

## Participatory Forest Management: Implications for Policy and Human Resources' Development in Yunnan Province

Yunnan Province of the People's Republic of China is located in the eastern Hindu-Yush Himalayan region and the northern zone of the Southeast Asian subcontinent. The Province is bordered by Vietnam, Laos, and Myanmar in the south and west, the Chinese provinces and autonomous regions (AR) of Tibet and Sichuan in the north, and Guizhou and Guangxi in the east. Yunnan province is situated between 21°09' and 29°15' N and 97°31' and 106°12' E.

Yunnan is a typical mountainous province. Hilly and mountainous terrain forms 94 per cent of its total area of 394,000 sq. km., and mountains form the remaining six per cent. The province spans 885 kilometres from west to east and 910 kilometres from south to north. It includes the mountainous areas underlying down from the Tibetan Plateau to hilly zones in the south-east. Yunnan has seven prefectures, eight autonomous prefectures, and two prefecture level cities administering 1,565 townships belonging to 83 counties, 29 autonomous counties, and 11 county-level cities. Kunming, the provincial capital, is the economic and political centre of the province.

### 1.1 Topography

The topography of Yunnan is characterised by high elevations in the north and low elevations in the south. The highest point, 6,563.6 m, is the Kagebo Peak of the Taili Snow Mountains, which lies on the border between Yunnan and Tibet AR. The lowest elevation, 26.4 m, is at the mouth of the Nand River, one of the

tributaries of the Yuanjiang River, on the Sino-Vietnamese border.

The province can be roughly divided into two distinct regions, the east and west canyon regions, by the Yuanjiang River Valley and the Yueling mountain ranges. The Hengshan mountain range lies in the west and the Yunnan Plateau in the east. The Hengshan mountain range stretches from south to north along the western Yunnan longitude axis and lies between 2,000 and 3,000 m. The mountainous topography of the area makes development difficult. The Yunnan Plateau is mostly below 1,000 m, with large basins, river valleys, and is the largest area of the province.

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### 1.2 Forest Resources

Yunnan is rich in forest resources; the total standing stock volume is 1,266 billion cu m., ranking third in China. The forested area covers 9.41 million ha, ranking third in China, and the forest coverage is 24.58 per cent, ranking

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**Table 1: Position Ranking of the Forest Resources in Yunnan Province**

	Forest stock volume (m <sup>3</sup> )	Forest area (ha)	Forest coverage
Forest resources	1.366 billion	9.41 million	24.58%
Position ranking	National 3 <sup>rd</sup>	National 3 <sup>rd</sup>	National 4 <sup>th</sup>
Remarks	No. 1 among the mountainous provinces	No. 1 among the mountainous provinces	No. 1 among the mountainous provinces

fourth in China. The area that could be utilised for forest development is 24.36 million ha, ranking third in China. The annual net rate of growth of forest is 3.14 per cent, higher than the national average (Table 1).

Of the existing forest areas, 29.2 per cent are state forests, owned by the state and managed by state entities, and 70.8 per cent collective forest areas, owned and managed by communes and villages. The state forests account for 44.8 per cent and the collective forests for 55.2 per cent of the total timber stock volume.

### 1.3 Biodiversity

The unique geographical setting contributes to a very rich biodiversity in the province. There are 15,000 species of higher plants belonging to 2,074 genera in 274 families, more than 50 per cent of the total species found in China. There are 4,758 species of important medicinal plants (365 worth commercial exploitation), 246 species of aromatic or spice materials, more than 200 species of oil plants, and 2,100 species of decorative plants. There are 1,751 species of vertebrates in the province, accounting for 55 per cent of the national total, and 782 species of birds. A large number of species is unique to Yunnan.

### 1.4 People

There are 26 nationalities in the province. The total population is 40 million (1996 census), a

third of which belongs to minority nationalities.

