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Indigenous Knowledge of Forest Management in Northwest Yunnan

By Chen Bo, Huang He, and Zhu Heshuang

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Abstract

This purpose of this project was to learn about the indigenous knowledge of forest management in northwest Yunnan. The team members have backgrounds in different disciplines and are associated with different academic institutions. The indigenous peoples who were studied are members of minority nationalities in northwest Yunnan, particularly in Nujiang Canyon (also known as Salween Canyon); they include the Lisu, Nu, Dulong, Tibetan, and Bai peoples, although initially the latter two were not planned to be included in our study. Our methodology mainly consisted of field research, the use of key people as information providers, secondary data, unstructured interviews, and field observations.

The study findings reveal the indigenous peoples' ideas and practices regarding the utilization and management of natural resources, especially forest resources. The study also showed that their knowledge is the result of their having adjusted over time to their natural environment in order to survive, and that their behavior has been effected by external influences and recent governmental policies. This indigenous knowledge should be taken into account in relevant government decision-making.

Chapter 1

Introduction

I. Statement of the Problem

Northwest Yunnan is a very critical watershed for several international rivers, but it also is a very fragile natural environment. Moreover, this region has been inhabited by people for a long time. In conducting our research, we primarily tried to learn about the indigenous knowledge and practices concerning forest management of some ethnic groups in northwest Yunnan, especially along the Salween Canyon (In Yunnan Province, Salween Canyon is called Nujiang Canyon, which is the name that will be used henceforth in this paper). The key question was how these ethnic groups, particularly the Lisu, Nu, and Dulong peoples, make use of their forest resources.

II. The Nature of Our Joint Research

This project is a joint-research project in the sense that all three team members are associated with different academic institutions and have different backgrounds and perspectives. The team leader, Chen Bo, and one member, Zhu Heshuang, are pursuing master degrees in history at Yunnan University, and both have conducted research concerning Yunnan's minority nationalities, such as the Buyi and Dulong peoples. Another member, Huang He, is studying for a master of arts degree in social and development studies at the University of the Philippines. She has conducted research regarding government projects in the Philippines during her study there; she also has engaged in studies concerning Nujiang Canyon in connection with the writing of her thesis. All of us have worked together while, at the same time, each has contributed his or her own ideas and has played a different role in the completion of this project.

Chapter 2

Overview of the Project

I. The Context

Yunnan Province is located in southwest China, and is bounded by Vietnam, Laos, and Myanmar to the south and southwest. It covers a total area of 394,000 square kilometers and is inhabited by 40 million people. Of the 55 minority nationalities in China, 25 are found in Yunnan Province.

The province is one of the country's major forest zones, with forest areas accounting for 24% of the province's total land area. In particular, the forests of northwest Yunnan are among the most extensive forest-cover areas in all of China.

Northwest Yunnan is also a very critical watershed for several important rivers. Four famous international rivers—the Irrawaddy, Salween, Mekong, and Yangzi Rivers—find their upper and middle reaches here in luxuriant forests and then pass through Yunnan to bordering countries. These are the major sources of irrigation for rice paddies or farm lots found adjacent to the riverbanks (see Figure 1).

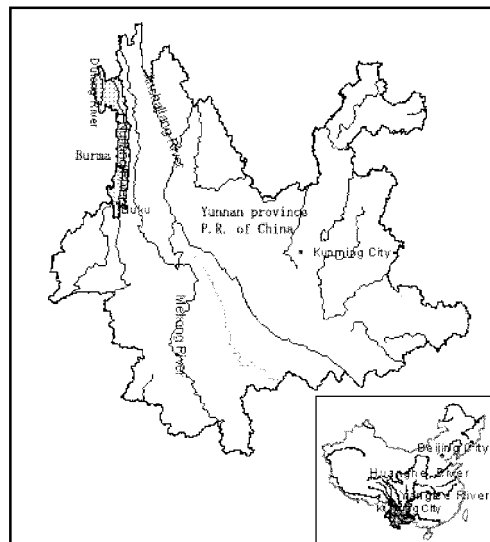


Figure 1. The River Systems of Northwest Yunnan

In the summer of 1998, China experienced severe floods. The flooding along the Yangzi River, Songhua River, and Nei River claimed

thousands of lives and caused damage amounting to billions of U.S. dollars. Some of the flooding was due to deforestation in the upper and middle reaches of these watersheds. As a result, both the Natural Forest Protection Project and the Sloping Land Conversion Program have been carried out nationwide, including northwest Yunnan, since October of 1998.

Because of the critical geographical position and important biodiversity pool of northwest Yunnan, it is the focus of this project. However, compared to other parts of Yunnan, the northwest is largely undeveloped economically. Much of it consists of high mountains or deep canyons. It is far from cities and relatively undeveloped and inaccessible. Extremely difficult natural conditions restrict the development of much of this region. Moreover, it is primarily inhabited by minority nationalities, such as the Lisu, Nu, Dulong, and Tibetan peoples, among many others. In fact, the western part of China is much more undeveloped than the eastern and coastal provinces are. At present, to develop western China is a very important strategy of the national government. One of the main items on the agenda of the central government is to promote the economic development of western China and to improve that area's ecological environment. In addition, one of the main tasks for the government of Yunnan Province is to take advantage of the opportunity being presented by the central government's strategy and to develop western Yunnan.

Although northwest Yunnan has a very fragile ecological environment, the people who live in the mountains there are believed to have lived there for many generations. In order to survive and make a living, they have adjusted themselves to their natural environment. In the course of this process they have also used and changed the environment. Although the various inhabited areas of northwest Yunnan are isolated, they are also influenced by the outside world.

Various social changes, such as a rising population, the introduction of a market economy, and state interference are dynamics that are affecting the community-environment relations in these areas.

Traditions and values that the people have retained for so long have been reshaped. During the long period of adapting to their environment and changing its nature over time, they have accumulated some of their own indigenous knowledge regarding the management of natural resources, though some elements of that knowledge are seen by “more modern” people as “unscientific” and “backward.” However, by applying their indigenous knowledge, these people have lived in the mountains for generations.

A number of research studies have been conducted concerning northwest Yunnan, focusing on Yunnan minority-nationalities’ lifestyles, customs, cultures, and religions. These studies have centered on the Lisu, Nu, Dulong, and Bai peoples, among others. Works of the Nationality Committee of Yunnan Province (2001), Guo Jing (1999), and He Guoliang (1993) give a general introduction to the different minority nationalities in Nujiang Canyon, reporting on the socioeconomic profiles, histories, lifestyles, customs, and so on of those peoples. Related to this, the Nature Conservancy is preparing an action plan to protect the biological and cultural diversity of all of northwest Yunnan. The main means of doing that are to establish biological and cultural reserves as well as harmonious ecological environments, among other steps (TNC, 2001). Also, He Peikun has introduced the viewpoints of some Chinese minority nationalities concerning ecology and their experiences in forest management. He has also discussed some of the forest-management practices of now-indigenous peoples who moved to this area in relatively recent times. (He Peikun, 2000). In addition, some research conducted by social workers in Yunnan has shown that the Natural Forest Protection Project and the Sloping Land Conversion Program have had remarkable social and economic effects on the local communities (Yunnan Institute of Social Science, 2001).

The published literature includes many

descriptions and explanations concerning the languages, cultures (including religious beliefs), customs, technology, and arts of some of the minority nationalities, but it lacks any discussion of forest cultures. The limited literature concerning forest cultures mainly discusses ecology and rural regulations, and there are hardly any articles concerning minority nationalities’ indigenous knowledge of sustainable forestry development, particularly in Nujiang. Also lacking are systematic studies of ethnic ecology, ethnic botany, and ethnic medicine. One purpose of our project, therefore, is intended to fill in some of these gaps.

II. Objectives of the Study

The general objective of our project was to find out how the aforementioned ethnic groups manage their forest resources and whether they have some indigenous knowledge that is worth studying and preserving. Specially, this project was intended to enable us understand the natural, social, and cultural elements that affect the use of natural resources in Nujiang Canyon. Another objective was to propose—based on our findings—recommendations for government decision-makers. The result is our main suggestion: that the government should take local practices and local conditions into consideration when adopting policies relating to forests, particularly in the form of such measures as the Natural Forest Protection Project and the Sloping Land Conversion Program, rather than merely uniformly applying policies on a top-down national-to-local basis.

III. Methodology

Our research relied heavily on unstructured interviews validated by on-site field observations and secondary data.

Secondary data were gathered from all levels of government offices and bureaus as well as from academic institutions. Various books, reports, and other documents available from the government provided background information regarding Nujiang Lisu Autonomous Prefecture, such as its geography and history, and the administrative system of Nujiang Prefecture, while data

from various government forestry agencies included information about the government's forestry policies and the exploration and utilization of the forest resources of Nujiang Prefecture. Documents from various government agricultural offices contributed data about the technology, crops, and cultivation practices in Nujiang Prefecture. Some magazines and other published works have enriched our understanding of the background of the peoples and cultures of Nujiang Prefecture.

We gathered field data in Nujiang from December 8, 2001, through January 31 2002, making use of unstructured interviews with key local people who provided information, validated by visual observations and secondary data. We interviewed personnel of various government forestry agencies from the town level to the provincial level in order to obtain some information about forest resources and forest management, as well as about laws and regulations relating to forests.

Interviews with members of local communities yielded direct information about the communities. Community leaders and old people were interviewed regarding the general background of a community and changes in the natural resources, including forests and lands, as well as about cultivation patterns and resource-management traditions. Local doctors were interviewed so we could learn how they make use of medical herbs.

Field observations enabled us to see a community and its natural surroundings, including such elements as vegetation, soil conditions, crops, village settlements, and people's activities. Photographs were taken to record such information.

IV. Limitations

Northwest Yunnan covers a large area. It was impossible for us to study the entire region. Therefore we were based mainly in Nujiang Canyon. Because most communities in that area are located on high mountains, they are not accessible by car but only on foot. Due to limitations of time, funds, human resources, and transportation, we had to limit our study of different ethnic groups to five communities: Yimadi, Zhanatong, Xiaochala, Chongren, and Dimaluo.

Moreover, most of the people in the study communities do not know how to speak Chinese, which caused great difficulties for us. With the aid of one interpreter in each community, we were able to interview a few people in each locale. Another limitation was that we could interview the people only when they had time available for that.

Chinese measures are used in this paper; for example, the yuan is used as the unit of money, and *mu* is used for land area. For the sake of the convenience of readers who are not familiar with these units of measurement, more-well-known equivalents of these units follow immediately below.

US\$1 = 8.27 RMB yuan
(i.e., 1 yuan = US\$0.12)

1 hectare = 15 *mu*
(i.e., 1 *mu* = 1/15 hectare = 0.16 acre)

Chapter 3

Study Results

The project team did a lot of field study as well as gathering secondary data. We spent almost two months in Nujiang Canyon. Despite the poor conditions, we visited and worked in five ethnic communities, namely, those of the Lisu, Nu, and Dulong peoples, as originally planned, as well as in those of Bai and Tibetan peoples, which were not originally planned to be studied. These ethnic groups, which are the major groups in Nujiang Canyon, are scattered along the canyon. We tried our best to interview as many people of each community as we could, including community leaders, old people, some young people, and doctors. We prepared case reports regarding these groups, and we tried to present a complete picture of the indigenous practices of these peoples in the study area (see Figure 2).

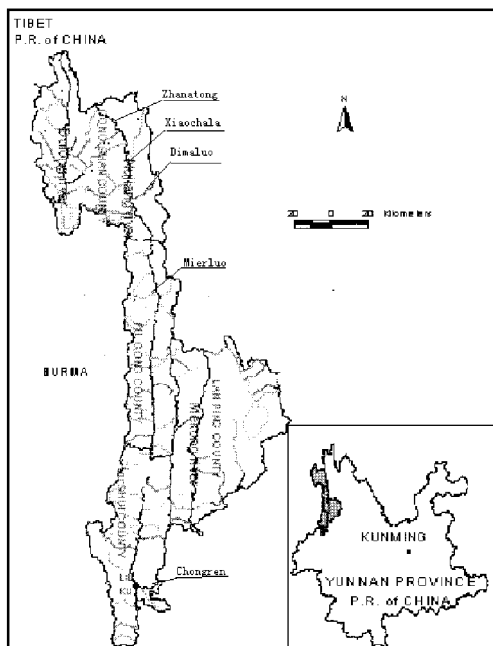


Figure 2. Study Sites

Nujiang Canyon is one of the economically undeveloped regions in northwest Yunnan. It is named after an important international river, the Salween, the Chinese name of which is Nujiang. The Salween River originates on Tagula Mountain in the Qinhai-Tibet Plateau, traverses Yunnan Province, and then flows into Myanmar. It flows between

Gaoligong Mountain and Biluo Snow Mountain, with an elevation difference of more than 3,000 meters forming a high mountain, steep slopes, swift currents, and a deep canyon, Nujiang Canyon, which is the second-deepest canyon in the world.

