



Participatory Forest
Management:
Implications for
Policy and Human
Resources'
Development in the
Hindu Kush-
Himalayas

Volume II
CHINA

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International Centre for Integrated Mountain Development
Kathmandu, Nepal

Participatory Forest Management: Implications for Policy and Human Resources' Development in the Hindu Kush-Himalayas

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Foreword

Enabling Policies and Programmes for the HKH

The last decade of this millennium is testimony to changing times for the people and forests of the Hindu Kush-Himalayas, and it has seen the emergence of people-centred forest policies in almost all the countries in the region. These policies aim to support and strengthen participatory forest management, and through this process ensure that the needs of mountain women and men are accorded due priority.

The evidence of the will of policy-makers in the countries of the Hindu Kush-Himalayas can be traced back to the beginning of this decade. In 1990, the Government of India approved an order to encourage *joint* forest management between government and forest dependent communities in degraded forest areas. Currently twenty-two states spread over the country have approved enabling government orders. These include all three states of the Western Himalayas—Jammu and Kashmir in 1993, Himachal Pradesh in 1993, and Uttar Pradesh in 1997—and three states in the North Eastern Himalayas—Tripura in 1991 and Arunachal Pradesh and Nagaland in 1997. Nepal approved a new Forest Act in 1993 that provides legal support to community forestry and remains one of the most progressive pieces of legislation in this field. Bangladesh approved a new forest policy incorporating the concept of participatory forest management in 1994. Myanmar gazetted a new Forest Act in 1992 and issued its first community forestry instructions notification in 1995. Bhutan enacted a new Forest and Nature Conservation Act in 1995 and approved its revised 'Social Forestry Rules' in 1996. Pakistan's national draft 'Forestry Sector Policy' was under discussion at the time that this workshop was held, people's participation was a strong element in the proposed policy. The North West Frontier Province of Pakistan developed a draft forest policy for the first time in 1997. The draft is people-centred, it is still under discussion and awaits approval. In 1993, Yunnan Province in the People's Republic of China put into place provisions for the auction of tenure of barren mountain areas, and this has stimulated people's involvement in forest management. Forest policies were revised in 1994 in the Tibetan Autonomous Region to encourage and support the involvement of the local population.

The emergence of people-oriented policies in all these countries over a decade points to a dramatic paradigm shift in forest management. This is the result of the increasing understanding of the fact that forests play a pivotal role in mountain areas and can no longer be managed without the active cooperation of the mountain communities.

An increasing area is being brought under community management through different benefit-sharing systems and tenure arrangements. These arrangements often build on or add to traditional forest management practices in mountain areas and this augurs well for the sustainable development of these areas.

The role of forestry professionals is changing from custodial to participatory. Reorientation of all levels of staff in forest departments is currently underway, and the curricula of educational institutions are being revised to ensure that the new generation of people-centred forestry professionals has the appropriate skills to support community-based forest management.

ICIMOD recognised this emerging trend and in 1993 established the Participatory Natural Resources Management Programme with a clearly defined focus on participatory forest management. ICIMOD has been able to document successes and provide regional and national forums for the exchange of views and experiences through workshops and field visits. We take some pride in having been a part of this exciting decade of change and in having made a modest contribution to changing policies and perspectives in the Hindu Kush-Himalayas.

The regional workshop 'Participatory Forest Management: Implications for Policy and Human Resources' Development' held in May 1998, whose proceedings are described in this publication, is one of the many activities arranged by the Participatory Natural Resources' Management Programme since 1993. This workshop brought together senior policy-makers from seven of the eight countries of the Hindu Kush-Himalayas.

Apart from providing a unique opportunity for professional foresters in the region to share their experiences in relation to the evolution of new policies, the meeting was also a milestone in the establishment of HIFCOM — the Hindu Kush-Himalayan Forum for Forest Conservation and Management — on a broad footing. The idea for HIFCOM was conceived at an earlier ICIMOD workshop held in India in 1995. Over the last three years, the institutional development process has been nurtured in close collaboration with forestry professionals in the region. The workshop in China brought together seven of the eight HKH countries for the first time, and the idea of HIFCOM as a regional forum for promoting participatory forest management among forestry and related professionals in the HKH was endorsed by the representatives of all these countries. This endorsement and the willingness of foresters to take responsibility for the further evolution of HIFCOM are indicative of the need for this forum. The stakeholders themselves have now taken over leadership of the forum and have drawn up plans for the future.

As we move into the next century, I am glad that we are able to bring this sense of optimism and hope to individuals and institutions in the Hindu Kush-Himalayas. The evolution of these policies for mountain forests would not have been possible without the sustained effort of the women and men of the mountains who have been managing these resources. It is they who have demonstrated that, given appropriate policies and an enabling framework, they can manage the natural resources of the mountains to meet their own needs whilst ensuring that the needs of future generations are safeguarded.

I am confident that we are now moving from a decade of policies and experiments to a future of practise and implementation that will test these policies on the ground and lead to further reflection, learning, and change. This can only happen successfully if policies are backed by appropriate, timely, and clear laws and rules that enshrine the spirit of the policies. A high level of commitment is required to ensure that policies do not remain merely statements of intent. For this, we will need to address the issue of human resources development with a greater sense of urgency than we have in the past. Apart from development of skills, the workshop participants identified issues of reorientation and changes of attitude as major future challenges.

I would like to take this opportunity to thank the South West Forestry College, Kunming, Yunnan Province, of the People's Republic of China for being such an effective host for the workshop and all the resource persons and authors of the papers for their commitment.

My gratitude also extends to the numerous mountain women and men who have shown that participatory forest management can work. They have been, and remain, our continuing source of inspiration and encouragement.

Egbert Pelinck
Director General

Acknowledgements

*In Appreciation of All Those Who Contributed
to the Workshop*

It is always difficult to acknowledge all the individuals and institutions who have contributed to the planning, designing, and implementation of a regional forum. We would, however, like to offer our special thanks to the following people, groups, and institutions.

We thank Professor Yang Fuchang and the senior officials, faculty, and staff of the South West Forestry College, Kunming, Yunnan who worked with us over a two-year period to make this workshop a reality. Their commitment and efficient arrangements contributed to the organization of an excellent event. We would also like to make a special mention of the contribution made by Lai Qingxiu and Dequn Zhou to this forum.

A wide range of institutions from China contributed in several ways to this workshop. We would like to express our appreciation to the the Chinese Academy of Sciences; the Chinese Academy of Forestry; the International Network for Bamboo and Rattan; the National Forestry Bureau of China; the International Cooperation Division of the National Forestry Bureau; the Provincial Government of Yunnan; the Municipality of Kunming; the Forest Bureau of Yunnan; the Foreign Affairs' Office of Yunnan; the Forest Bureau of Kunming; and the Kunming Institute of Botany. We acknowledge their support to the workshop and recognize that without their assistance we would not have been able to host this forum in China.

We would also like to thank ICIMOD's partner organizations in our regional member countries for their support to this important forum and for facilitating the participation of senior forestry professionals. In particular, we would like to thank the Ministry of Forests, Bangladesh; the Ministry of Agriculture, the Royal Government of Bhutan; the Ministry of Environment and Forests, the Government of India; the Ministry of Forests, the Government of the Union of Myanmar; the Ministry of Forest and Soil Conservation, His Majesty's Government of Nepal; and the Ministry of Environment and Forests, Government of Pakistan.

We would also like to thank the regional and national executive committee members of HIFCOM—the Hindu Kush-Himalayan Forum for Forest Conservation and Management—for working closely with us to plan and organize this workshop.

The intellectual contributions from the many authors who worked hard on the case studies have been significant and we would like to express our appreciation for their efforts.

This workshop would not have been possible without financial support from several donor organizations. We would like to thank the Swiss Development Cooperation, Bern, Switzerland for providing major support to the workshop and to the International Development Research Centre for their contribution to the forum. We would also like to thank the Ford Foundation, Beijing, China for their grant to the South West Forestry College. The grant enabled the participation of Chinese institutions.

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We would like to thank the Ford Foundation, New Delhi, India, for its continuing and generous support to ICIMOD's Participatory Natural Resources' Management Programme under whose aegis this workshop was organized.

Lastly we would like to place on record the contributions made by many ICIMOD staff to this workshop.

Abbreviations

Abstract

The Workshop on Participatory Forest Management: Implications for Policy and Human Resources' Development in the Hindu Kush-Himalayas brought together forest management personnel from various parts of the Hindu Kush-Himalayas. The basis of their discussions was the people-centred forest policies that have emerged in many countries of the region and their objectives of supporting and strengthening participatory forest management to ensure that the needs of mountain people receive the priority they deserve. The policies along with their constraints and opportunities were discussed in depth, guided by papers provided by the participants themselves. Volume 1 is the Workshop Document, Volume 2 deals with China, Volume 3 – Eastern Himalayas, Volume 4 – India, Volume 5 – Nepal, and Volume 6 – Pakistan.

MOF	Ministry of Forestry
MT	Metric Ton (tonne)
NGO	Non-government Organization
NPC	National People's Congress
PCC	People's Consultative Conference
PLA	People's Liberation Army
PR	People's Republic
TMB	Reminbi

Abbreviations and Acronyms

AR	Autonomous Region
DBH	Diameter at Breast Height
GNP	Gross National Product
HH	Household
MOF	Ministry of Forestry
MT	Metric Ton (tonne)
NGO	Non-government Organization
NPC	National People's Congress
PCC	People's Consultative Conference
PLA	People's Liberation Army
PR	People's Republic
RMB	<i>Reminibi</i>
SC	Standing Committee (of the NPC)
SCNPC	Standing Committee of the National People's Congress

Glossary

1 dan	50 kg
Billion	one thousand million
Brick-shipped tea	Brick-shipped tea is slightly fermented tea and is referred to locally as brick-shipped, but, coincidentally, it is also brick shaped.
Economic Forest	Areas that can provide cash income from trees – excluding timber. Includes orchards and plantations of rubber, tea, coffee and nut trees.
mu	One fifteenth of a hectare
Reminibi	The word for Chinese currency. The largest unit is the yuan. 1988 – 1 US \$ = 3 Yuan 1999 - 1 US \$ = 8.26 Yuan
Sihuang	four types of barren land (barren mountains, barren slopes, barren/idle river bank/marshes, and barren gullies) suitable for afforestation
tonne	metric ton – 1000 kg
Ziliushan	Land management of land owned by individual households
Zerenshan	Land management of land owned by collective communes but contracted to individual farmers for management

- Bhutan
Participatory Forest Management: Implications for Policy and Human Resources' Development in Bhutan
Planning and Policy Division of the Ministry of Agriculture, Bhutan
- Myanmar
Participatory Forest Management: Implications for Policy and Human Resources' Development in Myanmar
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India

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- Training Issues in Joint Forest Management in the Hindu Kush-Himalayan States of India
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1 Background

Part 1

Participatory Forest Management: Implications for Policy and Human Resources' Development in China

1.1 Geophysical Information

1.1.1 Geographical Location

China is situated in the Eastern Hemisphere, it lies on the eastern side of Asia and to the west of the Pacific Ocean. It is located between 53°31' N (the centre of the major channel of the Heilong River near the Moho River) and 4°15' N (the Zhongnanshan Islands in the South China Sea); and 73°34' W (Pamir Plateau) to 135°5' E (the confluence of the Heilong and Wushui rivers). It borders the D.P.R. of Korea, Russia, Mongolia, Kazakhstan, Kirghistan, Tadzhikistan, Afghanistan, Pakistan, India, Nepal, Sikkim, Bhutan, Burma, Laos, and Vietnam, Japan

hills form 69 per cent (mountains 33%, plateau land 26%, hills 10%), river basins 19 per cent, and plains 17 per cent.

1.1.4 Administrative Area

China has 24 provinces, five autonomous regions, four municipal cities, and one special administrative region. There are altogether 2,286 counties, of which 1,524 (67.2%) contain 45 per cent of the total population, are in mountainous areas.

1.2 Economic and Social

Wen Haizhong

1.2.1 Population

1 Background

1.1 Geophysical Information

1.1.1 Geographical Location

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1.1.2 Land Area and Utilisation

China has a land area of 14.261 billion *mu*, with 2.016 billion *mu* of arable land (14.1%), 0.121 billion *mu* of garden plots (0.9%), 3.372 billion *mu* of forest land (23.7%), 3.838 billion *mu* (27%) of grassland, 0.333 billion *mu* (2.3%) of dwellings and mining area, 0.076 billion *mu* (0.5%) of roads, 0.613 billion *mu* (4.3%) of surface water, and 3.892 billion *mu* (27.2%) of uncultivated land.

1.1.3 Topography

The topography is uneven. Of the total land area, mountainous regions, plateau land, and

hills form 69 per cent (mountainous regions 33%, plateau land 26%, hills 10%), river basins 19 per cent, and plains 12 per cent.

1.1.4 Administrative Area

China has 23 provinces, five autonomous regions, four municipal cities, and one special administrative region. There are altogether 2,288 counties, of which 1,524 (67.8%), containing 45 per cent of the total population, are in mountainous areas.

1.2 Economic and Social Conditions

1.2.1 Population

China is a densely populated country. In 1994, it had 1.1985 billion people, more than 20 per cent of the world's total population. Over 80 per cent of the population are engaged in agriculture, although the proportion has decreased since 1978 when the reform and opening policy began (Table 1).

1.2.2 Distribution of the Agricultural Labour Force

At present, there are 0.44 billion people engaged in agriculture. Of these 0.33 billion (75%) are engaged in primary industries such as agriculture, forestry, animal husbandry, and fishery; 0.5456 billion (12.4%) in secondary industries (industry, handicrafts); and 0.5544 billion (12.6%) in service industries (transportation, business, and food).

Table 1: The Agricultural Population of China 1945-1994

Year	1945	1949	1978	1990	1992	1994
Population in billions	0.4	0.54167	0.96259	1.14333	1.17171	1.19850
Agricultural population		0.44726	0.81029	0.90446	0.91873	0.90035
Percentage		82.6	84.2	79.1	78.4	75.1

1.2.3 Poverty

Since 1949, an outstanding feature of the poverty problem in China has been that absolutely poor people are only found in the countryside. In 1949, half of the four billion population was facing starvation. Before 1978, there were 0.25 billion people below the absolute poverty line. At the beginning of the 1980s, the Chinese government identified 18 regions as national poverty-stricken areas based on the average net income as an index. People whose net annual income was less than 200 *yuan* per year were considered to be poverty-stricken. In the 1990s, the price indices and living expenditure indices were changed. At present, people whose net annual income is less than 320 *yuan* per year are considered to be poverty-stricken.

