁹ If we calculate the total area of Mengsong “Lun xie di” using 9 mu per capita times by 2500 (population), we get 22,500 mu.

each year. If each plot is cultivated for 2 years on average, a 10 years rotation requires about 15-20 mu uplands per capita.

However, since there are irrigated paddy fields, Mengsong does not require these amounts of uplands for their swidden agriculture to be in healthy rotation. In fact, Dongfanghong villagers do not need to cultivate upland rice at all. Xianfeng villagers also converted parts of their swidden lands into irrigated paddy fields through terracing, and gradually stopped swidden agriculture by mid 1990s. Economically benefiting from other activities including mining, most Dazhai villagers also gradually stopped swidden agriculture. Many of their swidden lands were abandoned and it was estimated that there were about 3000 mu of regenerated swidden lands forests by late 1990s. In contrast, the paddy-field-deficient Hongqi village has been experiencing a shortage of uplands while their economy is still based on swidden agriculture. It is evident that most Hongqi swidden lands were being operated with a fallow period shorter than 8 years by late 1990s (Wang 1998). Shortage of uplands was also a key factor in Baka villagers abandoning swidden agriculture in 1990s. However, the key policy that will end swidden agriculture in Mengsong and in Xishuangbanna is the “logging ban” of 1998, which will be discussed in the following section.

Logging Ban and “Grain for Green” policy

The great flood of Yangtze River (and other major rivers of China) in summer 1998 prompted China to carry out a nationwide logging ban. Shifting cultivation or swidden agriculture was banned along with the “Logging Ban” because the latter forbids cutting any natural trees including the fallow fields of the swidden lands. In order to help both loggers as well as upland farmers become forest curators without jeopardising their economic benefits, two twin projects were initiated: Natural Forest Protection Project (“Tianranlin Baohu Gongcheng” in Chinese) and Land Conversion Project (“Tui Geng Huang Lin Gongcheng” in Chinese) in late 1998.

The purpose of the Natural Forest Protection Project is to protect its national natural forests through the “logging ban”, as well as to increase forest coverage through reforestation. This project has been conducted in upstream of Yangtze River (covering Hubei, Chongqi, Guichou, Yunnan, Sichuan, and Xizang (Tibet) provinces and regions), middle-and-up-stream of Yellow River (covering Henan, Neimeng/Inner Mongol, Shanxi, Shaanxi, Ningxia, Gansu, and Qinghai provinces and regions), and other state natural forest located areas (including Xijiang, Northeastern Inner Mongol, Heilongjiang, Jilin, and Hainan provinces and regions) since 1999. The project covers 69% of its national natural forests, that is, 1.1 billion mu out of 1.7 billion mu. All commercial logging of natural forests has been banned in these areas as those previous logging companies and workers were compensated for their loss from the ban by state funding (80% from the central government and 20% from its corresponding provincial governments).

The purpose of the Land Conversion Project is to decrease soil erosion through converting sloping farming lands into forests or grasslands with compensation/subsidy

from government. The lands can be converted to either ecological or economic forests. For 1 mu of reforestation on farming lands, landholders are said to be compensated with 150kg husked grain (particularly rice) in southern parts of China, or with 100kg husked grain (such as wheat) in northern China per year, and subsidised with a further 30-50 Chinese yuan per year for educational purposes and health/welfare. Landholders are to be compensated/subsidised continuously under the project for eight years for ecological forests; or five years for economic forests. Thus, this project is also known as the “Grain for Green” project. In case the grain is given to the farmers in a form of cash, the exchange rate is based on the equation of 1 kg grain equals to 0.7 Chinese yuan (i.e., the average market price of grain in 2000) (State Office of Land Conversion Project, 2000), which gives 210 Chinese yuan per mu per year. This project has been conducted in 25 provinces and regions (including Yunnan) since 2000.

Though it is not in the Yangtze River region, Xishuangbanna is still identified as a key target area of these two projects in Yunnan due to its ecological significance mentioned before. The Natural Forest Protect Project was started in Xishuangbanna in 1998. It is reported that in its first eight years phase, the project had successfully protected 17 million mu (about 1.13 million ha) of existing natural forests as well as regenerating about 1.79 million mu (about 119,285 ha) forests through various reforestation activities (see Table 3 and Fig 3), which take up 59.3% and 6.2% of its total lands in Xishuangbanna respectively. If what had been claimed is true, the project should have increased Xishuangbanna's forest coverage by about 6.2%. Adding this to the 59.3% previously existing natural forests and about 12% plantations (conservative estimation of rubber, tea and other plantation areas), implies that Xishuangbanna's forest coverage should be about 77.5% by now. However, the figure reported in 2008 was about 67.69%³⁰ (State Forestry Administration, P.R. China, 2008). The same report also says that the net increased forests area in Xishuangbanna through reforestation of the project is about 970,000 mu (about 64,667 ha, or about 4%), which is less than what they had claimed earlier. Therefore, although achievements of the project are positive, the amount of the reforestation as well as its ecological benefits may not be as great as it is claimed. Part of the reason is that, in reality, same areas may be claimed by different projects, as was the case in Mengsong, where a site set up for natural reforestation area in the project was picked up as a site for the land conversion project too (see Pic.3).

Though the Land Conversion Project was initiated in 1998, it was not carried out in Xishuangbanna until 2002. Since shifting cultivation was banned, the project was designed to convert 1337943 mu (89196 ha) sloping uplands into forests in Xishuangbanna, which took up 92.4% of its total swidden lands (Xishuangbanna Forestry Bureau, 2000). However, due to the limited budget, there were only 90,000 mu of converted farming lands plus 89,000 mu of reforested wastelands subsidised by the project from 2002 through 2006 (see Table 4). Similarly, though almost all wastelands in Mengsong (about 25000 mu) and 80% swidden lands of Mengsong (about 18000 mu)

³⁰ This number includes all mono-cultural plantations of rubber, tea, Chinese fir, etc.

were cultivated with tea under the influence of the land conversion project, only 4940 mu tea plantations were identified and subsidised by the project.

The initial purpose of these two projects, along with the logging ban, was to achieve ecological goals in the targeted areas. However, with their implementation, they became a market-oriented economy and this was reflected in the species used for reforestation (or plantation) in the projects. Main species used in the Land Conversion Project were rubber, tea, and Chinese fir, which are economic species, yet about 90.7% of the plantations are identified as ecological forests. Even so, in theory the ecological and economic forests should be defined according to 1) the species of plants used in reforestation, 2) planting density, 3) planting techniques, and 4) its purpose (ecology-oriented or economy-oriented) (State Forestry Administration of P.R. China, 2001). However, in practice only the planting density was applied to identify them.

I was told by the project personnel from Forestry Bureau of Xishuangbanna Prefecture that “ecological forests” require planting of 100 trees or more per *mu*. In case of rubber plantations, since one *mu* land can be planted with up to 40 trees, a leguminous species *Cajanus cajan* is intercropped in order to meet the ecological criterion (see Pic.4). *Cajanus cajan* plants are leguminous bushes that will die out naturally in a few years. The ecological benefits of the project have been jeopardised by the way it was conducted. For instance, there were already 3,000 mu naturally reforested swidden lands in Mengsong prior to the project.

These lands should be regarded as “converted” forests and the owners compensated for the loss of their farming lands or rewarded for their contribution to nurturing ecological forests. However, in practice the only way for them to get benefits from the project was to follow the standardised procedure, which includes cleaning the fields and planting tea trees (or other identified species) with standardized techniques (see Pic.5). When I asked the reason from the project authorities and personnel, I was told that people’s livelihood and economic development (equated to income) should be put as the first priority in the government’s agenda. Therefore, economic species should be used in the reforestation and the best result in terms of production should be guaranteed by applying the standardised techniques (i.e., clearing, burning, ditching, etc.). But what we faced was an ecological crisis. Ecological measures should be our first priorities, or at least needed to be balanced with economic and social concerns.

These standardised techniques may optimise short-term economic benefits of the reforestation, but would minimise its ecological benefits, because best ecological benefits of afforestation and reforestation on degraded lands are achieved with natural regeneration and native species, and minimal clearing of pre-existing vegetation (Murray 2006). Since the Land conversion project in particular, the government in generally in favor of economic benefits over ecological ones, the natural vegetation of almost all “wastelands” and understory of most state, collective and households’ forests in Mengsong have been, or are going to be, replaced with tea plantations (see pictures 6, 7 and 8).

Table 3 Xishuangbanna Natural Forest Protection Project (1998-2006)

Project Activities / Counties		Mengla County	Jinghong Municipality	Menghai County	total area (mu)	Percentage (%)
Reforestation (mu)	plantation (mu)	35,950.0	26,600.0	86,017.5	148,567.5	
	broadcast sowing by aircrafts (mu)	21,000.0	35,999.0	26,012.0	83,011.0	
	promoted natural regeneration (mu)	46,200.0	52,704.5	53,556.0	152,460.5	
	managed natural reforestation (mu)	15,075.0	18,240.0	16,324.5	49,639.5	
	natural reforestation (mu)	379,930.0	319,920.0	655,739.5	1,355,589.5	
	subtotal (mu)	498,155.0	453,463.5	837,649.5	1,789,268.0	9.5
Protected natural forests (mu)		6,690,000.0	5,830,000.0	4,480,000.0	17,000,000.0	90.5
Total area (mu)		7,188,155.0	6,283,463.5	5,317,649.5	18,789,268.0	100

Table 4 Xishuangbanna Land Conversion Project (2002-2006)

	Reforestation on farming lands (mu)	Reforestation on wastelands (mu)	Ecological forests (mu)	Economic forests (mu)	Total areas (mu)
Mengla County	33000	22000	54000	1000	55000
Jinghong Municipality	25000	25000	47000	3000	50000
Menghai County	32000	42000	61325.8	12674.2	74000
Total area (mu)	90000	89000	162325.8	16674.2	179000
Percentage (%)	50.28	49.72	90.68	9.32	

Notes

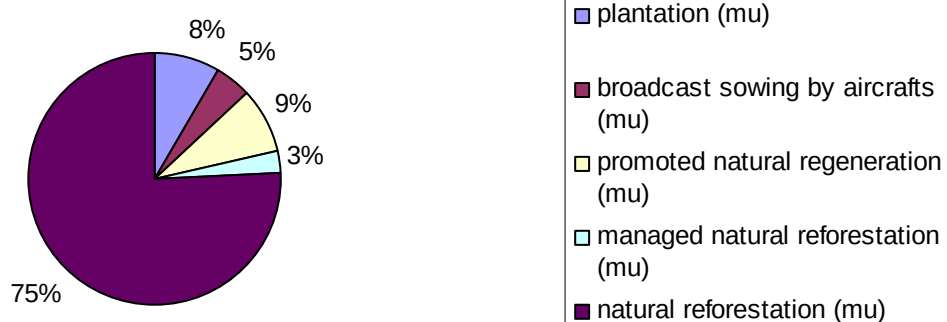
Major species include

- In Mengla: rubber, tea, teak, Neolamarckia cadamba, Chinese fir (Cunninghamia lanceolata),, Betula alnoides, Simao pine (Pinus kesiya), and bamboo
- In Jinghong: tea, Chinese fir, Neolamarckia cadamba, and Simao pine
- In Menghai: tea, rubber, Chinese fir, bamboo, among others

Data sources for table 3 and 4:

1. Data on Mengla County are from Forestry Bureau of Mengla County, available at its official website: <http://www.mlly.gov.cn/>.
2. Data on Jinghong Municipality are from Forestry Bureau of Jinghong Municipality, available at its official website: <http://www.jhsly.gov.cn/>.
3. Data on Menghai County are from official website of Yunnan Digital Rural at <http://ynszxc.gov.cn/szxc/>.