Ninety-eight per cent of the counties, cities, and townships are in mountainous regions. Twelve million people in the province are still living below the poverty line (defined as an annual net income of 300 yuan, equivalent to about \$37). More than half of the 127 counties (cities and prefectures) have been identified as 'national-level poverty counties'. Eleven million people live in these counties, and seven million of these still have food scarcity problems. This is 8.8 per cent of the 80 million poor people in China. Fifty-one of the 73 'poverty counties', with a total population of 8.5 million, are inhabited by ethnic nationalities, accounting for over two thirds of the ethnic population of Yunnan. The rate of illiteracy or semi-illiteracy in these counties is 28.7 per cent, 3.2 per cent higher than the provincial average, and in some counties the rate is as high as 40 per cent. The 'poverty counties' are mostly located in remote, hilly and stony, high elevation, cold, mountainous, and marginal areas where arable land is scarce and non-arable land resources abundant.

### 1.5 Administration

The levels of the administration are the same as in the rest of the PR of China. The basic levels are shown in Figure 1.

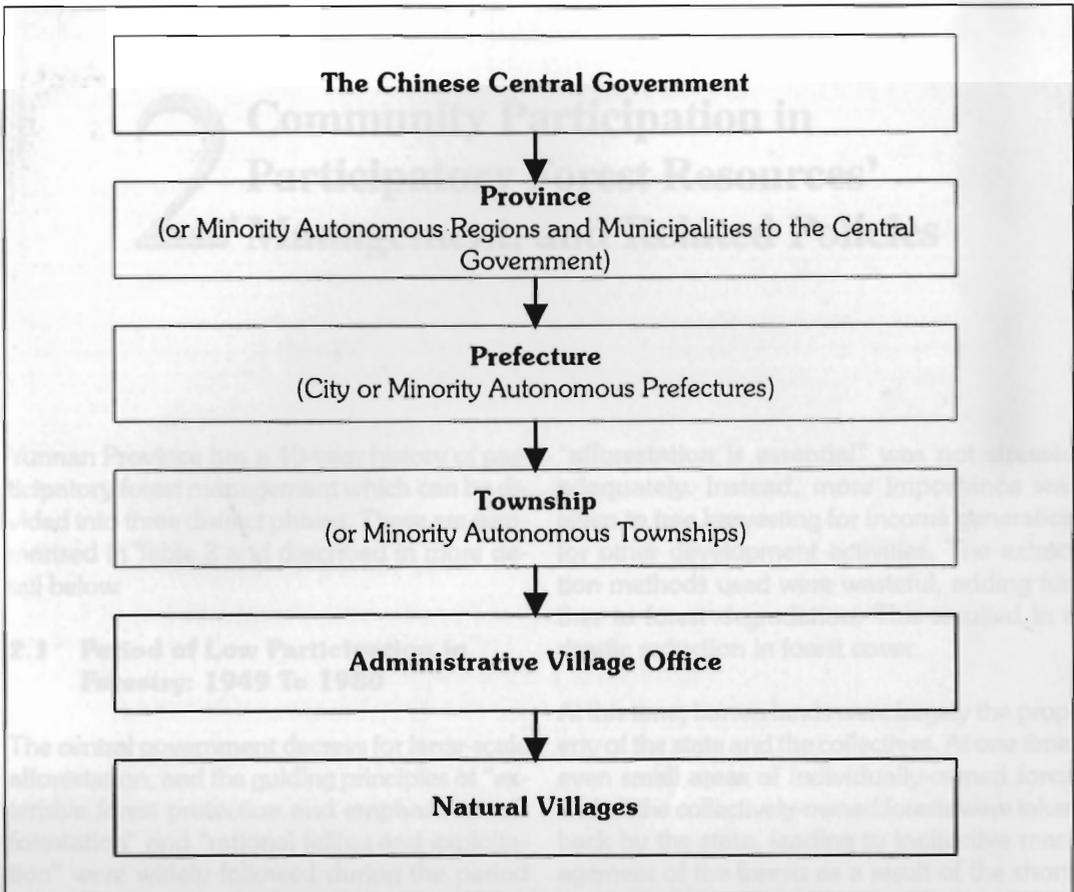


Figure 1: The Administrative Division Levels in the P.R. of China

Different Phases of the Management and Development of Forest Resources				
Phases	Period	Characteristics of Community Participation	Characteristics of Forest Resources Consumption	Policy Characteristics
I	1949-1980	Low or zero level of participation	Rapid exploitation of forest resources but low in forest use efficiency	Mainly state management
II	1981-1993	High level of participation but unstable	Rapid exploitation of forest resources but with increasingly high forest use efficiency	'Langshan' responsibility systems
III	1994-1997	High and effective level of participation	Regional differences in the exploitation of forest resources but low in forest use efficiency	'Shuang' local laws