Administratively, the Nujiang Lisu Autonomous Prefecture governs four counties, namely, Lushui, Fugong, Gongshan, and Lanping, the former three of which are located along the Salween River. The forestry administrative system is shown by Figure 3.

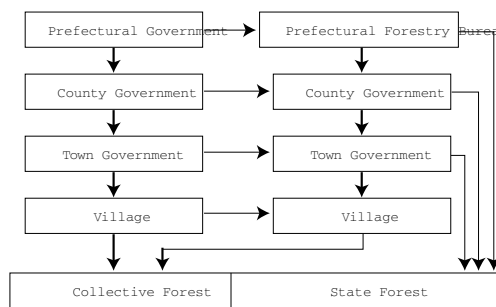


Figure 3. The Forestry Administrative System of the Nujiang Canyon Area

I. Case 1: The Lisu People of Yimadi Village

According to historical documents, the Nu and Dulong peoples were the indigenous residents in Nujiang Canyon. The Lisu people's ancestors used to live in Sichuan Province and along the Yangzi River, but have continuously migrated to Nujiang Canyon and other areas since the 15th century. Also, there are 400,000 Lisu people in Myanmar, Thailand, Singapore, India, and the Philippines. In fact, according to the Lisu people, the word *lisu* means "disperse," which implies that the Lisu people have had a long history of moving from place to place.

Lisu is the dominant group among the 12 ethnic groups that live in Nujiang Canyon. According to the census of 1995, the total population in the Nujiang Lisu Autonomous

Prefecture was 453,802, of which 231,601 were Lisu people, accounting for 54% of the total. The Lisu people are not only the most populous of the ethnic groups living in Nujiang Canyon, but also the most widely distributed. They live in all parts of the canyon and have a strong influence over the other minority nationalities there. The Lisu of Fugong County are the most typical of this ethnic group in the whole region.

Yimadi is one of the natural villages¹ of Mierluo Administrative Village of Lishadi Town of Fugong County, about 40 kilometers from Fugong County (see Figure 2). In the Lisu language, *yimadi* means “a small piece of flat land beside a river.” Yimadi Village has 28 households and a population of 120 people. All of the people are Lisu. Mr. Yu is the headman of the Mierluo Administrative Village. When we arrived there, he was leading all the people of the village in creating an irrigation channel.

According to some old people in Yimadi, the Nu people were the first to occupy Yimadi, beginning to do so about 100 years ago. More and more Lisu people moved here from other places and eventually they became the predominant ethnic group here. At present, they are found scattered from places at lower elevations of about 1,100 meters above sea level to locales at higher elevations of about 2,000 meters above sea level.

High mountains, steep slopes, thin soil, fractured rocks, variations in climatic conditions at different elevations, and high precipitation are the main characteristics of the entire Nujiang ecological environment, including Yimadi. The people who have been living in such a natural environment have had to develop various types of livelihood activities very carefully, so that they would not destroy the fragile environment and would instead maintain the ecological balance.

A. Farming

Swiddening, also known as slash-and-burn agriculture, has been a traditional agricultural practice of the Lisu people of Nujiang Canyon as an adaptive strategy in response to their natural environment (see Figure 4).



Figure 4. Swidden Farms in Nujiang Canyon

According to old men in Yimadi, in the past people usually chose a piece of land and cleared the trees and bushes off of it in April. After some time they burned the dried tree branches and bushes. Ashes from burning, which are rich in phosphorous and cilium, were used as fertilizer for the land. Burning also killed pests, germs, and weeds in the soil, so that people did not have to fertilize the soil or weed it during the planting season. Instead of using big tools to plow the land by cutting into the soil deeply, which they knew could cause soil erosion, people used very simple tools like digging sticks, small hoes, and hooks to dig shallow holes for corn seeds in the burned soft land. When traders from Myanmar moved to this area, they brought iron with them, and the Lisu people began to use iron tools. Normally people allow the land to lie fallow after it has been used for 1 or 2 years, as a result of which it has lost its fertility. The farmers will then clear another piece of land and cultivate it, following the same procedure described above.

Usually, techniques used by the people in cultivating their dry lands are dependent on the degree of slope of the land. On some relatively low-degree slopes, people use a cow to plow the land, while on steep slopes where a cow can't stand, people are limited to using hoes. In order to suit the natural conditions and to avoid soil erosion, on very steep slopes where the soil is fragile, people don't use plows, but use only digging sticks to poke holes into the soil, after which they put corn seeds in the holes. Corn is their main crop, but they also alternate between

1. A "natural village" is a group of people or collection of households existing within a certain small geographical area and having a small population. An "administrative village" is the smallest legislation-administration unit in China, consisting of a cluster of a few natural small villages within a certain area.

corn and kidney beans or soybeans, both of which are short and can grow on the stocks of corn. Squash is also interplanted with corn. These alternate crops also help to hold the soil by covering the ground with bines. Usually people plant soybeans in the spaces between the corn plants during the months of May or June, after they finish planting corn. They also practice sowing broadcasting to plant sweet and bitter buckwheat in September, before they harvest the corn. The interplanting of corn and beans not only maximizes the utilization of land and increases production; in addition, the roots of those beans can hold the soil. The Lisu people also plant tung trees and fruit trees along the boundaries of their land to hold the soil. In the Yimadi natural village, people plant tung trees along the four sides of one piece of land, which results in very orderly squares.

Since the 1950s, when transportation was improved and the Han (the majority population in China) began to move into Nujiang Canyon, new technology and skills have been introduced to this area. Also, the government adopted a series of measures to change the cultivation practices in the canyon. Lands on the lower slopes, close to the river, were converted to rice terraces as much as possible. A lot of land on the slopes was changed to bench terraces. Moreover, the bench terrace land was divided and distributed to individuals and became permanent dry land, and now such dry farming is the predominant type of farming in Nujiang Canyon. People now engage in dry-land agriculture every year. At present, there are 50 *mu* of wet rice land and 76 *mu* of dry land. At present, traditional swidden lands (shifting cultivation — the practice of clearing away forests to plant crops, then moving on when the soil becomes depleted of nutrients) account for only 10% of the total land in Yimadi. People use these lands for 1 or 2 years and allow the land to rest for a few years before they burn the grass and bush and then cultivate the land again. Sometimes the trunks of corn are even left in the soil instead of being removed after the ears have been reaped, because those roots can hold soil and also become fertilizer after they rot.

In recent years, agricultural technicians have

taught the local people in Yimadi to plant seeds in orderly rows and have introduced new species, both of which are measures that can increase production. The traditional farming practices are seen by some agricultural technicians as backward and unscientific. However, the above-described traditional planting practices are indigenous and effective methods that prevent soil erosion better in some very steep and rocky lands than does the recently introduced row-cultivation method. The simple traditional tools dig a hole not deeper than 10 centimeters, thereby not disturbing the soil by loosening it and then causing soil erosion during heavy rains. The experienced old men and women of Yimadi know that if the soil is dug too deeply and if it becomes soft, it is easily carried away by the strong rainwater.

B. Management of Forest Resources

The forests not only provide cultivated land for the Lisu people of Yimadi, but also virtually everything else that the people need in their lives. Due to the poor conditions of the land, farming in Yimadi is not very productive and the harvests' yields are not good. The people have to depend on gathering and hunting to supplement their diet. All of the mountains and forests in Yimadi are also home to dozens of types of wild edible vegetables, including ferns, wild celery, lilies, yams, and mushrooms. The people use some of the roots, leaves, and fruits of these plants as supplemental food. The Lisu people are able to identify which wild vegetables or mushrooms are edible and which are not. They know which ferns and colorful mushrooms are poisonous. They also know where and when they can find these edible plants. They also know where in the forests they can find medicinal herbs, such as Chinese Gold Thread and others, that they use to cure their diseases and for other medical purposes.

Also, hunting used to be an indispensable activity for the Lisu people. Some old people still remember when many animals, including tigers and monkeys, lived in the forest around Yimadi. The people applied a type of poisonous grass on the tips of their arrows that they shot at game animals to kill them. Wild pigs, bears, tigers, antelopes, and the

like provided the people with meat, hides, and oil. However, because wildlife is becoming extinct, the government now forbids hunting.

The Lisu women used to weave clothes for all the members of their family. They obtained the bark of hemp plants and used it to make thread that they then wove into cloth. Ashes from a stove or walnut was used to dye the cloth. The traditional Lisu-style house, which is called a “thousands-poles house,” is made of bamboo and other woods. Usually a house stands on dozens of wooden poles, and the roof and floor are made of plaited bamboo or a kind of grass named *shi*. The second floor is used to house people, and the ground floor is used for livestock. The skilled Lisu people of Yimadi even use corn skin or banana skins or bulrush to make plaited matting. Many of this kind of traditional house still exist in Yimadi, although only a few Han-style concrete houses are found there.

Lisu people mostly believe in animism. They believe that everything has a soul. Over the long period that the people in Yimadi have been interacting with their natural environment and making use of the area’s natural resources, they have also developed some special beliefs about their natural resources. In the past, there were many trees and mountains that the people regarded as holy and that were believed to be places where gods lived. It was believed that anyone who would cut those trees would get sick. If a person had to cut down a holy tree, he had to put two big stones beside the tree, to pretend that it was the stones, not the man, that cut down the tree. Trees around tombs were not allowed to be cut because the people believed that the souls of their ancestors protected those trees. These beliefs and taboos functioned to protect the forests and the overall natural environment of Yimadi.

However, as a result of the increase in population and the process of modernization, Yimadi has been changing. Abundant forests have been cleared for the cultivation of cash crops. Some government officials and others who are not from this area regard the people’s beliefs as “feudalistic superstitions” that should be destroyed. Now only the Stone Moon (a huge rock, situated on the top of the

mountain behind Yimadi, having a circular hole in the middle that looks like a moon) is still respected by the people of Yimadi as a holy object, as is the mountain. A lot of mysterious and beautiful stories about Stone Moon have been handed down through past generations. People worship it so much that it is taboo to speak loudly around the site, and they believe that to violate this rule will cause rain to fall. They also believe that anyone who cuts down a tree there will get sick. So the forest located in that area has been protected very well. When people go to the Stone Moon they even bring food and offer it to the god. Men do not shout or speak loudly when they are hunting in the forest near there because they think that might offend the god. Also, within Yimadi itself there are some big banyan trees that people respect as the houses of ghosts. There are two very big banyan trees, located on the opposite banks of a river in Yimadi natural village, that are believed to be more than 100 years old. One is considered to be a male, and the other one is believed to be a female. The local people believe that anyone who cuts one of these two sacred trees—even if only one branch—will surely die.

Modernization of the area, along with the introduction of a market economy, has also brought about some great changes to Yimadi. New varieties of corn are grown on the land, and modern fertilizer, instead of traditional animal dung and grass, is widely used to make the land more productive. The new method of planting corn—in orderly rows—has been accepted by the people because that makes it easier to weed, fertilize, and walk through the planted area than if the traditional method of planting is used. In addition, people’s planting activities are now oriented to the market prices of crops.

At the beginning of the 1970s, tung trees (whose oil is used as a special industrial oil) were planted on a large scale. After 20 years, the seeds and oil of these trees became important products of Nujiang Prefecture. Fugong County was the first area in the whole prefecture to produce tung oil. Before 1995, the price of tung seeds was 0.50–0.75 yuan/kilogram. A well-grown tree was expected to yield more than 20 kilograms of seeds. All of the people in Yimadi planted

tung trees on their land. Prior to 1995, one household could earn an average of 4,000–5,000 yuan from tung trees. However, the price of tung seeds went down to 0.1 yuan/kilogram in recent years, and so tung trees were cut down over a large area so that the land could be used for cultivating other plants. In contrast to the decline in the price of tung seeds, in 1996 the price of baiyun beans increased to 1.2 yuan/kilogram. Those who were growing this kind of bean in their swidden lands at the high elevation of the mountain were able to make small fortunes. One *mu* planted with this kind of bean brought a household about 800 yuan. Then, during 1997–1999, timber had its moment, so to speak. Some timber businessmen came to Mierluo to buy timber at a price of 2 yuan/decimeter. Many people in Yimadi changed their work from farming to felling timber. A basket of timber could sell for about 30 yuan. The forest disappeared so rapidly that some watersheds became denuded. It is clear that the market economy has had a significant impact on the activities of the people of Yimadi, even though that village is far from any city.

C. The Impact of the Natural Forest Protection Project

Since the Natural Forest Protection Project was implemented in 1998, all commercial logging has stopped. An individual is also not even allowed to cut down trees on his or her own land for selling, a prohibition that has brought loss of income for many people. Even to cut down trees for self-use of the timber is limited.