**Fig 3 Xishuangbanna Reforestation
in the Natural Forest Protect Project (1998-2006)**





Above and right - A site of the Natural Forest Protect Project at Mengsong, Menglong Township, Jinghong Municipality. The sign says: "Jinghong Municipality 2002 Natural Forest Protect Project: Natural Reforestation Area." But later, the area also became the Land Conversion Project target area, under which tea plantation was conducted since 2004.

Cajanus cajan



Both rubber (above left) and tea (above right) plantations are identified as ecological forests since they are intercropped with *Cajanus cajan*.



Above left - Naturally reforested fallow lands were cleaned for tea plantation in order to get subsidy under the Land Conversion Project in Mengsong.



Above right - Naturally vegetated wastelands were cleaned for tea and Chinese fir plantations in order to get subsidy under the Land Conversion Project in Mengsong.



Above left - Self-held household forests were cleaned for tea plantation under the influence of Land Conversion Project in Mengsong.



Above right - Understory of the State forests in Mengsong were cleared for tea plantation.

Other activities in Mengsong

Besides the policies discussed above, there are several government sponsored or approved activities that have had social, economic, and ecological impacts on Mengsong. These activities include, but are not limited to, dam construction, mining, rattan weaving factory, and logging. Mengsong is one of several key water sources to irrigate lowland paddy fields on Menglong Basin. Therefore, Jinghong municipal government decided to build a dam on *Naci River* in Mengsong (pictures 9 and 10). Long term ecological and

economic consequences of the dam construction to local community are not certain. What is certain is that the reservoir is going to submerge 130 *mu* of paddy fields, over 3,000 *mu* of collective forests, and about 15,000 tea trees in the forests (pictures 11 and 12).

Although the government promises that all losses will be compensated and that the project will not start until all of the investigation and estimation of the loss (especially the tea trees) and agreement on the compensation by all stakeholders is complete. However, the government started the project before all of those conditions were fulfilled in 2007. This has led to high tensions and conflicts between the local community and the government/project. Since the collective forests have titles, compensation for them seems to be secured, but those tea trees have not been granted titles. Therefore, compensation for these tea trees is not secured. As mentioned earlier, ownership of these tea trees were not acknowledged by the government officially, so the government usually favors the forest owners over tea tree owners when a conflict between them needs its mediation. This fact has made the tea owners accumulate hatred to the government. This hatred erupted in the form of an arson incident where tea tree owners set fire to the equipment storage for the dam construction on October 2, 2007. Negotiation on the compensation between the community and local government continues up to today.

Another environmentally threatening factor in Mengsong is mining activities. Tin and manganese mining destroyed some paddy fields and forests in 1980s and 1990s, both of which are forbidden now. But kaolin mining is now under operation (Pic. 13 and 14). Since strip mining techniques have been adopted, all the trees and topsoil at mining sites have been stripped, and downstream paddy fields been threatened (Pic. 15 and 16). Though the kaolin mining company has obtained permission from the Environmental Protection Bureau (EPB) of Jinghong Municipality, Mengsong leaders and villagers have strong doubts about the company and the bureau's *de facto* measurements of protecting Mengsong's environment/forests and arable lands. Mengsong leaders also think that the mining company should pay an environment protection fee to the Mengsong community, not to the EPB, because it is not the EPB but Mengsong community who has protected the environment and who will also suffer from the degradation caused by the mining.



Above left - Mengsong Dam construction site

Above right - Naci River on which Mengsong Dam will be built



Above left - 150 mu of paddy fields and 3,000 mu forests will be submerged by the new Mengsong Reservoir.

Above right - It is estimated that about 15,000 tea trees in the forests will be submerged too.



Above left - Kaolin mining factory in Mengsong

Above right - Kaolin mining site used to be covered by forests. The trees and topsoil were all striped in order to mine kaolin.



Above left - A land slide occurred at a kaolin mining site

Aabove right - Kaolin mining is threatening paddy fields

Local governments particularly, Menglong Township government, are also responsible for significant depletion of bio-resources (particularly rattan) and degradation of state forests

in Mengsong. In order to promote enterprises in rural areas, the Menglong Township government established a rattan weaving factory in Mengsong in 1986. However, since short-term profits in the market economy were emphasised, the rattan sources in *Sangpabawa*, which had been conserved by Mengsong community for over 150 years, were depleted within only six years of mismanagement by the government sponsored factory. The rattan weaving factory was forced to close down and the company moved out of Mengsong in 1992, leaving behind a devastated resource.

Many outsiders (mostly Dai people from lowlands) also came to log in Mengsong state forests with logging permission granted by the Menglong Forestry Station. It was stopped for a few years after the logging ban in 1998, but resumed in recent years. These logging activities have degraded the quality of the state forests in Mengsong. Mengsong villagers think it is unfair to allow outsiders to log in Mengsong without providing any compensation to them. Although they were identified as state forests in early 1980s, the forests have been conserved by the Mengsong community for centuries.

Baka in Post-Mao Era (1978 up to today)

Each Baka villager was distributed with 11 mu swidden fields under the Household Contract Responsibility System in 1983. These lands are dispersed in four plots, which were allocated for rice cultivation in a rotational period of 5-6 years (see Table 5). This allowed only four years of fallowing, which was insufficient rotation period for sustainable swidden agriculture, replacement of swidden agriculture in Baka village was inevitable. Under the Household Contract Responsibility System rubber plantation was picked up by the villagers with assistance from its neighboring state farms.

Table 5 Rice cultivations on swidden lands in Baka village under the Household Contract Responsibility System

Plot Number	I	II	III	IV
Plot size (mu/capita)	2	3	2	4
Years of rice cultivations	1983, 1984	1984, 1985	1985, 1986	1986, 1987
	1988, 1989			

Rubber plantations in Baka

One of the national biggest state rubber farms, Dongfeng State Farm, was established around Menglong Basin in 1958. The fifth branch of the farm was set up in the Baka village a few years later, mainly in traditional territory. Most of their rubber trees were planted on the most fertile lands of Baka village's swidden fields (lower than 800 masl) as

they were fallowed. This forced Baka villagers to farm less productive uplands with higher altitudes, and created a shortage of lands for their traditional swidden agriculture. Facing further limitations imposed by the Household Contract Responsibility System, the Baka inevitably began looking for an alternative to traditional swidden agriculture, as mentioned above.

Meanwhile, the state farms were required by the central and provincial government to help local communities develop rubber plantations in response to an economic call to adapt to a market economy under the Open and Reform policy. Therefore, the fifth branch of Dongfeng Farm helped Baka village to begin its first collective rubber plantation under a new co-operation system called “Lian Ying” in Bano in 1981, in which the village (e.g. Baka) provided free lands and labour while the state farm provided rubber seedlings and technological support. In return, the state farm would share the benefits of the harvest. The plantation area was expanded a little more in 1984. Table 6 shows all smallholders’ rubber plantations in Baka village during 1981 and 2006 while Fig 4 shows current (2005) possession of rubber plantations by households. Since Bano was replanted with a second rubber plantation in 2005, its first plantation was not showed in Fig 4.

In addition to the collective plantations, in 1985 and 1986 each household was also encouraged to grow private rubber trees on a newly distributed small plot of land in Lawjilawha (first tip of the plantation waves in Fig 4). However, this attempt was not very successful for three major reasons. First, the villagers lacked confidence in this new crop; second, the villagers had not been trained in the techniques; and third, the plot was too small to be viable. Things looked bad as Baka villagers had already ‘used up’ their first-circle swidden lands, and the previous fallow lands were not quite ready for its second circle of rice cultivation. Fortunately, those first-planted collective rubber trees were soon able to be tapped, and predictable profits began to flow

This urged a first wave of rubber plantations on their private lands in Baka village in late the 1980s (second tip in Fig 4). This wave of plantation lasted longest (1987-1992) as it took time for various households to initiate their first private rubber plantation due to financial and other reasons, but also was particularly characterised by intercropping rubber trees with rice and other traditional crops in their swidden fields, which would develop rubber forests as the fields fallowed.

The next wave of rubber plantation occurred on collective lands at Gawjaw during 1993-1995. Gawjaw was reserved as a village protection forest, which was identified as Fengjing Lin (scenic forest) in early 1980s. The forests were cleaned and distributed among households for the purpose of rubber plantation in 1993. As it required some investment, rubber plantation on the second plot of swidden lands did not occur until 1996 when the first plantations started to be tapped.

With income from the first plantations in hand, plantations on the third plot of swidden lands (those were cleaned before the logging ban in 1998) started immediately after it was done on the second plots in 1999, but this was stopped by the logging ban in 2000.

Then it continued again with the policy lifted by the Land Conversion Project, though none of rubber plantations in Baka were subsidised by the project. With capital accumulated from previous plantations, a fourth plot of swidden lands were quickly planted with rubber trees in 2003 and 2004. Thus, all of Baka village's swidden lands were planted with rubber trees by 2004. The Bano collective rubber trees planted in the early 1980s were cut down and the lands were distributed among households in 2005. All of these lands were then planted with rubber trees by the households in the same year.

The last wave of rubber plantation in Baka occurred at Bada in 2006. Bada was on Baka's traditional swidden lands, but was identified as state forests in "Linze San Ding" and "Liang Shan Yi Ding" in early 1980s. However, a neighboring Dai village, Man Liangsan, wanted to plant rubber trees on there as they did not have much upland elsewhere, so they applied for permission from the government. In order to avoid all these lands being taken by the Dai village, Baka village also submitted a claim. The result was that each village got half of the Bada lands. These lands were planted with rubber trees in 2006. Please see Baka land-use dynamics in Annex B.