# 2 Community Participation in Participatory Forest Resources' Management, and Related Policies

Yunnan Province has a 40-year history of participatory forest management which can be divided into three distinct phases. These are summarised in Table 2 and described in more detail below.

## 2.1 Period of Low Participation in Forestry: 1949 To 1980

The central government decrees for large-scale afforestation, and the guiding principles of "extensive forest protection and emphasis on afforestation" and "rational felling and exploitation" were widely followed during the period from 1949 to 1980. During this phase, and under the influence of Soviet methodology for forest management (mainly started at the beginning of the 1950s), the guiding principle of

"afforestation is essential" was not stressed adequately. Instead, more importance was given to tree harvesting for income generation for other development activities. The extraction methods used were wasteful, adding further to forest degradation. This resulted in a drastic reduction in forest cover.

At this time, barren lands were largely the property of the state and the collectives. At one time, even small areas of individually-owned forest and all the collectively-owned forests were taken back by the state, leading to ineffective management of the forests as a result of the shortage of staff. Exploitation of collective forests exceeded exploitation of state forests. Strict restrictions were imposed on the silvicultural activities of local communities and villagers. The

**Table 2: Different Phases of the Policy for Social Participation in Forest Management and the Involvement of Human Resources**

Phases	Period	Characteristics of Community Participation	Characteristics of Forest Resources' Consumption	Policy Characteristics
I	1949 -1980	Low or zero level of participation.	Rapid exploitation of forest resources but low in forest use efficiency	Mainly state management
II	1981-1993	High level of participation but unsteady	Rapid exploitation of forest resources but with increasingly high forest use efficiency	'Liangshan' responsibility systems
III	1994-1997	High and effective level of participation	Regional differences in the exploitation of forest resources, but low in forest use efficiency	'Sihuang' tenure lease

## Box 1

### Community Participation in Forest Resources' Management and Human Resources' Development in Dasongyuan of Yunnan Province

#### Location

Dasongyuan (big pine garden) mountain, Dasongyuan village, Songming county, Kunming City Administration, Yunnan Province

#### Area

166 ha

#### Geographical conditions

Elevation 2,150 masl; relative elevation 400 m; average slope gradient 25°. Distance from county capital 20 kilometres, of which national level road 3 kilometres, provincial road 15 kilometres and dirt road 2 kilometres. Average soil depth 0.3 m, the soil is developed by efflorescence from sandy rocks. No irrigation source. This area has been managed collectively since it was first allocated to Dasongyuan village in 1952.

#### Management of Forest Resources

Between 1952 and 1960, the original forest resources (forest coverage 72%) were all felled and utilised. The forest coverage in 1960 had been reduced to zero. Reforestation activities were started in 1960 with government funding and collective labour contribution. Because of unclear responsibilities and poor management, the forest coverage remained zero until 1995.

In April 1996, the village transferred the tenure of this area to Mr. Zhou Hongliang at a price of RMB 30,000 yuan. Under the lease, Mr. Zhou acquired the 73 years of users' rights to the land. As of January 1997, Mr. Zhou had invested a total of RMB 2.5 million yuan. He hired about 20 labourers from the village to dig 27,000 planting pits and planted them with economic/cash trees. The survival rate of the trees was 99%.

Mr. Zhou also established the necessary facilities for the efficient management of the forest resources, including purchase and installation of a satellite dish for television, installation of power lines together with a 50 kW power transformer, and installation of a high-lift water tank.

lack of policies motivating participation by the local population contributed to an all-time low in local participation in forest development.

