Chinese collective forestlands: contributions and constraints

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SUMMARY

Collective forests form the majority of China's forested area and have proven to be critical in maintaining the livelihoods of hundreds of millions of rural inhabitants, supplying wood and other forest products for China's burgeoning demand, and providing critical environmental services. This paper describes the key policy and institutional dimensions of China's collective forests and how collective forest property rights are defined both in law and in practice. The national and provincial distributions of collective forests are presented. The paper assesses the impacts and implications of critical national policies, including the National Forest Protection Program (NFPP), the expansion of the public protected area system, the Forest Ecosystem Compensation Program (FECP), the system of taxes and fees, and the log-harvesting quota. It concludes with recommendations regarding policy reforms that would strengthen the collective forest sector and increase its contribution to poverty alleviation, rural development, and sustainable forest conservation.

Keywords: collective forests, community forests, China, forest policy, tenure

INTRODUCTION

Collective forests are an important part of Chinese forests, making up some 60 % of the total forest area and contributing an ever-increasing share of timber and wood fibre to industry. The forests are also vital to hundreds of millions of rural dwellers and provide environmental services to a nation under great population pressure. However, fluctuating forest policy and mandatory programs over the last sixty years have resulted in a sector characterized by tenure insecurity and inefficiency. This paper introduces China's collective forests and then goes on to describe current policy measures that influence their productivity and contribution to rural development. The paper concludes with recommendations for policy reform for consideration by Chinese policymakers.

THE EVOLUTION OF COLLECTIVE FORESTLANDS

The history of collective forestland ownership in China is rife with discontinuity, contributing to tenure and regulatory conflicts and leading to difficulties in developing policies that promote sustainable forestry. Prior to the founding of the People's Republic of China in 1949, forestlands were predominately privately owned by an elite minority, however there were communal and state forestlands. This was the case across China with the exception of Tibet[1] and the frontier regions of Yunnan and Sichuan, where substantial tracts of forest were collectively managed territories held by ethnic minorities (Liu Dachang 2001). After the revolution, the Chinese Communist Party launched what was the first of many dramatic changes in forestland ownership. The new government initiated a Land Reform Campaign in which land was redistributed equally to the rural population.

To initiate a planned, centralized economy, the government began reorganizing rural society into elementary cooperatives[2] in the mid-1950s. This first government-initiated system of collective landholding pooled forest and agricultural resources and divided returns to individuals according to the proportion of land and other resources contributed to the collective. In the elementary cooperative, land was still privately owned owing to the Land Reform Campaign (Grinspoon 2002, Liu 2001) however, landowners lost some of their rights to individually manage. Elected leaders of the elementary cooperatives made management decisions. In many cases elementary coopera-

[1] This article uses the *pīnyīn* system of Romanization for standard Chinese readings of words and place names, excepting locations that have established names in the English lexicon: Hong Kong, Inner Mongolia, Macao, Tibet, Yangtze River, and Yellow River.

[2] Elementary cooperatives ale also known as ‚lower stage cooperatives' (Grinspoon 2002) and are the equivalent of present-day natural villages or hamlets. The present governmental system groups natural villages together to form an administrative village.

tives initiated tree planting on private forestlands of cooperative members and on communal land allocated to the elementary cooperative, though the latter form of land ownership was less common at this time. Following the formation of elementary cooperatives, the central government formally recognized collective ownership of forest resources alongside state and private ownership (Grinspoon 2002), arguably a move to consolidate state control over land and natural resources, given that the only elections in China are at the village level and even these elected representatives have many obligations to higher level government.

At the end of 1956, 96 % of rural households' land was merged to form advanced cooperatives[3], amalgamating both private forestlands and those in elementary cooperatives, thus bringing private forestland ownership to an end. An advanced cooperative included hundreds of households and decision-making was further centralized. In 1958, the government launched the Great Leap Forward and made additional changes, promulgating a policy further aggregating landholding, by combining advanced cooperatives and transferring land ownership and decision-making to the commune[4]. In elementary and administrative cooperatives there was democratic representation in the groups responsible for governing land use. However, the state appointed commune leadership and thus the Party managed and administered collective land use. At the same time as the commune initiative, the government implemented a program to drastically increase steel and iron output by establishing small furnaces nationwide. The double initiatives of (1) the amalgamation of advanced cooperatives into communes and (2) the iron and steel production program resulted in mass deforestation and famine (Liu 2001).

The early 1960s was a time of retrenchment (Grinspoon 2002) and the government reverted forestlands back to advanced and elementary cooperative[5] management. The notable difference was that land ownership remained collective whereas, after the Land Reform Campaign, private land ownership had been permissible in elementary cooperatives. During the period of retrenchment, the private ownership of fruit trees, non-timber trees, and previously private plantations was initially re-instituted (Liu 2001), though this was quickly rescinded during the Four Cleanups Campaign in 1964, a campaign that also sought to eliminate the corruption that contributed to the failure of the communes and the redistribution of land following the Great Leap Forward (Grinspoon 2002). From 1966 to 1976, the tumult of the Cultural Revolution embroiled China in a decade of strife that exacerbated forest mismanagement and deepened the insecurity surrounding rights to resources.

The definition of collective forestland in China is not static. In the period leading up to the Cultural Revolution, definitions included a variety of government-initiated management and ownership systems, ranging from village-level arrangements that grouped private landholdings and were governed by elected officials to township-level arrangements including thousands of households that were governed by state appointed officials. It is clear though that the meaning of collective forestland in China is different than elsewhere. Internationally, collective forests often refer to a voluntary or social grouping having rights much like those held by private forest owners, whereas in China, collective forests are often much more, if not wholly, government controlled. Fluctuating policies continued after the Cultural Revolution and the term collective forest remained complex.

THE BEGINNINGS OF CONTEMPORARY COLLECTIVE FORESTLANDS

Soon after the death of Mao Zedong[6] in 1976 another round of sweeping reforms occurred. Grinspoon (2002) and Liu (2001) record the most substantial changes, often translated into English as the Three Fixes, as follows: (1) Issuance of certificates to confirm forest resource tenure in hopes of stabilizing the sector, (2) distribution of non-forested land to rural households as family plots[7], and (3) introduction of the Contract Responsibility System (CRS)[8].

The forestlands upon which family plots are allocated remain collectively owned. As discussed, collective ownership assumes a variety of forms however, importantly, households have use and management rights over the land[9] and resources. It was not until 1998 that the revised Forest Law[10] granted transfer rights of the resources to households as well.

The CRS came about following the successes of the Household Responsibility System (HRS) in the agricultural sector. The CRS was introduced to the forest sector in the early 1980s, quickly growing to include

[3] Advanced cooperatives are also known as, higher stage cooperatives' and are the equivalent of present-day administrative villages (Grinspoon 2002).

[4] Communes are the equivalent of the contemporary township (Grinspoon 2002).

[5] At this time, advanced and elementary cooperatives became respectively known as production brigades and production teams (Grinspoon 2002, Liu Dachang 2002).

[6] Mao Zedong, founder of the People's Republic of China and its leader up until his death, is the *pīnyīn* Romanization of his name. It is also commonly spelled Mao Tsetong or Mao Tsetung in non-Chinese literature.

[7] The Chinese word for this type of land is *zìlíushān*. Liu Dachang (2002) translates this term as family plots, while Grinspoon (2002) refers to it as freehold mountains.

[8] The Chinese word for the land set aside in the Contract Responsibility system is *zérènshān*. Liu Dachang (2002) translates this term as responsibility hills, while Grinspoon (2002) translates it as responsibility mountains.