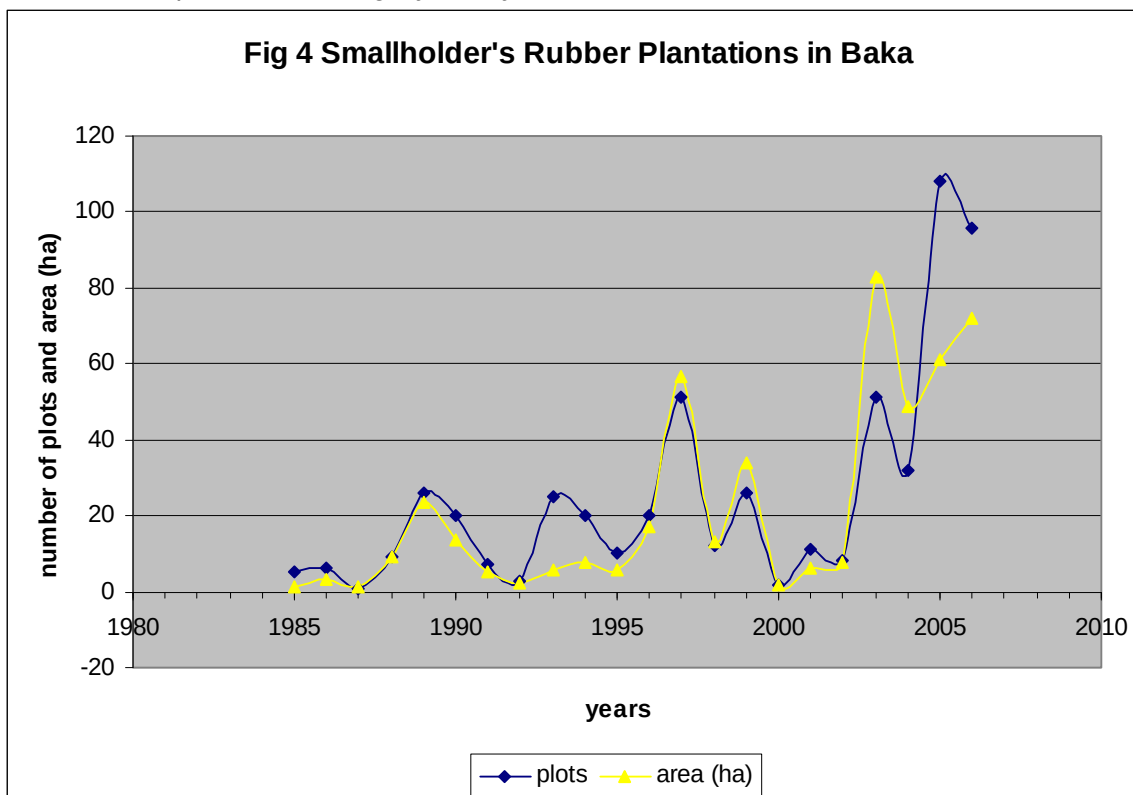
Table 6 Smallholder's rubber plantations in Baka village (1981-2006)

Years of plantations	Land plot name	Tenure of the lands	Numbers of rubber plantation plots	Area of rubber plantations (mu)	Total plots	Total area (mu)
1981,1984	Bano	Collective	Replanted in 2005 (see below)			
1985	Lawjilawha	Collective	5	22	11	71
1986			6	49		
1987			1	17	66	811
1988			9	125		
1989			26	349		
1990	Swidden Fields Plot No. I	Households	20	207		
1991			7	78		
1992			3	35		
1993			25	83	55	279
1994			20	112		
1995	Gawjaw	Collective	10	84		
1996			20	257	83	1307
1997			51	852		
1998			12	198		

1999	Swidden	Households	26	508	47	741
2000	Fields Plot	No. III	2	27		
2001			11	89		
2002			8	117		
2003	Swidden	Households	51	1242	83	1973
2004	Fields Plot	No. IV	32	731		
2005	Bano	Collective	108	918	108	918
2006	Bada	State forest	96	1080	96	1080
Total area			549	7180	549	7180

Note:

1. These numbers are calculated based on data collected in a household survey covering all households in Baka village in 2006.
2. Since all cultivable lands of Baka village (collective and households) had been planted with rubber trees by 2006, the area under rubber plantation in Baka has not been changed since then. However, the numbers reported during the survey will tend to be lower than the real amount of plantation. I was told by the village head that there were about at least 10,000 mu rubber plantations in Baka. If this information is reliable, the villagers did not report about 30% of their rubber plantations during my survey.



Cultural adaptations to rubber plantation in Baka

Rubber plantations have transformed natural landscapes and the whole society of Baka village. Economic (income, rice production, pig husbandry, and fuel supply), socio-cultural (living standards, belief system, and cultural traditions), and ecological (biological resources) consequences of rubber plantations in Baka were examined in this study.

Rubber plantation and income

The first and most direct economic benefit of rubber plantation is to bring unprecedented income into the households in Baka (see Annex C). This is the first reason why rubber trees have become the favoured cash-crop in Baka and in the most lowlands of Xishuangbanna. The per capita annual income was only a few hundred yuan in early 1990s, but it soared to 3801 yuan in 2005. Rubber contributed to about 92.4% of its total income in Baka in 2005. Since the villagers tended to under-report their income in the survey, particularly from rubber, both the per capita income and rubber's contribution percentage should be higher than these numbers. According to the village head, Mr Nyirer, per capita income from rubber reached 6,000 yuan in 2006.

However, the increased income is unevenly distributed among the households (see Table 7 and Fig 5). Most Baka households (91 out of 109, that is, 83.5%) earned less than 30,000 yuan, and the other 15.6% households (17 out of 109) earned between 30,000 and 50,000 yuan, while only one household had income over 120,000 yuan in 2005. The median income was 60,600 yuan, while the average was 17,577.2 yuan, which demonstrates the uneven distribution of income among households. This discrepancy is not only resulted from uneven possession of rubber plantations among the households (in terms of both total rubber trees and per capita, see Table 8 and Fig 6), but also reflects socio-economic differentiation in Baka village.

There are two major reasons that caused the uneven possession of rubber plantations among the households. The first was uneven land distribution due to uneven power distribution. In theory, the Household Contract Responsibility System of the early 1980s was meant to redistribute its lands among its member households within a commune (or a traditional community, usually a village) and equally according to household population size. In practice, however, those with power in hands, being commune leaders and their relatives, claimed disproportionately more lands than the commoners (this kind of uneven land distribution was very common in mountainous communities all over Xishuangbanna in early 1980s), which laid the foundation for the forthcoming socio-economic differentiation under a market economy. Secondly, rural (forestry and agricultural) reform in the early 1980s left out a lot of uplands unidentified and undistributed in mountainous communities all over Xishuangbanna (including Baka village), which provided lands for later village leaders with new power to possess as their own private property or to sell (contract out) on behalf of the communities and thereby accumulate private wealth. With this fresh capital, they could develop private rubber plantations on their own contracted or

claimed lands. The commoners, especially the poorest, lacked capital and had to sell (lease out) some plots of their lands in order to plant rubber trees on the left lands.

The first rubber planters were able to purchase (take lease of) those lands being sold (contracted out) with capital accumulated from their earlier plantations. This is another reason that further differentiation between “the haves” and “the have-nots” Moreover, there is a positive correlation between the number of rubber trees that have been under tapping and household incomes (see Fig 7). Therefore, it can be concluded that government policies favouring rubber plantations have accelerated socio-economic stratification among households in Baka.

However, an economy based on rubber plantations is very vulnerable in Xishuangbanna. First of all, rubber trees are quite vulnerable to unfavorable weather conditions (such as cold winters and storms), pests, and diseases. A cold winter with a temperature that is just lower a few degrees lower than normal years could cause the death of many rubber trees in Xishuangbanna, like in the winter of 1972-73. In addition to cold and storms, rubber trees are also often killed by pests and diseases. For instance, all rubber trees in Xishuangbanna were infected by powdery mildew in early 2008. Experts have estimated that this infection would decrease rubber production by 15,000 tons of dry rubber in Xishuangbanna, which would cause a loss of over 300 million Chinese yuan.³¹ According to 2008 Baka household survey, the loss of income caused by the rubber powdery mildew infection was about 1,252,000 yuan, which is about one third of last year's (2007) total income from rubber. Furthermore, market prices for dried rubber have been fluctuating dramatically. It soared to 26 yuan/kg³² for a few days in May, but then slumped down to 7 yuan/kg for the rest of the year, which might be partly caused by the Global Financial Crisis.

As a result, total income from rubber in 2008 was only about one third of last year's income in Baka village. Therefore, after accounting for losses from the rubber powdery mildew infection, Baka village's loss from the global economic depression in 2008 was about one third of last year's total income.

What is more dangerous is that Baka villagers have not comprehended the vulnerability and high risk of their economy based on the monoculture of a single crop (rubber trees). In the 2008 household survey, most people could not relate the eruption of the disastrous epidemic to the large scale monoculture of rubber. Instead, they attributed it to either climate change or failure of the epidemic control (effective prevention and treatment of the disease) due to fake pesticide. Some people even believed that it was caused by biological weapons released from the West with malice in order to frustrate the Beijing Olympic Games. Only three out of thirty respondents related it to the disappearance of local forests and worried that it would become worse year after year. When I asked villagers what they and their households could do if a similar epidemic would occur next

³¹ Source is from Yunnan Branch of Xinhua Net at http://www.yn.xinhuanet.com/nets/2008-02/29/content_12582249.htm.

³² This is the price that local farmers could sell their dried rubber to market.

year, most of them did not know what to do, just hoped that it would not happen again, or they believed that the government would take some measurements to prevent it from occurring again because state farms possess more plantations than the small holders. If it does happen again, some said that they would go to look for some off-farm work in towns and cities. Two households said that they would raise more pigs, but worried about pig fodder since rubber seeds have been the main pig fodder in recent times and the rubber trees would not produce any significant amount of seed if they got the disease.