As said earlier, a traditional Lisu house is made of bamboo and other wood. This kind of house needs repairing every 2 or 3 years. To build a house, one needs more than 20 big pieces of bamboo and hundreds of small ones. Even to plait a floor one needs about 400 pieces of small bamboo. However, now the total maximum number of pieces of small bamboo that can be gathered for the whole Mierluo area is only 7,000 per year, which is not enough at all, because every year 3 or 4 households in every natural village like Yimadi need to repair their houses.

Moreover, due to a lack of other types of fuel, the Lisu people use wood to cook food

for themselves and their animals. Because the Nujiang Canyon area is generally very cold, almost every family has a stove for warming their house throughout the entire day. This custom, which is shared by every ethnic group in Nujiang Canyon, including the Nu, the Dulong, and others, results in a lot of firewood being consumed. But now, because of government regulations, people are limited to using dead or dried trees or branches. They have to spend more time to walk further than in the past to find firewood. Mr. Yu, the headman of Mierluo, was worried about this situation, because although at present there are still some dried trees available in the mountains, what if the villagers run out of firewood someday?

Although the Natural Forest Protection Project has not yet been implemented in Nujiang Canyon, the Forestry Bureau of Fugong County is going to develop Stone Moon as a tourist site. The bureau's personnel have encouraged the people of Yimadi and other two natural villages to convert 1,500 *mu* of cultivated lands back to forest land. These lands had been used for growing soybeans and buckwheat, among other crops, which provided the local people with a certain amount of food. But now these people, being aware of the importance of the natural environment, are supporting the government and have planted trees on these lands without any compensation.

D. The Lisu Flower and Bird Calendar

Most of Lisu people live on high mountains and in deep valleys. Differences in elevations result in variations in climate, which in turn result in a diversity of plants and animals that exist at the different elevations. Therefore, the Lisu people were able to determine the best seasons for their various farming tasks and other activities by observing natural phenomena. They created a famous flower and bird calendar, based on the time of year when certain natural phenomena occur, such as the blooming of flowers, the calls of birds, and variations in the grasses that are growing. They divided the entire year into two broad seasons: the dry season, from November through February, and the wet season, from March through October. They also divided the year into ten “months” as

Table 1. The Lisu Flower and Bird Calendar

Gregorian Months (12)	Lisu Months (10)	Activities	Remarks	
March	Flower Blooming (i.e., peach)	Plowing land and sowing seeds	Stored food is not enough	
April	Bird Calling	Planting seeds		
May	Forest Burning	Cutting and burning of brush		
June	Starving	Planting season has passed		
July and August	Gathering	Gathering wild vegetables		
September and October	Harvesting Wine Boiling	Harvesting crops Making wine		
November				Fallow season
December	Hunting	Hunting		
January	New Year	Celebrations		
February	House Building	Building houses		

shown by the following table.

The Lisu people use this calendar to plan their agricultural work and other activities. For example, they sow buckwheat when the peach flowers bloom, and they start to plant corn when quercetin oaks are budding. But when camellias bloom, that means the season for planting corn has passed. The Flower and Bird Calendar is an indigenous calendar based on natural conditions and it is used by the Lisu people to schedule their agricultural and social activities and to connect their production activities with natural phenomena. It plays an important role in the Lisu people's planning of their community activities. Related to this, some of the old people in Yimadi have noticed that the area's climate has changed over time. Due to the smaller size of the forests, it is so much hotter in that area than it used to be that the planting season is also earlier now than in the past. In addition, the young people of Yimadi no longer very clearly understand the purpose, use, and significance of this Flower and Bird Calendar.

II. Case 2: The Nu People of Zhanatong

A. The Locale of the Nu People

The Nu were the earliest people to inhabit Nujiang Canyon, although a census taken in

1995 tallied only 25,789 Nu people, accounting for just 5.7% of the total population of the whole prefecture. At present, the Nu people mostly live in Gongshan Dulong and in Nu Autonomous County and part of Fugong County.

Zhanatong natural village is located in Bingzhongluo Township, in the northern part of the Gongshan Lisu and Nu Autonomous County. Its neighbor to the northwest is Tibet. Zhanatong is 40 kilometers from Cikai, the center of Gongshan County, and is about 4 kilometers from Bingzhongluo. But there is no road from Zhanatong to Bingzhongluo, only a rough and rugged mountain path.

Zhanatong has 25 households and a total population of 101, consisting of 51 males and 50 females. All of them are Nu People except for a retired primary-school teacher who is Dulong. "Zhanatong" is the village's name in the Han language, and in the Nu language it is "Badenden," meaning "a small flat part of a rock." It is said that the village has a history of more than 200 years and that it was started by only 2 families that moved here from Tibet.

Mr. Zhao Yongming, aged 26, the youngest son of the clan elder, has worked in Kunming and Shandong for 5 years. We were lucky to meet him and interview him and engage him as our interpreter.



Figure 5. Shrine Room of a Tibetan Buddhist Temple

B. Indigenous Ecological Concepts and Systems

1. Religious Rites

Zhanatong is located at the foot of Biluo Snow Mountain. The thick forest on the mountain has been a source of clothing and food for the Nu people of Zhanatong for a long time. The Nu people of Zhanatong believe in animism and Tibetan Buddhism (see Figure 5), which exert a tremendous influence on their productive labor and daily living. Most important of all is that all the villagers worship trees very much. They express their worship for the forest by holding religious rites, which reflect their simple ecological concepts and system.

The villagers believe that there is a forest god who is in charge of everything in the world, including production, life, diseases, flora, animals, and so on. They believe that if people respect him, he brings people high yields and happy lives. Therefore, there is a sacrificial altar on a piece of flat ground on the mountain behind the village. A mound with some small pine trees and an incense burner are in front of the sacrificial altar; that incense burner is the main incense burner for the whole village, although every family has placed a small incense burner and a small pine tree besides the main incense burner on the sacrificial altar. On the third day of the first lunar month of the year, all the villagers go to the sacrificial altar with some food to offer to the god. They put the food together and place some of it on the main incense-burner table. The religious leader and all the villagers offer food to the forest god and pray for a good harvest and a happy life, after

which the villagers have a meal and then go back home.

Related to this, the villagers don't cut down trees at will, because they believe that the forest god will punish human beings who do so without obtaining permission from him. Before a villager will cut down a tree, he or she will offer sacrifices to the god, thereby obtaining the god's permission to cut down the tree. The villagers believe that if that is not done, the person will die.

Mr. Lee Chunhua, aged 57, is the village's religious leader, called "*guba*" in Nu. He told us that the old pine trees, in which the forest gods lived, were planted by the villagers' ancestors. In the past, the old trees were so thick that even 4 or 5 people couldn't carry a tree. But during the Cultural Revolution, the leadership at the upper levels of China's government ordered the villagers to give up their superstitions and ordered them to cut down the old trees. Now no old trees exist around the village, and the villagers believe that the god has departed. But more than 20 years ago the villagers again began to offer sacrifices to the god. The forest god has been invited to return.

It is interesting and worth noting that the Nu people of Zhanatong are fond of peaches. They hold a unique Peach Flower Festival on the 10th day of the second lunar month every year. This is the most solemn festival of all the festivals held by the Nu people of Zhanatong. The villagers begin to prepare for it one month before it begins. The religious leader arranges the work. The old are engaged in religious activities, and the young do the cooking. Moreover, the old people instruct the other villagers on how to plant peach trees. Every family must plant peach trees, no matter what they must do to find the necessary seeds to do so. During the Peach Flower Festival, the villagers in Zhanatong are joined by all the Nu People from 2 other nearby nature villages—Sinidang and Riwabulang—and together they all choose 1 or 2 chairpeople who lead the activities of the Peach Flower Festival. The villagers fry corn and mill it into flour that they then mold into the shape of a man or a woman, to which they apply colors made with herbal medicines. The image is then put on a large stone. All the villagers gather around the

molded flour body and pray that the gods will take away all the people's diseases, which the people believe have been transferred to the flour body. The villagers sing and dance and have a good time throughout the entire day.

Mr. Zhao Huangchang, aged 70 and the father of Mr. Zhao Yongming, is the head of the family named "Dazha" in Nu. This family makes up 80 percent of all the villagers in Zhanatong. He told us that long ago, when medical treatments were not sufficient, so that many diseases couldn't be cured, the villagers thought that one's life was just like a flower and that life and death were like the blossoming and dropping away, respectively, of a flower. The villagers therefore offered sacrifices to the gods and prayed that the gods would take away all their diseases. This is the origin of the Peach Flower Festival. The villagers make the corn flour into a man or a woman in turn every year, which means that the man or the woman would take away the people's diseases by turns. The Peach Flower Festival is held in Zhanatong every year. So Zhanatong is also called Peach Flower Island.

The Nu people of Zhanatong have a special feeling for peach trees and peach blossoms. No one, not even little girls, picks peach blossoms, and no one collects old peach-tree branches to make a fire, even if the branches are dead. Rather, people will plant a small peach tree near a dead one. Also, there are some peach trees around every house. At present, there are about 500 peach trees in Zhanatong, among which the oldest is more than 100 years old, though it still blossoms and bears fruit every year. Young people who move away to work somewhere else often feel homesick when they see peach blossoms.

The Nu people of Zhanatong also honor walnut trees. The villagers never cut down a walnut tree, even if it is too old to bear fruit, because they think that the old walnut trees have been left by their ancestors, and they believe that their daily lives are closely linked with walnuts and walnut trees. They use walnut oil in cremations as well as in daily cooking. They use lamps lit with walnut oil for many days and nights during festivals. They believe that a disaster will befall someone who cuts down a walnut tree. The Nu people of Zhanatong honor the old walnut

trees by offering what in the Han language is named "*zanba*"—pancakes made of corn flour on the first day of the first lunar month of the year. During the Lantern Festival, Zhanatong's religious leader lights a walnut-oil lamp in the Tibetan Buddhist temple, and then they water the walnut trees with the walnut oil from that lamp. The villagers pray that the walnut trees will yield more nuts.

In addition, the Nu People are fond of various fresh flowers. They hold a Flower Festival on the 15th day of the third lunar month of every year; this is also called the Celestial Female Festival. It is one of the most solemn festivals for all Nu People, including the Nu people of Zhanatong. The purpose of this festival is to remember a girl who is known in the Nu people's folklore as the first person to put a bamboo cable over Nujiang Canyon and who was killed by a slave owner.

At present, the Nu People not only hold traditional memorial ceremonies, but also organize, in addition to the singing and dancing performances during the Fresh Flowers Festival, some exchanges of materials and goods. The Nu People cherish flowers very much and so they seldom pick any. As a result, the flowers around Zhanatong are more beautiful and more flourish year by year.

2. *Customs, Taboos, and Rules of the Village*

During the long time that the Nu People have been in Zhanatong, they have adopted some customs and taboos regarding agricultural practices, forest management, and other aspects of their work and daily living. Every person of a family, whether man or woman, old or young, must do what he or she can do to contribute to the family's productivity. A person who does not work receives nothing, and all the villagers are expected to follow the accepted customs, taboos, rules, and so on.

For example, each year after harvesting the corn, the villagers hold a memorial ceremony, during which they put fresh flowers on the piles of corn. Also, the villagers are prohibited from eating the meat of animals and from shooting monkeys and

bears. In addition, they are not allowed to harvest or remove weeds on the 15th, 28th, 29th, and 30th days of each lunar month, and on those days they may not talk about eating pork. It is believed that wild geese live together in pairs, as love birds, and that if one of them is killed the other will be lonely. Therefore, the Nu people of Zhanatong don't hunt geese. They also are forbidden to hunt parrots, because those birds can talk like humans. In addition, the Nu People believe that newborns come from heaven and that the soul of a fetus in a mother's stomach is attached to a bird known in Nu as a *xiganji*. Accordingly, the people are not allowed to hunt those birds. Also, the Nu people may not hunt crows, owls, or magpies, and they may not hunt or eat snakes, either. Some of the customs and taboos reflect the Nu people's wish for good harvests. At the same time, some of the people's beliefs and rules serve to protect animals and plants and are beneficial in maintaining the local ecological balance.

The Nu people have many rules concerning agriculture, livestock farming, water conservancy, protecting animals and plants, and the like. The villagers are encouraged to participate in the construction of irrigation projects and water-conservancy works and in increasing the output of grains and other agricultural products. The village rules provide that no one may cut down any trees within 50 meters of water-conservancy works, and also require that people plant some trees specifically in order to protect the watershed. All the villagers are supposed to pay attention to protecting the drinking water that is introduced directly from the mountain, and such drinking water may not be used to irrigate farmland. Every villager should protect wild animals and plants and use natural resources in rational ways.