30 million hectares and 57 million households (Liu and Edmunds 2003). This system contracts mostly non-timber forests and fuelwood forests to households, but the natural or administrative village collective often retains some control of cutting and product sales and the households have an array of schemes for sharing the benefits with the collective (Liu Dachang 2001). There are three primary forms of household responsibility management for forestlands. The first sees family plots managed in conjunction with responsibility hills. The second is the merger of individually contracted responsibility hills into a larger unit. Benefits are divided amongst the contributing households. Membership in this arrangement is not necessarily voluntary. The third and most common form is simply household management of the contracted responsibility hill (Liu Dachang 2001).

A further development was the advent of the Four Wastelands Auction Policy in 1992, whereby individuals are permitted to contract and lease degraded lands[11]. The rights accorded to these lands are similar to those of the family plots: The contractor possesses use rights for the land and the resources developed on the land (Grinspoon 2002, Liu Dachang 2001). According to Hyde *et al.* (2003), individual households now administer approximately 80 % of collective forests.

In addition to the aforementioned tenure arrangements, there is another category of land that is not allocated, leased, or contracted to individual households. These areas remain the property of either natural or administrative villages and are managed by that village government. This sort of shareholding system equally divides returns from the forest to villagers (Liu Dachang 2001). Liu and Edmunds (2003) report that this form of management was still present in each of the fifteen villages in which they conducted their research in Guizhou, Hunan, and Yunnan.

Other shareholding schemes exist too. Landholders pool their resources, either upon their own initiative or upon the behest of the government, and divide returns based upon the initial input. Such arrangements are often to supply wood and fibre to state and private companies (Liu Dachang 2001). Households that voluntarily form cooperative arrangements often retain more of the rights to their resources than obligatory schemes in which management decisions are not made by individual households. These schemes can be reminiscent of the pre-Cultural Revolution era as households may be forced to join a cooperative, violating the rights accorded them by law. A shareholding scheme may include all or part of a collective forest. If a collective forest has been parcelled out to individual households, then it is more likely that the collective forest would not be included in any one arrangement in its entirety, though this is not an absolute.

The preceding text highlights some of the more common types of collective forest arrangements. There is no catchall collective forestry ownership and management model. Grinspoon's (2002) research in Sichuan and Rozelle and Li's (1998) work highlight the diversity that exists between provinces, townships within in a county, villages within a township, and even between same-village institutions. The whole gamut exists, ranging from instances of county and village governmental ownership to household partnerships to shareholding arrangements. In each circumstance, rights, tenure security, decision-making, responsibilities, and distribution of benefits vary. Moreover, collective forests must often comply with national policies, regardless of ownership, without consultation, and with little opportunity for recourse. Therefore ultimately, collective forests are controlled by the central government, but the degree of involvement varies. In sum, there are so many variations of collective forests in China that the term itself no longer describes one set of attributes, although policies are frequently formulated and targeted to this category of land. Inevitably with unified policies targeted to such diverse realities, there are many problems, abuses, and unexpected outcomes, which might be avoided if policy were tailored to the ways in which land uses are actually decided and implemented on the ground.

COLLECTIVE FORESTS AND THE LAW

The Constitution of the People's Republic of China addresses the ownership of land and resources and makes the distinction between state and collective land[12]. The Forest Law of the People's Republic of China addresses forest resources specifically and differentiates between state and collective resources, stating that ‚forest resources shall belong to the state, unless the law stipulates they belong to the collective

[9] Since the land is designated forestland, rural households are not permitted to use it for other purposes, such as the cultivation of food crops, excepting fruit trees (Liu Dachang 2002).

[10] The available English version mistranslates the title as the Forestry Law of the People's Republic of China. We will refer to it, more accurately, as the Forest Law of the People's Republic of China throughout this paper.

[11] Degraded land is often translated to ‚wastelands' in English literature.

[12] Article 9 declares that ‚mineral resources, waters, forests, mountains, grassland, unreclaimed land, beaches and other natural resources are owned by the state, that is, by [all] people, with the exception of the forests, mountains, grassland, unreclaimed land and beaches that are owned by collectives in accordance with the law'. Article 10 states, ‚Land in the rural and suburban areas is owned by collectives except for those portions which belong to the state in accordance with the law, house sites and private plots of cropland and hilly land are also owned by collective (People's Congress 1999)'.

(People's Congress 1998)'. However, neither law defines the term ‚collective', thus the ambiguity surrounding its definition is the root of many ownership and policy conflicts. In addition to these two broad property types, the Forest Law defines five classes of forests: Protection forests, timber forests, economic forests, fuelwood forests, and forests for special uses (People's Congress 1998).

(1) *Protection forests* aid in water storage, prevent soil erosion, act as wind blocks, inhibit desert and sand encroachment, stabilize river banks, shelter farmland and grassland, and line roadways.

(2) *Timber forests* function primarily to provide timber. Bamboo groves are included in this category of forest.

(3) *Economic forests* include orchards and other trees that produce foodstuff, medicinal products and industrial raw materials.

(4) *Fuelwood forests* are designated production areas for fuelwood.

(5) *Forests for special uses* include forest areas for national defence, experimental research, seed trees for propagation, and environmental protection[13], and forests of historical interest and aesthetic value[14].

RIGHTS IN PRACTICE

Collective forest property rights are intrinsically associated with ownership and indeed this is implied on numerous occasions in the preceding text about collective forestland regimes. Moreover, rights to forests are not always so simple and thus are accorded the following separate description. Zhang and Kant (2004) differentiate between physical asset rights and economic rights. Physical asset rights include use, management, and transfer rights. Theoretically, de-collectivized forestlands, like family plots, responsibility hills, and contracted land from wasteland auctions have such rights, though in practice there are many scenarios in which these rights are limited. For example, in some cases, forestlands are only permitted for certain uses or the species to be planted are determined by the government. Furthermore, there are numerous policies and initiatives, like the logging ban, creation of national parks, and forestlands for environmental services, that unilaterally restrict an owner's management options despite laws that guarantee due process and property rights protection. In addition, there are times when coercion is employed to force those with rights to forestland resources to join schemes involuntarily.

Transfer rights were affirmed in law in the Forest Law of 1998 and the Rural Contracting Law of 2002 and give forest resource owners the right to lease or contract the resources, though certain restrictions apply (Zhang and Kant 2004). For example, protection forests and forests for special uses are excluded from the list of forests for which transfer is permissible. Other obstructions to unimpeded use, management, and transfer rights include requirements for harvesting trees and transportation of logs, as well as, the prohibition of converting forestland to any other type of land use (Zhang and Kant 2004). Xu and Ribot (2004) document instances in which villages are issued forest harvest permits without forests. There are of course villages with forests, but without harvest permits, thus fuelling a black market in forest harvest permits.

Zhang and Kant (2004) describe economic rights as the right to benefit from forest resources. Use rights are often confused with economic rights. In China, for example, even if use rights are unrestrained, owners with the rights to forestland resources are frequently limited to selling their timber to state-owned timber companies and thus, the potential revenue diminished by limited market freedom. Taxes, fees, and charges are other factors that limit economic rights, but not necessarily use rights.

Government restrictions on property rights are not exclusive to China. In most nations, forestland owners do not have absolute freedom to act as they choose. For example, there are regulations that limit forest activities to protect among other things wildlife and waterways, the government can expropriate land, zoning demarcates areas for various uses, and there are taxes. However, China differs from many other nations in that often compensation for foregone activities due to governmental intervention is less than other market opportunities and recourse to contest government actions does not exist or is cumbersome. International experience exemplifies the ability of public and private forestlands to sustainably provide forest products without an impingement on rights (Taskforce on Forest and Grasslands 2002).