Table 7 Distribution of Baka household income in 2005

Unit No.	Income (yuan)	Number of households	Unit No.	Income (yuan)	Number of households
1	0-4999	6	14	65000-69999	0
2	5000-9999	21	15	70000-74999	0
3	10000-14999	24	16	75000-79999	0
4	15000-19999	21	17	80000-84999	0
5	20000-24999	18	18	85000-89999	0
6	25000-29999	1	19	90000-94999	0
7	30000-34999	6	20	95000-99999	0
8	35000-39999	2	21	100000-104999	0
9	40000-44999	6	22	105000-109999	0
10	45000-49999	0	23	110000-114999	0
11	50000-54999	3	24	115000-119999	0
12	55000-59999	0	25	120000-124999	1
13	60000-64999	0	26	125000-129999	0
Total					109

Table 8 Distribution of rubber trees among households in Baka in 2006

Unit No.	Rubber tree possession per household		Rubber plantation possession per capita	
	Total trees	Number of households	mu/capita	Number of households
1	0-699	7	0-4.9	4
2	700-1399	28	5-9.9	31
3	1400-2099	30	10-14.9	28
4	2100-2799	24	15-19.9	26
5	2800-3499	10	20-24.9	13
6	3500-4199	7	25-29.9	4
7	4200-4899	1	30-34.9	2
8	4900-5599	1	35-39.9	1
9	5600-6299	1	40-44.9	0

Fig 5 Pattern of Baka households cash income in 2005

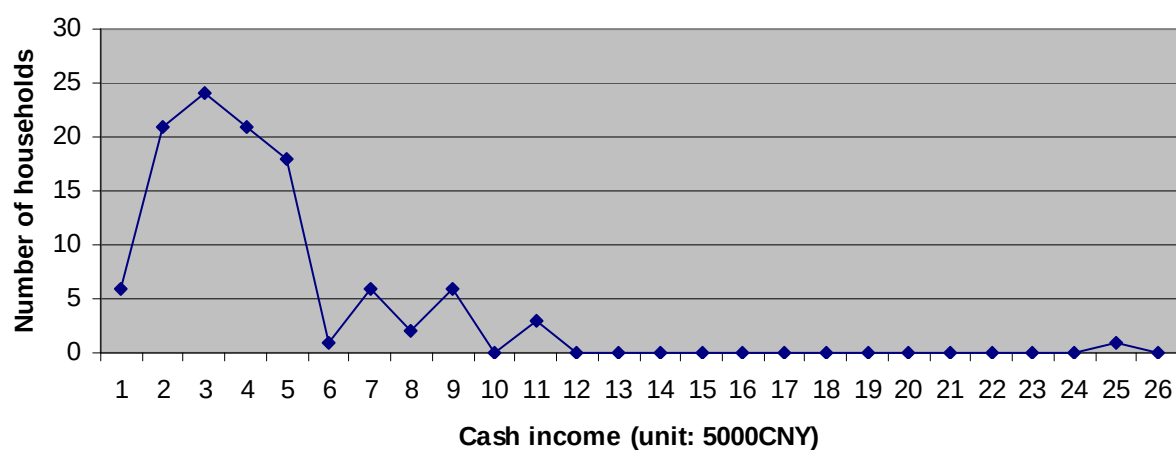


Fig 6 Distribution of rubber trees among households in Baka in 2006

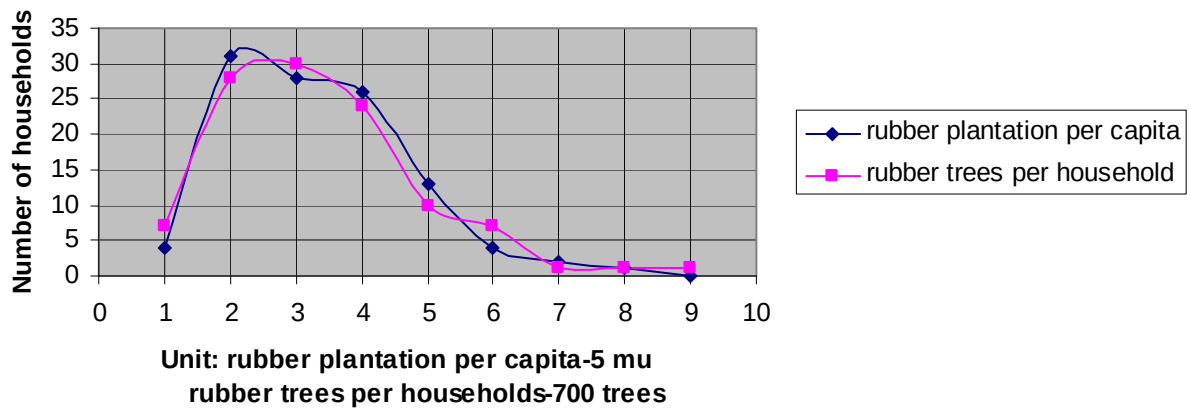
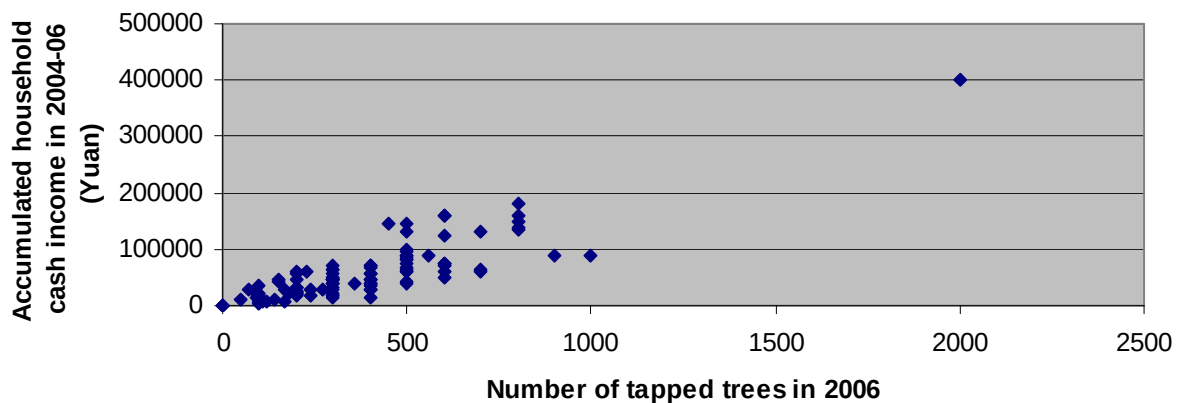


Fig 7 Tapped rubber trees vs. household cash income in Baka village



Rubber plantation and rice production

Rice cultivation had traditionally been the major activity in the Akha's subsistence economy prior to the 1980s. Being a staple food, rice had been the core crop of swidden agriculture in mountainous Akha villages of Xishuangbanna and beyond. When rubber trees were first introduced to Baka village, they were intercropped with rice on swidden fields. However, intercropping rubber trees in rice fields decreased rice harvests, resulting in the first food shortage in Baka village under the Household Contract Responsibility System in the late 1980s. In response they cut and cleaned their collective forests for rice cultivation in 1990 and 1991 (with government approval). However, this could not solve the food (rice) shortage problem in the long-term.

Another solution was to intensify production from their irrigated paddy fields, which were previously cultivated without much input and care. In addition to double-cropping their paddy fields, from the mid-1990s Baka villagers started to adopt new, high-yielding hybrid rice varieties and modern cultivation techniques including use of chemical pesticides, herbicides, and fertilisers). Despite the fact that a lot of villagers, particularly elders, were complaining about the taste of the hybrid rice, swidden agricultural practices (along with its unique varieties of colorful and tasteful upland rice and other traditional crops) gradually disappeared from Baka village in late 1990s.

Intensification of rice cultivation in irrigated paddy fields did not solve rice production problem in Baka. According to 2006 Baka household survey (see Annex C), among 109 surveyed households, 22 households answered that they could not produce enough rice for themselves. Though the rest 78 households answered that they produced enough rice for themselves, and yet 18 households of them bought or borrowed rice in 2005. Therefore, there were about 40 households out of 109 (that is, 36.7%) in Baka village that were not self-subsistent in rice production in 2005. It used to be shameful for Akha people as rice cultivators if they could not produce enough rice for their family. However, this did not matter much anymore, economically or morally. On the one hand, economic role of rice cultivation has been marginalised by rubber plantation; on the other hand, it has become normal and acceptable morally to buy rice and any other available goods in market. There were five households that expressed that they were going to give up rice cultivation in the near future as they would be too busy with rubber production.

Rubber plantation and pig husbandry

Pig husbandry is the second most important source of income in Baka village. Total proceeds from sale of pigs in Baka were about 74,416 yuan, which contributed to 3.9% of total household income in Baka in 2005 (see Annex C). The total of 130 hogs was killed for self consumption in Baka in 2005. If we use 800 yuan as an average price of a hog, it would represent a saving of about 104,000 yuan (about 5.4% of total income) for the village in 2005. According to 2008 Baka household survey, total sale of pigs in 2007 increased 140% compared to that of in 2005, reached to 178,240 yuan in absolute value. Rubber seeds have become the main fodder for pigs in Baka and most lowland areas of Xishuangbanna. This is another reason why rubber trees have become the favoured cash-crop in this region. In Baka, a total of 77,160 kg of rubber seeds (valued at 46,296 yuan³³) were fed to pigs in Baka in 2007. Rubber seeds are free for anyone to pick. Except one household who bought some rubber seeds, all the rest were picked by household members in the rubber fields.

Rubber plantation, fuel and timber

The third reason why rubber trees have become the favoured cash-crop is that rubber trees also provide firewood to local communities. Almost all firewood consumed in Baka is from dead branches of rubber trees. According to the 2008 Baka household survey,

³³ The market price of rubber seeds was 0.6 yuan per kilogram in 2007.

about 1736 m³ of dead rubber tree branches were consumed in Baka in 2007. Traditionally, there were two kinds of preferred firewood: hardwood (such as wood from *Castanopsis* spp.) and flammable wood particularly bamboo. Hardwood would create charcoal when it burns. Rubber wood is the perfect combination of both kinds of firewood. On the one hand, it is very easy to light; on the other hand, it creates charcoal when it burns. In addition, rubber trees can be easily sold as timber to local wood factories when they are too old to be good for tapping. Therefore, rubber wood has become favoured firewood in Baka and in the most lowlands of Xishuangbanna.

Rubber plantation and biological resources

Baka village has preserved about 3000 mu collective forests. According to the villagers, most local plant species are preserved in the forests. However, the forests are not only fragmented, like an island in a sea of rubber plantations, but also too small to accommodate any large animals in the long term. Therefore, as most forests surrounding Baka village have been replaced with rubber plantations, almost all large animals and birds have disappeared in this area. Application of chemical pesticide and herbicide in rubber plantations has also killed a lot of fish and crabs in the streams. Some of the local fish species such as *ngaqbawlaw* (in Akha) disappeared completely. Most important non-timber forest products (NTFPs) in traditional Akha economy such as bamboo shoots, bamboo worms, and mushrooms have also been reduced dramatically along with the expansion of rubber plantations.

Being the biggest holders of rubber plantations, the state farms were disliked by the Akha people (and by the local people in general). This is because in the 1960s the former appropriated many arable lands from the latter. As a form of revenge, local people often stole livestock (particularly chickens) and vegetable as well as rubber (as mentioned earlier) from the state farms, which resulted in social conflicts between local communities and the state farms. Once a while, the conflicts evolved into physical violence, even occasionally causing death. The conflicts escalated in the 1980s and 1990s when the villagers started to collect “waste rubber” from the state farms after the farm workers collected rubber for the day.

Rubber trees are usually tapped with a half circle cut of rubber bark every another day in Xishuangbanna. Latex usually flows out from each cut for a few hours and is collected with a bowl, but the latex is usually collected before it completely stops flowing, before it is coagulated, for processing into better quality rubber. The latex that flows out after the first collection continued to be received in the bowl, but will not be collected until right before the next cut when it is coagulated. This kind of coagulated rubber is called “fei jiao,” literally meaning “waste rubber.” However, it is not wasted. Rather, it will be processed for market, although the quality is lower. The “waste rubber” is like a bonus to the state farm workers.