They build their houses and coffins with the wood of pine trees. A coffin is made from a big pine tree. As an expression of respect for the pine tree, which the people regard as holy, the rest of the tree can no longer be used, and it must be allowed to rot naturally, which tends to increase the fertility of the soil. The villagers hold a memorial ceremony for the tree before they cut it down. They chop off the bark of the pine tree and let the pine resin

drain to the tree's roots. The pine resin will become pine pitch in 1 or 2 years. The villagers use pine pitch to light fires.

In the past, the villagers cut down the trees for firewood and sometimes even to sell the wood. But, since the Natural Forest Protection Project was implemented in 2000, the villagers have been forbidden to cut down trees to sell the wood. The village has to obtain government approval and a Certificate to Cut Down Trees before anyone may cut down trees to build a house or to get wood for a coffin. Also, it is necessary for them to pay 22 yuan per cubic meter of wood. Now no one even cuts down trees to get wood to burn, but instead people look for dried branches.

Moreover, the villagers plant lots of trees that have economic value, such as Chinese chestnut, pear, orange, and so on, besides the traditional walnut, peach, and lacquer trees. Most of the fruits are sold when they are ripe. The income of such forest products can help the villagers to meet their daily-life expenses. For example, the village's total output of chestnuts is 1,200 kilograms or so per year, an average of 50 kilograms per household. The selling price is 6 yuan per kilogram, and so a family can earn 300 yuan or so from selling the chestnuts. The price is higher, 16–18 yuan per kilogram, during the Mid-Autumn Festival than at other times. There are 4 orange trees in the village. Their total output per year is 200 kilograms, yielding income of 800 yuan or so per year.

The villagers are forbidden to cut down trees when the corn is ripe, because the trees protect the corn from violent winds that would blow the corn away if the trees are cut down. The people also plant wax gourd plants in order to prevent flooding. In addition, they cut the bark off walnut trees from 2 meters above the ground level so that the trees can yield more nuts.

C. Indigenous Modes of Production

1. Indigenous Agriculture

a. Cultivation Technology

The people of the 25 households in Zhanatong mainly engage in agriculture. The village has more than 120 *mu* of dry land.

The people have even tried planting rice, but they failed because the irrigation wasn't stable. The farmers grow corn, wheat, and some highland barley and buckwheat. Almost all of the families grow some vegetables, such as Chinese cabbages, radishes, chili garlic, onions, and so on, around their houses. They plant vegetables in almost every season. We noticed that the Nu People here could mix chili, salt, and other ingredients with vegetables in order to keep them longer. We were glad to eat delicious pickled cabbages and radishes when we stayed in Zhanatong.

The main crops in Zhanatong are corn and wheat. Corn is planted in the summer, and wheat is planted in the winter. Most of the corn is made into wine for self-use and for selling. A small amount of the corn is cooked to feed pigs. Also, a little of the corn is put near a fireplace by young girls and then roasted and eaten during their leisure time. It is very tasty. Wheat, highland barley, and buckwheat are often ground into flour for eating, but the village's output of these grains isn't large. The main food in Zhanatong is rice. The villagers like to buy rice to eat. The food of some poor families is half rice and half corn.

The Nu people of Zhanatong have planted corn for a long time. Their method of cultivating corn is as follows.

First, plowing. The villagers burn the rod of the wheat after the wheat is reaped. The rod and the leaves become ash that is good fertilizer. The villagers use a wooden plow to turn up the soil, and then they add some manure to it. They turn up the soil again after 3–5 days and then level the land.

Second, sowing. There are three ways, as follows: (a) Broadcasting. The seeds are broadcast into a ditch during the second plowing and are then covered by soil. Some seedlings grow close together and some seedlings grow far from each other. It takes the villagers some time to separate the densely growing seedlings. (b) Dibbling. The villagers broadcast 5 or 6 seeds in a pit. But the seedlings don't grow well, because there are many stones in the soil. So only a few people use this method. (c) Planting in rows. Seeds are planted 2 or 3 centimeters apart in

orderly rows. The seedlings grow well this way, because their roots are stable and can absorb the nutrition in the soil. This method has been popular since the people learned it in 1998.

Third, managing the plants. This is very important for planting the corn and ensuring a good output. The villagers move some of the densely growing seedlings to places where the seedlings are sparse. The villagers put soil around the seedlings when they have grown to a height of 40–50 centimeters, to protect them from the wind; at the same time, weeds are cut.

Fourth, fertilizing. The Nu people of Zhanatong used to apply animal manure to fertilize the soil. But since the government started economic-reform programs, chemical fertilizers are increasingly being used. About 30 kilograms of chemical fertilizer are used for one *mu* of land. Most of the chemical fertilizers used are nitrogenous fertilizers. Small amounts of mixed fertilizers also are used.

Fifth, defending against insects. At present, insect disasters seldom happen, because the seeds are soaked in insect-repellent substances. Also, county-government technicians come to Zhanatong and show the people how to prevent and control insects if an insect disaster occurs.

Sixth, harvesting. Corn is often reaped by hand after taking off the corn silk. The villagers carry the corn home on their backs and deposit it in a warehouse or hang it under their houses.

The Nu people of Zhanatong also keep cattle and a few goats that they use to plow the land and from which they obtain milk. The villagers also kill the old cattle and goats in order to get meat to eat. Goats have been introduced to Zhanatong only recently, and so there are only a few of them there.

b. Production Tools

Most of the production tools used by the Nu people of Zhanatong are made fully or partly of wood. Their primary and most important production tools will now be described. The wooden plow is the biggest and the most popular tool in Zhanatong. There is at least 1

plow in each household. Its materials are made of chestnut wood. The wooden plow is made up of three parts: (a) the bow-shaped plowbeam, which extends from the front to the rear of the plow and to which all the other parts of the plow are fastened, and which is about 2 meters long and has a radius of 10 centimeters; (b) the triangular plowshare, which is the pointed metal blade of a plow that cuts horizontally through the ground so as to form the bottom of a furrow, and which is about 1 meter long and 27 centimeters wide at its widest spot; and (c) the plow hitch, which is a fixture at the front of the beam to which the source of power (e.g., an

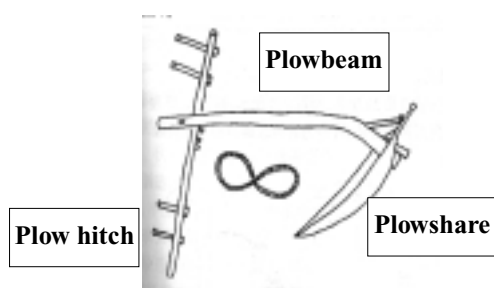


Figure 6. A Nu Plow

animal) is attached, and which is about 2.4 meters long and has a radius of 10 centimeters. The plowbeam is connected with the stout pole by a cane or a rope. Two oxen carry the stout pole so as to pull the plow, and 1 person drives the oxen when plowing. The wooden plow is used to plow hillside fields or terraced fields.

Some traditional production tools have been improved since ironware was introduced in Zhanatong. Iron-forged fittings are disposed on the part of a traditional tool to apply pressure that was not possible using only wooden fittings. For example, an iron-forged plowshare is disposed on a wooden plow. An iron-forged plowshare has the shape of an isosceles triangle that is about 14 centimeters long, 8 centimeters wide at its widest spot, and 4 centimeters high. Iron-forged plowshares are founded or forged by ironsmiths in Shantung, where other iron-forged production tools, such as sickles and choppers, also are made. A few families even have a sheller, which is a very modern tool.

2. Indigenous Gathering of Forest Materials

There are many types of fresh mushrooms on the mountain. The Nu People of Zhanatong collect them for food. Some are boiled in water with some salt, and some are used in stir-fried dishes. Some, such as morel mushrooms, pine mushrooms, and black edible fungus, are expensive. The villagers sell them on the market if they collect them, but they also give some to their relatives if they collect too many.

The Nu people of Zhanatong have much experience in collecting edible wild herbs. They know which wild herbs are edible and which are not. They often eat more than 10 kinds of edible wild herbs, including the pteridophytes and mucha, among others. Among these edible wild herbs, *shu huacai* is one of the most popular for the Nu people of Zhanatong. *Shu huacai* is a kind of herb that grows as a parasite on lacquer trees and walnut trees. It is often used to make a drink when receiving guests or during festivals. The drink is made by the following method. *Shu huacai* is first boiled for a while and then cooled. Sometimes people mix cooled *shu huacai* with some salt, chili, and mashed garlic, and sometimes they fry it with meat.

Also, the Nu people of Zhanatong collect the leaves of certain trees for use in making cloth, and they collect pine needles and put them in pigsties to keep the pigsties warm and clean. They put the resin of pine trees on the strings of the erhu, a Chinese musical instrument. The Nu people of Zhanatong use lots of materials from the forest in their daily lives.

3. Indigenous Handicraft Industries

The main indigenous handicraft industries in Zhanatong are weaving bamboo baskets and making butter-tea drums. Every family in Zhanatong has many kinds of bamboo baskets, bamboo tubes, bamboo boxes, and bamboo dustpans, among other bamboo items. Among them, bamboo baskets are the most popular and the most-used items. Bamboo baskets are made of wild oil bamboo or solid bamboo. Some are used to hold grains or vegetables. Some are used to carry various things, including greenfeed for

pigs. An elliptical bamboo basket that has a bamboo belt and that is carried on one's back has a maximum radius of 40 centimeters on its upper side, a minimum diameter of 12 centimeters at the bottom, and is 55 centimeters high. It is made by weaving 12 pieces of bamboo that are each 3 centimeters wide. It is used to carry vegetables or greenfeed. A family will use up more than 10 baskets like this in 1 year. A basket will be used for less than 1 month if it is used often. In addition, Nu women use some bamboo baskets as ornaments. The women like to carry a small bamboo basket when they go shopping or to participate in some get-together. These baskets are very exquisite. The bamboo to be used to weave such a basket should be newly sprouted, tender, and grown wild. In general, it is in summer that the villagers cut the bamboo to be used to weave into utensils. They weave the bamboo on the second day after cutting it (see Figure 7).



Figure 7. A Zhanatong Nu Man Weaving a Bamboo Basket

At present, only 4 persons in Zhanatong weave bamboo baskets. Other people exchange corn or other things to get bamboo baskets. An expert weaver can weave a basket in 1 hour. Sometimes the weavers bring their baskets to the market to sell them. Each of the above-described baskets can be sold for 5 yuan.

The Nu People of Zhanatong are influenced by the Tibetans. Every family makes butter tea to drink in the morning, and every family has a butter-tea drum. A butter-tea drum is a cylinder that is about 44 centimeters high, and that has an external diameter of 13.5 centimeters and is 1 centimeter thick. A

Tibetan butter-tea drum is made of wood from a lacquer tree or other kind of tree, but the Nu people of Zhanatong use the wood of what the Han Chinese refer to as the "PT fruit tree." The PT fruit tree is a wild plant whose fruit is as big as an ear of corn and is sweet and edible, and whose leaves look like the leaves of a bayberry shrub. It bears fruit in September or October. A PT fruit tree grows so fast that it needs only 2 or 3 years from when a seed is planted to when there is a big tree. The Nu people of Zhanatong cut the branches of a PT fruit tree to make butter-tea drums. The branches of a PT fruit tree can grow faster after the tree trunk has been cut down. Within 1 year after a PT fruit tree is cut down, a new tree will grow to full-size from the trunk of the one that was cut down. The villagers cut down the trees in winter, but they don't cut off any branches that are scarred. The butter-tea drum will split apart if it is made from a PT fruit tree that was cut down in summertime, because at that time the branches are filled with water. A butter-tea drum made from a PT fruit tree can be used for several dozens of years. Its quality is better than that made from the wood of other trees.

The craft of making a butter-tea drum is complicated. At present, only 3 people in Zhanatong can make one. Together they can produce a total of more than 100 butter-tea drums per year. Each butter-tea drum is worth 15–20 yuan. Only the Nu people of Zhanatong make butter-tea drums with wood from PT fruit trees. The quality of these drums is good and durable. All the butter-tea drums used by Nu People in other nearby villages come from Zhanatong.

Mr. Feng Dapen, aged 42, is a former head of the village. When we entered his house, he was weaving a bamboo basket to be used to carry vegetables. He is an expert both at weaving bamboo baskets and at making butter-tea drums. He was glad to tell us about the above-mentioned skills, and he said that in 1 year he can earn more than 2,000 yuan from those two handicraft skills. That is a quite a high income for a villager in Nujiang Canyon. Mr. Feng said that his father taught him the techniques, and that he would teach his son.

D. Ecological Change and the Natural Forest Protection Project

In the past, there was a dense forest on the mountain. Many types of animals, including bears, monkeys, wild oxen, and antelopes, lived in the forest. Later, however, the number of trees became less and less. In 1997, a businessman who come from outside and who estimated the size of the forest to be about 1,000 *mu*, cut down a lot of trees. Nobody in Zhanatong opposed him, because he had official permission to do that. But nobody in Zhanatong joined him, either. The trees were so big that 3 men couldn't carry one. But Mr. Feng Dapen told us that now there is not a single tree like that on the mountain.