PRESENT SCOPE OF COLLECTIVE FORESTS

The terms forestland and forest are distinct in China. Forestland encompasses (1) forested land, (2) prospective forest areas, or (3) designated forestland yet to achieve the minimum requirements of a forest (Zhang *et al.* 1999). Currently, the minimum requirement for classification as forest area is 20 % canopy coverage[15]. The national statistics for the amount of land in each forest category is determined by extrapolating data from aerial photos and nationwide ground plot surveys[16]. Moreover, it must be mentioned that in many instances zoning generalizes across regions. For example, the Regulations for the Implementation

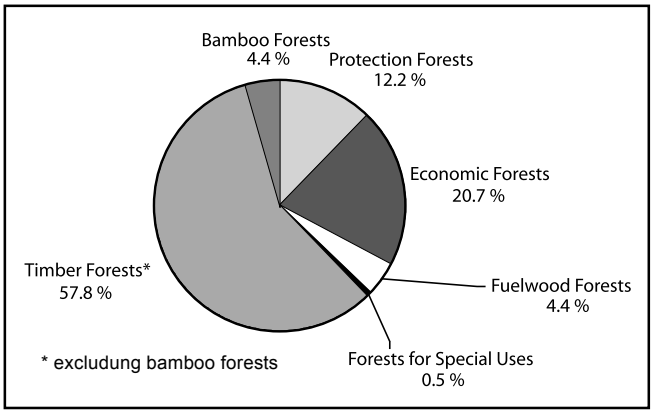
[13] Forests for special uses that are meant for environmental protection differ from the first category (protection forests) in that they are primarily for combating pollution.

[14] Note that state and collective forests for public benefit and forests compensated for ecosystem services can be included in either the protection forest or forests for special uses categories. As well, according to the National Park and Forest Tourism Management Division of the State Forestry Administration, national parks can be categorized in any of the five groupings.

of the Forest Law of the People's Republic of China, promulgated in January 2000, decrees that cultivation on sloping land with a gradient of 25 % or greater will cease and be planted with grass or trees (People's Congress 2000). Though the land may be classified as forestland, in practice some areas may not have been converted from their original farm use.

Across China[17] there are 257.0 million hectares of forestland and 153.6 million hectares of forest area. Collective forests preponderantly account for almost 60 % or 89.7 million hectares of the total forest area. According to official statistics, over 60 % (55.8 million hectares) of collective forest area is comprised of timber forests, inclusive of bamboo forests and plantations[18]. Notably, there are an additional 10.9 million hectares of collective protection forests and 18.6 million hectares of collective economic forests. Conversely, there are relatively few collective forests classified as ‚forests for special uses', accounting for just over 400 000 hectares and less than 0.5 % of total collective forested area. Figure 1 shows the percentages of each collective forest category. 92.1 % of all economic forests (18.6 million of a total 20.2 million hectares) and 93.2 % of bamboo forests (3.9 million of a total 4.2 million hectares) are on collective forestland (State Forestry Administration 2000).

FIGURE 1 *Collective forests by category (%)*



Source: State Forestry Administration 2000

According to available data, China's forest area and volume is increasing (Hyde *et al.* 2003). The area and volume of timber forests, inclusive of bamboo forests and plantations, and economic forests experienced substantial growth in the last period between the two most recent forestland surveys. In each of the aforementioned forest categories, collective forests outperformed state-owned forests. However, as reported by Albers *et al.* (1998) monoculture forests and exotic tree species are replacing natural forests. These new forests supply valuable resources like wood and timber, but environmental consequences, like loss of biodiversity, are yet to be quantified.

According to the State Forestry Administration (SFA) (2003), 7.8 million hectares of forest plantations were established in 2002 and 81.3 % of them were on collective land. In total, 73.6 % of the nation's plantations are located on collectively owned land (SFA 2000). In 18 provinces, more than 90 % of total provincial plantation areas were composed of newly initiated plantations from 2002. Presently, there are plans to plant approximately 3 million more hectares of plantation forest by 2010 to meet the growing requirements of China's pulp and paper industries (Cossalter 2004).

Collective forests are found all across China, however, their proportions vary by province. In fact, the ten provinces[19] with the greatest area of collective forests account for 75 % or approximately 67 million hectares of the total. Collective forests predominate in southern China, earning those provinces the moniker Southern Collective Forest Region (*nánfāng jítǐ lín qū*)[20]. Indeed, nine of the ten aforementioned provinces are in southern China, while only Liaoning is situated in the north.

In 16 provinces, collective forests compose more than 80 % of their respective provincial total forest areas. Nine of these provinces have collective forest areas that exceed or equal 90 %[21]. Figures 2 and 3 show the proportion of forestland and forest area that are owned by collectives and the state for each province. The collective forestland and forest areas represented by the darkest shading are those listed in the Southern Collective Forest Region by Rozelle *et al.* (2000) and

[15] This minimum was reduced from 30 % in 1996 to conform to international standards, at least partly explaining the officially recorded increase in total forest area from 133.7 million to 153.6 million hectares in 1998 (Sayer and Sun 2003, Zhang *et al.* 1999). The amount of forest area in 1993 using the 20 % definition was never published and thus it is uncertain as to how much the actual forest area increased. Furthermore, the Chinese national statistics include bamboo forests, orchards, and shelterbelts, none of which occur regularly in other nations' forest data.

[16] According to the State Forestry Administration, the data used in this report are based on aerial photographs and 90,227 ground plots covering an area of over 57,000 hectares.

[17] This report does not include data from Taiwan, the Tibetan areas outside of military control, and the special administrative regions of Hong Kong and Macao.

[18] Chinese forest experts theorize tha the proportion of timber forests will decrease, as more forests are set aside for public benefit and included in government ecosystem service compensation programs. This will likely increase the proportion of protection forests. Mitigating the trend of decreasing timber forests will be the expansion of plantations.

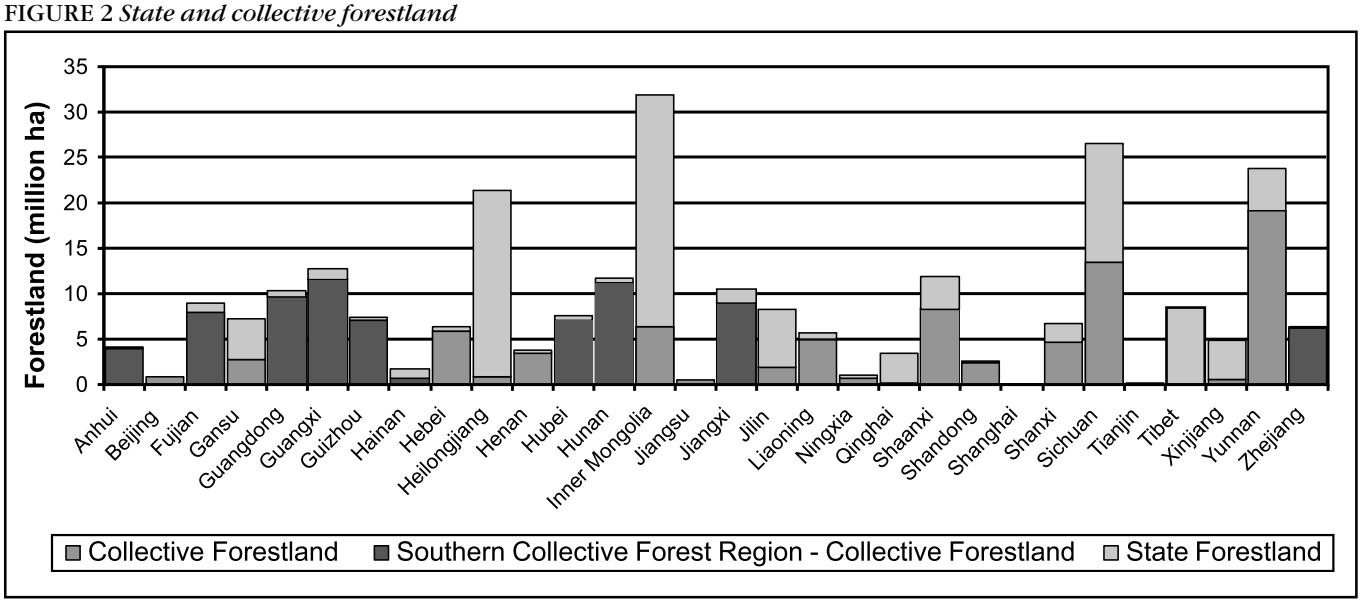
[19] In decreasing order, the ten provinces composing the majority of collective forest area are Yunnan, Hunan, Guangdong, Jiangxi, Guangxi, Sichuan, Fujian, Zhejiang, Hubei, and Liaoning.