Statistics show that the number of people living in absolute poverty has decreased from 0.25 billion in 1978 to 58 million in 1996. Thus nearly 0.2 billion people have risen above the poverty line in 18 years, a rate of nearly 10 million a year. China is one of the fastest countries in terms of poverty elimination. Currently, China is making every effort to achieve the aim of eliminating poverty by the end of this century.

1.2.4 Health Care

According to the 1992 World Bank report, China's level of health care is higher than the average in developing countries, and some of the indices have even exceeded the level of those in moderately developed countries.

- **Average ratio of doctors to population cared for**
China 1:1010; low income countries 1:5800; middle income countries 1:2500
- **Life expectancy**
China 70 years; low income countries 62 years; middle income countries 66 years

- **Infant mortality rate**

China 29 per cent; low income countries 69 per cent; middle income countries 48 per cent

- **Coverage of health care**

China 23 per cent (1982); other developing countries 22 per cent

1.2.5 Education

Since 1949, the Chinese Government has guaranteed the citizen's right to education, and it has taken various measures to develop the educational system. By 1996, 52.5 per cent of the country's counties (cities, sections) had realised the aim of 9-year compulsory education. Over 98.8 per cent of children above the age of seven were enrolled in schools in 1996 compared to 20 per cent in 1949. In 1996, 92.6 per cent of the students completing elementary school entered a middle school, compared with only 77.7 per cent five years' previously. By 1996, there were 3.02 million students studying in the country's 1,032 colleges and universities. Another 1,138 adult institutions of higher learning provided courses for a further 26.56 million people.

Postgraduate enrollment increased from 29,649 in 1992, to 59,396 in 1996. Currently there are about 16,200 people following postgraduate courses in various colleges and universities. In 1996, there were 247 college and university students, 5,576 secondary school students, and 11,124 elementary school students per 100,000 of the country's population, an increase of 70,940 and 622 respectively since 1991.

The national illiteracy rate has also decreased gradually. In 1995, there were 150 million illiterate adults (over 15 years old), an adult illiteracy rate of 16.49 per cent. By 1996, 10 provinces (autonomous regions and municipalities),

and 2,078 counties (cities, sections) had achieved their aim of eliminating illiteracy.

The proportion of young illiterates has dropped to 6.1 per cent. The ratio of illiterate people to the population of the country as a whole has decreased from 80 per cent in 1949 to 12 per cent in 1996. The general educational state of the population has reached a high level.

The right of women to education has also been fully guaranteed. Prior to 1949, 90 per cent of the women in China were illiterate. After decades of effort, 110 million illiterate women have been educated, and the female illiteracy rate has dropped to 32 per cent. In 1996, 98.63 per cent of school age girls entered school. The difference between girls and boys in the school entry rate dropped from 2.9 per cent in 1991 to the current 0.35 per cent. The proportion of female students in secondary schools, colleges and universities, and graduate schools has reached 45.29 per cent, 36.43 per cent, and 27.6 per cent respectively.

The right to education of the population is realised at different levels and in various ways. Currently, there are over 10.1 million students studying in 17,000 secondary professional schools. A further 625 thousand students are receiving special courses in 1,493 schools. There are 610 training institutions for disabled people, and these have trained 274 thousand persons. There are 8,000 schools of various kinds for old people. Since the reform and opening policy in 1978, 250 thousand students have been sent to study abroad.

1.2.6 Forest Resources

The fourth national forestry resources' inventory data showed that the area of land for forestry is 262.89 million ha, which is about 26 per cent of China's total areas, only 133.7 mil-

lion ha of which are actually covered with forest. Thus the actual forest coverage in the country is only 13.9 per cent. About 16.10 million ha or 12.4 per cent of actual forest are used as economic forests (that is plantations of trees for fruit and other crops), and 3.90 million ha or 2.92 per cent are bamboo stands.

The total standing stock in the country is 11.785 billion cu.m., of which 10.137 billion cu.m. (86.02%) are in forests (5.701 billion cu.m. or 56.24 per cent in coniferous trees, and 4.436 billion cu.m. or 43.76 per cent in broad-leaved trees).

Currently, China's forestry resources are characterised by a high absolute quantity but a very low average possession. Thus China is considered to be a country short of forestry resources. The total land area of China accounts for seven per cent of the world total, but the forest area for only four per cent and the total forest storage for less than three per cent. The average forest area per capita is 0.11 ha and the average forest storage per capita is 8.6 cu.m., only 12.6 per cent and 14 per cent respectively of the world averages.

The composition of the forestry resources is also not appropriate, especially in terms of areas under different types of forests (Table 2).

The table shows that the composition of the forest resources is inadequate. The current composition of forest types cannot meet the need for forest resources.

The utilisation rate of forest land is not high and the unit storage is relatively small. The productivity of forest areas is also low. Artificial forests occupy large areas but are of poor quality. The regional distribution of forest resources is not balanced. The forest growth rate is higher than that of consumption, however,

Table 2: The Area Covered by Different Types of Forests

Forest type	Timber Forest	Shelter Belt Forest	Fuelwood Forest	Special Use Forest	Economic Forest	Bamboo Forest
Area (%)	66.08	12.5	3.34	2.6	12.52	2.96
Storage (%)	74.20	19.56	0.76	5.46		

resulting in a gradual increase in the total forest storage.

1.2.7 China's Afforestation Plan to the Year 2000

In 1990, the State Council of China began to implement the Afforestation Plan of 1989 to 2000. The Plan is the country's guideline for afforestation and forestry management in these 12 years. According to the plan, at the end of the 12 years the reforested area will reach 57.165 million ha. This will include 39.579 million ha of artificial forest and 6.16 million ha of aerial afforestation. The average area afforested will be 4.764 million ha per year. By the end of this century, the total area of forest is expected to increase to 39.585 million ha, comprising 16.514 million ha of timber forests, 12.385 million ha of shelter forests, 4.116 million ha of fuelwood forests, 6.02 million ha of economic forests, and 550 thousand ha of forests for special purposes. The average increase in forest area will be 3.299 million ha per year, and the national forest coverage rate is expected to increase from 13 to 17 per cent, with an average annual increase of 0.34 per cent.

1.2.8 Outline of the Integrated Mountain Development Programme of the Ministry of Forestry

Forestry plays a major role in the development of the economy of mountain areas. Thus the Ministry of Forestry of China (MOF) put forward a plan for the development of mountain areas in 1996. The programme focusses on sustained development through forestry and the development of appropriate science and technology.

The most important task in carrying out the programme is to promote appropriate technologies and the application of related instruments and equipment. Technologies used for the development of the resources in mountain areas include technologies for tree variety improve-

ment and high-yield cultivation; for the development, storage, preservation, and processing of new varieties of woody oil and food plants; for the improvement of low yielding oil tea stands; for the cultivation of trained seedlings, seedlings from tissue culture, and disinfected seedlings; for the extended application of ABT root-inducing powder; for high-yield bamboo stands and bamboo boards; for water saving and drought resistant afforestation; for wood processing and non-wood product processing; for disease and pest control; and for fire management .

The programme emphasises reinforcing the construction of the following supporting industries: processing of bamboo and bamboo shoots; exploration of biologically active substances in trees; processing of camphor and turpentine oil; development of engineering material from botanical fibre; flowers; and economic forestry.

The specific objectives of the programme for mountain area development are to increase the transformation ratio of science and technology achievements from 33 per cent to 50 per cent; to increase the average rate of science and technology applications from 20 per cent to 40 per cent; to increase the contribution rate of science and technology to the forest economy in mountain areas from 21.2 per cent to 40 per cent; to increase advanced areas and model experimental areas to 50 per cent or more; to set up seven experimental model areas for forestry science and technology at prefecture level; to establish 60 model counties that have proper forestry as a result of science and technology; to ensure that the income generated by forestry science and technology reaches 20 per cent of the net income per capita in mountain areas; to generate additional employment opportunities; to enable two state-owned forest farms to eliminate poverty; to increase the total sales' value of forest farms by a high margin; and to train 100 thousand person days of technical extension personnel and one million person days of forest workers and farmers.

2 Forestry Policies in China

Government policies are an important factor in the development of the uplands. The Chinese Government forestry sector has paid serious attention at various levels to the role of forestry policies in guiding, forecasting, evaluating, educating, and enforcing law in forestry management. There are various forestry-related policies. The policies and laws have been formulated for the benefit of the people of China and their implementation has played a constructive role in integrated upland development.

The major policy-makers and decision-makers for implementing policies are the Communist Party of China and various levels of government. They play a leading and decisive role in the formulation and enforcement of forestry laws. Various research institutions, consultation agencies, and universities also participate in decision-making and policy formulation, as do the general public inasmuch as they can propose suggestions and state opinions to the decision-makers. The other main participants in policy formulation and enforcement are the various agencies responsible for policy enforcement.

Forestry policies in China can be classified into two major categories: national forestry policies and regional (local) policies. The former are promulgated by the central government and generally cover a wide range of issues. They contain general principles and guidelines for the whole country. These policies are called 'basic policies' or 'general policies'. The latter have a smaller scope and are more detailed. These policies and regulations are called 'specific policies'.

The number of forestry policies in China is considerable, and there are extensive historical records about and practical experience in the formulation, promulgation, and implementation of forestry policies. There are several national-level papers on forestry policies that were achieved through decades of effort.

2.1 The Major Current Forestry Policies and Their Evolution

There are two major themes in China's forestry policies.

- All forestry policies are oriented to motivate the enthusiasm of the whole society in afforestation and greening activities
- All forestry policies are oriented to achieve the maximum economic, ecological, and social benefits for the integrated development of society.

The first has been a recurrent theme in the past, continues to be important now, and is likely to be equally important in the future. The second theme is the result of the lessons and experience drawn from past forestry development activities. The objective of forestry development has changed from one of simply achieving production of timber and other forest products to one of attaining sustainable development. Although this change in policy has not yet exerted a significant influence on the people of China, it has been incorporated into the formulation and implementation of all forestry policies.

The development and basic contents of China's forestry policies is summarised in the following.

2.1.1 Policies for Forest Land Use

The policies on forest land use (mountain land use) largely focus on issues relating to the ownership and tenure of land (mountains) designated as forest. From an economic point of view, forest land is one of the most important factors in forest production. Forests have direct or indirect roles in the generation of employment, income, and other useful products. The history of the Chinese revolution and reforms indicates that the land-use system (policy), including the special category of forest land use, provides the basis for the stability of Chinese society.

In the traditional feudal society, the landlords owned all the land, including forests. Starting in the 1950s, the Chinese government guided farmers to adopt a policy of agricultural cooperatives, and land tenure was gradually transferred to public ownership under socialism. Land and all farming equipment were collectivised under the ownership of the collectives.

At the end of the 1970s, the Chinese government adopted a policy of reform and opening up to the outside world. This change has brought about some changes in land management in rural areas, including in the land tenure system. There has been widespread adoption of a household-contracted land tenure system, that is farmers are allowed to contract and manage all types of land. The separation between land ownership and land tenure has motivated farmers tremendously and stimulated enthusiasm for agricultural production.

In the 1980s, legal provisions were made allowing land tenure to be transferred to other parties. In one case, four categories of barren lands (*sihuang* — barren mountain land, barren slopes, barren/idle rivers and gullies, and barren marshes) were auctioned. In the 1990s, the aim of China's economic reforms was defined as the establishment of a socialist (market-oriented) economic system. The public

ownership system was defined as covering a wide range of arrangements including shareholder cooperative systems. The forestry policies formulated under the guidelines of the theories of the socialist market system have since been refined.

The major contents of the current policies on forest land use can be summarised as follows. The ownership of forest land belongs to the state and the collectives. The tenure of state-owned and collective forest land can be transferred in accordance with related laws and regulations. Forest land can be contracted by any citizens, legal agents, or other economic entities for afforestation for 30 to 50 years.

Collectively owned *sihuang* land can be leased, through auction, for 50 to 100 years. Whoever buys the land is responsible for the control and management of the area and enjoys the income generated. The tenure can be transferred, contributed as shares, rented, or mortgaged.

2.1.2 Policies for Forest Management

Forest land is legally defined as land with 50.4 per cent tree cover. Currently two billion *mu* (133.33 million ha) of forest land are in need of reforestation. The total cost of this rehabilitation is estimated to be nearly 100 billion *yuan*, at a reforestation cost of 50 *yuan* per *mu* (750 *yuan/ha*).

In 1981, the Government of China promulgated a new forestry policy with a focus on "the three-determinations" of

- the mountain forest tenure system,
- the mountain land managed by households, and
- the forest household production responsibility system.

The implementation of the policy meant the beginning of the break up of the system of single ownership by the state and brought about great changes in forestry management. The major change has been that the managers of forests have more flexibility and power in choosing management strategies, and the units en-

gaged in forestry production have become independent commercial entities. The law protects their interests, rights, and liabilities. There are two main points.

- Farmers managing forests own the resources. Such rights, liabilities, and interests have been strong incentives for farmers' participation in forest management.
- The management model has been transformed from one of collective management to a combination of collective management and individual management at two levels. New management models and entities include various arrangements, for example, stakeholder cooperative management, leasing, contracting, cooperative afforestation, and shareholding cooperatives; all introduced as a result of the new framework of reform in forestry management and development.

In summary, the basic forestry policy is "combining the efforts of the central government, collective entities, and individuals in forest development and greening; coexistence of multiple management systems; and developing multiple economic elements on the basis of public ownership". This will probably remain unchanged in China for some time to come.

2.1.3 Policies for Benefit Sharing of Income from Forestry

The issue of income from forestry is closely concerned with the relationship to production. Forestry policies in China have experienced many historical changes in this as discussed below.

The campaign for transformation into agricultural cooperatives was started in 1953 after the founding of the new modern-day China. Dur-

ing this time all forests and mountain land owned by individual farmers were collectivised, and the farmers involved in forestry production did not obtain any direct benefit from marketing forest products.

In 1963, the central government decreed that there would be two types of forest and tree ownership: state ownership and private ownership. Whoever owned the trees would have full control over the production and the income generated. However, as a result of the disturbances during the Cultural Revolution, this policy could not be implemented fully.