The villagers of Zhanatong think that the atmosphere has changed greatly as a result of the trees becoming less. It is hotter than before, and it is not as cold in winter. But the wind is stronger and there is less rain than before. Also, soil erosion is occurring more frequently.

The Natural Forest Protection Project, mentioned earlier, is intended to maintain the ecological balance. The Nu people of Zhanatong think that a dense forest will appear again in 15 years as a result of this project. They understand and accept this project, even though it is causing some economic difficulties for them. The villagers must go farther away to find firewood than in the past. It takes them 3 hours to carry a basket of firewood to their homes from the site where they can find it.

III. Case 3: The Dulong People of Xiaochala Village

The Dulong people are one of the special indigenous minorities of Yunnan Province, though their population is the smallest of all the national minorities. Nearly 90% of the Dulong live in Gongshan Dulong and Nu Autonomous County, in the Nujiang Lisu Autonomous Prefecture. The biggest group of Dulong ethnic people lives along both sides of the Dulongjiang River, but smaller groups are dispersed throughout the Nujiang region. Xiaochala Village is the place having the highest concentration of Dulong ethnic people in the Nujiang region. Most of the

people here came from the Dulongjiang region, and they still maintain the lifestyle, language, traditions, and the original flavor and basic characteristics of the place of their origin. Through these one can understand their past, contrast their present situation with what it used to be, and understand the variations in the lifestyles, language, and traditions of the Dulong people in various locations. In past years, many scholars studying the Dulong mostly went to the Dulongjiang region, but neglected the Dulong of the Nujiang region. Xiaochala Village is located on a high mountain west of the Nujiang River, more than 30 kilometers from Gongshan County, in the Shuangla Administrative Village of Binzhongluo Town (see Figure 2). It has 25 families and 106 Dulong. A small muddy mountain footpath, having a slope of more than 70 degrees, is the only access to Xiaochala. Anything to be brought into or out of the village must be carried on someone's back. The village still has no electricity, and the living conditions in general are very poor. The Dulong were not the original people of Xiaochala Village. In the middle of the 20th century, the first group of Dulong migrants left their living places along the Dulong River and moved to Nujiang Canyon. After a long and difficult journey of climbing snow-covered mountains and traversing deep forests, they settled in Xiaochala. Now Xiaochala has the biggest Dulong population of any village in the Nujiang region.

A. Indigenous Management of Forests

The Dulong people have no conscious policy regarding forest management, but they have some traditions and taboos relating to forests. These include the following.

1. Taboos concerning Giving Birth

Before the founding of the People's Republic of China in 1949, Dulong women had to give birth outside their houses because the Dulong people believed that a newborn baby was unclean and the men would not hunt animals if the women violated this rule. So a newborn baby could be brought home only after being washed. In addition, women were not allowed to eat animal meat during pregnancy. Nowadays the people of Xiaochala no longer

follow these rules.

2. Taboos concerning Construction

According to the carpenter Luo Mingda, Dulong people invite a sorcerer to check the foundation first if they are planning to build a house. The sorcerer, putting some wild seeds in a bamboo tube that is filled with water, says, "If the foundation is good, the pepper seeds won't be turned over; if the foundation is not good, the pepper seeds will be turned over." Then the sorcerer checks the pepper seeds. If a lot of seeds are turned upwards, which means that the foundation is not good, the owner has to choose another location on which to build the house. Also, Dulong people do not use the branches of a tree when building a house, because they think that the people who will live in the house will often be sick or quarrel together if the house is built using the branches.

3. Taboos concerning Funerals

Dulong people usually bury their dead, and the coffin is made from a big pine tree. The leftover parts of this tree may not be used for anything else, but must be allowed to rot naturally. All villagers stop working on a day that someone is being buried, because they believe that if they work the trees in the forest will fall down, rocks will fall from the mountain, and crops will not grow. The Dulong people also believe that certain kinds of trees, such as the Dang tree ("*dise*" in the Dulong language) must not be cut down because these are believed to be sacred trees. The people believe that anyone who violates this rule will get sick.

4. Taboos concerning Hunting

During the first month after a woman gives birth, the husband does not hunt any animals, because the people believe that the woman is "unclean," and that the woman's condition is believed to have some bad effect on hunting. This plays a role in protecting forest animals. Also, a man may not sleep with his wife during that period, and he also has to wear clean clothes if he goes hunting. The people believe that the mountain god is a sacred and pure spirit, and that if a hunter has any sexual activity the god will not allow animals in the forest and thus the hunter will not be able to

kill any game. A hunter is also expected not to sweep the floor or to sprinkle water on the parlor floor before he goes hunting. People are also not expected to visit a family if one of its members is hunting.

5. Taboos concerning Daily Living

There are some taboos relating to plants and animals in the daily living of the Dulong in Xiaochala Village. When someone cuts down a big tree, he must cover the tree stake with soil. Also, usually spiders may not be hit, because they are regarded as "good-luck insects" that help people by guarding people's houses. The Dulong people even hang rice straws from the ceiling for spiders. In addition, people may not shout loudly in the mountains, because the god may get angry with them. People also may not talk while they look for medicinal herbs or mushrooms, because if they talk the herbs and mushrooms will become rotten.

6. Taboos and Customs concerning Agriculture

The Dulong people believe that farming should not be done in any place where there is a ghost. If farming is done there, someone will die and crops will not grow well. This kind of land is called "*nanlangdi*" in the Dulong language. Also, before Dulong people cut down trees in a forest to clear land for farming, they must offer a sacrifice to the god of the forest. They cook one chicken and some cake, and someone prays for safety and happiness, hoping that the god will bless them with a good harvest. Then, after eating all the food, they start to cut down the trees. In addition, when people are planting seeds, other people should not visit them, because if that happens crops might not grow. The people also pray to the god to bless them and protect them from all disasters, such as insect invasions, severe rainstorms, and so on. Also, the people do not eat chicken or other birds or fish, because they believe that if they do, their crops will die, just as the animals did.

B. Indigenous Agriculture

Because Xiaochala Village is located high on a mountain, the area is economically undeveloped and the people mainly work on one plantation. Most of villagers live in

poverty, with a few just meeting their basic needs. Their main crops are trees: lacquer, walnut, chestnut, and tung. The vegetables that they grow are simple and of old varieties, consisting primarily of bitter vegetables, cucumbers, garlic, scallions, broad beans, soybeans, garden peas, hot peppers, and pumpkins, and the yield is very low. The village people's food is mainly corn. The whole village has 224 *mu* of dry lands, most of which are cultivated by human power only, with a few being worked by cattle.

The Dulong people's diet consists mainly of corn, wheat, potato, taro, and buckwheat, due to the limitations of soil, water, and temperature, among other factors. Cash-crop trees, such as walnut trees, paint trees, tung trees, apple trees, and so on, also are planted in Xiaochala, but their production is not high.

The Dulong people, like the Lisu people, used to practice shifting cultivation (the practice of clearing away forests to plant crops, then moving on when the soil becomes depleted of nutrients), which is called "*xiaomulang*" in the Dulong language and which accounted for most farmland use before 1949. As a result of the government's prohibition against shifting cultivation and the introduction of new cultivation techniques, the Dulong people have settled down. Xiaochala has no wet rice farms, but only dry land for corn and other crops. The people cultivate some comparatively flat and fertile land every year, and they still practice swidden farming on some poor-quality and outlying lands, allowing the lands to remain uncultivated for a few years after they are used.

The Dulong people also have another kind of farmland, wax gourd farmland, which is actually another kind of swiddening land, in the sense that its management and production are similar to those of swiddening land. However, the Dulong people cultivate wax gourd plants on their swiddening land rather than doing nothing with the land during the fallow season. This kind of plant grows very fast, it has lush branches and leaves, and after it is burned the leaves' ashes contain many nutrients and are highly effective at fertilizing the soil. The Dulong people usually plant corn one year and buckwheat the next year, combining buckwheat and

water wax gourd plants the following year. After 5 or 6 years the wax gourd plants can be cut down and burned. This kind of farmland is rich in nutrients and can be continuously cultivated for many years. Therefore, it is the Dulong people's favorite type of farming.

Home gardening is another type of Dulong traditional cultivation, making use of the small pieces of relatively flat land that are around their houses. The Dulong people of Xiaoxhala cultivate home gardens every year, using them for growing corn, potatoes, and taro, rather than other vegetables. The total land area of such gardens in Xiaochala has increased since 1949, as a result of converting swiddening land to settled land and changing slopes to flatland plots. Xiaochala used to be surrounded by flourishing forests, and home gardens accounted for only somewhat more than 10 *mu* of land before the establishment of the P.R.C. in 1949, but the total area had increased to more than 100 *mu* by 1957. In 1958, more than 300 *mu* of forest land was cleared and converted to wet rice farmland. However, because of the high elevation, the lack of water, and low temperatures, rice plants couldn't develop fully, and so these wet rice lands were abandoned after a few years, and so far there is no rice farming in Xiaochala.

C. Indigenous Medicine

During the process of struggling with and adjusting to the natural environment, the Dulong people have accumulated, through their observations and experiments, a body of indigenous knowledge concerning medicine. People know how to use certain herbs and minerals to cure some common illnesses. However, the people's medical knowledge is mainly the result of their trial-and-error experience rather than the result of a complete and systematic theory of medicine. They have learned, for instance, that a certain herb can be used to stop nosebleeding and to promote sobering, while other herbs can be used for snake bites, wounds, rheumatism, and so on. They also apply the liquids of some poisonous trees to their arrows for hunting. In addition, the Dulong people also have some knowledge concerning women's

health. For example, they believe that some plants that have a certain smell are not good for pregnant women and fetuses. Therefore, women usually do not eat certain kinds of food, such as garlic, buckwheat, and sticky rice, in order to avoid miscarriages. During pregnancy, the mother often eats chicken and eggs cooked with lacquer oil, which is said to be very nutritious.

The deep forest around Xiaochala produces many kinds of valuable herbs, such as golden thread, Chinese angelica, edible fungus, gastrodia, and so on. In the past, the Dulong people didn't know that herbs could cure some diseases, with the result that some were allowed to rot in the fields and others were eaten as food. Later on, the Dulong people learned to gather herbs and other materials to cure diseases. For example, the bladders of bears and chickens are used for stomachaches, and honey is eaten to cure colds. The people also know some simple methods of making medicines. For example, they mix about one-half kilogram of honey with a little caladium powder and pack the mixture into a tightly covered bottle. After 1 year, this mixture is not only nutritious but also serves as a medicine that prevents people from diseases. If someone is wounded by a knife, people usually collect some leaves that are called "simao" in Chinese and "wen" (in Dulong), wet them with saliva, and apply them to the wound, causing the bleeding to stop and the pain to ease.

Doctor Li Hanlian (see Figure 8) of Shuangla Village usually finds medicinal herbs in the forests surrounding Xiaochala Village. He knows the indigenous medicine system, including a total of 200–300 kinds of plants, animal parts, and minerals that are used therein. Doctor Li studied at Dali Medical College for 6 months. He introduced the following local herbs to us:

- (1) Gastrodia: It grows in rich soil at an elevation of 1,500 meters above sea level. It can be used for high blood pressure and to nourish oneself. Top-grade gastrodia can be sold in the market for 40–50 yuan per kilogram.
- (2) Chinese caterpillar fungus: This is often discovered in heaps of soil at an elevation of 3,000 meters above sea level. A pair of

Chinese caterpillar fungus generally can be sold for 5–6 yuan, and it is used to cure gynecological diseases, pulmonary tuberculosis, and nephritis.

- (3) *Solanum lyratum*: It grows at an elevation of 3,000 meters or so above sea level and often appears on pine tree roots. It is sold for 8–9 yuan per kilogram and is used to cure cancer and to restore virility.
- (4) Chinese goldthread: This is often found in the snow at the top of hills at an elevation of 2,000 meters above sea level. It is used to cure dysentery.
- (5) Snow lotus: It grows in the snow at an elevation of 3,000 meters above sea level and is used to cure moon blindness, high blood pressure, tuberculosis, and other problems.
- (6) Snow tea: Its can be found on snow-covered mountains at an elevation of 3,000 meters above sea level.
- (7) Rhubarb: It grows at an elevation of 2,000–2,500 meters above sea level. It is used to cure dysentery accompanied by abdominal distension.
- (8) Calamus: It grows in large quantities at an elevation of 2,000 meters above sea level and is used to cure stoma diseases.
- (9) *Cao xuejie*: It grows at an elevation of 2,000 meters above sea level. If mixed with red flower, Chinese angelica, and cow blood, it can cure gynecological diseases.
- (10) *Da Busi*: It grows in large quantities at an elevation of 2,000 meters above sea level and is used for wounds.
- (11) Flavor goldthread: Also known as soil golden thread (in Chinese, "huang lian"), it grows on snow-covered mountains, at an elevation of 3,000 meters or so above sea level. It is used to cure dysentery, but the quantity able to be found is becoming less.
- (12) Gall: It grows in forests at an elevation 1,500 meters above sea level and is used to clear away heat.
- (13) Wild ginseng: It grows in small quantities in bamboo forests below an

elevation of 2,000 meters above sea level. It can be used to cure high blood pressure, to stop bleeding, and to increase the amount of blood. Top-grade wild ginseng can be sold for 20–30 yuan per kilogram.