[20] There is no one standard governing which provinces are included within the Southern Collective Forest Region. For example, Rozelle *et al.* (2000) include Fujian, Guangdong, Guangxi, Hainan, Hunan, and Jiangxi. Katsigris (2001) adds Anhui, Guizhou, Hubei, and Zhejiang to the group. Yin's (2003) list also includes these ten provinces, though he includes only part of Anhui, but goes further by adding parts of Jiangsu, Sichuan, and Yunnan.

Katsigris (2001). This region has a population of over 480 million people, of which over 300 million, or almost 25 % of China's total population[22], live in rural parts of these ten provinces (State Statistics Bureau 2002).

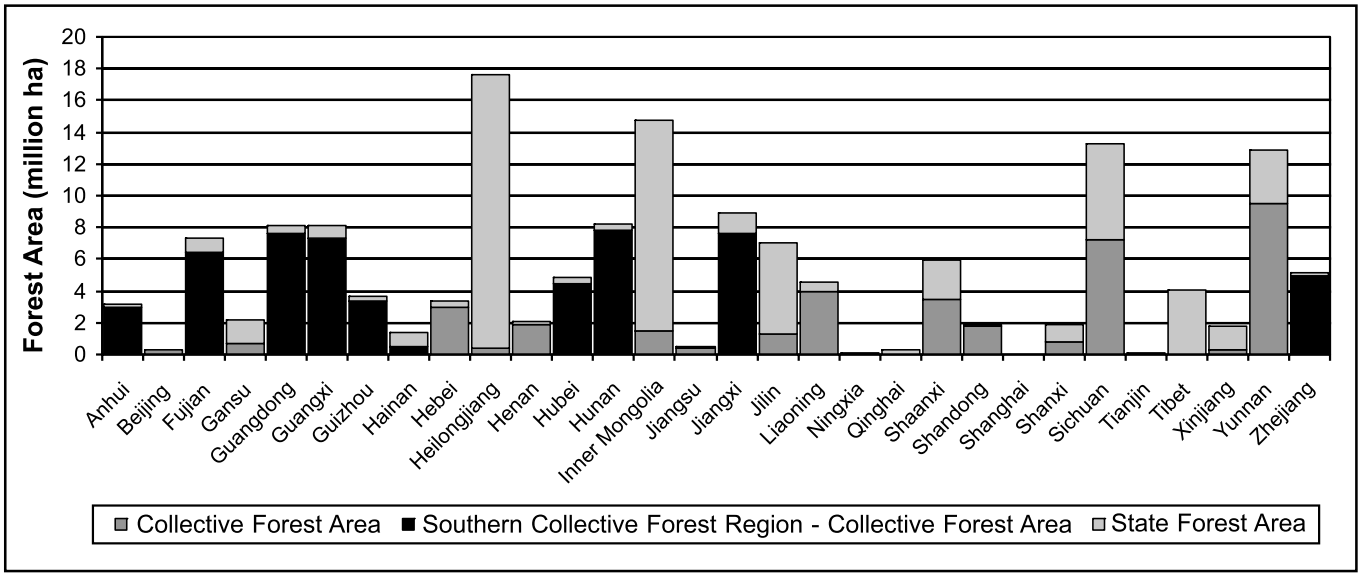
from state-owned land has declined. According to official statistics, 44.4 million m^3 of commercial timber and fuelwood was produced domestically in 2002, of which 20.5 million m^3 or 46.3 % came from collective forests (SFA 2003).

FIGURE 2 *State and collective forestland*



Source: State Forestry Administration 2000

FIGURE 3 *State and collective forest area*



Source: State Forestry Administration 2000

The growing importance of collective forests as a timber source is demonstrated in Figure 4. Since 1997, the proportion of domestic timber coming from collective forestland has steadily increased, while timber

In addition to the large percentage of timber originating from collective forests, many non-timber forest products also come from collective sources. In 2000, 67 million metric tons[23] of non-timber forest products (NTFPs) were produced, comprised mostly of fruit and amounting to 62 million tons (SFA 2003) and 7.6 billion US$[24] (Katsigris 2001). The Southern Collec-

[21] The nine provinces with collective forest areas that equal or exceed 90 % of total provincial forest area, in decreasing order, are Zhejiang, Hunan, Shandong, Guangdong, Anhui, Guizhou, Hubei, Henan, and Guangxi. The seven provinces with collective forest areas between 80 to 90 % of total provincial forest area, in decreasing order, are Beijing, Hebei, Fujian, Tianjin, Liaoning, Jiangxi, and Shanghai.

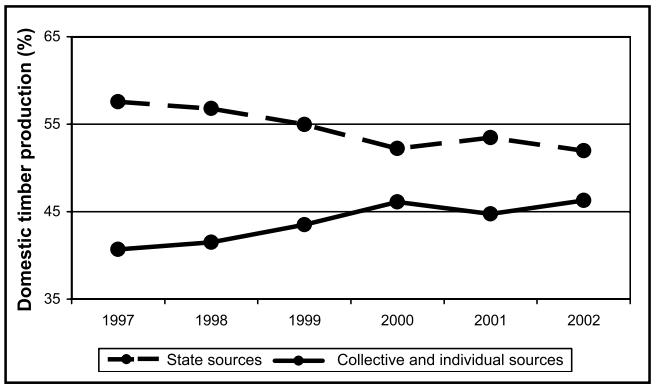
[22] According to the national census of 2000, there were 1.26 billion people in China.

[23] All subsequent tons are metric tons.

[24] All subsequent dollars will be U. S. dollars.

tive Forest Region produced the majority of the following products: Camellia oil[25] (97 %), dried bamboo shoots (93 %), resin (88 %), palm sheets (64%), and tallow[26] (61 %) (SFA 2003). Collective forests also yield great amounts of fuelwood. According to the SFA (2003), from 1997 to 2002, roughly 7 % of timber production was for fuelwood purposes.

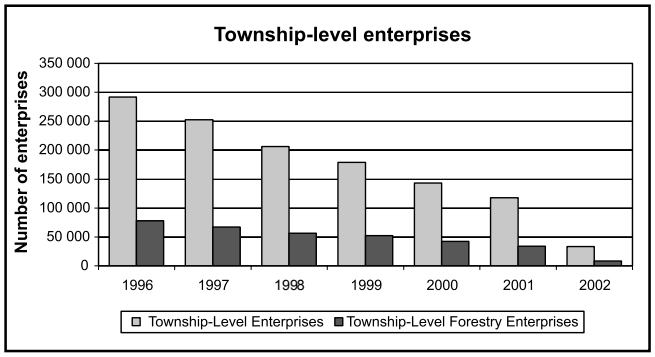
FIGURE 4 *Domestic timber production*



Source: State Forestry Administration 2003

At present, there is no national data on small-scale forest enterprises or on the contribution of collective forestry enterprises to the economy. The closest indication of the contribution of local and collective-level enterprises comes from township-level surveys of enterprises, including forestry enterprises. These statistics only include forestry enterprises with production