Local villagers went to collect the “waste rubber” without permission from the state farms in 1980s and 1990s. Some people even stole normal rubber before it was collected. This had been the cause of conflicts between the state farms and the local communities.

Some local people got arrested and punished with serious fines or even jailed for stealing the rubber.

When I asked Baka villagers why they did so, they answered that the state rubber trees were planted on the local people's forested lands, which used to provide them a lot of NTFPs, and they did not get benefits from the plantations. Now, they were very poor, they needed more and more money to pay for their children's education, medical cares, and buy food from market. Since their private rubber plantations did not produce rubber until the late 1990s, they had no other choice but stealing the "waste rubber" to meet their urgent need for cash prior to it. It seemed fair for them to "collect" some rubber from the state plantations as they used to get NTFPs in the forests before. But from the state farms' point of view, local people's behavior was simply theft. The majority of local villagers stopped "collecting"/"stealing" the "waste rubber" from the state farms once they started to tap their own rubber trees by the end of 1990s. Only a few elders continue to "collect" it as part of their livelihood. As long as they did not steal the "normal rubber," their collection was tolerated by the state farms. And the tension between the state farms and the local communities has lightened since then.

The disappearance of local forests has encouraged Baka villagers to preserve some important plants in their home-gardens. There were 170 useful plant species found in their home-gardens, 44.1% of which are introduced directly from local forests. Therefore, if managed correctly, home-gardens could become an effective method of *ex situ* conservation of plants. However, the crop biodiversity of swidden agriculture (e.g. varieties of upland rice) has been lost to rubber plantations in Baka.

Rubber plantation and living standards

With the increased income from rubber plantations in recent years, living standards in Baka village have been improved significantly by getting better shelters, better transportations, and better communications. Ten households have build villa-style houses in last a few years and almost all households have one or two motor bicycles. Most households have cable TV, a telephone line and tractors. Rice cultivation has been mechanised. Most teenager and adult villagers have mobile phones. Gravity-fed drinkable water has been piped to each household.

However, consumerism is forming among the villagers along with the increased income from rubber plantations. Not only have traditional celebrations such as weddings and new house celebrations been revitalised at larger scales, but so have some other newly adopted celebrations such as birthdays (especially those of first and tenth birthday celebrations). These celebrations are lavish and competitive as they are regarded the best way of showing the family's wealth and social status. Sacrificing a water buffalo and a hog is a must for such a celebration. A professional photographer must be invited to video tape the whole process and make a VCD or DVD for the celebration.

Hundreds or even more than a thousand guests are invited to such celebrations. Invited guests should give a money gift to the holders, called “gua li” in Chinese. The amount of the money gift usually ranges from fifty to several hundreds yuan. The more you give, the more “face” you would gain. All of these gifts are recorded in a pre-prepared red book because these gifts should supposedly be paid back to the giver when he/she holds a celebration in the future. One of such celebration usually costs tens of thousands of Chinese yuan, but most of the cost is usually compensated by the money gifts. The higher cost is a celebration, the more prestige would the holder gain. Though the cost would be somehow offset by the money gifts, the high cost usually prevents poor families from holding as many and big celebrations as those of better off ones.

Therefore, although the gifts exchange in such celebrations seem to reciprocal in theory, better-off families usually get more benefits from this kind of social exchanges than those poor ones. Expected money gifts for these frequent celebrations have become big economic burdens to a lot of households especially those poor ones. According to 2008 Baka household survey, the total money gifts given by the villagers was about 416,000 Chinese yuan in 2007. It took up about 21.7% of whole village’s total income in 2005. Even if the total income doubled in 2007 compared to than that of 2005, the gifts would represent about 10.9% of its total income. This new custom has become an economic burden for local families, especially poor ones.

Moreover, although Baka villagers could get better health care and education with their increased income, rubber plantations have caused them deteriorating health conditions and have discouraged more children from getting better educations. According to doctors from two local clinics, villagers from Baka have worse health than those from Bohe, another Akha village which is only several hundred meters away from Baka. They attribute this to the polluted water that Baka village drink. The drinking water for Baka village flows from rubber plantations and has been polluted by the pesticides and herbicides; while that of Bohe is from reserved natural watershed forests. Four malformed babies have been born in Baka, while there have been none in Bohe in recent years. This may also be related to the polluted water.

Teachers from local primary and secondary schools often complain that it is more difficult to teach/discipline students today than ten years ago. They partially attribute this to the rubber plantation-based economy because tapping rubber does not need much education. Thanks to the family planning, each couple usually has no more than two children. They hope at least one child would tap rubber when he/she is grown up. Another reason is the fact that it is very difficult to find a job in cities and town even for people with college degrees in China now. Parents think it is wasteful to invest in their children’s education for this reason.

Furthermore, though it is not the direct cause, the rubber plantation-based economy has also created conditions that contribute to vicious lifestyles in Baka and other communities in this area. For example, rubber trees are usually tapped every another day in Xishuangbanna and a tapper could manage 300-600 trees a day depending on her/his skill. Since there are not many trees ready for tapping yet, most Baka villagers tap every

another day. This gives the rubber tappers (usually younger generations) a lot of free time to kill. Even on the days they need to tap the trees, they are free in the afternoon because rubber tappers in Baka village (and in this area) usually get up at 2-3am to start tapping and finish it at dawn because the early morning is the time of highest latex production for the trees. Then they have a nap at the field shed for a couple of hours before they cook and eat brunch. They collect the latex around noon and transport it back to village afterward.

Along with the sudden increase in income, gambling has suddenly becomes a very popular way for the villagers to kill time. Many people become addicted to gambling, with some losing all their rubber trees and owing huge debts. Gathering and drinking is also a popular way of killing time. Many people become alcoholic. Five people died from alcoholism in Baka village in recent years, among whom two were killed in motorcycle accidents when they were drunk and the remaining three died from heart attacks as they were drinking. Some people suffering alcoholism became mentally disordered and were sent to asylums.

Prostitution also becomes prosperous in Dongfeng town along with rubber boom, resulting in increased spread of STDs (sexually transmitted diseases) in surrounding communities. According to an herbalist in Baka, more than 20 patients with STDs had visited him for private treatment in recent years. There were no patients like this ten years ago.

Rubber plantation and belief system

Though animist belief of the Akha was suppressed and most sacred forests were destroyed during the Mao-era, some sacred forests (e.g. a cemetery) and other sites that were taboo or *yahawr*. However, most of these remaining sacred forests and sites were further replaced with rubber plantations in last decade. The sacred (or *yahawr*) forests/sites were reserved under the name of *naef* (spirits). Those who dare to challenge the animist belief are usually younger generations in their 30s and 40s. When I asked them why they dare to claim these sacred lands, they said that they did not believe that there was no such a thing as *naef* or spirits. They believe that money is omnipotent, like a popular Chinese saying “qian neng shi gui tui mo,” literally meaning “money can make ghosts mill.” So even if there were *naef*, they have become to believe that power of money surpasses that of *naef*. Since rubber trees are called money trees, it is okay to replace these sacred forests with rubber trees.

Of course, there are people, especially elders, who still believe in power of *naef*. For example, the wife of a man who cleared a sacred forest for rubber plantation got eye problems in Baka village. People explain that she has got a punishment from *naef* because her husband broke the Akha “law”.

Despite disagreement on sacred forests vs. rubber plantations, rubber trees become the favoured cash-crop in Xishuangbanna, though they were initially disliked by the Akha people when they were first introduced at the state farms. The Akha (and other local people as well) disliked the smell of wasted rubber too. They would hold their breath whenever they were passing a latex collection station where strong smells of wasted rubber were emitted, but now they have gotten used to it. Baka villagers will joke: “we cannot sleep well without the smell now.”

Rubber plantation and cultural traditions

Increased income from rubber plantation promoted the social status and acceptance of the Akha people in Xishuangbanna, and this is reflected in the changing patterns of intermarriage between Akha and Han. Prior to 1980s, five Akha women from Baka village married Han men who were workers in the neighbor state farm, while no single Han married into Baka village. It was believed that you married upwards if you married to a Han Chinese, that the social status of a state farm worker was higher than a peasant farmer. It was easier for an Akha woman (especially a beautiful one) to marry a single Han worker in the farm than any other way. However, ten Han men and six Han women married into Baka village since the 1980s, especially since the late 1990s when Baka villagers started to tap their own private rubber trees. Yet no single Baka villager married out to the state farm workers during the same period because peasant farmers with private rubber plantations are now believed wealthier than the state farm workers.

Increased income from rubber plantation has enabled Baka villagers (and many other villagers as well) to not only revitalise some of their traditional cultural festivals (e.g., Akha new year festival or *Gartanrpar*), but celebrate them at even larger scales. Improved living standards have also liberated Akha women from many heavy traditional duties such as fetching water and carrying firewood, allowing them more time to make traditional costumes for the festival celebrations. Hand-weaving traditional cotton cloth has even become a kind of competition among Akha women. For instance, according to 2006 Baka household survey, there were 247 *yar*³⁴ of woven cotton cloth in the village in 2005. If this presents average amount of cloth woven in Baka each year, it could produce enough cloth to make costume for every villager in three years. Since this trend has continued for many years, there is actually a lot of excess cotton cloth in Baka village, though it is not evenly distributed among the households.

³⁴ *yar* is a length unit of cloth in Akha. One *yar* of cloth could be made a set of Akha costume for an adult.