Since the 1970s, when China adopted the policy of reform and opening up to the outside world, the "eating from the big pot" system of income sharing (everyone receiving an equal share regardless of ability or contribution) has been discarded and a new system adopted of "income sharing in proportion to (labour) contribution, supplemented by multiple income sharing mechanisms". This policy endorses the different income-sharing mechanisms resulting from the current different levels in production capacity, multiple economic composition, multiple marketing mechanisms, and management models in China.

The focus of income sharing from forestry is that income sharing will be based mainly on the labour contribution, but production factors like land, capital input, and technical investment will all be taken into consideration.

Table 3 illustrates an example of income sharing from forestry in Huahua Prefecture.

The taxes and added costs shown in Table 3 include the tax for wood and log products. When farmers sell forest products directly, a 10 per cent tax is charged on the income. A 10

Table 3: Share of Income from Timber Marketing by Different Stakeholders (%)

Region	Money from marketing timber	Taxes and added costs	Forestry development funds	Township & village accumulation funds	Production costs	Income for the forest farmers
Huahua Prefecture in Hunnan Province	100	25	15	10	10	40

per cent transaction tax is also levied on the profit between the turnover from net sales and the wholesale cost. For retailing, 30 per cent of the net sales is charged and an additional education tax of two per cent is charged on the payments for product tax, added tax, and transaction tax submitted by any individuals or trading entities. The forest development fund relates to the cost of tending the forest. More details are provided in section 1.1.4. The village reserve includes the township unified accumulation cost. The accumulated funds are spent on welfare programmes organized by the farmers and assisted by the government, such as supporting village-run schools, family planning, and construction of village roads. Village reserves can also include village accumulation funds, village public welfare funds, and management costs. The total township and village accumulation funds do not exceed 50 per cent of the farmers' per capita average income in the previous year.

2.1.4 Protection Policies for Forestry

Peoples' understanding of forestry and the relevant laws has increased in recent years. Such understanding includes the following.

- The manifold natural, social, and economic characteristics such as long term production cycle, high management risks, and high capital input
- That the benefits of forestry can only be obtained through large-scale forestry activities and not through the efforts of single households
- That the ecological benefits of forests are more important than the economic benefits.

Forest protection policies in China cover a wide range of subjects such as forest fire control, forest pests and disease control, wildlife management, and construction of nature reserves and national parks. All these require support from rational economic policies.

Economic support to forestry is one of the major concerns in many countries. China has introduced the following measures.

- Collection of a forest tending cost for the sole purpose of reforestation. This policy was initiated in 1953 with the objective of sustaining simple forestry reproduction. At present, the forest tending cost in collective forests in the southern provinces is set at 12 per cent of the net sale price of timber (bamboo) in the initial transaction.
- Government financial assistance or long-term loans are provided to collectives and individuals engaged in afforestation and forest tending. The Government has, at various times, provided preferential taxation policies for certain forestry activities such as afforestation of deserts. In 1986, China started to provide loans with payable discounted interests (when selling a bill of exchange) for afforestation and forest tending activities. Starting in 1997, this special loan is also provided, in selected counties, for integrated mountain development. The central and local governments are responsible for the payable discounted interests at the annual rate of three per cent.
- A certain sum of funds is drawn from the income of industrial sectors with a relatively high consumption of timber to establish forests for their use.
- Some areas have started to establish different kinds of forestry system. For example, in 1997, Xinjiang Autonomous Prefecture promulgated a policy of compensation for the ecological benefits of forests. Government offices, entities, and institutions pay one to two *yuan* towards the compensation fund, depending on the total salary of employees. People with low incomes are exempted from this tax. Businessmen are charged five to 40 *yuan* per month depending on their net income. One *yuan* is charged per tonne of crude oil, 0.05 *yuan* per tonne of non-metal ore, and 0.3 *yuan* per tonne of gold ore. Furthermore, 10 per cent of the admission fees to scenic spots, forest parks, nature conservation reserves, and hunting grounds is also given to the compensation fund.

2.2 The Outlook for China's Forestry Policies

In March 1996, the highest legislative body in China, the National People's Congress (NPC) and its Standing Committee (SC), ratified the "Agenda of 2010 for national economic and social development, and the ninth five-year plan." This laid down the objectives and strategies for the sustainable development of the economy and society for the following five years and 15 years.

One of the key measures proposed was to reinforce environmental conservation and the rational exploitation of natural resources. The Chairman of China, Mr. Jiang Zeming, also pointed out that both resources and the environment must be substantially protected, and that not only must current development be well-planned, but we must also think for our future generations. These statements have clarified the general direction for progress and improvement in China's forest policies.

In 1995, the National Ministry of Forestry proposed that forest management should be carried out according to the forest function. This change in policy is one of the key measures in changing from traditional forestry to modern forestry practices nationally. The policy classifies forests into welfare forests and commercial forests on the basis of their economic and ecological benefits and different functions. In an effort to implement this policy, the MOF is ex-

perimenting with the following reform strategies.

- Protection forests and special use forests are classified as welfare forests and are managed by the government. Timber forests, economic forests, and fuelwood forests are classified as commercial forests and are managed by enterprises for market-oriented products.
- As a result of the different nature of and aims for managing welfare forests and commercial forests, different management mechanisms have been adopted. Welfare forests are managed to maximise their ecological benefits, and the afforestation measures taken can be different from those in commercial forests. The management objective of commercial forests is to meet market demands. The felling volume is determined on the basis of management plans, and priority is given to allocating felling quotas.

There are three main financial policies. First, compensation is provided by the government on the principle that whoever manages the forest will have to provide the input. The inputs needed may be provided through government financing. Second, social compensation, that is fees to compensate for the ecological benefits of forests, will be collected. Third, forest management units are encouraged to create alternative income by taking advantage of the resources. Compensation will be drawn from a part of the income generated.

3 The Chinese Legal System for Forest Protection

In order to understand forestry legislation, it is necessary to understand the Chinese legislation system. In accordance with the stipulations of the Constitution of the People's Republic of China and relevant laws, legislation in China may be implemented at various levels.

- Legislation by the Central Government. The highest political authority of China is the National People's Congress (NPC) and its Standing Committee (SC). This is the highest legislature in China, and it exercises the greatest legal power within the territory. No regulations stipulated by any administrative or judicial institutions are allowed to run counter to the national laws. The highest administrative authority in China is the State Council. The State Council is authorised to promulgate administrative regulations and codes, all of which only have legal force when related to laws. Departments or commissions of the State Council may also draft and enact regulations and codes in accordance with the laws and administrative regulations and decisions of the State Council, which have a certain legal force within the territory of China.
- Legislation at the local level. Each province, autonomous region, and municipality directly under the Central Government has its own People's Congress and SC, which acts as the local legislature. These legislatures have the authority to promulgate local laws and regulations in accordance with existing laws and administrative regulations and the practical situation in

the local area. These laws and regulations only have legal force within the local administrative area.

The people's governments at the level of provinces, autonomous regions, municipalities directly under the Central Government, and municipalities specially authorised by the State Council may also enact local government laws. Such local laws only have legal force within the local administrative area. The local-level authorities or governments enjoy considerable freedom and flexibility when drafting local laws and regulations, as long as these do not run counter to the national laws and administrative regulations. In other words, the local laws and regulations may cover aspects not specified in the national laws, codes, and regulations. In practice, legislation by the Central People's Government has often drawn on the experience and lessons learned from local legislation.

The Chinese Government has always attached great importance to establishing a legal system for forest industry. In 1963, the State Council of China promulgated the Regulations for Forest Protection, and this was the first law in China on forest protection. In the decade between 1966 and 1976, implementation of the forest protection law came to a standstill, as did all other laws. In 1976, after summing up the experience of protecting and managing the forests in the past, China began to draft new laws for the protection and management of forest resources.

The 6th meeting of the Standing Committee of the 5th session of the National People's Congress (NPC Standing Committee), which convened in February 1979, approved the Forest Law of the People's Republic of China (Draft). The 7th meeting of the 6th session of the NPC Standing Committee approved the Forest Law of the People's Republic of China on September 20, 1984. The Law was promulgated for formal implementation on January 1, 1985.

Forest-related legislation has developed fast within subsequent legislation concerned with China's environmental resources, and forest-related laws and regulations have been regularly updated. By the end of 1997, 10 forest administrative regulations and codes matching the Forest Law had been approved by the State Council of China. The major ones are as follows.

- Detailed Operational Regulations of the Forest Law of the People's Republic of China (1986)
- Detailed Operational Regulations for the Protection of Land-based Wildlife (1992)
- Regulations for Forest Fire Control (1988)
- Regulations for Forest Pests and Diseases' Control (1989)
- Administrative Method for Forest Felling and Regeneration (1987)
- Management Regulations for Natural Reserves for Conserving Forests and Wildlife (1985)
- Regulations for the Management of Seeds of the People's Republic of China (1989)
- Regulations for Protection of Endemic Plant Species of the People's Republic of China (1996).

The Ministry of Forestry of China has promulgated over 50 sectoral regulations related to practical forest work. The major regulations include the Provisional Methods for Forest Land Management, the Method for Supervising and Inspecting Timber Transportation, and the Management Method for Popularising and Using Elite Tree Seeds.

According to some statistics, over 300 forest-related local laws and government regulations

have been promulgated by the People's Congresses, their standing committees and the people's governments at provincial and autonomous prefecture levels. These forest laws and regulations are all based on the Forest Law of the People's Republic of China and are compatible with other relevant laws, administrative regulations, departmental stipulations, and local government laws and regulations. They provide the legal basis for the sustainable development of forestry in China.

3.1 Forest Tenure

Forest tenure is defined in the Forest Law and refers to the ownership of or the right to use, forests, trees, and land. In accordance with the civil laws of the People's Republic of China, ownership consists of the legal right to possess, use, benefit from, and dispose of the property.

A Certificate of Forest Tenure issued by a People's Government at the county or higher level provides the legal guarantee of ownership of forests, trees, and products. According to the existing Chinese ownership system, forest land belongs to the state and no individual may own forest land. Institutions or individuals may lease forest land, however, and such forest tenure is protected by Chinese law against infringements by other institutions or individuals.

3.1.1 State Ownership and Tenure of Forests, Trees, and Land

The forest, trees, and land owned by the state are important properties and resources of the country. After the promulgation of the Forest Law in 1985, and in accordance with the relevant regulations by the State Council, a Group for Forest Tenure Confirmation and Certificate Issuance was established. The Group is led by the Ministry of Forestry of the People's Republic of China and incorporates the relevant forest administrative departments under local governments. The Group has confirmed and issued certificates for the tenure of state-owned forest, trees, and land in Heilongjiang and Jilin Provinces and in the Inner Mongolian Autonomous Region.

The holders of these Certificates of Tenure of Forest, Trees, and Lands are state-owned forest enterprises established with investment from the state. The Certificates of Tenure were issued by the Ministry of Forestry of the People's Republic of China on behalf of the State Council. The certificates endow the state-owned forest enterprises with the legal right to run businesses and exercise management over the state-owned forest resource. By the end of 1995, Certificates of Tenure had been issued for about 480 million *mu* of state-owned forest land. Such actions have played an important role in protecting state-owned forest resources.

3.1.2 Collective Ownership and Tenure

Ownership of forests, trees, and products by collective organizations is registered by people's governments at the county level or higher authorities, who also issue a Certificate of Tenure. Collectively-owned forests, trees and land are found in a number of provinces and autonomous regions in China. In these areas, about 60 per cent of the forest resources are owned by collective organizations which undertake business activities and manage the resource. Collectively-owned economic organizations are the key holders of forest tenure in rural areas of China. The work to confirm forest tenure and issue certificates for collectively owned forests has been completed, and the forest tenure system is basically stable. Unless specified in relevant laws, these collectively-owned forests may not have their tenure withdrawn or transferred to the state. Forest tenure owned by collective organizations may be sub-contracted to individuals or organizations for practical operation and management. The sub-contractors have the legal right to gain from the operation and management.

3.1.3 Individually-owned Trees and Forest

Trees owned by individual citizens are important components of private property. In accordance with the law, Chinese citizens may also have tenure of state-owned or collectively owned forest land. All trees owned, and forest land used, by private citizens must be regis-

tered and archived by the government at county or a higher level, and a Certificate of Tenure will be issued to confirm the ownership or tenure. Contractual operation is the major form through which individual citizens acquire ownership of trees or tenure of forest land. Individuals may also obtain tenure through inheritance, leasing, or purchase. For example, individual citizens may obtain tenure of mountain land suitable for growing trees through contracted operations. The trees planted on these lands will belong to the contractors unless otherwise specified in the contract. Trees planted on private plots or mountain slopes will belong to the owner of the land.

3.1.4 Common Ownership of Trees or Forest Tenure in China

It is a common practice in China for families to lease barren lands for reforestation. In such cases, all the family members have the ownership of the trees collectively.

3.1.5 Management of Conflicts on Forest Tenure

Disputes arising among the owners or users on ownership, use, benefits, or disposal of trees or forest land are dealt with as stipulated in the Forest Law in the following way.

- The People's Governments must handle tenure-related disputes between state-owned institutions at a county or higher authority level.
- The People's Governments must handle tenure-related disputes between collectives at a county or higher authority level.
- The People's Government must handle tenure-related disputes between state-owned institutions and collective organizations at a level higher than the county level.
- The local people's governments at the township or county level must handle tenure-related disputes between individual citizens, or between individual citizens on the one side and collective organizations or state-owned institutions on the other. A disputing party that does not agree with

the judgement by the people's government may submit the case to the people's court within 30 days starting from receipt of the judgement. To protect the legal rights of both parties in disputes about forest tenure, the Forest Law stipulates that neither party has the right to cut trees from disputed areas before resolution of the conflict.

3.1.6 Management Measures for Forest Land Requisition

Forest land requisition refers to a situation in which the state takes over collectively-owned forest land for state needs, for example for national construction projects. Forest land requisition involves a change in the ownership, because the collective ownership is converted to state ownership. When requisitioning forest land, the collective must be financially compensated, and such requisition cannot take place unless approved by the people's governments in accordance with the law.

3.1.7 Management Measures for Forest Land Occupation

Forest land occupation refers to the use of state-owned forest lands by any state-owned unit because such lands are needed in construction projects or mining. Land occupation will alter the usage of the forest land, because the land is no longer used for forestry. Authorised people's governments must approve land occupation, and the original land user must be financially compensated.