FIGURE 5 *Quantity of township enterprises*

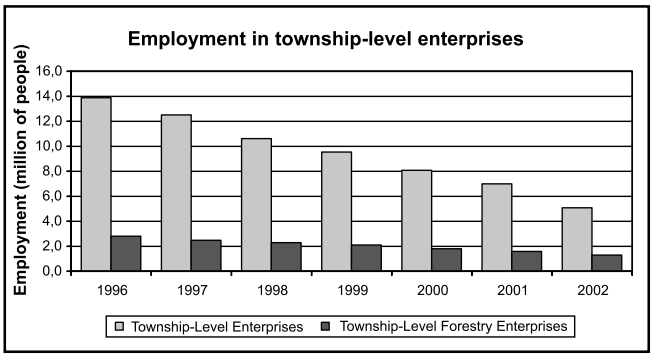


Source: China Township Enterprise Yearbook 1997-2001

value greater than or equal to 5 million CNY[27] (approximately $ 600 000). More importantly, the township-level data show the importance that the forestry sector plays at the local level. In 2002, there were 8 120 township-level forestry enterprises across China (China Township Enterprise Yearbook 1997-2001). Over 24 % of all township-level enterprises were in the forest sector, which was broadly divided into the following four categories: (1) Bamboo and timber harvesting and transportation, (2) timber, bamboo, and rattan processing, (3) furniture production, and (4) paper and paper products processing. Figure 5 illustrates the decreasing number of township-level enterprises from 1996 to 2002. This decrease is attributed in part to the increasing trend of privatizing enterprises that were previously state run.

During this period of decline, township-level forestry enterprises more or less maintained their share

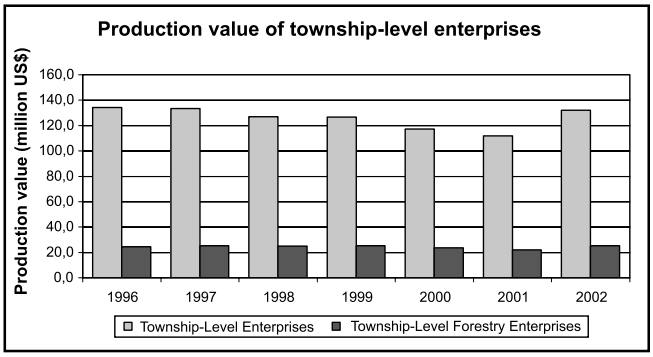
FIGURE 6 *Employment in township enterprises*



Source: China Township Enterprise Yearbook 1997-2001

within total township-level enterprises, dropping slightly from a share of 26.9 % in 1996 to 24.4 % in 2002. Employment data for township-level forestry enterprises is shown in Figure 6 and displays a similar downward trend to that for the quantity of township-level forestry enterprises. Employment in township-level forestry enterprises reduced from 2.8 million in

FIGURE 7 *Production value from township enterprises*



Source: China Township Enterprise Yearbook 1997-2001

1996 to 1.3 million in 2002. However, forestry enterprises' share of total employment in township-level enterprises rose from just under 20 % to almost 26 % over the same period.

Figure 7 exhibits the production value of the township-level enterprises. Despite the decrease in employment and quantity of township-level enterprises, the state statistics show that the production value remained relatively stable, going from $ 134.2 million in 1996 to $ 132.0 million in 2002. According to the data, the forestry segment actually increased its production output from $ 24.6 million to $ 25.4 million over the same period. Given that the number of township-level forestry enterprises decreased by almost 90 % coupled with the loss of approximately 1.5 million jobs

[25] This product comes from *Camellia* spp.
[26] This product comes from *Sapium sebiferum*.
[27] US$ 1.00 equals 8.28 CNY.

between 1996 and 2002, the growing production output is intriguing. Despite further investigation, we were unable to satisfactorily determine why the production output did not decrease along with employment and the number of enterprises. The statistics from the township-level forestry enterprises are just one component of the forestry sector and do not fully represent the contribution that forests make to rural China. In particular, the contribution of numerous collective forestry enterprises falls below the minimum production output value that the China Township Enterprise Yearbook (1997-2001) uses as a minimum in their survey of enterprises and thus is not captured in the data presented.

Collective forests contribute significantly to livelihoods and poverty alleviation in the Southern Collective Forest Region and across China, and in many places forest resources yield valuable benefits. In some regions, forest resources are the primary source of income (Zheng 2003). However, in other areas rich with forest resources, poverty prevails. Often, forest areas are in remote regions where easy access to forest resources is inhibited by distance from markets and terrain. Of the 592 counties deemed officially poverty-stricken, 496 were in mountainous regions (Chen 1996), areas afflicted by the isolation in which forest resources persevere. Li and Veeck (1999) demonstrated a correlation between plentiful forest resources and poverty.

Why such abject poverty remains amidst the abundance of valuable resources presents a challenging dilemma. For one, several programs and policies infringe upon rights to resources and impede rural inhabitants from benefiting from their surrounding resources. According to Ruiz Pérez *et al.* (2003), in their research on bamboo forests, the important contribution that bamboo forests make to local economies are ‚instructive of the potential contribution of commercial timber production to poverty alleviation and rural development. If some of the taxes and regulations that act as disincentives for traditional forest investment were reduced, then timber production and the general performance of the timber sector could follow more closely many of our observations for bamboo‘.

Rozelle *et al.* (1998) show the significance of population, land quality, wealth, and tenure as factors that influence forest cover and volume. High-quality agricultural land and wealth from industrial growth both increase forest cover and volume, offsetting the negative impact of a growing population. The authors also demonstrate the significance of tenure, showing collective forest areas to be better at increasing forest cover than state-owned forests. Similarly, Zhang *et al.* (2000) find that de-collectivization to household responsibility management upon implementation of the CRS and decreasing profitability from agricultural land both increase forest area. Conversely, Rozelle *et al.* (1998) show that forest policies to date resulted in decreasing forest cover.

Key policies affecting the collective forest sector include the logging ban component of the Natural Forest Protection Program (NFPP)[28], national parks, the Forest Ecosystem Compensation Program (FECP)[29], the system of taxes and fees, and the harvest quota. Each will be discussed in turn.

NATURAL FOREST PROTECTION PROGRAM

The pilot phase of the NFPP was implemented in 1998 and 1999, before the program was launched in its entirety in 2000. The program was developed after drought and intensive irrigation agriculture halted the flow of the mighty Yellow River for the majority of 1997 and following severe flooding on the Yangtze River the subsequent year. The program has three primary elements: (1) Complete logging bans in the upper Yangtze River[30] and mid-to-upper Yellow River[31] and diminished logging in state-owned forests, (2) reforestation and silvicultural treatments for particular forestlands, (3) provision of alternative employment and pensions of state enterprise employees. The ban was designed for specific zones of environmental significance and for state forest regions. However, in 2001, the autonomous region of Xinjiang instituted a complete logging ban in all natural forests regardless of ownership, apparently to impress the central government. Likewise, Sichuan and Yunnan introduced similar logging bans, which were subsequently condoned by the central government (Zuo 2001a).

In many places across China, the logging ban was extended to collective forests (some 26.8 million hectares according to an SFA survey of the NFPP in 2003) including a ban on the harvest of fuelwood and wood for non-commercial use, raising questions of the legality of such action, considering that the Constitution and Forest Law affirm the ownership of forestlands by collectives. Zuo (2001a) describes how in the most excessive scenarios, communities are even prohibited from accessing NTFPs and fuelwood, either by mandate or from the deactivation of infrastructure like roads and bridges. Katsigris (2001) reports drastic economic reductions across many regions of China with natural forests, notably in communities and households. In 2000 in Sichuan, for example, the output

[28] This program is also referred to as the Natural Forest Conservation Program (Waggener 2001, Yang 2001, Zhang and Kant 2004).