Conclusions and discussions

- Thanks to the commune system, constructions of these reservoirs, paddy fields and roads were completed through massive mobilisation of the people at very low budget. These constructions were the most positive contribution from the commune system to the local agricultural economy and social development. However, the commune system had destroyed the Akha traditional natural resource management system that was embedded in sacred ecology.
- The Chinese government, through its economic development programmes such as promotion and investments in rubber plantations and social movements such as “Great Leap Forward” in which massive labour was mobilised in the commune economy, is most responsible for the loss of forests (especially rainforests) and biodiversity of Xishuangbanna. Expansions of rubber plantations resulted in massive deforestation from the large-scale slash-and-burn agricultural practices of the commune system (which is different from traditional swidden agriculture), the loss of local large wild animals (such as tigers, leopards, golden cats, lynxes, bears, deer, antelopes, monkeys, loris, among others) and many birds (such as hornbills, peacocks, eagles, among others) disappeared (except in nature reserves) due to loss and fragmentation of their habitats by the early 1980s.
- Rubber plantations were also promoted by the government as an alternative to traditional swidden farming practiced by local indigenous peoples such as Akha—which was viewed as backward and unproductive by the government. As a result, smallholder private rubber plantations were started in the 1980s and now are catching up to, even surpassing those of state farms in terms of planting areas. This expansion is responsible for the disappearance of those fragmented forests. The Household Contract Responsibility System and land distribution pattern under the system has accelerated the replacement of swidden farming with rubber plantations in mountainous villages with lower altitudes like Baka. Although rubber plantations were only encouraged at altitudes below 1000 masl, private smallholders’ plantations have reached 1300 masl in Menglong, resulting in very poor growth of rubber trees and much reduced profitability.
- Household income in Baka village has increased in many-fold recently due to rubber production. Living standards of Baka villagers have improved substantially from the increased income in recent years. However, households are more vulnerable as rubber farmers than as swidden farmers to unfavorable weather conditions (such as cold winters and storms), pests and diseases, and to fluctuations in global rubber prices. This vulnerability is not a direct effect of rubber plantations *per se*, but rather from the landscape and livelihood simplification and homogeneity that monoculture of rubber creates. What is worse is that Baka villagers are so locked into rubber plantations that they did not know other way out in the case of a rubber crisis. High dependency of household and village economies on rubber has also been accompanied by social stratification.
- Rubber trees have become the favoured cash-crop for most people in Xishuangbanna, because they produce not only unprecedented income, but also other important

resources for rural livelihood such as firewood, timber and animal fodders. These side-benefits have been an important reason for the recent expansion of private rubber plantations. However, replacement of local forests with rubber plantations in Baka area has reduced availability of NTFPs for collection, not to mention the disappearance of wild animals and loss of agricultural biodiversity. Drinking water has also been polluted by chemical pesticide and herbicide applied to the rubber plantations in Baka village.

- Although 74.1% of Baka village's total lands are planted rubber trees, a certain level of plant diversity has been preserved by Baka villagers in their home-gardens and their collective forest. There were 170 useful plant species found in their home-gardens, 44.1% of which are introduced directly from local forests. Therefore, if managed correctly, home gardens could become an effective method of *ex situ* conservation of plants. Baka collective forest takes up 22.2% of their total land, and most local plant species are still preserved in the forest. So, collective forests could also be an effective method of *in situ* conservation of plants.
- Tea plantation is another alternative to shifting cultivation and promoted as a model of economic development at higher altitude (above 1000 masl) by local governments in Xishuangbanna. However, since the price of tea was low until 2004, tea plantations did not replace swidden agriculture spontaneously in higher communities like rubber plantations had in lower communities,. Rather, replacement of swidden agriculture with tea plantations has been achieved through "stick and carrot" policies in early 2000s. On the one hand, shifting cultivation has been banned (with the logging ban) under the Natural Forest Protect Project in China since 1998 (the stick policy); on the other hand, swidden lands' conversion into plantations (of tea, rubber, Chinese fir, etc.) has been encouraged through governmental subsidies under the Land Conversion Project (the carrot policy), which started in 2002 in Xishuangbanna. Soaring prices for tea in 2004, 2005, and 2006 further catalysed a tea plantation fever in Xishuangbanna. As a result, all wastelands in Mengsong (about 25,000 mu) and 80% of swidden lands of Mengsong (about 18,000 mu) had been cultivated with tea by 2008, though only 4,940 mu of them have been identified and subsidised by the Land Conversion Project.
- Although the initial purpose of the Natural Forest Protect Project and the Land Conversion Project is to achieve ecological goals (e.g., soil erosion control through increasing forest coverage and improving forest/vegetation quality) without jeopardising social and economic development of targeted areas, in practice local governments and project personnel (especially those of the land conversion project) tend to put economic benefits first, or simply pursue economic goals at expenses of ecological and social benefits. Therefore, ecological benefits of the projects have been jeopardised by the ways the projects are perceived and conducted.
- Land/forest tenure conflicts between households and households, households and villages, villages and villages have become a big issue as a consequence of the transformation from shifting cultivation based subsistence economy to a cash-crop farming based market economy in mountainous areas of Xishuangbanna, like Mengsong. In order to solve this problem for good, local government has decided to entitle households land/forest tenure with clear demarcation. But the definition of this entitlement is not clear and thus caused more uneasiness to local communities as

they worry that improper demarcation and entitlement may create more problems and tensions than it solves.

For example, in Mengsong, Akha people traditionally grow some cash-crops such as tea, bamboo and rattan in the forests. While the forests usually belong to the community, the cash-crops belong to individual households. The complication in Mengsong is that six villages have been living side by side for a long time. Their community forests were divided into state forests, village collective forests, and household forests in 1983 by the local government. But each village's collective forest contains individual households' tea gardens from across all these six villages; household forests also contain tea gardens of other households from the same or other villages. It is not clear whether the entitlement is for the land or for the plants or both, and how to address the traditional overlapping tenure system.

- Like we observed in Baka, the whole of Xishuangbanna has experienced fast economic growth in recent years. Increased incomes have enabled local people to build better houses, get better health care and greater mobility (with motorcycles and other vehicles), access to broader information and entertainment (mainly through public media), revitalise local cultural traditions with new resources, and liberated local people (especially women) from heavy labor such as transporting agricultural products, animal fodder, and firewood that are now transported with tractors. However, in the rural areas this economic boom stemmed mainly from rubber or tea plantations, which is achieved at expenses of forests and biodiversity, as demonstrated in Baka and Mengsong. In addition, the recent economic boom has not only widened social stratification, but also created many new social problems such as gambling, alcoholism, economic burdens from competitive feasts, and prostitution. Therefore, it could be concluded that this kind of development is not a sustainable development as defined by the WCED.
- Akha people explain all of these changes within their own animistic worldview. During the Mao Era, when people destroyed the sacred forests without being punished as they used to believe, led Akha people to believe that forest spirits were disappearing, that Han Chinese were like wandering spirits Akha people had to deal instead, and that Chairman Mao was the supreme God governing all creatures, including spirits. They started to worship Chairman Mao and believe that they would get punished if they did not follow Chairman Mao's order. Mao's death caused a big panic to Akha people who started worrying of returning of those powerful forest spirits. However, having tasted the power of money, some Akha youths dared to challenge the very notion of spirits by expanding rubber or tea plantations even on most sacred lands. A new form of religion that would worship money as powerful spirits is forming.

7. KEY MESSAGES

Akha societies have adopted various economic systems with different natural resource management strategies as they've adapted to various social (including political, economic, and cultural) and natural environments at different places and time. Social and natural environments have been two sets of force/pressure with which Akha societies have to deal.

Politically, Akha societies have gone through several shifts, from statehood to chiefdom to villages, as adaptive mechanisms responding to shifting frontiers with surrounding states of Chinese, Tai, Burmese, and Tibeto-Burman groups. This shift is accompanied with migration from *Jadae* to *Sipsongpanna* (nowadays called “Xishuangbanna” by the Chinese) and its neighboring mountains of Mainland Southeast Asia (MSEA). In *Jadae*, Akha people established their own state. As they occupied valleys of Red River, irrigated rice cultivations seemed to be the major agricultural form, at least for core population of the Akha, if not for all.

In *Sipsongpanna*, a dual political structure was developed in Akha societies: an internal government (or Village Elders’ Council) led by a chief *daoeqma* and an externally-added *jawrbax-pyaflo* system, to deal with two basic challenges/forces faced by the Akha societies. On the one hand, Akha societies needed to respond to the natural forces from their physical environments; on the other hand they needed to react to the social forces derived from the political pressures of the lowland state.

As they were forced to move up into mountains, Akha gradually became more specialised in swidden agriculture, growing dozens of varieties of rice and hundreds of other crops species, managing agroforestry (of tea, bamboo, rattan, and indigo) and supplementing their diets with home-gardening, hunting and gathering. A lot of Akha communities even adopted opium poppies as major cash-crop from late 19th through the first half of 20th centuries. Contrary to the common perception of shifting cultivators as deforesters, the Akha had sustainably managed their natural resources and played an undeniable role in conserving local biodiversity until the onset of Mao’s modernisation programs in the 1950’s. Thus it is the state that has been most responsible for deforestation in Xishuangbanna. Among all the state development programs and policies, rubber plantations have contributed foremost to the deforestation and loss of biodiversity in Xishuangbanna.

Traditionally, the Akha people sustainably managed their natural resources (especially forests and forest-related animals and plants) not because they were culturally nature lovers, nor due to their animist belief as some cultural ecologists might assume. Rather, it was because for centuries their livelihoods (e.g., swidden agriculture as well as hunting and gathering) had been based on forests and their survival as highlanders of MSEA dependent upon the sustainable management of forests and forest-related resources. In doing so, Akha societies had accumulated a rich body of traditional ecological knowledge (TEK) through empirical observations. As an oral culture without writing scripts, their TEK were vividly recorded and presented in proverbs and a phenomenological calendar, and represented in a lot of stories (including fairy tales) and myths.

Through reciting those proverbs, stories and myths constantly, the Akha TEK had been taught and transmitted, generation to generation, for centuries. More importantly, their TEK, which included environmental rules of natural resource uses, had been efficiently applied in their practices of natural resource management (such as forest management, agricultural activities and land use management, home-gardening, collecting plants, hunting and fishing, among others). This efficiency had been guaranteed by the village

elders' council (i.e. an internal government led by a chief *dzoeqma*) who monitored and enforced their customary laws. More importantly, the council enhanced the messages through religious representations and moral transactions in their natural resource management. In addition to being embedded in their customary laws, Akha TEK is also represented into their belief system and worldview as environmental taboos and rules, and integrated into their moral system as environmental ethics. Those taboos and rules are observed in their practice of natural resource management and enforced as religious rituals that are repeatedly conducted.

For instance, most ecologically significant locations are set aside as sacred sites—*yawhawr*—in which any human activities are forbidden. Such locations include, but not limited to, habitats of sacred plants such as fig trees (those fig species are believed by ecologists as key species in maintenance of tropical ecosystems) and sacred animals/birds such as lorises and hornbills (they tend to live in primitive forests which serve as refuges for local animals/birds and plants in shifting cultivation areas), water springs/wetlands/natural ponds/lakes (vital parts of tropical ecosystem), spots of landslides and steep-sloped hills (too vulnerable to be disturbed). It is also a taboo—*dawr*—to encounter animals that are mating. Natural resource management by traditional societies is often termed as “sacred ecology” as it involves religious representations in most traditional societies (Berkes 1999).

Due to those taboos and rules, Akha's traditional shifting cultivations opened just small patches of forest at any given time. As a result, it was evident that over 70-80% of Xishuangbanna lands were still covered by natural forests in 1950 (Gao, 1999). However, almost half of the forests had disappeared as a result of new ways of natural resource management promoted by the Chinese government under the name of development. Large scale shifting cultivations, involving massive clearance of forests without observing those taboos and rules, were encouraged as a form of commune economy during Mao Era. Indeed, those sacred forests were destroyed intentionally in the “anti-superstition” campaign. All those religious rituals and related cultural activities were forbidden. Along with these changes was the forced abolishment of the *dzoeqma*-led internal government of the Akha. As a result, Akha TEK and its sacred ecology have been forgotten.