3.2 The Logging Quota and Logging Permit System

Allocation of quotas for tree felling, and drafting rational quotas for annual tree felling, are important to ensure sustainable utilisation of forests. The Forest Law specifies that the state must place strict restrictions on annual felling of trees, and that the volume of trees to be harvested must be set lower than the rate of forest growth. The annual tree-felling quota is a legal index through which the state exercises control on tree harvesting by forest operators, and it has a le-

gally binding force. Institutions involved in drafting tree-felling quotas, and all related departments, must abide strictly by the quotas.

3.2.1 Examination and Approval of the Annual Logging Quota

In accordance with the Forest Law and Operating Regulations, state-owned forest industry bureau, forest farms, agricultural farms, factories, and mines have to submit annual quotas for felling trees from state-owned forests. Counties set the annual quota for felling of collectively or privately owned trees.

The principles of rational operation and sustainable utilisation are followed when drafting tree-felling quotas. The quota submitted is examined by the local people's government before being submitted to a higher government authority. The quota is then examined by the forest administrative authorities at the level of province, autonomous region, or municipality directly under the Central Government, and evaluated by the people's government at this level before being submitted to the State Council for approval. With the rare exception of those few provinces or autonomous regions where the gross reserve of mature or over-mature forests exceeds two-thirds of that of the timber forests, all provinces, autonomous regions or municipalities directly under the Central Government must submit their annual forest-felling quota for approval. Approval is based on the principle that the volume of consumption of the timber forest must be set lower than the rate of forest growth. The forest-felling quota approved by the State Council is adjusted every five years.

3.2.2 Range Controlled by the Logging Quotas and Principles for Determining Logging Quotas

According to the regulations, any harvesting of forest reserves that involves cutting trees with a DBH of five cm or more must be included in the forest-felling quotas. The only exception is the cutting of scattered trees planted by rural residents on their private plots or around their houses.

The following principles must be followed strictly when determining forest-felling quotas.

- The volume of timber to be harvested must be set lower than the rate of forest growth. Since forests fall into the category of reproductive resources, consumption must be based on forest reproduction capacity. The latter must be greater than the former to guarantee restoration and development and ensure sustainable forest utilisation.
- Differences in the age of trees or the category and silvicultural purpose of a forest can mean that the above principle is inappropriate. The principle of ensuring that the consumption of timber forests does not exceed the stock growth is followed for timber forests with a special age structure and for non-timber forest products. In these cases, the principle of proper operation and sustainable utilisation is followed when determining the annual forest-felling quota.

3.2.3 Determination of the Annual Felling Quota

The volume for annual logging is determined in the forest operation plans. Forest operating units that have not yet compiled their forest operation plans must determine their forest-felling quotas based on the most recent data for the forest resources released by the forest administration, or on archived data for the forest resources. Factors such as forest acreage, species of forest and trees, age of trees, resource consumption and reproduction, and patterns and cycles of logging, are taken into consideration when determining the annual forest-felling quota. The practical methods used in calculating the annual forest-felling quota are decided by the forest administrative authorities at the level of provinces, autonomous regions, or municipalities directly under the Central Government.

3.2.4 The System of Forest Felling Permits

The Forest Law specifies that logging permits must be acquired before cutting trees, and that tree felling must be done in accordance with

the quota specified in the permits. Logging permits are issued to the forest operating units or individuals by the authorised government institutions and provide the legal basis for tree-felling operations. By enforcing such permits, the state exercises important legal control to ensure that excessive forest felling does not occur.

To obtain the logging permit, tree-cutting units or individuals must submit an application to the relevant authorities. The logging permit is issued by the forest administration at the county level or by a higher authority. Under normal conditions, the forest administration or other authorised institution must decide within 30 days, starting from receipt of the application, whether or not to approve the logging operation. Forest felling units or individuals are responsible for the reforestation of logged land. The acreage, number and species of trees, and time limit are all specified in the logging permit. The land area reforested and number of trees planted must be greater than those harvested.

3.3 Timber Transportation Permit

Management of timber transportation is one of the important components in the protection and management of forest resources. According to the Forest Law, timber going out of forest areas cannot be transported without obtaining a timber transportation permit issued by the authorised forest administration. The timber transportation permit is a legal document showing that the timber is permitted to be transported out of the forest area. There are two categories of timber transportation permit, "Out-province Timber Transportation" and "In-province Timber Transportation."

3.3.1 Major Contents of the Timber Transportation Permit

The Timber Transportation Permit specifies the species of trees; type, dimensions, and quantity of timber; start and end points of transportation; and valid period of the permit. The timber transported with a permit must be of a type specified in the national and professional speci-

fications related to timber, bamboo, and semi-finished products. These are all controlled by the administrative authorities nominated by people's governments at the level of the province, autonomous region, or municipality directly under the Central Government. It is not necessary to apply for a permit to transport timber in the course of production.

3.3.2 Permit for Out-province Timber Transportation

A Permit for Out-province Timber Transportation must be obtained in order to transport timber out of the province. Those applying for the permit must submit the following documents.

- For timber which is allowed to be produced and sold by individuals: the tree-felling permit, cancelled after cutting the trees, and a receipt for the tax-paid
- For timber from private land or used timber material: an identification paper issued by the local forest station or by the people's government of the township
- For timber which is allowed to be transported when an individual moves his or her home to another place: an identification paper showing move of residence registration, or job transfer
- For timber belonging to timber marketing and processing units: the documents specified by the forest administrative authorities

Permits for Out-province Timber Transportation are issued by the forest administrative authorities at the level of the province, autonomous region, or municipality directly under the Central Government.

3.3.3 Permit for In-Province Timber Transportation

A Permit for In-province Timber Transportation is required to transport timber within provinces. This permit is specified in the Operational Regulations for Implementing the Forest Law of the People's Republic of China promulgated by the People's Government of Liaoning Province. In this case, a transportation permit issued by the forest administrative authorities must be sub-

mitted when transporting timber or final or semi-finished timber products. Similarly, the Regulations for the Management of Forest Resources in Guangdong Province state that submission of a transportation permit issued by the provincial forest administrative authorities is mandatory when transporting timber, final timber products, raw bamboo, or semi-finished bamboo products.

3.3.4 The Timber Inspection Stations

Timber inspection stations supervise timber transportation. This is the grass roots' level law enforcement body of the forest administrative authorities. The authorities are not allowed to establish new timber inspection stations or dismiss the existing ones without the approval of the provincial-level people's government. The timber inspection stations are required to raise awareness of the Forest Law and relevant regulations and policies related to supervision of timber transportation and to inspect, in accordance with the law, the permits for timber transportation in order to curb illegal timber transportation.

3.4 The System of Legal Responsibilities

Any violator of the Forest Law is punished in accordance with the law. The law-violating activities specified in the Forest Law are listed below.

3.4.1 Theft

Wilful felling of trees that belong to the state or collective organizations (including trees grown by individuals on lands legally contracted for operation from state institutions or collective organizations) or to private individuals are punished as follows.

- The illegal harvester will be ordered by the forest administrative authorities or relevant authorised institution to compensate for the losses and to plant ten times the number of trees felled. They will be fined three to ten times the amount of money made from the sale of the illegal harvest.

- In more severe cases of theft, criminals may be sentenced according to the Criminal Law of the People's Republic of China to up to seven years imprisonment and forced labour, or public surveillance, and/or fined.

3.4.2 Indiscriminate Felling

Indiscriminate felling refers to all activities that are carried out without obtaining a logging permit, or deliberate cutting of trees not specified in the permit. Such indiscriminate tree felling activities are punished as follows.

- For lighter offences, the loggers will be ordered by the forest administrative authorities or other authorised institution to plant five times the number of trees felled, and they will be fined two to five times the value of their illegal earnings.
- In cases of serious violation of the law, criminals may be sentenced to up to seven years imprisonment and forced labour, or public surveillance, and/or fined.

3.4.3 Illegal Issuance of Logging Permits

Issuing logging permits that exceed the approved annual quota, and issuing of logging permits by unauthorised individuals, constitute illegal issuance of logging permits. Unauthorised issuance of a logging permit is generally considered to be a slight offence, and the unauthorised issuer is subjected to administrative penalties at his work unit. Serious misconduct that results in severe destruction of forest resources is penalised in accordance with the Criminal Law.

3.4.4 Forging or Speculative Reselling of Logging Permits

Forging or speculative reselling of logging permits is punishable under law. If such activities have not resulted in any profits, the wrongdoers are subjected to fines of RMB 50 to 100 enforced by the forest administrative authorities. When these activities have brought about illegal profits, the wrongdoers are subjected to confiscation of their illegal profits, and they will be fined two to five times the amount they made.

3.4.5 Forging or Speculative Reselling of Timber Transportation Permits

If the wrongdoers responsible for forging timber transportation permits or speculative reselling of timber transportation permits have not gained any profit, they will be fined RMB 50 to RMB 100. If the activities have made a profit, the profits are confiscated.

3.4.6 Illegal Destruction of Forests or Trees

Persons who cause destruction of forests or trees through activities such as land encroachment, quarrying, sand extraction, or cutting of firewood, will be ordered by the authorised institutions to compensate for the losses and to replant one to three times the number of trees destroyed. If the wrongdoers cannot plant the trees, the forest administration will plant the trees instead and all expenses incurred must be paid by the wrongdoer.

4 Implementation of Forestry Laws and Regulations

There has been a significant increase in the forest area and growing stock in China. There are currently 133.70 million ha of forest in China, with a growing stock of 11.785 cu.m. and a total forest cover of 13.92 per cent. Five million ha are reforested annually, and 3.6 million ha are protected for natural regeneration. There are 34.25 million ha of plantations, the largest area of plantation in the world.

The past two decades have witnessed a steady progress in the implementation of ecological projects. Since 1978, ten shelterbelt forest programmes have been launched in major river and lake areas and in areas where natural disasters strike frequently. These programmes cover 80 per cent of the land area of China and constitute the basic framework for ecological construction. The ten ecological programmes are:

- the "Three-North" Shelter Belt Construction Programme,
- the Shelter Belt Construction Programme in the Middle and Upper Reaches of the Yangtze River,
- the Coastal Shelter Belt Construction Programme,
- the Construction of Shelter Belt in Agricultural Lands in the Plains' Programme,
- the National Desertification Prevention and Desert Control Programme,
- the Afforestation (Greening) Programme in the Taihang Mountains,
- the Shelter Belt Construction Programme in the Middle Reaches of the Yellow River,

- the Construction of a Shelter Belt System in the Pearl River Watersheds' Programme,
- the Construction of a Shelter Belt System in the Taihu Lake Watersheds of the Huihe River, and
- the Construction of a Shelter Belt System in the Liaohe River Watersheds.

There have been many changes in the forestry sector. Along with the development of traditional industries, such as timber processing, forest machinery, and forest chemical industries, a series of newly-developed industries have emerged like the bamboo industry, forest (eco) tourism, and flower industries. Forestry now plays a key role for primary industries, secondary industries, and tertiary industries. Forestry contributed 1884.5 billion yuan to the GNP in 1996.

Rapid progress has been achieved in forest protection and in wildlife, plant, and biodiversity conservation. A total of 547 nature reserves has been established accounting for 6.37 per cent of the total national land area. Large numbers of rare and endangered species, for example pandas, have been well-protected and their populations have started to increase.

Outstanding achievements have been made in integrated mountain development in China. In order to improve the economy of the mountain regions and to promote poverty alleviation, integrated mountain development has been implemented combining basic measures of soil fertility improvement, flood control, af-

forestation, road construction, and development of power. The average per capita income in 24 demonstration counties increased by 14 per cent between 1995 and 1996. The demonstration counties have now been increased to include 59 counties in 30 provinces (and autonomous prefectures and cities).

Forestry has developed into a comprehensive industry combining afforestation, forest management, logging and transportation, forest industries, multiple management, machinery manufacturing, and technical extension and education. A considerable and systematic forestry industrial system has been developed. The number of staff in the forestry sector has increased from only tens of thousands in the 1950s to 2.4 million in 1997.

4.1 Successful Experiences in Mountain Development

China is a mountainous country, and sustainable social and economic development is closely correlated to mountain development. The mountain areas have significant forests, and forest industries lead economic development in these regions. Forest laws and policies have played a significant role in promoting and safeguarding mountain development, and much successful and valuable experience has been gained.

4.1.1 Motivation and Incentives for Afforestation

Since 1978, China has discarded the traditional ideas and ideological models that had long restrained the development and productivity of forests. A breakthrough has been achieved in the greening of the national territory through afforestation.

Promotion of the National Compulsory Tree-Planting Campaign

In 1981, the National Peoples' Congress promulgated the "*Resolution on the National Compulsory Tree Planting Campaign*", followed by the "*Regulations for Implementing the National*

Compulsory Tree Planting Campaign" in 1982. The regulations make it compulsory for all adults to plant three to five trees each year. During the 15 years of this programme, five billion people have participated in planting over 25 billion trees.

Influenced by the national compulsory tree planting campaign, 21 provinces and autonomous prefectures in China have decided to re-forest barren mountains. At the same time, measures and systems supplementary to the national compulsory tree planting have been created. These measures and systems include establishing a tree-planting base, registration cards for compulsory tree planting, inspection and supervision of compulsory tree planting, and performance appraisal and commendations.

Promotion of Sectoral Afforestation to Speed Up Forestry Development

In addition to the efforts of the forestry sector and the government at various levels, the railway, transportation, coal mining, and water resources' sectors and their affiliated organizations are also responsible for afforestation and greening of barren mountain areas, marshes, and wastelands within their area of operation and within factory and mining areas.

By the end of 1991, 1,438 forest farms and 528 nurseries had been established. Trees have been planted along 24 thousand km of railroad tracks, 71 per cent of the total railroad length suitable for tree planting, and 360 thousand km of roadsides, about 60 per cent of the total length suitable for tree planting. The petroleum sector has planted 50 million trees, the agricultural farming sectors have established 12 million *mu* of plantations, and the People's Liberation Army (PLA) has afforested an area of 1.125 million *mu*. Four-side trees planted have reached 155 million and 38.71 million sq. m. of rangelands were established. During the six years from 1985-1991, the Youth League constructed 5,500 greening projects, with a total area of 22.95 million *mu*. In 1991, nearly 120 million women participating in the national

compulsory tree-planting campaign and the construction of shelterbelt systems planted 700 million trees and established 150,000 green project bases with a total area of 7.05 million *mu*.