[29] This program is also referred to as the Forest Ecological Benefit Compensation Program (SFA 2002, Lu *et al.* 2002, Sun and Chen 2002) and translated in the Forest Law as the ‚forestry ecological efficiency compensation fund‘. Existing literature seems to use ecological, ecosystem, and environmental interchangeably. Periodically, fund or scheme is substituted for program.

[30] This includes the provinces of Chongqing, Guizhou, Hubei, Sichuan, Tibet, and Yunnan.

[31] This includes the provinces of Gansu, Henan, Inner Mongolia, Ningxia, Qinghai, Shaanxi, and Shanxi.

of timber from collective forests reduced to 6 % of past levels and resulted in a provincial loss of $120.8 million. Concurrently, employment and the number of township-level forestry enterprises were more than halved. Chen *et al.* (2001) support these claims with findings of their own that document township incomes plummeting from 1998 to 2002: In one township, annual income reduced over 75 %. The authors, along with Yang (2001), also document the decrease in taxes collected and allude to difficulties that township governments face with less revenue. In his investigation in Yunnan, Zhao (in prep.) reports that by denying communities use of their forests, the NFPP has dramatically reduced their active management, indicated by a rise in illegal forest activities, a shift from community protection patrols to policing by government forestry officials, and a declining level of effort to prevent and combat forest fires.

TABLE 1 *Collective forest area within the NFPP*

Province		Forestland (hectares)	Forest area (hectares)	NFPP area (hectares)
Gansu	total	7 208 700	2 174 100	2 430 500
	collective	2 806 800	664 500	708 800
Guizhou	total	7 407 100	3 673 100	4 470 700
	collective	7 013 300	3 404 100	4 154 100
Henan	total	3 786 400	2 090 100	617 700
	collective	3 457 300	1 886 900	507 300
Hubei	total	7 640 900	4 828 400	2 779 200
	collective	7 059 200	4 419 400	2 384 300
Jilin	total	8 297 400	7 069 800	3 670 000
	collective	1 842 900	1 298 500	10 000
Ningxia	total	1 004 000	146 400	719 900
	collective	683 300	67 100	436 500
Qinghai	total	3 379 500	308 800	1 927 300
	collective	102 700	26 800	83 300
Shaanxi	total	11 974 900	5 920 300	6 368 000
	collective	8 322 700	3 457 900	3 927 700
Shanxi	total	6 764 700	1 835 800	1 546 700
	collective	4 605 300	818 500	491 400
Sichuan*	total	26 579 100	13 301 500	14 641 300
	collective	13 455 800	7 220 800	7 270 600
Yunnan	total	23 807 900	12 873 200	9 237 500
	collective	19 149 000	9 519 400	6 833 300

* includes the data for Chongqing

Table 1 lists the key provinces in the NFPP, the amount of forest area covered by the program, and the portion of that area that is composed of collective forests. In Chongqing[32], Guizhou, Henan, and Hubei, more than 80 % of the NFPP area is composed of collective forests. Though Sichuan and Yunnan have proportionally less collective forest area within the NFPP, the provinces have allocated 5.8 million hectares and 6.8 million hectares of collective forests to the program.

It is generally argued that the NFPP infringes upon the rights of collective forest owners in two ways: Firstly, collective forest owners' rights to their forests, guaranteed them both in the Constitution and the Forest Law, were unilaterally denied them, as their forests were included in the NFPP without consultation during the program's design. The logging ban component of the program is compulsory and does not give owners recourse to contest. Secondly, the program does not include an instrument to compensate collective forest owners for the economic losses accrued as a result of the logging ban. Reneging on the rights of and denying the benefits accorded to collective forest owners contravene legislation, aggrandize tenure insecurity, and curtail incentives to invest in the sector.

THE EXPANSION OF PUBLIC PROTECTED AREAS AND NATURE RESERVES

Public protected areas and nature reserves in China have historical roots dating back over two thousand years, first documented in the Qin and Han dynasties (Xu in prep.). In 1956 the central government founded the first nature reserve in modern-day China (Harkness 1998, Menzies 1994, Xu in prep.). Following the Great Leap Forward and the Cultural Revolution, the creation of nature reserves increased quickly, so that by 1999, there were 1 146 nationally protected nature reserves in China receiving funding worth $ 16.1 million in the previous year (Lu *et al.* 2002). By 2002, the number of nature reserves grew to 1575, encompassing 133 million hectares, and accounting for over 13 % of China's total land area. By 2050, the government is proposing 2500 nature reserves totalling more than 170 million hectares and roughly 18 % of the national land area (Xu in prep.).

Given the long history of human habitation in virtually all of what is now modern China, there have long been conflicts between communities and advocates of protected areas and these issues have only increased in recent years as the ambitious expansion plans have been implemented (Xu in prep.). Several concerns exist from a collective forest perspective. Firstly, communities and stakeholders have not often been consulted or their views considered during the process of establishing a nature reserve. There are numerous instances in which protected areas were delimited on maps before determining land and resource ownership. The expropriation of collective forestland, to establish protected areas, violates the rights held by legitimate owners and is often accom-

[32] Chongqing was split from Sichuan in March 1998 and its forestlands and forest areas are included in the 1998 statistics for Sichuan. To compare the NFPP data with the provincial forestland and forest area data, the areas from Chongqing and Sichuan have been combined in the table. The areas of collective forestland and forest in Chongqing are 1,728,700 and 1,464,700 hectares respectively. The areas of collective forestland and forest in Sichuan are 12,912,600 and 5,805,900 hectares respectively.

panied by losses of rights for communities and insufficient compensatory provisions.

There are many examples of growing rural poverty and illegal activities in and around protected areas (Démurger and Fournier 2004, Harkness 1998, Xu in prep.). Xu (in prep.) documents one instance in which community members protested the expropriation of their collective forests for a nature reserve by destroying the very forests they had previously managed. Xu *et al.* (1999) describe the forest management of the Hani minority nationality in Yunnan as effectively ensuring sustained forest conservation. Harkness (1998) confirms that the government has at times wrested control of well-managed collective forestland from its owners and put it under weaker state control - thereby diminishing chances to achieve conservation goals. Though protected area managers acknowledge that economic development and agreements with locals inhabitants are prerequisites for the success of protected areas (Albers and Grinspoon 1997), the preceding examples illustrate that there are not only property and legal issues that merit greater attention and care, but that the fundamental approach of expropriating collective forestland by the government and replacing it with public ownership and administration merits rethinking. Alternative and complementary approaches that strengthen community rights and capacities to conserve their forests should be sought (Xu in prep.).

FOREST ECOSYSTEM COMPENSATION PROGRAM

Since the late 1970s, the Chinese government has initiated a number of programs aimed at restoring or protecting forests, in addition to the creation of public protected areas. The largest of these, in terms of scope and funding, have been the shelterbelt programs, all of which have been the subject of much domestic and international scrutiny. These have included the ‚Three-North', Yangtze River, Coastal, and Farmland Shelterbelt Development Programs. The projects continue to this day, though they have been united to form the Key Shelterbelt Development Program - one of China's six key forestry initiatives[33]. Extensive afforestation was the most publicized achievement of the programs. The same catastrophic environmental events that spawned the NFPP, gave rise to another program: The Sloping Land Conversion Program (SLCP)[34] (See Zhigang Xu in this issue). After some experimentation in Gansu and Sichuan in 1999, the SLCP pilot phase began in 13 provinces in 2000 and was broadened to 20 provinces by 2001. The general concept of the program was to convert cropland on steep slopes prone to erosion to forestland and grassland, compensating farmers with grain, money, and saplings (Zuo 2001b). The programs resulted in the regulations governing the implementation of the Forest Law in 2000. The regulations suggested that 30 % of forests be set aside for ecological benefit, although there was no legal obligation for provinces to adhere to this benchmark. Initially the FECP compensated 13.3 million hectares in 11 provinces[35] with an annual budget of $ 120.7 million, or just greater than $ 9 per hectare. Seventy percent of the funding is to go to the owner or contractor that has rights to the resources, while 30 % is for administrative use (Zuo *et al.* in prep.).