#### 2.2 Period of Unsteady but High Participation in Forestry Development: 1981-1993

Towards the end of the 1970s and at the beginning of the 1980s, China promulgated a series of policies and adopted new measures for forest conservation and forestry development. Afforestation and greening were defined as the major national policy thrust and a new period of forestry development started.

In 1983, the Provincial Government of Yunnan and the Standing Committee of the National

People's Congress of Yunnan Province promulgated and enacted a policy on "liangshan" management responsibility for forest management. Two types of mountain forest areas were defined, namely *ziliushan*, which are owned and managed by individual households, and *zerenshan*, which are owned by collective communes but contracted to individual farmers for management. The collective forest areas in different parts of Yunnan were contracted out and allocated to individual households for management. This move greatly motivated the enthusiasm of local communities and villagers to participate in forest management and injected vitality and vigour into the development of community forestry. The participation of the local population in participatory forest management boomed, and their human resources were em-

ployed substantially. However, as a result of the long period of poverty, lack of adequate funds, and market driven factors, part of the *zerenshan* and a large proportion of the *ziliushan* experienced losses of forest to a various extent within a short period of time (usually in one year).

During the later part of this phase, it was found that the system of *liangshan* responsibility resulted in two opposing outcomes. When the holders of *liangshan* were economically strong (whether associated management among households, collective entities, or individual households) the management of the *liangshan* forest improved significantly, the available human resources were fully utilised, and there was a dramatic increase in participation by the local population. However, when the holders of *liangshan* were economically weak or impoverished, the *liangshan* did not undergo such dramatic improvement and the participation of local people in forestry activities was limited.

The most important reasons for these opposing outcomes were, firstly, differences in peoples' understanding, level of knowledge, and educational background, and, secondly, the extreme lack of funds for forestry development.

### **2.3 Efficient and High Participation in Social Forestry: 1994 to 1997**

With the progress of market-oriented economic reforms in China and the demands of economic development in the mountainous regions, people have gradually realised what role forest industries can play, and the ecological awareness of local people has started to develop.

At the end of 1993, Yiliang county of Kunming city administration initiated the first trial in the lease of user rights for collective barren mountain areas. Subsequently, the Standing Committee of the NPC (National People's Congress) of Yunnan promulgated the "Provisions for the Auction of Tenure of Barren Mountain Areas" to promote leasing users' rights to barren mountains suitable for afforestation. Enforcement of this policy made it possible for afforestation and

greening of all the unmanaged collective barren mountains. Community participation in forest development and management was heavily promoted as a part of this programme.

In an effort to accelerate afforestation and greening activities, the government at various levels and the Standing Committee of the NPC in Yunnan further extended the policy for auctioning barren mountains suitable for afforestation to include the auction of '*sihuang*' (barren mountains, barren slopes, barren/idle river bank/marshes, and barren gullies) that were suitable for afforestation. The tenure of the *sihuang*, including the use rights, management rights, and property rights to the produce therefrom, could be leased or auctioned to collectives, organizations and entities, or individuals who had the means and the potential to develop and manage such lands. This practice has substantially accelerated the overall development and management of barren mountain lands in Yunnan Province and has largely promoted the development of the local rural economy. The policy stipulates that:

- farmers from the communes that own the barren mountain land enjoy the privilege of buying the land;
- the duration for using the land will be 50 – 70 years;
- the next generation can inherit the land tenure;
- the land tenure can be transferred after 10 – 20 years;
- there is no ceiling or ground price for the land lease by auction;
- outsiders may also acquire the land tenure from village collectives.

During this phase, the participation of local communities and households has been more enthusiastic and effective. Considerable numbers of local farmers with the financial means and management potential have provided input to the development of barren lands they received through auction or tenure transference. Implementation of the policy has brought about many economic, social, and ecological benefits.

# 3 Policies for Forest Resources' Management in Yunnan Province

The present basic forestry policies of the government have a direct and significant impact on community participation in forest management. The basic forest policies are promulgated and implemented in accordance with the "Forest Law" ratified by the Standing Committee of the NPC. The focus of the Forest Law is to address equally the significance of forest conservation and sustainable forest resources' management and utilisation.