Multi-level and Diversified Forms of Afforestation by the State, Collective Entities, and Individuals.

State afforestation includes establishing state forest farms and forest bases and implementing afforestation projects. Since the 1950s, China has established 4,192 forest farms. Starting in 1981, 15 Chinese provinces have initiated plans to establish fast-growing and high-yielding forest bases, commercial timber forest bases, and middle-aged and young forest tending bases. In collective afforestation, the major forms are village forest farms, and shareholding afforestation cooperatives. The state has also actively encouraged households to lease barren mountain areas to develop family forest farms and foreign investors are encouraged to invest in afforestation.

4.1.2 Role of Forestry in the Development of Local Economies

Forestry is no longer just a simple concept of tree planting and production of timber (and bamboo). The scope of forest production is broadening and now includes large industries that exert a significant impact on economic, social, and environmental aspects and resources.

Forest production includes primary industries, providing forest products such as forest foods, herbal medicines, flowers, and wildlife resources; secondary industries, providing timber, bamboo, plywood, forestry chemical products, furniture, and materials for construction; and tertiary industries such as eco-tourism, recreation, and recuperation activities.

The extent of forest production can determine the role forestry plays in integrated economic development in mountain regions. Many up-

land areas have now established their own integrated system for marketing, processing, and production of forest products to match the local resource conditions and technical capacity. Service industries, such as tourism, have also developed and contributed to local economic development.

The following sections provide some examples of the different types of industries that have developed.

Cultivation of Fruit Trees

A total area of 13 million *mu* had been brought under horticulture¹ in Hebei province by the end of 1995. This area produces about 1.7 billion kg of fruit generating 5.1 billion *yuan*. There are 133 townships distributed throughout the province whose income from fruit trees from mountain areas accounts for 30 per cent of the income from the total agricultural lands (the land area for agriculture includes that for forestry). In another 79 townships and 1,316 villages, the value is more than 50 per cent. The number of households with an annual income above 10,000 *yuan* has reached 10,948. The average per capita income from fruit trees in these rural areas is more than 100 *yuan*. In the better areas, the figure has reached 500 *yuan*, and in well-developed areas as much as 8,000 *yuan*.

The area covered by various kinds of trees grown for cash income in Hubei Province is now 15 million *mu*. The proportion of such trees in newly-established plantations has risen from 20 per cent to more than 35 per cent. In 1993, the yield from the 12 major economic trees in Hubei province reached one billion kg. The income from these trees accounts for 20-50 per cent of GNP in mountain and hilly counties, and in some counties the figure is as high as 80 per cent.

Jiukou Township, located in the southern part of Zhongqiang City of Hubei province is a good example of these activities. The township had 1,333 ha of sandy land that generated hardly

¹ Horticulture here refers to commercial fruit and vegetable farming.

any income. In 1990, local farmers were encouraged to establish 2,000 ha of pear orchard. A series of service systems was established based on these trees—including a packaging company, marketing company, cool storage plant, wholesale market, information service, restaurant, and hotels. In 1996, despite continuous flooding of the area, the total yield of pears reached 35,000 tonnes, generating direct sales of 52 million *yuan*. The total income from industries related to the pears reached 285 million *yuan*. The county benefitted by receiving 4.8 million *yuan* annually from the industries. The average annual net income of people in the province has now reached RMB 1470 per capita.

Changshou Township, which has been awarded successively the “Star of the Townships in China” and “Top Ten Best Townships of Hubei Star”, is located in a hilly zone. In recent years, the area under fruit trees, mainly plum, orange, peach, chestnut and eucommia (*Eucommia ulmoides*), has reached 12,700 ha. In 1996, the yield of fresh fruit reached 12 000 tonnes and the annual per capita net income of the farmers reached RMB 3,800 *yuan*.

Processing Industries

Yibing District was once an area with a relatively underdeveloped economy. Since the establishment of an experimental zone in forestry, over 300 enterprises have been set up to manufacture paper, timber, bamboo products, silk, tea, and non-timber forest products. Currently, the area has an annual paper production of 250 thousand tonnes, twice that in 1990. In 1994, 1.52 million tonnes of machine-made paper was produced with a value of over 500 million *yuan*. More than 150 enterprises are engaged in processing bamboo products such as furniture, handicrafts and construction material with a value of over 138 million *yuan*, three times the value in 1990. The tea processing capacity in the area has also reached 350 thousand *dan* (1 *dan* = 50 kg). Tea products of excellent quality have been developed and 17 brands of tea have been awarded prizes of various kinds. In 1994, the tea-processing industry had an output worth 96 million *yuan*.

In 1994, forest industries in the district created a total output worth 940 million *yuan*, 430 million more than in 1990, and these industries have become one of the mainstays in the area's economy.

Bamboo Industries

Linan County in Zhejiang lies in the north-west of the Tianmu Mountains and has a population of 500 thousand. The county has a total land area of 4.69 million *mu* (of which 4.04 million *mu* is mountainous) with a forest coverage of 71 per cent. The site conditions are excellent for bamboo and the county has 700 thousand *mu* of bamboo forest containing 63 different species from 11 genera. In 1995, the county generated a GDP of 5.2 billion *yuan*, 400 million *yuan* of which was from the bamboo industry.

Chongyi County in Jiangxi province has been making an effort to speed up commercialisation of bamboo products and has made the bamboo industry one of the key industries in the county. Up to now, 30 thousand hectares of bamboo stands have been developed with an output value of 216 million *yuan*. The bamboo industry contributes 19.8 million *yuan* in taxes, 32.8 per cent of the financial income of the county.

Tourism

Qiandao Lake in Zhejiang province is visited by 522.7 thousand people (42 thousand from overseas) every year. To make the tourist industry economic, the park has successfully attracted the necessary technology, familiarised itself with the market demand, and promoted overall development. In 1996, the lake realised an amount of 220 million *yuan* with a tax payment of 8.80 million *yuan*, 46.8 per cent and 22.2 per cent higher, respectively, than in the previous year.

4.1.3 Poverty Alleviation in Mountainous Regions

Mountainous and hilly areas account for 69 per cent of the total area of China and 56 per cent

of the total population. Four hundred and ninety-six of the 592 poverty-stricken counties in China lie in mountainous or hilly regions where most of the poor people (about 80 million) live. The success of poverty alleviation efforts in the mountainous regions will largely depend on the development of forestry.

Lin County in Shanxi Province is one such poverty-stricken county. People in the county depended on government food relief until 1978, when the county government made a new effort to use the local resources. The main objective was the development of jujube (the Chinese date). Currently, the area under jujube stands has reached 33 thousand ha. The total yield exceeds 50 million kg, and the county has become the largest jujube producer in the country. Income from jujube accounts for 51 per cent of the county's total agricultural income, and the average annual income of farmers engaged in jujube production has increased by 700 *yuan*. A county-level corporation in charge of jujube transactions has been established. Jujube products are sold to more than 20 provinces in the country. Factories have been set up under the corporation to produce jujube based sauce, juice, and other fresh jujube products. These have found their way into markets in Singapore, Japan, and other countries. In this way, the area has successfully transformed its rich resources into marketable commercial products and opened up a new route to poverty alleviation

Wulian County in Shandong province lies in the eastern part of the Yimeng Mountains; 86 per cent of its area is mountainous and it has a forest cover of 42.8 per cent of the total area. The county has followed a plan to establish one mainstay industry per township, and produce one quality product per village. In this way a regional economic framework has been set up related to local resources and with numerous bases, each with considerable potential for commercial products of excellent quality, good market prospects, and high overall efficiency. In 1996, the county's GNP reached 2.7 billion *yuan* and the net annual income per capita of local farmers 2,000 *yuan*, 38 per cent of which was derived from forestry.

4.1.4 To Further the Overall Development of the Mountainous Regions

Huaihua District in Hunnan province is composed of 10 counties and two cities. More than 31.14 million *mu* of the District's 41.4 million *mu* total area is mountainous, which is typical of the mountainous regions of South China. The area has been chosen by the Ministry of Forestry of China as "the experimental area for reform in forestry", which mainly focusses on the intensive and multiple exploitation of mountainous resources.

A new approach has been promoted of establishing raw material bases at higher levels in the mountains, setting up factories at the foot of the mountains, selling the products to the outside world, and enhancing efficiency through scientific research. After eight years of effort, thousands of hectares of fruit trees and other trees for economic purposes have been planted. More than 1,300 people have specialised in the transportation and selling of forestry products. Over thirty tonnes (cu.m.) of products are processed every year in the region. The output value per unit area in the region has risen from five *yuan* to 80 *yuan*, and the output value of forestry has risen from 123 million *yuan* to 1.46 billion *yuan*. The overall income related to forestry has risen from 280 million *yuan* to 2.6 billion *yuan*, and now accounts for 25 per cent of the overall agricultural output value.

In 1969, Duhu reservoir was built in Xibotou village of Chixi City in Zhejiang province. It occupied almost all of the farming land. Most of the 200 families who had lived there were forced to leave the area and settle down in Mianan (ten kilometres away). However, 90 families remained, determined to exploit the mountain resources and to rely on the mountains for their living. Energetic efforts were made to develop forest-based industries. In 1996 strawberries alone generated an average income of 5,057 *yuan* per capita for the 435 villagers. Together with bamboo shoots, tea products, oranges, timber, and other by-products, the general income of the village reached 3.25

million *yuan* with an annual per capita income of 7,500 *yuan*. Currently, there are six private telephones, 30 motorcars, and five trucks and buses in the village. Each household has a living area of 55 sq.m. and over 80 per cent of households have purchased refrigerators and colour TVs. Most families have cash savings of more than 20 thousand *yuan*. The comprehensive development of resources in a mountainous region, led by economic forests, has enabled this once poor village to become quite rich.

Luotian County in Hubei province has based its economic objectives on its physical features. The area consists of mountains (80%), water (10%), and farming land (10%). The local government has formulated a market-oriented development programme that aims to increase the income of farmers by developing processing industries. Chestnuts, silk products, tea, persimmons, bamboo stands, pine, and Chinese fir are being developed. An integrated programme was started in 1992. Pine and fir trees are being planted on the hill tops; plantations of tea and mulberries developed on hillsides; poplars and willows planted along lake banks, dams, and roadsides; and fruit trees and garden plants established in and around residential areas. To date, 107 thousand *mu* of raw material bases have been set up (including 53 thousand *mu* of economic forests). Most slopes have been transformed into terraced fields with irrigation, good access, and electricity. With the development of the economic forests, some of the villages in the county have begun to form integrated management systems in which each township has its own mainstay industry and each village is able to produce its own products. Following directions and guidance from appropriate departments in the county, farmers are now attaching importance to both forest plantation and grain production. Increased investment has been made in the development of science and technology, and these are now closely linked with daily productive activities. In this way, advantages in resources in the area have been transformed into advantages in economic development. In 1996, annual income from forestry reached 1,090 *yuan* per capita, 70 per cent of total income. Forestry in the

county has generated an income of 32 million *yuan*, 40 per cent of the total.

4.1.5 The Family Contract System and the Share System in Forestry

In the family contract system, individual farmers or families contract to perform the exploitation and development of mountain areas suitable for forestry. Some contractors have gained considerable benefits under this system, but as a whole this has been done on a small scale. The share system has been more effective. In the share system, farmers unite to form a relatively large forestry entity with the interest shared according to their investment in cash and labour. This united entity can ensure more integrated management and has also solved the problem of limitations in investment faced by most individual contractors. This system allows cooperation between different regions, administrative departments, and ownership systems, and it has thus promoted the re-arrangement of productive factors and capital investment.

The government of Hunnan province has created an effective management system to greatly accelerate afforestation and has raised the quality of tree plantation. In this system, the governments of the local townships and villages invest cash, the farmers invest their land and labour, and specialised personnel plant trees. All sides share the profits generated according to their relative investment. About 70 per cent of the newly-planted tree stands in the province have been planted under this arrangement.

A different share system has been adopted in Sanming Forest Area in Fujian province with a board formed to conduct forestry management. This has ensured proper management of forest resources. The existing forest resources are well preserved, and at the same time the enthusiasm of local farmers for tree planting and protection has increased. Corporations of various kinds engaged in forestry management have been set up under the share system and investment has been attracted from a variety of sources to form cooperative forest management

groups. At present, forestry management mainly concentrates on the planting and tending of trees. The form of cooperation varies in different places. It can be, for example, between a forestry investment company on one side and townships and villages on the other; or between forest stations belonging to townships and counties, and cities, townships or villages; or between townships and villages; or between villages. In this way, the whole society has been activated, and this has greatly broadened the scope for forestry development. By the end of 1990, the corporation managed forest area had reached 197.4 thousand ha, accounting for 10.5 per cent of the total forest land of the city with a total investment of 164.64 million yuan.

4.2 Major Issues in Forest Protection

There are often conflicts between the development of a local economy and the rational use of resources, and everyone involved in developing mountain areas confronts this problem. Excessive tree felling and constant loss of trees are the two major problems in forest protection.

4.2.1 Excessive Tree Felling

Controlling excessive felling of trees is the most important part of the Chinese Forest Law. Once a free timber market is allowed, protection becomes more difficult, especially in mountain areas where the economy depends on forest resources. In areas with weak secondary and tertiary industries, seeking of short-term profits is widespread. From 1991 to 1995, the actual tree removal exceeded the sustainable national production capacity by 34 million cu.m. per year. A large part of this excessive felling took place in just three provinces, seven million cu.m. in Yunnan, 5.5 million cu.m. in Fujian, and 2.8 million cu.m. or more in Jiangxi.

There are numerous reasons for excessive felling. Firstly, some local government leaders are only interested in obtaining economic profit from forestry, they neglect the ecological and social dimensions of forests and develop the economy at the cost of forest resources. Felling

permits are given irrationally and irresponsibly, and this also encourages an increase in illegal felling. Secondly, some local governments consider forest resources to be a sort of 'local bank', and readily turn to the forest for funds when building airports, roads, reservoirs, or power stations. Thirdly, there is no legal provision or administration for timber management and processing. Irrational collection of taxes on timber transactions has led to a big price difference between buying and selling. The great profits thus incurred have further attracted illegal timber transactions. Finally, some mountain areas and forest areas are relatively underdeveloped. Local finance, enterprises, and forest farmers all depend on the forest, and this often leads to excessive felling.