In many provinces, forestry bureaus have identified regions of public benefit, jockeying for inclusion in the program. Sun and Chen (2002) report that 64 % or 8.5 million hectares of the forestland within the program is collectively owned. Of the collective forestland within the program, collective forestry farms own 6 %, signifying that the vast majority is under household management. There is concern that participation in the FECP, particularly in collective forest areas, is not voluntary. Indeed, Sun and Chen (2002) raise other issues pertinent to the program's long-term success. The FECP does not compensate the market value for the ecosystem services that the forestland yields to forest owners. Rather, the $ 9 per hectare is an arbitrary amount and in many circumstances does not adequately recompense for foregone activities. Qu (2002) reports that in Guangdong, there is a tremendous opportunity cost for participating, as compensation is one-tenth of the foregone revenue from other activities. Similar shortcomings are found in Anhui (Liu Yongchun 2002) and in Hunan (Zuo *et al.* in prep.). The latter authors describe that a foremost concern of participants is the balance between subsidy gains and management and use rights losses. Another puzzling absence is that of clear objectives for the FECP (Sun and Chen 2002). The FECP can manage for any of the following: Protected areas, biodiversity, non-timber forest products, tourism, hydrological functions, and carbon sequestration (Lu *et al.* 2002, Sayer and Sun 2003). Though collective forests are a valuable source of environmental service benefits, forestry bureaus have rushed to include forests while offering forest owners little option but to join a program that compensates poorly and further augments tenure insecurity and mounting mistrust between collective forest owners and governmental institutions.

[33] The other five programs are the NFPP, the Sloping Land Conversion Program, the control of desertification, wildlife conservation and nature reserves, and the development of a forest industrial base.

[34] This program is also known as the Cropland Conversion Program (Gao 2001, Ge *et al.* 2001, Li et al. 2001, Sichuan Academy of Social Sciences 2001, Zhao 2001), Tuígeng Huánlín (Grant 2001), Land Conversion Program (Liu Shuren 2002), Program for Conversion of Cropland to Forest (SFA 2002), and the Grain for Green Policy (Uchida, Xu, and Rozelle 2003).

[35] The original provinces were Anhui, Fujian, Guangxi, Hebei, Heilongjiang, Hunan, Jiangxi, Liaoning, Shandong, Xinjiang, and Zhejiang.

TABLE 2 *Areas of collective forest within the FECP*

Province	Total forest area in FECP (hectares)	Collective forest area in FECP (hectares)	Subsidy (million US$)
Anhui	800,000	618,400	7.2
Fujian	866,667	690,270	7.8
Guangxi	2,333,333	1,996,400	21.1
Hebei	1,266,667	971,600	11.5
Heilongjiang	1,666,667	96,130	15.1
Hunan	2,000,000	1,711,930	18.1
Jiangxi	1,266,667	723,730	11.5
Liaoning	1,400,000	1,164,870	12.7
Shandong	533,333	414,200	4.8
Xinjiang	1,000,000	0	9.1
Zhejiang	200,000	161,730	1.8
Total	13,333,333	8,549,260	120.7

TAXES, FEES, AND CHARGES

Taxes, fees, and charges are additional factors that limit China's poorer regions from maximizing the benefits of their surrounding forest resources. Liu and Landell-Mills (2003) succinctly summarize the situation, stating that ‚China's forest taxes are high, and its system of taxes and fees on forestlands and forest products is complex'. The system of taxes, fees, and charges is widely variable, but it often exceeds half of gross revenue. Moreover, the impacts reach further than the pocketbook, worsening social and environmental conditions.

Government agencies are not permitted to introduce taxes. However, they are able to collect taxes introduced by the central government. The taxes fail to yield sufficient funding for the agencies and local governments to operate, thus they acquire extra revenue from fees and charges, which they are able to implement[36]. Over time, fees and charges have accumulated, creating a complicated and restrictive system that characterizes the situation of today. The taxes and charges common to state and collective forestlands are as follows: (1) Special agricultural products tax, (2) value-added tax, (3) education value-added tax, (4) urban construction and maintenance tax, (5) income tax, (6) afforestation charge, (7) maintenance and upgrade charge, (8) forest protection and construction charge, and (9) forest quarantine charge (Lu *et al.* 2002, Liu and Landell-Mills 2003[37]).

In addition to these national taxes and charges, there exist four provincially mandated charges within the Southern Collective Forest Region: (1) Forest restoration charge in Fujian and Guizhou, (2) insect and disease control charge in Jiangxi, (3) fire protection charge in Jiangxi, and (4) administration charge in Jiangxi (Liu and Landell-Mills 2003). To confuse matters further, there are many unofficial charges, not to mention any of the fees. In one example from Jiangxi, unofficial charges accounted for nearly 11 % of roadside log value (Liu and Landell-Mills 2003, Liu 2003, Lu *et al.* 2002).

On numerous occasions it has been shown that forest farmers turn away from timber production due to burdensome taxes. In Guangxi, evidence showed farmers selling timber as fuelwood at $ 19.30 per ton rather than at $ 60.39 m^3, due to lower taxes and ease of transaction (Liu et al. 2003). In Hunan, an example from one county demonstrated how farmers there only received 10 % of a log's value after taxes, charges, fees, and other costs: A trifling $ 9.66 for twenty years' growth. In comparison, there were few taxes on fruit and fuelwood and the returns on those ventures greatly exceeded the timber option (Li *et al.* 2003). There was further indication that farmers increasingly involved themselves in non-timber forest product industries over timber industries (Cai *et al.* 2003).

Liu and Landell-Mills (2003) suggest that the present rate of taxes, charges, and fees encourages illegal logging. They theorize that lowering taxes, charges, and fees would mitigate the enticement to avoid their payment. Misspending the revenue collected from taxes and charges is an issue that perpetuates the ineffectiveness within collective forestry. Most of the revenue is meant for developing various aspects of the sector, though forestry agencies siphon much of it for salaries and operational costs (Yin and Xu 2002). The revenue's intended purposes remain financially neglected and problems persist.

THE LOG-HARVESTING QUOTA

In 1985, a harvest quota (often termed ‚annual allowable cut') controlling the commercial harvesting of logs, was instituted nationally for all forestland irrespective of ownership. Forest harvest quotas are commonplace in other countries around the world, however they are almost exclusively government initiatives for public forests (Bull and Schwab 2002). In China, the SFA sets the log-harvesting quota based upon the statistics from the national forest survey and the volume harvested from the previous year. The quota is divided and distributed at each level of government beginning with the SFA and resulting in the ultimate assignment of the quota across the nation at the local level. From a collective forest perspective, two categories of issues have been identified: (1) The property rights question - the inconsistency between

[36] The people's Congress at both the national and provincial levels may institute charges, thus charges vary on a provincial basis. Townships and village authorities may institute fees for a wide range of purposes, e. g. rural education, family planning, and road construction (Lu *et al.* 2002).

[37] Lu *et al.* (2002) and Liu and Landell-Mills (2003) differ in how they define charges and fees. We have listed the charges and fees according to the detinitions put forth by Lu *et al.*

[38] The authors report that in this particular area, fuelwood was quoted at $ 24.15 per cubic meter and that an instance of leasing 2000 orange trees had resluted in annual income of approximately $ 2415.

the logging quota and the Forest Law allowing collectives to use their forests; and (2) the implementation of the policy. Owners and managers of collective forests have greater difficulty gaining access to the quota than state-run corporations. In response, many collective forest owners and managers have de-emphasized timber production and shifted to cultivating cash crops, like fruit, and other forest resources, such as fuelwood. In many regions, the log-harvesting quota plummeted after the initiation of the logging ban component of the Natural Forest Protection Program in 1998, compounding the problem of access to an already restricted supply of harvestable volume. Furthermore, Yang (forthcoming) reports that there are negative socio-economic impacts in some areas as a result of being unable to access the harvest quota. As well, illegal logging activities and corruption have arisen in areas previously devoid of such practices. Though there are some cases of environmental improvement, there is speculation that these environmental achievements could have been made without diminishing management incentives and tenure security in collective forests.