The current forestry-related policies and regulations can be divided into three levels (Figure 1). At the 1<sup>st</sup> and 2<sup>nd</sup> levels, the policies and laws are formulated and promulgated by the NPC – the state legislature. These policies generally remain effective in the long term and amendments are not easily feasible. Policies at the 3<sup>rd</sup> level are formulated and promulgated by the ministries under the State Council or local government at various levels. These policies have more flexibility in terms of amendments and adaptability to local situations.

## 3.1 Agroforestry

In Yunnan, as a result of the extremely limited arable land resources, some contradictions exist between the policies for forestry development and those for agricultural production. Often there is competition between forestry and agriculture for the use of land. In certain areas, this competition is largely minimised by a policy of mixed cultivation of trees and crops (inter-cropping) that supports the development of both forest resources and agricultural crops. Inter-cropping has encouraged a higher level

of local participation in forest resources' management so that these local resources are fully exploited. The policy was formulated and implemented by local communities, but requires a certain level of educational background and management ability to be successful.

## 3.2 Land Closure for Protection and Rehabilitation

The policy of forest protection through mountain closure was initially adopted in the 1950s in areas with colder climates. These areas make up 27.6 per cent of the total territory of Yunnan. The policy was later extended to warm areas as well. The practice, which originated in Yunnan, was also adopted by other provinces of China in the eastern Himalayas, including the Tibet AR, and Sichuan Province.

This policy is regulated and enforced by local government sectors at various levels in areas identified as needing protection for key wildlife and plant species, or areas where vegetation resources are severely degraded. In some areas local farmers have themselves decided to adopt this policy.

## 3.3 Rehabilitation of Marginal Agricultural Land through Afforestation

The policy of rehabilitating poorly cultivated slope lands through afforestation is a regional policy formulated when severely degraded forest resources have endangered the living and productive environment of the local people.