- (14) Western ginseng: It grows in small quantities on snow-covered mountains at an elevation of 3,000 meters above sea level. People cook it with chicken to enrich people's blood and to restore virility.
- (15) Wood joss-stick: This was introduced from outside areas in recent years, and the Dulong people plant it in dry land. It is used to stop bleeding and stomachaches, as well as in making tobacco.
- (16) *Paederia scandens*: It is often found in large quantities in river-ditch sand at an elevation of 1,500–2,000 meters above sea level. It is good for enriching the blood.
- (17) Spider mushroom: So named because it looks like a spider, it grows in pine forests every June and July. It is used to eliminate inflammation, to strengthen the stomach, and to help in digesting food.
- (18) Bamboo mushroom: It grows in bamboo forests every June and July. It is used to help in digesting food and to cure cancer.
- (19) Mulberry mushroom: It grows on the roots of mulberry plants and is used to cure bronchitis, pneumonia, and similar ailments.
- (20) Bulb of fritillary: It grows at an elevation of 3,000 meters above sea level and is used to stop coughing and to cure stomach diseases.

Doctor Li told us that certain vines, flowers, and bark can be used as medicines, as can certain animal parts, including bile, antlers, musk, bear bladders, snake bladders, tiger bones, deer blood, cow bezoar, and chicken muscles, among others. Some of those are hard to find. These days, a few chickens and edible birds' nests are still used. Snake bladders and cow bezoar also are used to eliminate various problems. Chicken muscles are used to help digestion. Edible birds' nests are used as a tonic. The native people also



Figure 8. Doctor Li Hanlian

use parts of some animals to treat indigestion. Mineral medicines, mainly vermilion cinnabar, are brought from Tibet and are used for women's abnormal menstruation.

D. Gathering Edible Plants

The Dulong minority still practices relatively early-stage types of agriculture, from slash-and-burn to hoe-cultivation methods. The food produced from their lands is not sufficient to sustain their lives, and so they must gather foods in the forest to supplement their diet. Such gathering accounts for a large amount of their food, second only to that obtained from agriculture. We doubted if the forests could provide enough food for the villagers, but in fact the mountain forests are large enough so that it is not a problem for 100 people to gather considerable quantities of edible items.

The Dulong people have knowledge of some plants' biological characteristics and their ecology. The people know where and in what season to find certain plants, and they know how to cook the plants and are aware of the medical value of the plants. Usually people gather plants' tender shoots, flowers, and leaves in springtime and summer, and pick the fruit and dig up the roots in autumn and winter. Gathering is done by everyone in Xiaochala, irrespective of sex and age. April through June is the period when people are the busiest gathering wild foods, even though they also have to prepare for farming during that time.

There are more than 20 kinds of plants that the Dulong people best like to collect. In the past, the Dulong depended on gathering

plants to avoid starvation. Usually the whole family went to the mountain together; the women looked for the stems and leaves of plants, and the men dug up roots and carried all the food items back home. Children were expected to study and learn all the knowledge and skills involved in gathering. Most of these wild plants, and especially roots rich in amyllum, were substitutes for regular foods when the people were threatened with starvation. Flowers also are delicacies for the Dulong people. There are more than 50 kinds of edible flowers such as banana flower, genista, and so on. The Dulong people sometimes fry such flowers with eggs or meat, and sometimes fry them alone after boiling them. They also gather mushrooms.

There also are plenty of bamboo resources in and around Xiaochala. The Dulong expression “Eat bamboo, use bamboo, and wear bamboo” best illustrates how strongly dependent on bamboo the Dulong people are. During April through June of every year, when bamboo shoots come out of the ground, the old men and women all go to the mountains to collect fresh, bamboo shoots, which are thick and delicate, from along the mountain brooks. The tools used to collect bamboo shoots generally are simple ones, such as just knives and baskets. It is not difficult for a man to cut and bring home 40 kilograms of bamboo shoots in one day.

E. Traditional Wooden Products of the Ethnic Dulong People

1. Bamboo Splint Weaves

Dulong people use bamboo to make many tools, as well as containers such as baskets. The local bamboo is so strong that it is suitable for weaving into production tools. To make a basket, a bamboo plant is cut down, its skin is removed and cut into splints, all of the same size, that are interwoven to make a type of net that can be formed into baskets of various types. Because of the limited availability of other containers locally, these kinds of baskets are more suitable for the local people to use to carry goods on their heads or backs than are the other available means by which to carry items, such as on their shoulders.

2. Textiles

The Dulong people are also famous for their unique hand-made blankets, which are called “Dulong blankets.” In the past, the raw material used to make such blankets was hemp, and hemp plants were cultivated in their slash-and-burn fields. The whole blanket-weaving procedure—from washing the hemp, slubbing it, weaving per se, and so on—involves handcraft labor. Now, following the introduction of wool and cashmere into the region and the gradual disappearance of hemp plants, the people of Xiaochala are using modern threads, not hemp, for weaving. In the past, the Dulong people used to create dyes for their blankets by boiling the skins of certain types of plants, such as wax gourd to obtain purple-red colors and walnuts to get blue colors. However, because of the change of weaving materials, the people’s knowledge of this traditional dyeing technology is disappearing.

3. Crossbows

A crossbow is an essential tool for every Dulong man and, accordingly, producing crossbows is an important cottage industry in Xiaochala. An excellent crossbow is made of top-grade mulberry wood and firm hemp thread. Many Dulong men can produce crossbows to sell, as well as for their own use. One crossbow can be sold for 30–50 yuan.

F. Other Traditional Forest Products

1. Lacquer Tree Oil

Lacquer trees grow mainly at the bottom of valleys and mountain gullies. The weather and other conditions in the region where the Dulong people live are suitable for growing lacquer trees. Lacquer tree oil is one of the Dulong’s major edible oils. It is produced by the following process. First, the people remove the lacquer seeds from the shell (the bark of the lacquer plant). They then dry the seeds of the lacquer plant in the sun and then use a special mortar and foot-powered pestle device to grind them into a powder. They steam the lacquer bark in a food steamer, put the steamed bark into a bag, and then press the bag hard to squeeze the juice out of the bark. After the juice dries for some time, it

becomes lacquer oil. Lacquer oil has the characteristics of melting fast, being not greasy, and being highly nutritious. It is the best edible oil for a pregnant woman to eat to nourish her body, and it can be used to create *xia la*, which is chicken cooked with lacquer tree oil and wine, and oil tea. It also is very often used to fry vegetables when cooking.

2. Walnut Oil

The Dulong are good at growing and using walnuts. Virtually every family can typically harvest more than 100 kilograms of walnuts each year. The people primarily use the walnuts for the oil that can be obtained from them. People first crush dried walnuts into pieces and pound them until they stick together. Then people put them into a pot with water and boil the mixture until the water is gone and the remaining walnut oil slowly drains off. Then some ash is added, as a result of which the walnut oil becomes clean.

3. Honey

Raising bees and collecting honey also are important in the Dulong people's lives, because honey nourishes people. The people of Xiaochala like to raise bees and to collect their honey. Some even raise bees in as many as 10 hives. Generally, people remove honey from a beehive twice each year. They primarily use the honey to mix with some foods and to cure diseases.

G. Forest Management by the Local Government

Much attention has been paid to forest protection not only by the local people, but by the local government as well. The tenth item in the Xiaochala Village Regulations provides: "There shall be no personal logging in the state forest, collective forest, or other people's forests; no digging into the soil on waysides; no damaging of fruits, vegetables, or other crops."

The forest behind Xiaochala Village has already been enclosed as a natural reserve. The forest guard Lin Guangming is responsible for managing that forest. He is paid 120 yuan per month from the Bingzhongluo Forest Station under the condition that he will inspect the forest twice

each month and report to the station regarding any evidence of illegal activities in the forest.

The Natural Forest Protection Project was implemented in January of 2001 in Gongshan County. As a result, anyone from Xiaochala who wants to take logs from the forest must obtain approval from the forest station if the amount wanted is less than 2 cubic meters and from the county government if the amount is 2 cubic meters or more. The forest around Xiaochala now falls under the scope of the Natural Forest Protection Project and is in the charge of a forest guard named Xiaorong. He also has to report to the local forest station regarding his work. From the available reports, we learned that there has been no illegal removal of logs from the forest near Xiaochala for more than one year. And because the better the forest is protected, the more the animals are in the forest, some wild animals such as bears, antelope, and monkeys are sometimes seen there.

IV. Case 4: The Tibetan People of Dimaluo Village

During our fieldwork, we heard that the people in Dimaluo Village were very strongly concerned about managing the nearby forest. This interested us and caused us to visit the village, which is inhabited by Tibetans, even though this had not been planned as part of our project.

Dimaluo is an administrative village in Pengda Township, Gongshan County, Nujiang Lisu and Nu Autonomous Prefecture, in northwest Yunnan Province (see Figure 2). It is located in the east part of Nujiang and is west of Biluo Snow Mountain. It is about 810 kilometers from Kunming and about 36 kilometers from Cikai, the center of Gongshan County.

The Dimaluo Administrative Village consists of 12 natural villages containing a total of 440 households and a total of 2,200 people, 45% of whom are Tibetans. There are also Nu, Lisu, Dulong, Naxi, Han, and other peoples living there. In the Tibetan language the "luo" in "Dimaluo" means "gully." More than 85% of the people in Dimaluo believe in Catholicism, and there are 6 Catholic

churches there. Among them, the Bai Hanluo Church is more than 200 years old. The cultivated land of Dimaluo totals 3,900 *mu*, all of which are dry land. The main industries of Dimaluo are livestock husbandry and forestry, and 40% of the total income of Dimaluo is from livestock husbandry.

A. Forest Protection by Tibetans — A True Story

In 1979, there occurred a mud-rock slide in Moladan, one of the natural villages of Dimaluo Administrative Village. Seventeen people and many livestock were killed, and many people were hurt. Also, more than 100 *mu* of cultivated land were submerged. From that experience the people learned the lesson that such slides can happen if the trees in their swidden lands are cut down. Therefore, now all of the villagers consciously protect the forest and forbid anyone to cut down trees at will.

In 1995, the government was going to construct a road on the mountain. A labor contractor cut down some trees in Dimaluo to clear land for the road. The villagers spontaneously organized themselves to stop the contractor from building the road, and they appealed to the township government for help. But the township government supported the labor contractor. The villagers therefore appealed to the county government. They visited the county government leaders 4 times. The largest number of people to visit the county government leaders at one time was more than 70. Finally, after the villagers opposed the labor contractor with crossbows and knives, he went away. After that, the villagers on their own built a road along another route where they didn't have to destroy the trees. Initially, the villagers used their own tools and their own money to build the road by themselves. But later, they were subsidized by the administrative village.

Since then, the Tibetans in Dimaluo have enjoyed a good reputation. Their strong concern for protecting the trees is praised, and their behavior is regarded as a good example of how people all across the county can protect forests and maintain the area's ecological balance.

B. Current Forest-Management Methods

Although the Sloping Land Conversion Program is not being implemented in Dimaluo, the villagers there have already consciously started to convert some of their tilled land to forest land. They plant lacquer trees and grass, not ordinary crops, on mountain slopes of more than 20 degrees. Also, the villagers who have been living on the mountain are moving to the foot of the mountain.

In addition, the people control logging in their village very strictly. There are 4 intermediaries involved in examining and approving any logging that is desired to be conducted; namely, the small-village group, the forest guard, the villagers' commission, and the township forestry station. A person may cut down a living tree only if approval is obtained from all 4 of them. Usually a villager can obtain approval to cut down trees only if that is necessary for building a house or a coffin. People are forbidden to cut down trees for use as firewood. They may obtain firewood from the forest only by cutting down dead trees or by cutting up trees that have been blown down by the wind. Not only cutting down trees, but smoking in the forest, is regulated.

To solve the problem of a lack of firewood, the villagers want to buy methane-burning stoves instead of using fire-burning stoves. But methane gas can't be easily obtained locally, because the area is located at too high an elevation above sea level. Moreover, to buy a methane-burning stove kitchen costs more than 2,000 yuan, which is also a problem. The village wants to assign some people to go outside the area to study the technology of building methane-burning stoves and then to teach all the other villagers how to do that.

