

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

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 Mohe River) and 4°15' N (the Zhengmuanshan Islands in the South China Sea); and 73°34' W (Pamir Plateau) to 135°5' E (the confluence of the Heilong and Wushuli rivers). It borders the D.P.R. of Korea, Russia, Mongolia, Kazakhstan, Kirghiztan, Tadzshikistan, Afghanistan, Pakistan, India, Nepal, Sikkim, Bhutan, Burma, Laos, and Vietnam. Japan lies to the east and Malaysia, Brunei and the Philippines to the south-east.

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 reforest 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.