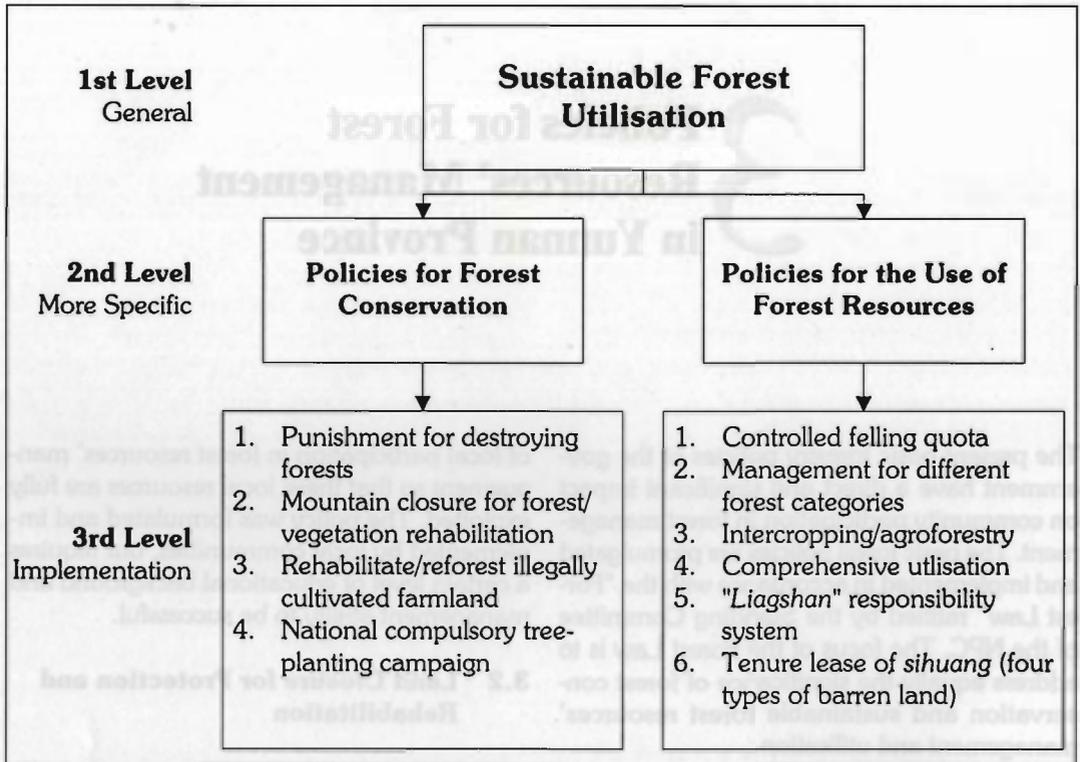


Figure 1: Levels of Forestry-related Policies and Regulations

Considerable difficulties have been experienced in the practical implementation of the policy, particularly in the eastern regions of the Himalayas where most of the indigenous nationalities live. This region has a long history of converting forest land for agricultural expansion. Over the last 10 years, the awareness of the local people of emerging environmental hazards has increased. In the short term, enforcement of this policy will have a certain negative impact on the communal socioeconomic development as it changes the approaches and production measures of the local communities. Successful implementation of this policy is likely to depend on the introduction of a system of compensation and a certain level of enforcement.

### 3.4 The National Compulsory Tree-Planting Campaign

The national compulsory tree-planting campaign is a long-term policy, initiated in the 1950s, decreed in the Forest Law of the Chinese government. However, as a result of the existence of

relatively rich forest resources, and the lack of understanding of sustainable exploitation of forest resources among the local population, only residents in densely-populated cities and towns voluntarily plant trees in the surrounding areas. This policy lacks compulsion in enforcement and is generally organized by the local communities. It is not effective in some areas.

### 3.5 Felling Quotas

Felling quotas were introduced in the early 1990s as a measure for forest conservation and sustainable utilisation of forest resources and to reduce waste. This policy is strictly enforced by the forestry departments of the government at various levels in all areas of Yunnan regardless of the status of forest resources. To achieve effective enforcement of this policy, punishments for violations of this policy are extremely severe.

### 3.6 *Sihuang* Tenure

The tenure lease of "*sihuang*" was started in 1993, and it is the first forest management

### Box 1

## *Sihuang* Tenure in the Chuxiong Prefecture of Yunnan

By the end of 1994, the total land area leased under *sihuang* in Chuxiong Prefecture of Yunnan had reached 468,000 *mu*, 16.7% of the total potential *sihuang* in the prefecture. A total of RMB 6.87 million yuan was raised, 79.9% of the estimated lease payment. Ninety-eight thousand *mu*, or 20.9% of the total leased area was developed and utilised.

policy that effectively achieved participation of local communities in forest management. As a result of implementing this policy, though, imbalances have been created in different regions in forestry development. The difference in forest resources in various regions has further increased (Box 1).

Since the *sihuang* policy was implemented, it has been promoted and practised extensively and has brought about many positive outcomes, including obvious financial gains. The *sihuang* policy is a continuation and improvement of the *liangshan* policy. When the *liangshan* policy was practised, local people had no confidence in the sustainability of the policy and were, therefore, unwilling to invest their capital and labour resources for reforestation and greening. Furthermore, there was no technical support or necessary cash investment, resulting in long periods of idleness of the *sihuang* resources. Under *sihuang* the property rights remain state-owned. The *sihuang* tenure lease separates the land-use rights and the land property rights. The land tenure is transferred, contracted, or leased at agreed terms or prices to potential developers. The objectives of this policy are to motivate the enthusiasm of villagers (in the local communities) and others to participate in the control and rehabilitation of barren lands. The ultimate goal of this policy is

to achieve overall economic, ecological, and social benefits.