4.2.2 Decrease in Forest Land

Actual forest land constitutes about 12.4 per cent of China's land area. At present, 80 million *mu* of forest lands are afforested each year, but at the same time seven million *mu* of forests are destroyed for various reasons. Once destroyed, forests are extremely difficult to restore, especially at high elevations, on stony mountains, and in sandy, windy, and arid areas. Soil erosion has increased following the destruction of forests at the sources of big rivers, in high mountains, and on steep slopes. The result is barren mountains and poor water quality, and this directly threatens the existence of the local inhabitants and can lead to further cycles of poverty. In some regions, loss of one *mu* of forest can result in people in a much wider area facing the threat of sand and wind, water erosion, flood, and drought. If forest land disappears, it will be impossible to regenerate forest resources, leading to degeneration and a total loss of farming land that will eventually hinder the local economy.

Unplanned possession and excessive use of forest land for developing zones, real estate, and other construction activities have also led to a continued loss of forest land. In some regions, possession beyond permission and possession without permission are common, and large areas are sometimes gradually occupied so that

attention is not drawn to them, further contributing to the loss of forest land. According to some preliminary statistics, 50 per cent of so-called forest land in Jiangxi is currently used for other purposes. The land has been occupied without the permission of the local forestry department. In Fujian and Yunnan, the figure exceeds 30 per cent. In Jiangxi alone, 34 thousand *mu* of forest land have been utilised for construction purposes. In recent years, the government has ceased to give permits for occupation of forest land, but unauthorised occupation of land for construction purposes is still increasing in some regions.

Shifting cultivation is one of the major causes of the loss of forest. In Xishuangbanna in Yunnan province alone, more than 300 thousand *mu* of forests are removed for farming

every year. In some areas, trees are cut down on steep slopes to make way for banana, pineapple, sugar cane, and tobacco plantations. In some regions, forests are sold as wasteland, and this has also resulted in the destruction of forest resources.

There are many reasons for the loss of forest land. Firstly, some local leaders have failed to give due importance to forests and have only emphasised the importance of farming land. Secondly, there is no integrated management and different departments manage the trees and the land on which trees grow. Thirdly, the long return period for forestry investment has made people unwilling to invest in forest development and forest protection. Finally, there is little or no legal action against the destruction or unauthorised occupation of forest land.

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. Hills and mountainous terrain forms 36 per cent of its total area of 394,000 sq. km., and mountains form the remaining 66 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.

Zhou Yuan
Zhou Dequn
Zhang Lichang
Zhang Jiexiang

Yunnan Province has about 600 large and small rivers — tributaries of major rivers like the Irrawadi, Mekong, Lancang, Salween, Yuanjiang, and Napanjiang. All these rivers drain into either the Indian Ocean or the Pacific Ocean. There is a great seasonal variation in water level, with the river discharge peaking during the monsoon. Only a few of the rivers are supplied by glaciers, and most are largely replenished with surface slope runoff.

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

1 Yunnan Province of China

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

	Forest stock volume (m ³)	Forest area (ha)	Forest coverage
Forest resources	1.366 billion	9.41 million	24.58%
Position ranking	National 3 rd	National 3 rd	National 4 th
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 Forest Management and the Evolution of Community Participation				
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 1st and 2nd 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 3rd 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.

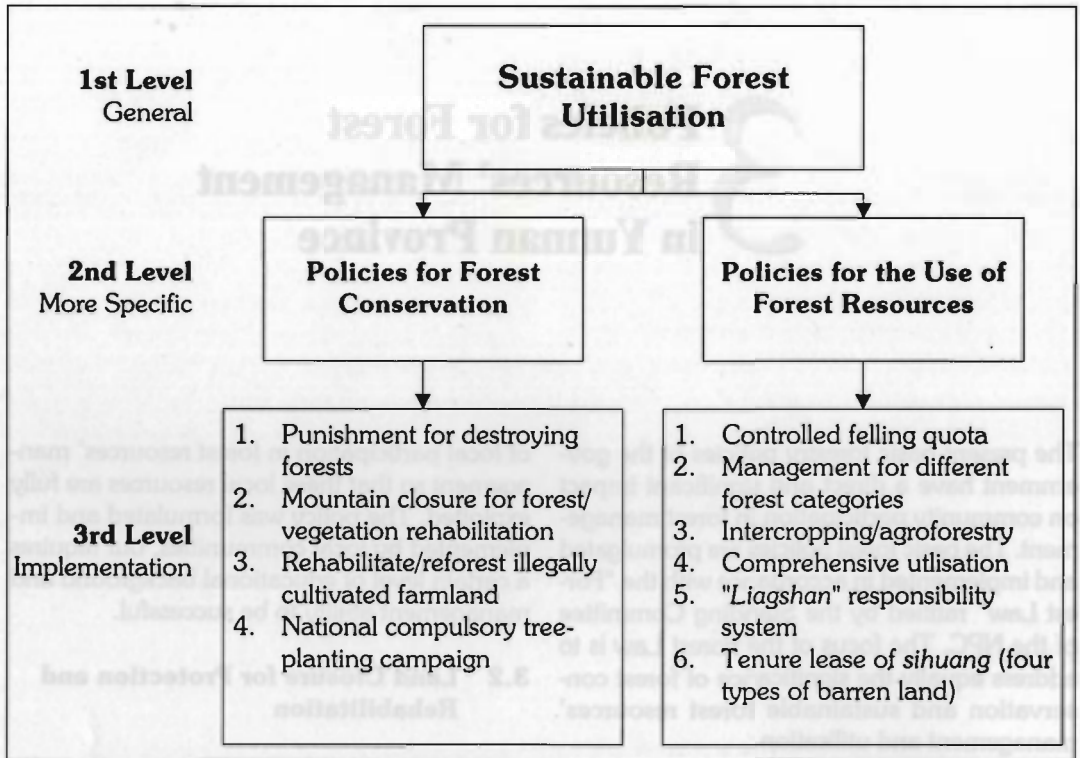


Figure 1: Levels of Forestry-related Policies and Regulations

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.

Bibliography

(not necessarily cited in the text)

Xue Jiru and Jiang Hanqiao, 1986. *Yunnan Forests*. People's Republic of China: Yunnan Science and Technology Publishing House.

Yunnan Science & Technology Publishing House.

He Peikun, Li Guangming and Zhou Hengfang, 1995. *Studies & Exploration on Social Forestry*. People's Republic of China:

Kunming City Administration, 1996 and 1997. *Barren Lands Auction News Letter of Kunming City Administration*, Vols 1-6, 1996 and Vols 1-6, 1997.

Participatory Forest Management: Implications for Policy and Human Resources' Development in the Tibetan Autonomous Region

1.1 Location

The Tibet Autonomous Region (AR) lies in the southwest of China, between 26°50' and 36°55'N and 76°25' and 99°06' E. It has a total land area of 1,2284 million sq km., approximately one eighth of the total land area of China. Most of Tibet lies at high altitudes and the topography is complex. The lowest point, in Nade County in the south-east, is only a few hundred metres above sea level. The highest point is on Mount Qomolangma (also known as Mt. Everest), the highest mountain in the world (8848.13 m), which lies on the border between Tibet and Nepal. The average elevation of Tibet is slightly more than 4,000 m.

Tibet is a part of the Qinghai plateau, the so-called "Roof-of-the-World". It is 2,000 km long from East to West, and 1,000 km wide from south to north. It has borders with Myanmar, India, Bhutan, Sikkim, Nepal, and Kashmir in the south-east and south; Xinjiang Autonomous Region and Qinghai Province of China in the north; and the Sichuan and Yunnan Provinces of China in the east.

1.2 Geography and Vegetation

The Qinghai plateau is the youngest plateau in the world. It is high in the north-west with an average elevation of 5,000 m and low in the south-east (with an average elevation of 4,000 m). There are many mountains, rivers, and lakes, together with various plants. Most of the plateau is covered by west to east

are the Hindu-Kush Himalayas, the Qomolangma-Nangpaigangpa mountains, the Karakoram-Tarbagatai mountains, and the Kunlun mountains.

The Hindu-Kush Himalayas lie at the southern edge of the Qinghai plateau and are 2,000 km long and 200-300 km wide with an average elevation of 6,000 m. These huge mountains act as barriers against the flow of cold winds from the north and also stop the flow of the south-east monsoon from reaching the plateau. The mountains are rich in vegetation diversity. It is an important part of the Himalayas. It supports the development of various types of forests. However, the southern slopes of the mountains lie in a semi-arid zone and have trees only in the mountainous areas.

Gou Wenhua
Zhao Bing

The Hengshan mountains lie in the south-eastern part of Tibet and are one of the few north-south running mountain ranges in China. They consist of parallel rows of mountains with deep valleys in between. The mountain peaks lie between 4,000 and 5,000 m, but the valley bottoms lie below 1,500 m. Rich forests grow on the southern aspect of the mountains as a result of the low elevation of the valleys and the influence of the Indian Ocean Temperature Front. The climate in the middle range of the mountains is very dry because of the influence of the trade wind from the valley, and the vegetation consists of sparse shrubs adapted to the hot dry conditions. The precipitation and relative humidity increase gradually with increasing elevation.

1 General Introduction to the Tibetan Autonomous Region

1.1 Location

The Tibet Autonomous Region (AR) lies in the southwest of China, between 26°50' and 36°53'N and 78°25' and 99°06' E. It has a total land area of 1.2284 million sq.km., approximately one eighth of the total land area of China. Most of Tibet lies at high altitudes and the topography is complex. The lowest point, in Maito County in the south-east, is only a few hundred metres above sea level. The highest point is on Mount Qomolangma (also known as Mt. Everest), the highest mountain in the world (8848.13 masl), which lies on the border between Tibet and Nepal. The average elevation of Tibet is slightly more than 4,000 masl.

Tibet is a part of the Qingzhang plateau, the so-called "Roof of the World" It is 2,000 km long from East to West, and 1,000 km wide from south to north. It has borders with Myanmar, India, Bhutan, Sikkim, Nepal, and Kashmir in the south-east and south; Xinjian Autonomous Region and Qinghai Province of China in the north; and the Sichuan and Yunnan Provinces of China in the east.

1.2 Geography and Vegetation

The Qingzhang plateau is the youngest plateau in the world. It is high in the north-west (with an average elevation of 5,000 masl) and low in the south-east (with an average elevation of 4,000 masl). There are many mountains, rivers, and lakes, together with remnant plateau. Most of the plateau is covered by west to east

mountain ranges. The major mountain systems are the Hindu-Kush Himalayas, the Gandisi-Nianqingtanggula mountains, the Kelakuanlun-Tangula mountains, and the Kunlun mountains.

The Hindu-Kush Himalayas lie at the southern edge of the Qingzhang plateau and are 2,400 km long and 200-300 km wide with an average elevation of 6,000 masl. These huge mountains act as barriers against the flow of cold winds from the north and also stop the flow of the south-west monsoon from reaching the plateau. The mountains are natural boundaries for vegetation distribution. Rainfall on the southern aspects of the Himalayas is plentiful and supports the development of rich virgin forests. However, the northern slopes of the mountains lie in a rain-shadow area and here there is only shrub-meadow desert.

The Hengduan mountains lie in the south-eastern part of Tibet and are one of the few north-south running mountain ranges in China. They consist of parallel rows of mountains with deep valleys in between. The mountain peaks lie between 4,000 and 5,000 masl, but the valley bottoms lie below 1,500 masl. Rich forests grow on the southern aspect of the mountains as a result of the low elevation of the valleys and the influence of the Indian Ocean Temperature Flow. The climate in the middle range of the mountains is very dry, because of the influence of the *foehn* wind from the valley, and the vegetation consists of special shrubs adapted to the hot dry conditions. The precipitation and relative humidity increase gradually with increasing elevation.

Dark conifer trees like *Picea* and *Abies* start to grow above 3,000 masl.

The Tibetan plateau is a major watershed for tributaries of big rivers like the Yangtze, Langchan, and Yalu Tsangpo rivers as well as for many Indian rivers. The Yalu Tsangpo River is the biggest river in Tibet with wide valleys in the upper reaches, medium-sized valleys in the middle reaches, and mountainous country in the lower reaches. The inner rivers are located in the north of the Tibetan plateau with small watersheds draining into the basin.

The forests in Tibet are mainly distributed in the middle and lower reaches of the Yalu Tsangpo River and in the Niyangqu watershed. The main areas suitable for afforestation are the upper reaches of the Yalu Tsangpo, Nianchuhe, and Lashahe rivers.

As a result of the variable topography and climatic conditions, the Tibetan AR has a diversity of vegetation zones. The main vegetation types are, from south-east to north-west, subtropical forest, high-altitude hygropium, high-altitude steppe, and high-altitude desert. The southern areas contain tropical monsoon forests, evergreen broad-leaved forests, mixed forests, deciduous broad-leaved forests, dark conifer forests, semi high-altitude brush hygropium, high-altitude hygropium, and high-altitude scattered cushion vegetation occur.

1.3 Current Administrative Divisions and Social Status

Tibet contains one municipality (Lhasa), six prefectures (Rikaze, Shannan, Changdu, Linzhi, Naqu, and Ali), 74 counties (cities at county level, regions, and administrations), more than 950 townships (towns, administrations, and farmlands), and 7,410 villages (Tables 1 and 2).

Tibet has a low population compared to other Chinese provinces. In 1952, the population was 1.15 million, and it has now risen to more than 2.4 million. The population is increasing at a rate of 17.8 per cent per year, five per cent more than in China as a whole. The major nationality in Tibet is Zhang. This group form 95 per cent of the total population and Han a further 3.5 per cent. Other nationalities include Hui, Luoba, Menba, Naxi, Xiaerba, and Den. The population is distributed unevenly. It is mainly concentrated along the Yalu Tsangpo, Lashahe, Nimong, and Niyangquhe rivers. A few groups live along the Nujiang and Langchanjiang rivers, and a very few live in the west and north of the region.