The villagers manage their pasturelands strictly, too. There are 5 pieces of pastureland in their natural village. The villagers herd sheep and cattle in one pasture for 15–20 days and then move the animals to another pasture. By the time that they move the livestock back to the first pasture, the grass there will have grown well. The livestock-raising season is from May 20 through

September 20 of every year. During the winter, the villagers feed the animals in livestock sheds. On average, each person has 1 big livestock animal and 2 small ones. More than 10,000 *mu* of land have been devoted for use as pasturelands, but some pastures haven't yet been used.

There are a great many kinds of flora on the mountains near Dimaluo, especially around Hot Spring Lake. In 1999, 2 rare pigeon flowers were sent from Dimaluo to the World Gardening Fair. The villagers plant lacquer trees, walnut trees, chestnut trees, and so on. A lot of *Gastrodia elata* and other medicinal herbs, and many animals, such as bears, monkeys, red deer, wolves, and tigers, among others, can be found in those mountains.

V. Case 5: The Bai People of Chongren Village

The Bai people are not a major nationality group in Nujiang Canyon, but they account for 28.5% of the canyon's total population. They are mainly distributed in Laowo Town of Lushui County. Chongren is one of the typical Bai people's administrative villages in Laowo Town. It is located on a hillside west of the Laowo River (see Figure 2). The land is comparatively flat, such that the rice terraces present a beautiful landscape, although dry farming is also an important component of livelihood activities in Chongren. The people here also enjoy better living conditions than the other peoples that we studied. There are 2,438 *mu* of paddy fields and 1,843 *mu* of dry land in Chongren. The main produce includes rice, wheat, corn, beans, potato, and cole, among other vegetables. Chongren Administrative Village also has about 10,000 *mu* of collective forests. There are 15 natural villages containing 740 households and 3,119 people in Chongren. More than 90% of the people are Bai, while Han Chinese and Lisu and other minority nationalities make up the rest. The per capita average land holding is 1.37 *mu*.

A. Logging in Chongren

Chongren is a normal village just like any other village, although it is little better off than other villages of Nujiang Canyon

because it has much better natural conditions and because the Bai people are one of the minority nationalities most influenced by the Han people. The people in Chongren make a living by exploiting their natural environment, planting crops, and gathering food items in the mountains. They obtain drinking water from mountain brooks.

However, as a result of the economic development of the area, especially the exploitation of Phoenix Mountain, the economic situation of the Chongren people has advanced greatly in recent decades.

Phoenix Mountain contains a 5,000-*mu* state-owned forest farm, located just behind Chongren but more than 20 kilometers away. Until 1981, there was no road to this forest farm. Also, a lack of transportation made it impossible for people to go to the mountain to get logs. In addition, tools were very simple, just knives and axes. As a result, the forests on Phoenix Mountain had been protected very well.

In 1981, the Timber Company of Nujiang Prefecture started timber production on Phoenix Mountain after a road was built. The company brought new and advanced technology and tools for logging, such as chain saws instead of axes and knives, as well as cranes, bulldozers, and trucks to be used instead of men's hands, arms, and shoulders for clearing land, carrying logs, and so on. All of these developments made logging easier, faster, and more efficient than before. The company hired many villagers to do logging work. As a result, Chongren, the nearest village to Phoenix Mountain of all the villages of Laowo Town, Lushui County—and even of the entire Nujiang Canyon—obtained unprecedented employment opportunities. Instead of the men in the community having to go out to look for jobs, they obtained substantial cash earnings from the logging operations. In the recent years, members of 85% of the households in Chongren were employed by the logging firm in various ways. Most of them worked at cutting and hauling lumber; some of them transported the lumber in various types of vehicles, such as trucks, minicabs, and tractors; some of them ran stores or restaurants or just sold meat and vegetables beside the road. A few people cut

trees from a self-use hill and sold them to the company.

Considerable monetary benefits from the logging operation, among other activities, enabled the community to build roads, to improve the local irrigation system, and to establish schools. Road construction ended the isolation of Chongren and allowed exposure to the outside world, which facilitated the Chongren people's communication with other people. New species of plants and new skills have been introduced into Chongren to increase agricultural production. Also, it is now easier to transport products like vegetables and livestock from the village's households to the Laowo market. Moreover, cash from logging and other activities has enabled most households to send their children to school and to build new houses as well. Clothes, salt, and other necessities or luxuries have begun to flow into Chongren.

However, although the Chongren community and individual households have gained monetary benefits from the logging operations, they have also suffered some nonmonetary losses, one of which is strongly reflected by the fact that in the whole community no one wears traditional Bai clothing and everyone prefers ordinary Han Chinese clothes. In the past, Chongren people traditionally hand-wove their clothing, but the modern Chongren people no longer do this. All of their clothes come from outside the area. Another loss has resulted because electrical machinery has replaced hand-pounding of rice, wheat, and the like, and waterpower-driven mills, a development which, while liberating people from heavy labor and improving efficiency, has involved a trade-off as reflected in the loss of indigenous technology. These days, villagers use many types of commercially manufactured containers, including plastic bags, instead of bamboo-made containers such as bowls, barrels, and basins. Indigenous knowledge is increasingly being lost. A third loss, moreover, is that the logging has upset the natural environment. It was said by some people that there have been some landslides on Phoenix Mountain. Also, some Chongren villagers who are more than 50 years old remember that there used to be a

flourishing forest in Chongren and Laowo a few decades ago. Some kinds of wild animals such as wolves and wild pigs, among others, used to be seen in the forest, and a type of big, flat white fish called the "Laowo fish" inhabited what was then the clean Laowo River. That fish was a delicacy for the Laowo people. But now that kind of fish, as well as various wild on-land animals, is becoming extinct. The problems perceived by the people are attributed to the decreasing watersheds and an increasingly incidence of droughts. Although the people have obtained monetary benefits from logging and the opening of land in the forest for tilling, they are at the same time also bearing the ecological costs of those activities.

B. The Impact of the Natural Forest Protection Project on the Chongren Administrative Village

The Natural Forest Protection Project, which is well-known as a logging ban, was implemented in 1998, resulting in a halt of all commercial logging. The Timber Company of Nujiang Prefecture also stopped operations on Phoenix Mountain and even destroyed the road that had been built. Chongren was probably the Nujiang Canyon community most effected by the project.

It is estimated that a male laborer usually earned 500–3,000 yuan per year from the forest farm, which is no longer the case now. A farmer who owned a vehicle earned more from transportation when logging was being done, but now most of the vehicles that had been owned in the community have been sold. Also, along the logging road are several small stores that during the logging years enjoyed the brisk business that resulted from a steady stream of customers but whose sales and profits have now declined. As a result, the income of most of the households of Chongren has declined, and a few households have even dropped into poverty. Some families now cannot afford to pay their children's school tuition fees. In addition, Chongren as a collective has lost funds for improving the village's public facilities. Also, the people now find it difficult to find firewood and wood for building or repairing houses, and sometimes logs are illegally taken from the forest. Also, because some

people don't have even enough money to buy enough food, sometimes they also steal chickens and other property.

C. Village Rules and Regulations concerning Resource Management

Although the Natural Forest Protection Project has affected Chongren greatly, especially adversely in terms of monetary considerations, it has also strongly increased the people's awareness of the natural environment. They are aware of the importance of and necessity for this state measure, and they are very supportive of this project.

In order to protect the existing forest resources, the Villagers Committee of Chongren has adopted a number of forest-management regulations that were approved by all the members of the community. These regulations include:

- (1) All the mountains within Chongren territory are closed to commercial logging.
- (2) Every household must take turns in inspecting the forest for evidence of illegal felling of trees or poaching of animals.
- (3) Village people may gather for use as firewood only dried leftover branches, dead branches, and dead pinecones.
- (4) No one may cut down live trees unless they are needed for housing, and even then only after obtaining the permission of the Villager Committee; trees may be cut down only at the specified place at a specified time, and the person doing that must pay 2 yuan per tree for a pine seedling to replace the tree selected to be cut down.
- (5) Anyone caught illegally logging will be fined 20 yuan per log. If the illegal logger refuses to pay the fine, he or she will be sent to Forest Station, which will take further punitive action against the person as prescribed by the applicable laws and regulations.
- (6) Thirty percent of an illegal-logging fine is awarded to the inspector who discovers the illegal logging. An inspector who does

not carry out his or her responsibility will be punished.

Chapter 4

Analysis

Northwest Yunnan, especially Nujiang Canyon, is a very fragile natural environment. This area is characterized by high mountains, steep slopes, deep gorges, and rocky, infertile soil. But this region is also rich in many kinds of natural resources, and thousands of species of flora and fauna are found there.

Because of its poor natural conditions, northwest Yunnan in general, including Nujiang Canyon, is one of the most undeveloped regions of Yunnan Province. A number of ethnic groups, including the Lisu, Nu, Dulong, and Tibetan peoples, among others, have lived here, along the Nujiang River, for generations. Of the peoples that we studied in this project, only the Bai people of Chongren, who do not live directly alongside the Nujiang River, inhabit relatively flat, cultivated land in an area whose natural conditions are better than those where the other groups live. Usually a small group of a minority-nationality people lives in a small area with other minority nationalities nearby

within the broader area. They interact with each other and influence each other such that they share great similarities in many aspects of life, although each group also has its own unique culture. Through our study, we learned that some indigenous farming methods, indigenous medicine, botanical practices, and other ways of living and doing are shared in common by the peoples we studied, although, for the sake of avoiding repetition, all of these ways are not discussed in detail in our accounts of each of these groups.

It is believed that these ethnic groups have lived in Nujiang Canyon for generations. They have survived by exploiting their natural environment. Their relationships with the natural environment can be analyzed by using Rambo's systems model of the human ecology approach (Rambo, 1983) (see Figure 9).

In each case, both the group's social system and the ecosystem with which it interacts can be seen to retain their integrity as systems,

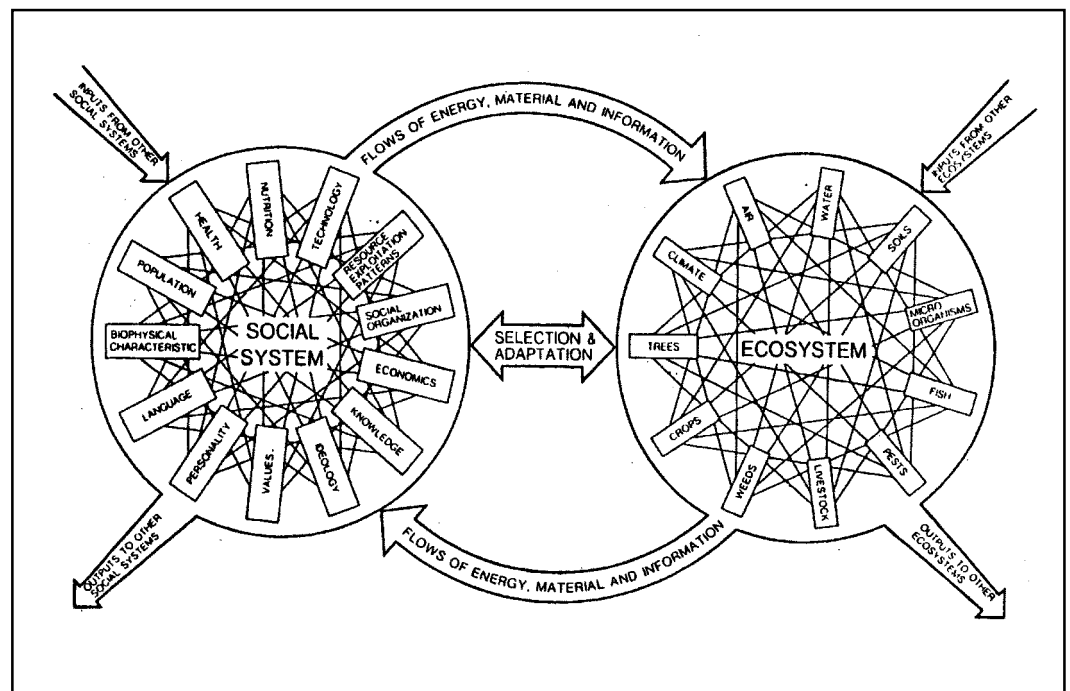


Figure 9. Social System-Ecosystem Interactions

(Source: Rambo's *Conceptual Approaches to Human Ecology*, 1983, p. 26)

with each changing its structural configuration according to its internal dynamics. The main components of a social system include people, knowledge, technology, economics, livelihoods, and beliefs and customs. The ecosystem consists of soil, water, climate, trees, crops, and so on. There are flows of energy, tangible materials, and information between these two systems. Both of these systems select and adapt to each other, while at the same time being influenced by input from other social systems and ecosystems.