In the *sihuang* tenure lease, prices are determined on the basis of the locality, accessibility, land quality (soil fertility), management premises, and economic capacity of the local villagers. The land-use rights can be auctioned and sold to any legal unit, entity, or individual. Development activities are generally required to start within three to five years of the procurement of the tenure. This policy aims at creating entities with multiple land-use management systems and at encouraging local villagers to participate in the exploitation and development of barren lands. The policy is highly beneficial in terms of the rational disposition and flow of production factors, for example, land resources, cash investment, technologies, and labour forces, and achieves optimal coherence and efficiency of productive factors.

By the end of May 1997, the Kunming City Government, which is the pioneer of this policy, had leased 890,000 *mu* (approx. 59,330 ha) of *sihuang* to 44,000 local households. So far an area of 460,700 *mu*, (or 51.8 per cent of the leased land) has been exploited and utilised. Table 1 shows details of the type of area leased.

The vast majority of the lessees (98.9% or 143,000 households) are from local communities. They lease 801,000 *mu*, or 90.1 per cent of the total leased area. Around 1,000 lessees from outside (1.1% of the total) lease the remaining 9.9 per cent of the land, (89,000 *mu*).

To date, Yunnan Province alone has leased nearly 10 million *mu* of *sihuang*, and 46 per cent of the total has been exploited after lease. Local communities have largely shown a great enthusiasm for the implementation of this policy. The voluntary nature of the participa-

**Table 1: Details of the Area Leased under *Sihuang* by Kunming City Council**

Type of Area	Area Covered	Area as % of Total Leased Area
Waste land / bare mountain	601,000 <i>mu</i>	67.5%
Low-yielding forest area	252,000 <i>mu</i>	28.3%
Low-yielding orchards	37,000 <i>mu</i>	4.2%

## Box 2

### *Sihuang* Tenure in the Banliu Administrative Office of Guanglu Township in Yao'an County

The Banliu Administrative Office of Guanglu Township in Yao'an County of Chuxiong prefecture has leased the land-use rights to 3,145 *mu* of *sihuang*, which is 97.8% of the total barren mountain area in the administrative village. A sum of 42,500 yuan was generated with an average of 13.51 yuan per *mu*. The lease is for 50 years, or in a few cases for 60 or 70 years. Thirteen production communes are involved in the lease project. One hundred and forty-six households of the 544 in the village became lessees (1994 statistics). On average, each household has leased 16.21 *mu*. The maximum area leased to an individual household is 254 *mu* (approximately 15 ha).

tion has meant that the extent and level of community participation in forest management is higher than previously, and human resources in the communities are being utilised optimally (Box 2).

Table 2 gives the statistics of barren land lease in Damaichong and Xiaomaichong communes.

Both communes and local populations are involved in current government policies related to forestry development; only the extent of participation varies. Some of these policies are for benefit in the long-term, whilst some provide immediate benefits to the participants.

### 3.7 Conclusions

Policies are formulated by the SCNPCs, government, and communities in order to promote poverty alleviation and the development of community forestry and are implemented in various ways. Enforcement of these policies has made it possible to improve both the quality and the quantity of forest resources and to manage better and make more efficient use of

forest resources. Other benefits of these policies include increased income for local farmers, better disposition of local labour resources, and increasing participation of communities in forest management.

Depending on the ownership of the forests (in Yunnan Province, one thirds is state-owned forest, one thirds collective forest, and one thirds individual household managed forest), the roles the communities play in forest management differ. Communities play decisive roles in all decision-making relating to all types of silvicultural measures in community/collective forests. Individual households decide on the measures to manage their individual forest areas and farms. However, the change of forest policies is still the responsibility of the state legislature responsible for promulgating forestry policies, the SCNPC at various government levels, government at various levels, and the government functional sectors responsible for forest management.

Forest management in Yunnan has undergone fundamental changes since 1949. Before 1949, forest management in Yunnan was mainly a

**Table 2: *Sihuang* Tenure Lease in Some Communes in the Banliu Administrative Village Office Area**

Name of commune	Lessee Households			Area ( <i>mu</i> )			Lease Payment ( <i>yuan/mu</i> )		
	HH	% of total	Total	HH avg	Max.	Min.	Avg.	Max.	Min.
Dachong	17	94.44	298.3	17.55	35.1	4.2	9.98	10.00	9.00
Damaichong	22	91.67	860.0	39.09	210.0	5.0	7.83	10.00	5.0

HH: households; max.: maximum; min.: minimum

continuation of past practises. There was an inadequate management structure with only a small number of management staff with a very low level of education. There were no plans for exploitation and utilisation of forest resources. Silviculture and management measures were ineffective and no feasible measures were undertaken. The forest resources were thus seriously destroyed.