1.4 Socioeconomic Status

In Tibet, 86 per cent of the total population depends on farming and animal husbandry. Before 1952, the economy was based on ag-

Table 1: Administrative Structure

Prefecture (city)	No. of counties	No. of townships		No. of villages	Remarks
		Townships	Towns		
Lhasa city	8	86	5	762	Excluding 6 township administrative offices and 5 farm lands
Linzhi	7	59	2	603	Nature reserve and farm lands included into number of township
Changdu	11	159	9	1604	
Shannan	12	144	2	899	Excluding 6 farm lands
Rikaze	18	205	10	1715	Excluding 2 administrative offices, 2 farm lands, and 1 breeding station
Naqu	11	143	2	1487	3 farm lands included in number of township
Ali	7	105	1	340	
Total	74	901	31	7410	

Table 2: Names of County Level Areas Managed by the Prefectures (City)

Prefecture (city)	Names of counties
Lashashan	Chengguan region, Mozhugongka, Dazi, Duilongdeqing, Qushui, Nimu, Dangxiong, Linzhou
Linzhi	Linzhi, Milin, Langxian, Gongbujiangda, Yalu Tsangpo River, Chayu, Motuo
Changdu	Zuogong, Mangkang, Luolong, Bianba, Changdu, Jiangda, Gongjue, Leiwuqi, Dingqing, Chaya, Bashu
Shannan	Naidong, Zhaguo, Gongga, Sangmu, Qiongjie, Luozha, Jiacha, Longzi, Qusong, Cuomei, Cuona, Langkazi
Rikaze	Rikaze city, Nanmulin, Xietongmen, Jiangzi, Dingri, Shajia, Lazi, Anren (Beilang, Renshi, Kangma, Dingjie, Shenba, Yadong, Jilong, Nielamu, Shaga, Gangba)
Naqu	Shenzha, Bange, Naqu, Nierong, Anduo, Jiali, Baqing, Biru and Suoxian counties, Wenbu and Shuanghu administrative offices
Ali	Pulan, Zhada, Heer, Rishang, Geji, Gaize, Cuole.

riculture, animal husbandry, and a few handicraft industries. After four decades of democratic reforms, Tibet has made remarkable achievements through the efforts of the local people, and the support of the central government and neighbouring provinces. The Tibetan economy now includes agriculture, ani-

mal husbandry, industry, transportation, and post and finance sectors. Because the gross national product (GNP) is increasing yearly, the living conditions of the local population have also improved. Even so, there are still 320,000 people in Tibet living below the poverty line.

2 Forest Resources and Development

2.1 Forest Resources

2.1.1 Overview

Tibet has a total forest area of 7,170,000 ha, making it the fifth largest province in terms of forest area in China, and a standing stock volume of 2.084 billion cu. m., the largest in China. Forest coverage is only 9.84 per cent, however, ranking 22nd in China.

Virgin natural forests account for 99 per cent of the total forest. Timber forest represents 81.33 per cent of the standing tree area and 82.82 per cent of the standing stock volume.

Approximately 37 per cent of near mature, mature, and over-mature timber forest (43.76 per cent of stock volume) is accessible. The rich forest resources supply timber, fuelwood, bamboo, medicinal herbs, and other forest products needed for the establishment and development of Tibet and the subsistence of the local population. The forests also play an important role in the protection and improvement of the ecological environment of the plateau and surrounding areas.

Tibet has more than 6,000 species of higher plants, most of which are found in the forests. They include 5,800 species of seed plants, belonging to 1,258 genera in 208 families. There are 1,500 species of arboroid plants, belonging to 363 genera in 110 families; some 50 species of gymnosperms, belonging to 16 genera in eight families; about 15 species of pine that are generally only found in Tibet; more

than 40 rare and valuable plants that have been listed as national protected species; and over 1,000 types of medicinal herbs.

Forest products are used as raw materials for the production of a number of products such as perfumes and oils. They also provide many subsistence products like fodder, and edible and medicinal mushrooms like *Hydnum erinaceus*. The forests are rich in wildlife resources. Tibet is home to 488 species of birds (42% of the species found in China), 142 species of mammals (32% of the total in China), 55 species of reptiles, 45 species of amphibia, 48 species of fresh water fish, and more than 2,300 species of insects. There are some rare and valuable animals including *Presbytis* spp., *Hemitragus jemlahicus*, *Moschus himalayan*, and *Naemorhedus cranbrookii*. A total of 125 species of animals are listed as protected species.

2.1.2 Characteristics

As a result of the variation in altitude, edaphic characteristics, and climatic conditions, Tibet has many different types of forests.

Six zones can be distinguished from the lower to the higher altitudes: the tropical zone, upland subtropical zone, upland temperate zone, upland moist zone, semi high-altitude boreal zone, and the high-altitude cold zone. The forests found in these zones are tropical rain forest, monsoon rain forest, subtropical evergreen broad-leaved forest, deciduous broad-leaved forest, temperate *Pinus* spp. forest, *Cupressus* spp. and *Quercus* spp. for-

est, evergreen deciduous and broad-leaved mixed forest, temperate deciduous and broad-leaved forest, *Pinus* spp forest, *Cupressus* spp forest, *Quercus* spp and *Larix* forest, semi high-altitude dark conifer forest, and *Sabina* forest.

The precise forest community varies. For example, *Abies* spp forest includes *Abies georgei*, *Abies yunnanensis*, *Abies spectabilis*, *Abies delavayi*, *Abies densa*, *Abies delavayi*, *Abies ernestii*, and *Abies squamata*; *Picea* spp forest includes *Picea likiangensis* var. *linzhienensis*, *Picea likiangensis* var. *balfouriana*, *Picea spinulosa* and *Picea smithiana*; and *Pinus* spp forest includes *Pinus densata*, *Pinus armandi*, *Pinus griffithii*, *Pinus roxburghii*, and *Pinus yunnanensis*. There are many different types of *Larix*, *Cupressus*, *Sabina*, *Quercus*, *Populus*, and *Betula* forests as well.

As a result of the variation in climate and temperature, the forests are distributed unevenly. Most forests are found in the eastern part of the Himalayan, Nianqingtanggula, and Huanduan mountain ranges. Small areas of forest are also found in the southern part of the region, the south-western part of the Himalayas towards the valley of the Yalu Tsangpo River, and in some western and northern areas. Most plantations are located in the middle of the Yalu Tsangpo River Valley and the Lashahe and Nianchuhe watersheds. The steppe and deserts are found in the western and north-western areas of Tibet.

Forests are found in all the prefectures (and the city) with the exception of Ali, which only has areas of rangeland and shrub. The most highly forested prefectures are Linzhi and Changdu. Thirty of the 74 counties have significant forest resources (Table 3)

2.2 Role of Forests and Forestry in Tibet

Forestry plays a key role in the regional economic development of the Autonomous Region. Forestry was first established formally when the Autonomous Region was founded about 30 years ago. Since then, an independent and modern system of forestry management and related industries has developed, including the introduction of modern methods of silviculture, protection, management, and rational exploitation.

2.2.1 The Forest Administration

The Forestry Department is responsible for implementation of forest policy, silviculture, forest maintenance, surveys of resources, and design of macro-management plans for rational exploitation of the forest resources. Forestry Bureau with various sections have been set up in all prefectures or cities, with the exception of Ali. Forestry Bureau and forest stations have been set up in forested and other appropriate counties

The Forest Department has a large number of forest staff which includes 110 technicians and 580 forest rangers. More than 30 wood monitoring stations have been established with more than 100 staff.

2.2.2 Forest Management

In the past, Tibetan forests were managed by different Departments, and this led to illegal logging and severe forest degradation from the 1960s to the beginning of the 1970s. After the mid 1970s, the Forestry Department was given sole authority for forest management. At present, there is a system of good organization and efficient policy and management with par-

Table 3: Forest Resources in Tibet's Counties

Prefecture	Tibet	Linzhi	Changdu	Shannan	Rikaze	Naqu	Ali
No. of counties	74	7	11	12	19	11	7
Counties with forest	30	7	11	4	5	3	0
Percentage of counties with forest	40	100	100	34	26	27	0

ticipation by the local population. This has been effective in protecting forest resources and ensuring reasonable utilisation. The benefits from forestry have also been shared among the local people.

In order to strengthen the management of forest resources in Tibet, the state and autonomous region have carried out inventories of forest resources, vegetation, land, and wildlife many times since 1951. The major inventories and surveys are listed below.

- Forest survey of parts of eastern and southern Tibet
- Forest investigation of south-eastern Tibet
- Integrated science survey of the Yalu Tsangpo river watershed
- Integrated survey of the Mount Qomolangma region of Tibet
- Forest resources and forest production survey of south-east Tibet
- Forest inventory of the whole of Tibet AR
- Continuous forest inventories, by setting up an inventory system for Tibet
- Forest management inventory of a part of the Tibetan forest
- Forest cutting blank renewal inventory of the entire Tibet AR
- Forest division of the whole Tibet AR
- Site condition survey of suitable land for forest
- Forest development planning for the Yalu Tsangpo River, Nianchuhe and Lashahe watershed areas
- Desertification control treatment planning for the Yalu Tsangpo River, Nianchuhe and Lashahe watershed areas
- Cutting area survey and design
- Afforestation design

Tibet has a distinct dry season during which the dryness and strong winds facilitate the spread of forest fires. These forest fires are very difficult to extinguish because of the lack of manpower and the difficult terrain. Forest fire control has been given more attention by the government and by various levels of the forestry department, and some success in fire control has been achieved through the participation of local people.

Thirteen nature reserves have been established in Tibet in order to protect the natural scenery, vegetation types, biodiversity, and rare and valuable wildlife and plants. Of these, two have been upgraded to national protection areas. The total protected area is 325,330 sq.km., about 26.5 per cent of Tibet's land area.

2.2.3 Greening of the City by Plantation

Before the democratic reforms in Tibet, there were only a few horticultural and green areas. Since the 1960s, greening of the city has been promoted extensively. Tibetan cities have become greener and more beautiful through planting activities undertaken by local institutions, communities, the army, and local people. Tibet City has a total green area of about 670 ha with a greening rate of 17.1 per cent, the public greening area is 159 ha. This effort has been awarded many times by the appropriate national institutes.

Afforestation activities in forest areas were started in the early 1950s. There have been three main phases, each with varying degrees of local participation.

- The period from 1959 to 1968. In this starting phase, small afforestation activities were implemented, with cuttings used as the major plantation method. The focal areas for plantation were the front of farmhouses and some city areas. The major species used included *Populus spinulasa*, *Populus alba*, and willow.
- The first phase for preliminary development (1969 to 1986). Afforestation was carried out with exotic high-yielding and fast growing species on river banks and bare lands. The dominant species used were Beijing poplar and other poplar species.
- The second phase for rapid development (1987 to 1998). Large-scale afforestation was carried out based on appropriate planning, adapting imported exotic species and planting them in combination with indigenous species, and using shrubs and grasses in different forest categories. Planting activities have continued in the spring,

autumn, and rainy seasons using both seedlings and seeds.

Large-scale afforestation on suitable land has been important for the improvement of the ecological environment. Plantations have acted as wind shelters, controlled floods, and improved agricultural yields, as well as supplying local populations with fuelwood and fodder.

2.2.4 Forest Industry

Forest industry in Tibet AR started in the 1960s. At present there are 30 state enterprises employing more than 3,000 people. Forest-based industries, such as log and fuelwood production, wood processing industries, resin production, and medicinal herb exploitation, contribute about 10 per cent of the gross output volume of agriculture and industry and about eight per cent of the GNP in the whole region. Rich forests are valuable resources for local populations to overcome poverty and to obtain prosperity.

In the mid 1980s, parts of the state-owned forest were allocated to communities or villages for management, with the ownership retained by the state. Collective forest farms were established in some counties. At present, there are more than 20 such collective enterprises and thus many farmers benefitting from the scheme.

The development of forest industry not only contributes a great deal to the regional economy, it has also contributed to the development of qualified local people.

2.2.5 Economic Forests

Economic forest is the name given to plantations of fruit trees, oil-bearing trees, and tea bushes. Apple trees were introduced to Lhasa in 1956. The success of apples in Lhasa was instrumental in promoting the development of

horticulture in Tibet. Nowadays, there are more than 400 fruit orchards in the region (including apples, peaches, pears, and oranges), producing six million kg of fruit annually.

Tea was successfully cultivated in Tibet in 1956. Since the 1970s, 2,100 *mu* of land has been brought under tea cultivation. The annual output of tea exceeds 120,000 kg per annum and includes 20 types of green, flower, and brick-shipped tea (brick-shipped tea is slightly fermented tea).

The local species of oil-bearing trees are walnut and Chinese pepper. Walnut is the most important tree in terms of economic benefits, and plantations of exotic and native species of walnut have been increased. More than 80,000 walnut trees have been planted and the annual output of walnuts is now one million kg. Moreover, 180,000 Chinese pepper and 120,000 *Aleurites fordii* have also been planted.

2.2.6 Forestry Education and Research

Before 1974, forest professional staff were mainly trained and supplied by other provincial institutions. A forestry faculty was established in the Tibet Agriculture and Animal Husbandry Institute in 1977 to train high-level forestry professional technicians. In the three decades since its establishment, more than 600 professional staff have been trained by the Institute and more than 400 persons have attended training courses in various fields related to forestry. The Agriculture and Animal Husbandry School, established in 1974, introduced courses in forestry for middle level forest technicians in 1983.

In the last three decades, forestry research in Tibet has seen remarkable achievements. As a result, the Tibetan Autonomous Regional and Linzhi Prefecture Forest Institutes were established with more than 100 research scientists.

3 Forest Policy

Tibetan forests are an important part of the forests in China. The Chinese national decrees and rules related to forests are thus applicable to the Tibet AR. Some further local regulations have also been formulated appropriate to the local conditions.

3.1 China's Policy, Decrees, and Regulations Relating to Forest Management

China's national policies, decrees, and regulations are formulated by the National People's Congress (NPC), the State Council, and the Ministry under the State Council involved with policy formulation. The local People's Congress is responsible, together with the local government and forestry department, for the formulation of regional or local policies, decrees, and regulations.

3.1.1 National Policies, Decrees and Regulations

The decrees and regulations currently enforced in Tibet include major laws and regulations for criminal violations and public security such as the Criminal Laws and the Public Security Management and Punishment Provisions of the People's Republic of China. Forest policies and decrees include various laws such as the Forest Laws and the Forest Protection Provisions. The Administrative Procedural Laws of the People's Republic of China cover comprehensive policies and decrees. The major national laws and regulations relating to forest management are described in the Beijing report.

3.1.2 Local Policies, Decrees and Regulations

The formulation of Tibetan policies and regulations is based on the practical requirements for the rational exploitation and protection of forests, wild animals, and plant resources. The Tibetan Autonomous Region Forest Protection Provisions and Eight Provisions for Forest Protection and Fire Control are the major local decrees and regulations relating to forest management.