Another major factor that contributed to deforestation and loss of biodiversity in Xishuangbanna was rubber plantations. The newly born government of China needed to produce this strategic but unavailable industrial material rubber within its own territory for the sake of national security during the cold war. From the state's point of view: Xishuangbanna's tropical natural forests were wasteful and needed to be reclaimed; traditional swidden agriculture was unproductive that needed to be replaced; and both were uncontrollable (untaxable).

Rubber plantations were justified by the belief of Chinese that the plantations were forests which would provide environmental/ecological services as those natural forests did. So it was just “forests for forests” and would kill two birds with one stone. Therefore, numerous state-run rubber plantation farms have been established in Xishuangbanna under the Reclaim Bureau of Yunnan Province since 1956 (which were co-operated into

ten county-level state farms by early 1980s). Since local indigenous people were viewed as backward and thus unqualified for this new job of modern productivity, the farm workers were recruited from Han populations in other parts of China, and indeed most first batch workers were retired veterans. Thus rubber plantations seemed to be a perfect new technology which would allow the state control over local resources and indigenous people.

The huge expansion of rubber cultivation has been achieved at the expense of rainforests and forested lands used for shifting cultivations by local people. This has allowed Xishuangbanna to become the second national biggest base for rubber production but forces local people to farm less desirable lands, and indeed leaves insufficient lands for continuing traditional swidden agriculture in many Akha villages. The rural reform in early 1980s particularly Household Contract Responsibility System further limited swidden lands within demarcated areas, which forced many Akha communities with altitudes (lower than 1000 masl, like Baka) to abandon swidden agriculture and adopt rubber plantations. Their culture and lifestyles have also become adaptive to rubber plantations.

Since rubber plantations become unprofitable at higher altitudes, replacement of swidden agriculture in the higher mountains of Xishuangbanna was achieved more forcefully through “stick and carrot” policies. On the one hand, the logging ban under the Natural Forest Protect Project in 1998 forbade cutting any natural trees, which also meant to forbid shifting cultivation as it required cutting trees. On the other hand, the Land Conversion Project incited shifting cultivators to adopt monoculture plantations of cash-crops particularly tea and Chinese fir or even rubber trees. However, since the project in particular and the government in general favoured economic benefits over ecological ones, more natural forests had been replaced with monoculture plantations, which greatly jeopardised the ecological goals of the project.

Therefore, it could be concluded that Akha societies and their natural resource management have evolved as they adapt to dynamic changes of two sets of forces. Where natural forces were the major challenges, the Akha natural resource management system tended to be more sustainable since ecological balance is of no less concern than economic and cultural benefits; while social-political forces surpassed natural ones, Akha people tend to adopt a new strategy of natural resource management which would provide best interests to them. In doing so, negative ecological consequences may follow if the social-political forces (like those of Chinese policies) favour economic or political benefits over ecological ones. Thus, in order to achieve a sustainable resource management regime and a sustainable development, stakeholders, especially those with power and influence such as governments, and international organisations/societies should create favourable conditions that allow local communities to adopt ecologically friendly strategies.

For instance, the Chinese government and Natural Forest Protection Project should pay Mengsong communities for their contributions to forests conservation; instead of providing incentives for them to replace natural forests (swidden lands in fallow) with tea plantations. Economic development of local communities is important, yet there are other

options to promote economic development in Mengsong. For instance, providing stable market prices for their organic tea from their traditional tea trees in agroforests is more helpful than blindly expanding tea plantations with any protection measures. If the government could stabilise and protect the market prices for their organic tea, Mengsong would not need that many new tea plantations. As one of key water sources to Menglong Basin, Mengsong could be also compensated for their contributions to forests conservation, by the lowlanders who benefit from it, through government differentiated taxation and its redistribution system. The government should also discourage commercial mining and logging from outsiders in such ecologically important areas like Mengsong where local communities got little economic benefits.

Government approved activities have not only destroyed local forests/ecology, but also broken local people's hearts as their generations-long investments were easily reaped by unrelated others without any compensation. Local people were further cheated and had their rights trampled by the government in its dam construction in Mengsong. All of these problems were created from lack of inclusion of local communities in decision-making processes. Equal and fair participation in decision-making is the key prerequisite for a sustainable development (WCED, 1987). However, China is yet far from establishing such a political system.

In order to achieve sustainable development in largely indigenous areas like Xishuangbanna, China should respect local people's culture and rights to their own resources; return to them the identity of mastership; allow them to contribute to the management of natural resources with their traditional ecological knowledge and wisdom; and not allow TEK and agro-biodiversity to disappear without any effective measures for protection and conservation. Once they regain dignity, confidence, and resources, local people are capable of contributing to sustainable development of the Mekong region, like Baka villagers who started to initiate a cultural and ecological restoration project.

South-East Asian governments, particularly those of Laos and Myanmar who are eagerly opening up lands for rubber plantations under the influence of China, should take the lessons from Xishuangbanna. Local communities and governments might get economic benefits from rubber plantations, but a substantial proportion of forests should be preserved for animals as well as local people's livelihoods (e.g. collecting or even reasonable hunting). Economic activities should be diversified to reduce the high risk created by the monoculture of cash-crops, like rubber trees, are subject to fluctuations in the global market economy. Reciprocal social and cultural services, as well as relevant educational services, need to be provided to local communities in order for them to prepare for exposure to modern societies.

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ANNEXES

A. Mengsong Land Use Dynamics

Traditional belt name	Traditional land use types	Under Commune System	Under Household Responsibility System in 1980s	Under Household Responsibility System in 1990s-2000s
I. <i>pu</i> -villages	Residency	Growing	Growing	Growing
	Home gardens	Fluctuating	Growing	Remained
II. <i>putsanq</i> -village forests	Village protection forests	Destroyed	Partially recovered and became scenic forests (Feng jing lin)	Partially became tea agroforests
				Some remained as scenic forests
III. <i>ghaqtсанq</i> -protected forests	Watershed forests	Protected	Became state forests	Becoming tea agroforests
	<i>Sangpabawa</i>	Protected	Became state forest	Becoming tea agroforests
	Cemetery groves	Partially destroyed	Partially recovered	Remained
	Earth Lord groves	Destroyed, partially became fruit orchards	Became part of collective or household forests	Became tea agroforests
	Holy Water	Destroyed	Not restored	Not restored
IV. <i>miqhaeflafghaw aqganq</i> -firewood forests	Timber, firewood forests	Maintained	Became collective and household forests	Most of them became tea agroforests
	Tea agroforests	Developing	Developing	Expanding
V. <i>nyoqjawrkmrtuiv</i>	Pasture lands	Partially maintained	Partially became “Lun xie di”	Most became tea plantations

<i>aqganq</i> -fenced buffalo forests			Partially remained	Became tea plantations
		Partially became fruit orchards	Maintained	Most became tea plantations
				Some remained as fruit orchards
VI. <i>yarmrjawqxm q</i> <i>aqganq</i> -“arable” lands	Irrigated paddy fields	Developing	Developing	Some destroyed by mining
	Swidden fields	Expanding	Became “Lun xie di”	Some became irrigated paddy fields
				Most became tea plantations
				Some became rubber plantations
				A small proportion remained as swidden fields
			State wastelands (25000 mu)	Tea plantations
	Sacred sites	Destroyed, became farming lands	Some remained as farming land	Became rubber or tea plantations
			some were abandoned	Remain abandoned

B. Baka Land Use Dynamics

Traditional belt name	Traditional land use types in old settlements	Under Commune System after being relocated in 1967 and 1971	Under Household Responsibility System in 1980s	Under Household Responsibility System in 1990s-2000s
I. <i>pu</i> -villages	Residency	Growing	Growing	Growing
	Home gardens	Fluctuating	Fluctuating	Fluctuating

II. <i>putsanq</i> -village forests	Village protection forests	Remained	became scenic forests (Feng jing lin)	Rubber plantations
III. <i>ghaqtсанq</i> -protected forests	Watershed forests	Protected	Became state forests	Becoming rubber plantations
	Cemetery groves	Destroyed	Partially recovered	Shrunk
				Most became rubber plantations
	Earth Lord groves	Abandoned, and adopted tea plantations	Tea plantations	Tea plantations
	Holy Water	Abandoned	Not restored	Not restored
IV. <i>miqhaeflaighaw aqganq</i> -firewood forests	Timber, firewood forests	Remained	Became collective (Ji ti lin)	Cleared for farming in early 1990s and recovered since then
	Tea agroforests	Tea plantations	Remained	Rubber plantations
V. <i>nyoqjawrkmtuiv aqganq</i> -fenced buffalo forests	Pasture lands	Partially maintained	Became “Lun xie di”	Rubber plantations
		Most became farming lands		
VI. <i>yarmrjawqxm q aqganq</i> -“arable” lands	Irrigated paddy fields	Developing	Remained	Most remained
				Some became banana plantation
	Swidden fields	Expanding	Became “Lun xie di”	Rubber plantations
	Sacred sites	Destroyed, became farming lands		

C. A summary of Baka household survey in 2006

H.H. No.	H.H. Size	Smallholders' Rubber Plantation by 2006				Rice Production and Consumption in 2005				Livestock in 2006		Killed in 2005		Household income in 2005 (Chinese Yuan)				
		trees	mu/ capita	Tapped trees in 2006	Rubber income 2004-06	Total harvest (kg)	Enough 1=yes 0=no	Bought (kg)	Borrowed (kg)	Chicken	Pig	Chicken	Pig	Rubber	Live-stock	Tea	Others	Total income
1	6	2890	16.1	500	144000	3600	1			27	19	20	1	40000	0	0	0	40000
3	4	1000	11.1	100	3000	500	1	180		1	7	20	1	0	0	0	5000	5000
4	6	3431	19.1	556	90000	1710	1			28	2	24	1	20000	350	100	0	20450
5	6	4168	23.2	300	45000	2400	1		100	12	5	15	1	15000	700	100	0	15800
6	5	3005	20.0	500	85000	1500	1	100		14	6	10	0	30000	0	0	0	30000
7	2	110	1.8	110	8400	500	0	125	90	33	1	1	0	3000	788	500	1200	5488
8	4	2590	21.6	600	75000	2100	1		100	13	9	5	1	15000	700	0	0	15700
9	5	1560	10.4	450	145000	1560	0		60	23	3	10	2	35000	0	0	0	35000
10	5	1040	6.9	150	41000	1650	1			14	3	10	0	15000	0	100	0	15100
11	5	2400	16.0	300	45000	2940	1			9	2	20	1	15000	0	0	0	15000
12	8	3880	18.5	600	125000	3300	1			50	4	10	2	30000	0	200	400	30600
13	5	1810	12.1	400	45000	600	1			0	5	30	1	15000	0	200	0	15200
14	7	3570	17.0	900	90000	3000	1	50		8	6	10	2	20000	0	150	10000	30150
16	4	2670	22.3	500	60000	1500	1			4	3	3	1	10000	0	100	0	10100
17	8	2100	8.8	400	40000	2250	1			20	4	10	3	10000	0	60	0	10060
18	4	1090	9.1	200	18000	600	0	150		21	5	20	0	5000	2000	0	0	7000
19	4	1854	15.5	600	60000	1050	1			14	3	5	1	20000	400	0	0	20400
20	7	1636	9.1	300	18000	750	0	150		10	8	15	0	5000	800	50	0	5850
21	7	1480	7.0	400	30000	1050	1			15	5	20	0	10000	0	200	0	10200
22	6	2730	15.2	500	90000	1620	1			45	5	12	5	25000	1500	0	0	26500
23	4	1700	9.4	600	160000	1500	1			0	3	0	0	50000	600	0	0	50600