Between 1949 and 1980, as a result of a lack of experience of and knowledge about sustainable forest management, the regenerating capability of forests was overestimated. At the same time the role played by people in forest rehabilitation was both under and overestimated, and the forest coverage in Yunnan suffered substantial reduction. During this period, the level of community participation in forest management was the lowest ever. Human resources in the communities, the rural labour force, were restricted to agricultural activities and were not involved in forest development activities.

Between 1981 and 1993, the policy of contracting *liangshan* was launched in an effort to solve the conflict between community needs and forest resources' development and to make

full use of the available human resources. This policy promoted community participation in forest management and more human resources were involved. As a result of people's poor understanding of this policy and of economic constraints, destruction of forest resources took place. After the trees were removed there was another crisis, namely a crisis of forest resources and income.

Between 1994 and 1997, appraisal of the role forestry plays in community development, and the idea of effective community participation in forest management, raised heated discussions. Tenure lease of the four types of barren land was proposed in 1993 in order to achieve high efficiency and to make full use of local community labour forces. After four years of practical implementation, this system has been shown to optimise the use of community, human, financial, and material resources. The system has achieved better use of forests and forests have been effectively protected.

Benefit sharing of forest products differs in accordance with the nature of the different types of forest land use rights. Table 3 gives an example of benefit sharing when forests are managed under normal conditions.

**Table 3: Benefit Sharing of Income from Forest Products**

Revenue	Tax	Silviculture Fund	Interest	Income tax
100%	5%	10%	65%	20%
Land-use rights	State and community	Community	Producer	State

# 4 Human Resources' Management and Training for Staff Involved in Forest Resources' Management in Yunnan

In Yunnan province, management of state forests is carried out by long-term regular foresters or forest workers. Households, temporarily contracted from local villages, manage the collective forests. Forests owned by individual households are managed by the household.

The levels of education, and technical and management abilities of the regular staff engaged in managing state forest areas, are generally higher than those of people involved in the management of collective and private forests. The managers of collective forests and some of the managers of private forest areas are mostly local farmers. Their knowledge of forest management is largely acquired through communication and exchange of ideas between themselves, and some of the techniques are passed down from the older generation. The human resources' development of this group of people, and the quality and frequency of the training offered, are critical for the sustainability of the forest resources. It is estimated that, in Yunnan province alone, there are several thousands of local people directly involved in managing collective and private forests, yet less than 0.1 per cent of this group have vocational schooling or higher level education, about 10 per cent have high school education, 22 per cent have junior school education, and about 32 per cent have primary school education. Nearly 36 per cent of the population is illiterate or semi-illiterate.

The educational level of forest managers is closely related to the success in forest man-

agement. Those who have received vocational schooling or above, all generate sound short-term economic returns as well as long-term sustainable forest resource management. The rate of failure among the illiterate or semi-illiterate population is as high as 44 per cent.

It is clear that raising the educational level of those engaged in collective and individual forest management will result in improvement in forest management and maximise the economic and ecological benefits from forestry. However, raising the educational standard for these forest managers cannot be achieved in a short period by these people on their own, and assistance should be provided from different levels of government.

Senior staff for state forest management can be hired from among the graduates of universities and colleges. The training of field staff with specific responsibilities at lower levels is generally conducted by local senior staff. The demand for senior management staff in collective forests will not be met for another 10 years. At present this demand can only be met by the local functional sectors of the government at various levels – the forest stations. The training of field staff can only be offered by the professionals at the forest stations or those technicians experienced in forest management in the communities. The training of management staff is generally decided by the owner of the self-managed forest areas.

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