3.2 Current Local Forest Policies

The development of Tibetan forest policies can be separated into three phases: the forest start-up phase, the forest rehabilitation and development phase, and the rapid forest development phase. The forest policies formulated during these different phases were based on the social and economic conditions during these periods.

3.2.1 Forest Policies during the Forest Start-up Phase 1960-1976

Policies relevant to forest protection, harvesting, afforestation, and greening were formulated by the local government in 1961 after the democratic reforms in Tibet, and in accordance with national forest development. These policies stressed that state-owned forest should first be protected, and then rational cutting and exploitation implemented. Regeneration and afforestation, combined with tending, were promoted at the same time. If a farmer planted a

tree on his own land, the tree and forest products belonged to the farmer.

Forestry suffered serious ravages under the Cultural Revolution after 1966. Unreasonable resource management, illegal cutting, and several forest fires were the major causes for the destruction of forests at this time.

Measures like planned cutting, supply, and allocation and only cutting in certain places were then adopted. The state was given sole control over all such activities, in particular the state-owned forest farms and local government cutting yards. Forest fire control activities were also promoted.

3.2.2 Forest Policies during the Forest Rehabilitation and Development Phase: 1977 to 1984

In 1977, the Chinese economy started to improve, especially following the opening up and reform of the economic system in 1979. At the same time, the condition of the forests also started to improve. Forest policies continued to stress suitable measures for forest protection, planned cutting, and supply. Further refinements were introduced in the Eight Provisions for Forest Protection and Fire Control.

All institutions involved in forest product harvesting that were not managed by the Forest Department were closed in 1979. All state-owned forest resources (including forest enterprises) in the Tibetan region were brought under the management of the Forest Department. Log and sawn timber were supplied by the Forest Department, and producers were not allowed to market the products themselves. In 1977, the forest policy was changed so that afforestation was to be organized mainly by the collectives with support from the state and individuals.

3.2.3 Rapid Forestry Development Phase: 1985 to the Present

The formulation and implementation of the Forest Law of the People's Republic of China in 1984/5 marked a new period of develop-

ment. Starting in 1985, the policies for forest resource management encouraged the involvement of local communities and individual households. Measures were introduced so that parts of state-owned forests could be allocated to a community or a village for management, though the ownership still belonged to the state.

The Tentative Regulation for Forest Policy, which changed restrictions on protection responsibility areas and management responsibility areas for communities and individual households, was formulated by the Autonomous Regional People's Government in 1985. Local people living in protection responsibility areas were given permission to market fuelwood, charcoal, thinning wood, raw wood materials, and bamboo products; to hunt (non-protected animals); to collect and weave products; and to produce sawn timber according to the national plan. The regulation also stressed that poorer communities and households should be paid more attention by the local government and forestry department.

Later, forest policies were further changed to motivate voluntary cooperation by local communities in planting trees or grass on bare lands and wetlands. People were allowed to own the trees they planted and their children had the right to inherit the use of the land. State-owned forest land could be contracted to individual households or managed by an association of households. All income generated could be taken by the contractors. In 1994, the forest policies in Tibet were changed to further encourage and support local people to utilize barren lands. Anyone who managed such lands was allowed to retain the products or other benefits obtained from the land, and the land use right could be inherited or transferred.

In order to meet the demands of the market economy, wood allocation and price setting were removed in 1993 and management rights were given to enterprises. Enterprises were allowed to produce in accordance with market needs and the prices of products were allowed to fluctuate in line with market conditions. In order to avoid illegal cutting and forest damage, production of wood was still managed on

the basis of an indicative plan. Two certificates, a Cutting Certificate and a Transportation Certificate, had to be verified.

A policy was also formulated to attract foreign investment, technology, and qualified personnel for mutual benefit and to achieve rational exploitation of forest resources and comprehensive use of wood, to organize scientific surveys and design, to develop private nurseries and fruit orchards, and to coordinate with projects supported by foreign organizations. In 1994, in order to protect the environment and to increase the income of the local population, provisions for the utilisation of forest products, such as wild edible mushrooms and herbal medicine, were included in the policy.

3.3 Efficiency of Forest Policy

Implementation of the above-mentioned national and local policies, decrees, and regulations has played a positive role in the protection and utilisation of the Tibetan forest, wild animal, and plant resources; has brought about improvements in the environment; and has helped in the development of society. Specifically, they have helped in the management of forest and other resources, strengthened forest security, and helped in the punishment of all illegal activities causing damage to forest resources.

Forest fire control has been strengthened by the implementation of elaborated rules for fire control at various levels. Two hundred and seventy fire control organizations and joint groups between local people and the army have been established. These organizations now have about 1,000 professional and part-time staff. Public awareness of the need for fire control has increased. Statistics show that the annual incidence of forest fires, and the area damaged were reduced by 57 per cent and 88.3 per cent respectively in the period of the Seventh Five Year Plan (1986-90) compared to that of the Sixth Five Year Plan (1981-85).

Use of artificial reforestation to promote natural regeneration and mountain closure activi-

ties have been carried out in a total area of more than two million *mu*.

The forest products available from forests have diversified from straightforward wood products to include fuelwood, bamboo products, logs, herbal medicines, edible mushrooms, and weaving products. Increased production of forest products has substantially increased the total income of the local population through the rational exploitation of resources. Tentative estimates show that the local people living near forest areas have increased their annual income by over 40 million *yuan*, more than 100 *yuan* per capita, through commercial timber production. They also generated over 20 million *yuan* through the collection and marketing of herbal medicines and wild edible mushrooms. These gains have increased the enthusiasm of the local people for forest resource protection.

The enthusiasm of the local people for reforestation has also increased. Plantations have benefitted the ecology and economy and have supplied timber and firewood to the local population, thereby reducing damage to the natural forests. For example, 440,000 plants, or 2,200 plants per person, have been planted in villages in Rikaze county. The plantations now supply sufficient fuelwood for the people of this county. A forest zone 75 m wide and 1,500 m long has been planted to control strong winds.

In the past there was no forest in Bianxiong township in Rikaze county, and the area was very windy. The output of grain per *mu* per harvest was about 100 kg. An 11 km protection forest system was established, which decreased wind speeds over an area of 509 *mu*. A 22,000 m band of forest has protected a reservoir and conserved 85,000 *mu* of paddy fields. The output of grain has increased by more than 400 kg per *mu*. A local farmer who has been planting trees for the last 10 years now obtains an annual income of over 3,000 *yuan* from timber from his 40 *mu* plantation.

In recent years the utilisation of Tibetan forest resources has been characterised by increasing investment, adoption of new technologies,

4 Social Forestry

The situation of social forestry and development of human resources are gradually improving in Tibet. However, as a result of the heterogeneous distribution of forest resources, local people have different levels of awareness about, and interest in, forests. These necessitate different approaches to the promotion of social forestry and human resource development.

4.1 Government Participation in Forest Resource Management

Before the democratic reforms, most forest resources in Tibet suffered from serious neglect, forest fires, and illegal cutting. There were no plantation activities and only a few monasteries and courtyards of upper-class nobles were planted with scattered trees by their slaves under *corvee* labour. Since the democratic reforms were introduced, the central and regional governments have paid more attention to the forest resources.

A forest management bureau was set up under the Tibetan Agriculture and Animal Husbandry Department in September 1965 in order to develop the forest resources as a basis for industry and local economic development and to overcome local poverty. This was the first forest management organization in Tibet. The organization was responsible for forest resource development and management. Later, after much restructuring, the Tibet Forestry Department was established and its functions defined more clearly. Forest management systems have also been set up at the prefecture, county, and township levels.

The forest resources of Tibet belong to the state, thus the government plays a key role in forest resource management. In the last three decades, the forest resources have been developed through government management. At the same time the government has contributed much to improving the local economy and the living standards of the local people, in order to enhance protection of forest resources. The major activities and changes are listed below.

- Local forest policies, decrees, and regulations have been formulated and elaborated to implement the policies, decrees, and regulations of the central government, taking into account the social and economic conditions in Tibet and the demands of the local population.
- The status of Tibetan forest resources has been improved with the assistance of the central government and relevant local institutions.
- Investment in activities like forest fire control, wildlife protection, and forest management has increased.
- People from all walks of life have been involved in the reforestation of barren lands and in establishing a forest conservation system.
- Policies and concepts for forest resources' exploitation have been formulated according to the rules of a planning economy and management carried out based on the market economy.
- A large investment has been made in forestry education to enhance the training of

forest professional staff in forestry and research.

4.2 Social Forestry for Forest Resource Management

Forest resource management should depend on support from all sides of society, not only from the government. This point has been given due attention by the Tibetan government from the very beginning.

4.2.1 The Formulation of Forest Policies, Decrees, and Regulations for Social Forestry

National and local forest policies and regulations are formulated by the NPC and at various levels of government. The representatives in the PC represent all sides of society including workers, farmers, intellectuals, researchers, technicians, and businesspersons. Many women and minorities are involved. All proposals, suggestions, and demands on forestry are collected by the PC representatives and various levels of government and presented to the autonomous Standing Committee of the National People's Congress (SCNPC) and the autonomous people's government for reference and scrutiny. Emphasis is placed on a high level of participation by all sides of society in policy-making for forestry development.

4.2.2 Social Forestry in the Utilisation of Forest Resources

Under the previous planned economy system, exploitation of forest resources was strictly controlled by the state. Local people living adjacent to forest areas could use products like fuelwood, wild edible mushrooms, and fruits for subsistence, but they had few, if any, forest products for marketing. Thus, they were not interested in managing the forest resources.

After the introduction of a market economy in China in the mid-1980s, local communities in Tibet have been involved in the management of the state-owned forest resources and given permission to market forest products. In this

way local people have started to benefit directly from the exploitation of forest resources. In 1993, the total income of the local population from forestry reached 43 million yuan, or 100 yuan per capita.

Poor villages and individual households in forest areas have been given more support by the local government. For example, Mr. Buqiong's household (three men and four women) in Cayu County in Linzhi Prefecture was a relatively poor household with an annual income in 1994 of 400 yuan. After being helped by the local government, they earned a net income of more than 2,000 yuan from cutting and marketing of 15 cu.m. of timber, and more than 2,500 yuan from collection of other forest products by the four women in their forest responsibility areas. As Mr. Buqiong said: "With the development of economic reform, our life is getting better and better, based on the good policies formulated by the government. Now we are getting more and more benefit from the forest. We very much appreciate the fact that we are supported a lot by the government at various levels. I planted Chinese pepper on over 10 mu of land by myself this year, and I trust that our living standard will improve even further."

Awareness of the proper utilisation of forest resources has improved as a result of the changes in forest policies, and the local people have benefitted. It is becoming increasingly important to attract surplus labour in forest areas, especially to encourage women's participation in the collection and marketing of forest resources such as wild edible mushrooms and herbs for herbal medicines.

With further adjustments in forest policies, the thrust has now moved towards the processing of forest resources. Many enterprises have been set up, by both collectives and individual households, that include extensive processing such as Zhang style furniture and bamboo weaving. At the same time investment from inside and outside Tibet is contributing to the increasing exploitation of forest resources and the development of the economy in forest areas.

4.2.3 Social Forestry in Forest Resource Management and Protection

Forest resource management and protection is an activity that involves all strata of society. With the development of multiple management activities in forest areas, the likelihood of forest resources being damaged has also increased. Policies and regulations, such as the Forest Laws, Forest Fire Control Provisions, Forest Protection Provisions, and Wildlife Protection Laws, have been disseminated in order to raise public awareness about the importance of forest protection and forest fire control.

In order to ensure the security of forest resources, the forest ranger group (a special group of farmers) has been restructured and strengthened in key forested counties. The terms of reference of the forest rangers have been defined clearly and responsibilities assigned to collective forest farms and individuals to raise public awareness of forest protection.

4.2.4 Social Forestry for Afforestation

Massive reafforestation campaigns have been undertaken in the three decades since the introduction of democratic reforms. In 1997, afforestation was implemented by collectives, together with the state and individuals, on the principle that whoever plants a tree, owns it.

Afforestation activities are being planned on barren lands and wetlands in the agricultural area along the Yalu Tsangpo River and the Nianchuhe and Lashahe watersheds, using government investment. Local residents will be involved in the afforestation activities. In smaller areas and scattered open lands and wetlands, afforestation activities will be carried out on the basis of the voluntary cooperation of local residents through the association of administrative natural villages, the association of households, and contracted afforestation and management by individual households. A "Forest and Wood Ownership Certificate" will be granted to the owners of the forest.

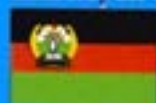
There is a scarcity of forest products like firewood in the agricultural areas of the Yalu Tsangpo River, and Nianchuhe and Lashahe watersheds because these areas have no forests. The local population are now very interested in the afforestation programme because of the new policies. The residents of Zhongzi Township, situated in the north of the Nianchuhe watershed, have planted trees on 4,000 *mu* of land (1.6 *mu* per capita). Over 300,000 plants (127 plants per capita) have been planted here since 1979. Grass has also been planted on a further 4,700 *mu* of land (2 *mu* per capita). Since the trees grew, the residents have been harvesting 25 tonnes of fuelwood annually. Furthermore, the plantations have protected the agricultural land, supplied fodder for livestock, promoted the development of animal husbandry, and improved the environment.

Afforestation actions involving various members of society, such as the "Cadre Plantation", "Youth Plantation", "Women Plantation" and "Joint Effort Plantation of the Army and the People", have become very popular in Tibet. Large areas of open lands and wetlands have been planted in this way.

4.3 Contributions from Outside Tibet

Over the past three decades, several hundred forestry technicians have been trained for Tibet by different forestry colleges. A number of interdisciplinary researchers involved in research and the Tibetan forest resources' survey have contributed much to forest development in Tibet. Members of the Ministry of Forestry, Chinese Science Academy, Chinese Science and Forest Academy, Southwest Forestry College, Beijing Forestry College, Central South Forestry College, and Central South Forest Reconnaissance Institute have been involved in forestry development in Tibet for a long time. Many enterprises from different provinces in China have also been involved in the utilisation of forest resources in Tibet and are contributing to the economic development of Tibet and its forests.

Participating Countries of the Hindu Kush-Himalayan Region



Afghanistan



Bangladesh



Bhutan



China



India



Myanmar



Nepal



Pakistan

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