24	4	3785	31.5	150	45000	1500	1			23	3	20	1	15000	0	0	2000	17000
25	2	1650	11.0	500	66000	1600	1		100	30	2	20	2	20000	0	150	0	20150
26	2	680	7.6	500	80000	900	1			8	7	2	0	20000	400	200	0	20600
27	4	2420	20.2	300	45000	3000	1			0	11	10	1	15000	1600	0	0	16600
28	7	2400	11.4	1000	90000	2800	1			70	3	10	2	30000	1000	200	0	31200
29	3	2280	19.0	500	90000	1760	1			15	10	100	1	30000	3400	30	0	33430
30	5	2750	18.3	400	35000	1350	0	250		25	7	15	1	10000	1500	50	0	11550
31	4	1280	10.7	300	40000	1750	1		70	4	11	5	2	10000	0	0	0	10000
33	4	680	5.7	180	21000	900	0		50	3	3	5	1	6000	2000	0	0	8000
34	5	1090	6.1	400	68000	1800	1			30	4	20	1	10000	0	100	0	10100
36	6	3000	16.7	700	60000	1120	1			26	10	10	1	20000	1000	0	0	21000
37	6	1640	9.1	140	12000	3500	1			50	6	10	1	4000	4200	500	0	8700
38	6	1760	9.8	200	45000	2700	1	100		16	3	10	1	20000	970	150	0	21120
39	6	3107	14.8	700	130000	3300	1	75		22	10	50	4	40000	900	100	0	41000
40	5	1910	12.7	100	20000	1200	1			21	11	12	1	5000	3500	500	0	9000
41	4	1620	13.5	170	7500	1050	1			26	4	5	0	1500	0	0	0	1500
42	8	5400	22.5	800	140000	4200	1			50	7	30	3	40000	0	200	0	40200
43	4	1880	15.7	100	10000	600	1			15	1	30	1	3000	5000	0	5000	13000
44	3	1300	14.4	200	31000	750	1			16	5	20	3	10000	1000	0	0	11000
45	5	2960	24.7	500	130000	1200	0	100		9	2	50	5	40000	0	0	0	40000
46	4	5750	38.3	2000	400000	1500	1			5	2	20	1	120000	500	0	0	120500
48	2	390	6.5	100	8000	0				5	0	0	0	0	0	0	8000	8000
49	6	1350	7.5	400	30000	2100	1			35	5	20	1	10000	900	200	0	11100
50	4	1200	10	300	50000	600	1			60	3	12	0	20000	3000	0	0	23000
51	3	1970	21.9	500	100000	1125	1		100	26	2	15	0	30000	2000	0	0	32000
52	3	1470	16.3	100	18000	1000	1			5	8	20	0	8000	1100	0	0	9100
53	5	3880	32.3	300	40000	1200	0		100	24	11	10	1	10000	0	300	0	10300
54	7	2220	10.6	500	94000	3600	1			20	5	10	1	15000	1600	500	0	17100
55	6	4600	25.6	800	160000	3000	1		100	15	4	10	2	50000	0	500	0	50500
56	5	2280	15.2	300	58000	2100	1			30	4	10	1	10000	0	200	0	10200
57	3	2250	15	500	44000	1375	0	200	100	6	14	5	1	15000	800	100	0	15900
58	4	1060	8.8	300	50000	900	0		50	7	1	10	0	15000	400	0	0	15400
59	5	2988	19.9	300	45000	2100	1	100		6	13	10	1	15000	1800	0	0	16800
60	3	930	10.3	300	17000	510	1			20	10	4	1	5000	300	50	0	5350

61	3	650	7.2	300	15000	660	0	100		16	7	2	0	5000	0	200	200	5400
62	3	2380	26.4	300	70000	1200	1			0	1	6	3	20000	0	0	0	20000
63	4	2396	20	200	33000	2660	1		50	0	18	10	0	10000	1000	0	300	11300
64	4	800	5.3	270	30000	2100	1	150		11	5	30	1	10000	0	0	0	10000
65	3	720	8	400	15000	1800	1			0	4	5	1	5000	0	0	0	5000
66	4	1730	14.4	300	65000	1250	1			36	3	20	1	20000	1600	0	0	21600
68	5	1344	8.9	400	55000	3080	1		50	5	7	10	1	15000	650	0	0	15650
69	3	1500	16.7	400	70000	1350	1			0	2	4	0	20000	3000	300	0	23300
70	4	2490	20.8	800	150000	2100	1			15	6	50	1	40000	0	50	0	40050
71	4	880	7.3	200	26000	1200	1			10	3	2	0	7000	500	0	0	7500
72	3	1560	17.3	300	30000	600	1			19	0	5	0	10000	0	100	0	10100
74	3	1600	17.8	100	20000	0	1			10	6	0	0	0	0	0	0	0
75	3	1400	15.6	200	55000	700	1		50	6	2	15	0	15000	200	100	0	15300
76	4	1100	9.2	200	21000	1020	1			11	7	10	2	6000	400	0	10000	16400
77	4	1920	16	170	29000	1620	1			11	3	10	3	10000	0	0	1800	11800
78	5	690	4.6	90	20000	600	0	300		0	7	1	1	5000	1600	0	0	6600
79	7	1400	6.7	200	20000	2500	0	50		65	5	50	1	5000	0	0	500	5500
80	6	3180	17.7	400	70000	2700	1			15	2	10	2	20000	400	0	0	20400
81	5	700	4.7	0	0	1500	1			27	7	30	0	0	500	200	0	700
82	4	1100	7.3	500	60000	750	1		100	22	4	20	1	20000	0	100	0	20100
83	6	540	3	300	33000	1050	0		300	5	7	25	1	5000	500	0	0	5500
84	4	2550	21.3	50	10000	1350	1			0	3	0	1	3000	860	0	0	3860
86	6	1468	8.2	500	65000	1500	1			20	10	10	1	20000	700	400	0	21100
87	6	2130	11.8	600	70000	2100	1			40	5	20	1	20000	200	200	0	20400
88	5	945	6.3	90	14000	1320	1			30	2	6	1	5000	300	200	0	5500
90	4	1130	9.4	0	0	900	0	150		4	3	10	0	0	500	0	9500	10000
91	5	1105	7.4	360	38000	1125	1			3	11	4	5	10000	0	30	0	10030
92	5	1330	8.8	200	60000	875	0	250		1	4	5	0	16000	600	0	0	16600
93	6	2105	11.7	300	45000	1410	1			30	6	40	1	15000	0	200	100	15300
94	5	1810	12.1	200	26000	1500	1			0	7	10	4	8000	2000	0	0	10000
95	3	1200	13.3	600	75000	600	0		300	47	13	7	2	20000	2500	50	0	22550
96	2	1110	18.5	240	19000	1200	1			0	4	5	1	6000	1000	0	0	7000
97	3	3410	28.4	500	40000	1180	1			0	4	0	1	10000	1600	0	0	11600
98	3	1009	11.2	120	8700	780	0	500		9	3	5	2	800	0	50	0	850

99	5	1440	9.6	100	35000	1200	0	150		20	4	10	1	10000	0	300	0	10300
101	5	1630	10.9	70	30000	2100	1			5	13	5	5	10000	480	500	0	10980
102	3	1020	11.3	300	23000	780	1			15	2	6	0	8000	1700	0	0	9700
103	4	1650	13.8	200	20000	960	1			0	5	5	1	5000	0	0	0	5000
104	4	1016	8.5	400	38000	675	1	50		0	1	0	2	15000	0	200	0	15200
105	1	1350	22.5	0	0	1230	1			15	0	20	1	0	500	600	1800	2900
106	6	2450	13.6	300	65000	2400	0	150		55	6	30	1	20000	0	400	0	20400
107	4	1764	14.7	400	55000	1470	1			1	2	5	1	15000	0	70	0	15070
108	4	1140	9.5	400	45000	1800	1			12	3	0	1	15000	0	300	0	15300
109	4	1450	12.1	300	45000	1500	0	50		6	12	5	1	10000	300	300	0	10600
110	5	1420	9.5	300	40000	1800	1			6	0	5	0	10000	0	0	0	10000
111	6	2140	11.9	240	30000	1920	1			40	3	20	1	5000	0	0	0	5000
112	5	2740	18.3	600	160000	2975	1			18	17	10	1	50000	0	0	0	50000
113	6	2522	14	500	83000	2000	1			23	6	10	1	20000	500	100	0	20600
114	6	2310	12.8	600	50000	1860	1			30	2	5	1	10000	700	200	1000	11900
115	6	3650	20.3	800	180000	3600	1			13	3	20	1	40000	1000	300	0	41300
116	4	1880	15.7	500	73000	2450	1			0	3	10	1	15000	700	300	0	16000
118	5	2410	16.1	230	60000	1200	1			30	12	20	2	20000	500	500	300	21300
119	5	4120	27.5	700	65000	2850	1			12	4	20	2	15000	280	500	0	15780
120	7	3230	15.4	800	135000	2100	1			3	6	15	2	35000	1500	500	0	37000
Total	504	215358		41036	6286600	176920	87	3480	1870	1856	595	1518	130	1770300	75478	13040	57100	1902878
Percentage (%)														92.4	3.9	0.7	3.0	100

Notes:

- These numbers are calculated based on data collected in a household survey in Baka village in April, 2006, which covered 109 households out of 120. The rest 11 households were not surveyed due to time conflicts.
- Among the 109 households, 22 households answered that they could not produce enough rice for themselves. Though the rest 78 households answered that they produced enough rice for themselves, and yet 18 households of them bought or borrowed rice in 2005. Therefore, there were about 40 households out of 109 (that is, 36.7%) deficient in rice in 2005.
- Livestock includes pigs and chicken. Sale of pigs was 74416 yuan and that of chicken was 1062 yuan.
- Other income sources include labor wages, small occasional businesses, Amomum (a medicinal plant) and woven bamboo handicrafts.
- Household no.74 separated from its mother household in 2006, and thus there was no separate income for it in 2005.
- Based on the information, the annual per capita income in Baka village was 3801 Yuan in 2005.