For each of the groups, agricultural methods include wet rice farming, dry farming, and swidden farming, but the proportion of each varies from group to group. The steep slopes on the mountains and the aridity of the land result in dry farming being the dominant mode of agricultural production and result in corn, buckwheat, and beans, among other vegetables, being the main crops for the people of Yimadi, Zhanaong, Xiaochala, and Dimaluo. In contrast, the relatively flat landscape around Chongren results in that village having the most wet rice production among the communities we studied, although that village also has dry-farming land. People depend on their ecosystem for survival, and the ecosystem, in turn, is affected by the people's activities. The people get rice from

their paddy lands, and they harvest corn, buckwheat, beans, and other vegetables from their dry lands. They also look for wild vegetables, medical herbs, and mushrooms in the forest, where they also hunt animals. In addition, they cut down trees and bamboo plants in the mountains to obtain wood for their housing and handcraft works. They obtain everything for their lives from their local ecosystem. At the same time, labor, energy, and materials like tools, waste, and chemical fertilizers flow from the social system to the ecosystem. Figure 10 is a transect of Nujiang Canyon that shows the agroecosystems of the studied communities, including the location of particular timber and agricultural products and natural resources and the elevation at which the particular plants grow and the management of those natural resources takes place.

Social systems and ecosystems select and adapt to each other. During the long process by which the studied ethnic peoples adjusted to their natural environment and made use of natural resources to survive, they accumulated a body of rich experience concerning the management of their natural resources. The Bai people are one of the ethnic groups most influenced by the Han Chinese, and accordingly they mastered wet rice farming early on, while the Lisu, Nu, and

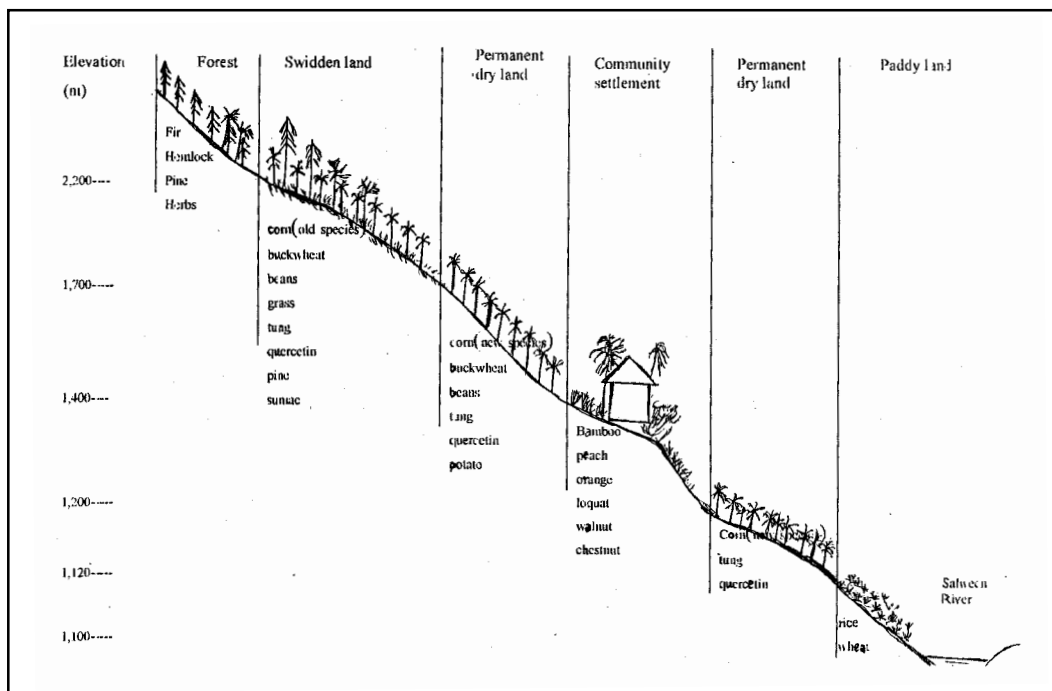


Figure 10. Transect of Agroecosystems along Nujiang Canyon

Dulong ethnic groups were still practicing swidden farming when the People's Republic of China was founded in 1949. The Bai people of Chongren, living on relatively flat land, own the most wet rice plantations, while the Lisu people of Yimadi, the Nu people of Zhanatong, and the Dulong people of Xiaochala mainly engage in dry farming, and the Tibetan people of Dimaluo are good at livestock raising due to their large pasturelands. All of these peoples utilize different production methods that are suitable for their respective local conditions. They also are all at different levels of economic development. We observed that the Bai people of Chongren are better off than the other groups, and that the Dulong people of Xiaochala are in the worst situation economically because the natural conditions where they live are the worst of those of all the groups we studied.

It is worth noting that groups such as the Lisu, Nu, and Dulong peoples have been able to live on high mountains along Nujiang Canyon for so long. This is due in part because they adopted swidden farming as an effective production model that is suitable to the natural conditions of that area. They use very simple tools and very simple methods to plant crops on the arid land that characterizes those locales. They even utilize different cultivation methods for different lands such as swidden land, permanent dry lands, and home gardens. Moreover, the interplanting of many kinds of crops, such as beans, buckwheat, and squash, not only maximize the productivity of their land, but also help to hold the soil.

In addition, they also make use of many kinds of forest products. They know which kinds of plants are edible and which herbs can be used as medicines to treat specific diseases. They also know when and where to find these plants. They know where, when, and how to hunt animals. They have learned how to use bamboo and the wood from various types of trees to make many types of tools and containers as well as housing. They also know how to distinguish seasons and conduct their various activities according to natural phenomena. This indigenous knowledge has been passed from generation to generation, which has enabled these

peoples to live in this canyon for so long.

The religious beliefs of these peoples might seem weird to us "modern" people, but to some extent those beliefs help to protect natural resources. These peoples express their worship of the forest by holding religious rites, which is one manifestation of their simple ecological concepts and ecological system. Their indigenous ecologically oriented cultures reflect the fact that people are very dependent on natural resources and the natural environment when the level of human productivity is rather low. At the same time, these cultures manifest the love that these peoples feel for nature and their natural environment, and the peoples' respective cultural beliefs encourage them to protect nature and their natural environment.

Both the social systems and ecosystems of the peoples we studied also have been affected by other social systems and ecosystems, as manifested by the introduction of new technology and new species of plants. Settled dry farming has replaced shifting cultivation as the dominant agriculture farming in Nujiang Canyon. Orderly row plantation is taking the place of the earlier and simple, but more-haphazard, methods of cultivation. New varieties of crops also are replacing old ones, so as to increase the productivity of the land. Market incentives also are influencing the activities of all of these peoples, and the Yimadi most of all.

The ecosystems of these communities have also been influenced by changes in their social systems. From a long time past, these communities used to be surrounded by lush forests where many kinds of animals lived. However, as a result of the increasing human population and excessive exploitation of natural resources, especially in response to market incentives, the natural environments of these communities are being degraded, which is reflected in part by forests becoming smaller and animals decreasing in numbers, in some cases even becoming extinct.

We devoted special attention to the Natural Forest Protection Project. The implementation of this project, which reflects the application of a national policy to the locales of these and other local communities,

is another factor that has brought great changes to all of these local communities. Although this policy is intended to benefit both these communities as well as the natural environment in the long run, in the short-term it is adversely impacting the peoples of these communities in such ways as decreased incomes, lack of firewood and timber for housing, and other difficulties.

Chapter 5

Conclusions and Recommendations

Northwest Yunnan is a flourishing forest area and an important watershed. It is also a very fragile ecological environment that is characterized by high mountains and deep canyons. This area is inhabited by many minority nationalities, and therefore this area is rich in both biodiversity and cultural diversity. However, this area also is much less developed economically than other areas due to its poor natural conditions and various socioeconomic factors.

Despite the fragile natural environment of northwest Yunnan, the people who live there, including the Lisu, Nu, and Dulong peoples, among many others, have lived there a long time. These indigenous peoples have survived on the area's natural resources and have accumulated a wealth of indigenous knowledge concerning the management of natural resources. That knowledge has enabled them to adapt to their environment and to continue to survive there despite the adverse natural conditions.

Our project team, composed of three members having different academic backgrounds and associated with different academic institutions, has made a serious effort to explore this body of knowledge, including that relating to such fields as ecology, botany, and medicine. We spent almost 2 months in the field and studied 5 ethnic groups in Nujiang Canyon; namely, the Lisu, Nu, Dulong, Bai, and Tibetan peoples. These ethnic groups share significant similarities, although each of them is unique. This paper has elucidated the indigenous knowledge of these peoples concerning forest management and has analyzed the results by using Rambo's Systems Model of Human Ecology. This study has shown the dynamic interrelationships between the social systems and ecosystems of these local communities.

These indigenous people have lived in northwest Yunnan for a long period by exploiting their natural environment and

making use of its natural resources, including forests. The local natural environment of each of these peoples has provided them with everything they need. However, these peoples' activities have also influenced their respective local natural environments. Both the peoples and their environments have also been influenced by outside forces such as the market economy and government policies. Each people's indigenous knowledge and local practices have been changing as a result of the people's social and economic development. To some extent each people's knowledge and traditional practices have served as effective ways by which the people have adapted to their natural environment, even though some of those ways are regarded as "unscientific" or "backward" from a "modern" perspective and accordingly have been discouraged or prohibited by some recent policies of the government. As a consequence, some of the indigenous peoples' traditional knowledge and practices have even been lost.

In recent decades, timber production has improved the economic condition of Nujiang Prefecture and other areas of China, and it has become an important industry in this country. This has not only benefited the government financially and brought high profits to timber companies, but has also brought economic benefits to some local communities. However, it has also resulted in many communities and people paying nonmonetary social and ecological costs, such that some local communities and even China as a whole suffered such consequences as flooding from the Yangzi River in 1998. The fact that trade-offs are associated with economic and financial benefits implies that those benefits come at a cost, albeit nonmonetary, that is often unrecognized and is more often difficult to measure.

At present, one of the central aims of the government of Yunnan Province is to develop its northwest region. The government aims to

promote economic growth and to improve the natural environment in that region, which is also a key area of the Natural Forest Protection Project. In regard to this, as the results of our study, as reported in this paper, we strongly recommend the following.

First, indigenous knowledge and practices should be taken into consideration during decision-making processes relating to the adoption and implementation of relevant government's policies. Indigenous knowledge of forest management needs both the understanding of the nation's people and further study. Some of the indigenous people's traditional practices are suitable for their local conditions, and therefore those practices should be given respectful consideration and attention rather than casually being regarded as "unscientific" or "backward" and then rejected completely. New methods and technologies should be introduced to this area very carefully, because it is a fragile environment. Modern technologies should be effectively integrated with traditional methods so as to improve both the local living conditions as well as the natural environment. Also, because most of the people in the locales that we studied have only elementary education, they should be given more access to education.

Second, local problems should be solved soon. Many ethnic groups in northwest Yunnan use wood not only for fire to cook food for themselves and their livestock, but also to warm their houses, partly because of the cold weather and partly because of their culture. Our fieldwork revealed that the problem most frequently mentioned by the people, no matter in which community they lived, was a lack of firewood as a result of the Natural Forest Protection Project. Although the people are very aware of the importance of this measure and are very supportive of it, firewood is very important for their daily lives. They do not have other energy alternatives, and they cannot afford to buy or build methane stoves, which cost more than 2,000 yuan each. The government and its relevant agencies should help these local communities solve this problem, because these people might cut down trees again when they use up all the firewood currently available.

Third, the government should take steps to create more jobs and more-varied means of livelihood and to develop ethnic industries. Most of local people in northwest Yunnan still live in poverty, depending on simple farming methods. However, from our study we know that most of these people are good at weaving and producing many kinds of handicrafts. They are also able to identify edible wild vegetables, herbs, and other plants that are useful as foods, for medicinal ingredients, or other purposes. But at present most of these plants are gathered only for use as food by the people themselves and some of the knowledge and skills for doing that are getting lost. However, in fact, some of these forest products are very valuable resources that can be sold outside the local communities. Therefore, to develop these peoples' skills would also not only help to maintain and develop their indigenous knowledge of forest management, which in itself would be worthwhile, but also would improve these peoples' well-being.

A government endeavor such as the Natural Forest Protection Project should not be considered as a purely ecological project; rather, it should address the well-being of the people affected. In order to secure the cooperation of the local people in both conservation and afforestation, these people need to "own" the project. It is therefore necessary to ensure that local people are empowered as forest stewards and that the government's forest-management plans will enhance the well-being of these people and also promote the biological, social, and cultural diversity of the region.

The forests of northwest Yunnan should be viewed not just as "timber mines" but as multifunctional national and local natural resources. They should be sustainably managed not just on the basis of national needs or interests, but also on the basis of locally perceived needs and the indigenous knowledge and practices of the local peoples. The forests of northwest Yunnan Province should be managed pursuant to systems that reflect a diversity of roles, needs, and mechanisms so as to foster the full cooperation of, and benefit to, the local peoples of that region

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