CONCLUSION

Collective forests comprise the majority of all forestland in China and contribute an increasing share of wood and wood fibre to industry. In addition, collective forests yield invaluable resources and income to hundreds of millions of people across China and they are increasingly recruited into projects providing environmental services. The growing importance of collective forest areas is a trend that will continue for the foreseeable future.

In China, the meaning of collective forest has changed on numerous occasions. The collectivization of forestland began at the natural village level, but grew to include thousands of households at the township level. The changes saw many rights wrested from individuals and management put in the hands of, at first, democratically elected officials at the village level and subsequently appointed state officials in the township government. More recently, many rights to forestlands were decentralized and given to rural households in family plots, responsibility land, and land auctions. In the process the meaning of collective ownership has been confused. A collective is not a voluntary grouping of individuals or a form of common ownership in which decision-making is in the hands of those working the land. Instead, the government considers collective forests a national resource. This signals that for the time being secure rights for collective forest owners are unlikely and that collective forest owners will be subject to the will of the central government. Moreover, rural households will continue to bear the burden of responsibility for many government initiatives, yet without the rights normally associated with ownership.

Though the Chinese government has diverted substantial sums of money and implemented good-intentioned policies to the forest sector, acknowledging the sector's value, there are important legal and policy obstacles that limit the rights accorded collective forest owners and the benefits that collective forests provide. Intrusive and fluctuating forest policies leave collective owners and managers with little confidence in their rights to the land and resources. Policies like the logging ban and harvest quota diminish management incentives, encourage illegal activities, and often decrease socio-economic benefits. Moreover, a complicated system of taxes, fees, and charges further stifles the sector. The expropriation of collective forests to form nature reserves and areas for the provision of environmental services are often involuntary and accompanied by insufficient compensation. Though, the forest rights *de iure* are clear, *de facto* government and business coercion exist. Increasing forest production, improving environmental conditions, and ameliorating social and economic environs are all likely outcomes with further market reforms and policies that strengthen and secure the rights of collective forest owners and managers.

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ANNEX

ANNEX 1. *National forestland and forest area by province and ownership*

Province	Ownership	Forestland (ha)	Forested area (ha)						
			Total	Timber forest*	Bamboo forest	Protection forest	Fuelwood forest	Special use forest	Economic forest
National total	total	257 047 300	153 632 300	99 395 000	4 210 800	21 384 700	4 451 700	3 968 000	20 222 100
	state	105 902 000	63 886 700	47 529 800	285 600	10 464 600	455 800	3 557 600	1 593 300
	collective	151 145 300	89 745 600	51 865 200	3 925 200	10 920 100	3 995 900	410 400	18 628 800
Anhui	total	4 186 500	3 170 500	2 109 400	250 800	147 300	63 600	18 500	580 900
	state	297 500	222 000	159 200	10 500	12 700	2 300	17 400	19 900
	collective	3 889 000	2 948 500	1 950 200	240 300	134 600	61 300	1 100	561 000
Beijing	total	930 600	337 400	33 400	0	139 500	10 200	23 400	130 900
	state	59 700	37 600	3 600	0	12 200	400	16 100	5 300
	collective	870 900	299 800	29 800	0	127 300	9 800	7 300	125 600
Fujian	total	9 018 300	7 353 700	4 452 900	820 300	798 600	93 800	153 700	1 034 400
	state	1 043 700	880 200	642 500	28 800	84 100	2 400	67 200	55 200
	collective	7 974 600	6 473 500	3 810 400	791 500	714 500	91 400	86 500	979 200
Gansu	total	7 208 700	2 174 100	816 900	0	853 600	5 000	246 200	252 400
	state	4 401 900	1 509 600	696 500	0	555 700	0	240 500	16 900
	collective	2 806 800	664 500	120 400	0	297 900	5 000	5 700	235 500
Guangdong	total	10 347 000	8 150 200	6 029 700	383 800	489 400	235 100	33 600	978 600
	state	632 600	512 700	335 700	4 700	48 000	9 600	19 200	95 500
	collective	9 714 400	7 637 500	5 694 000	379 100	441 400	225 500	14 400	883 100
Guangxi	total	12 691 900	8 166 600	4 962 400	249 800	1 061 700	259 400	24 000	1 609 300
	state	1 128 900	811 900	518 800	19 200	182 600	4 800	14 400	72 100
	collective	11 563 000	7 354 700	4 443 600	230 600	879 100	254 600	9 600	1 537 200
Guizhou	total	7 407 100	3 673 100	2 193 900	54 400	361 800	345 800	118 400	598 800
	state	393 800	269 000	109 000	3 200	44 800	12 800	67 200	32 000
	collective	7 013 300	3 404 100	2 084 900	51 200	317 000	333 000	51 200	566 800
Hainan	total	1 699 600	1 349 300	233 900	21 600	522 900	0	60 000	510 900
	state	1 002 600	859 900	54 000	4 700	406 500	0	56 400	338 300
	collective	697 000	489 400	179 900	16 900	116 400	0	3 600	172 600
Hebei	total	6 312 200	3 361 300	1 167 100	0	570 900	237 900	11 200	1 374 200
	state	530 500	392 200	308 800	0	54 600	8 000	9 600	11 200
	collective	5 781 700	2 969 100	858 300	0	516 300	229 900	1 600	1 363 000
Heilongjiang	total	21 312 400	17 603 100	16 525 600	0	407 400	44 800	578 300	47 000
	state	20 457 500	17 197 000	16 283 100	0	281 500	44 800	572 100	15 500
	collective	854 900	406 100	242 500	0	125 900	0	6 200	31 500
Henan	total	3 786 400	2 090 100	1 003 900	19 400	368 000	87 100	38 700	573 000
	state	329 100	203 200	111 500	1 600	11 900	1 600	29 000	17 600
	collective	3 457 300	1 886 900	892 400	17 800	326 100	85 500	9 700	555 400
Hubei	total	7 640 900	4 828 400	3 116 500	131 200	441 600	384 000	48 000	707 100
	state	581 700	409 000	252 800	6 200	57 600	3 200	48 000	41 200
	collective	7 059 200	4 419 400	2 863 700	125 000	384 000	380 800	0	665 900
Hunan	total	11 736 600	8 239 700	5 139 800	490 000	269 000	147 300	32 000	2 161 600
	state	560 300	381 100	288 300	6 400	41 600	0	22 400	22 400
	collective	11 176 300	7 858 600	4 851 500	483 600	227 400	147 300	9 600	2 139 200
Inner Mongolia	total	31 819 500	14 748 500	12 296 300	0	595 200	291 900	719 600	845 500
	state	25 386 000	13 215 200	11 518 400	0	248 800	267 200	719 600	461 200
	collective	6 433 500	1 533 300	777 900	0	346 400	24 700	0	384 300
Jiangsu	total	592 600	462 400	137 800	23 000	61 600	9 400	8 000	222 600
	state	140 100	100 800	46 200	5 800	21 200	200	6 400	21 000
	collective	452 500	361 600	91 600	17 200	40 400	9 200	1 600	201 600
Jiangxi	total	10 453 200	8 897 800	5 902 100	627 300	352 000	608 100	44 800	1 363 500
	state	1 478 600	1 318 600	1 062 600	96 000	57 600	6 400	25 600	70 400
	collective	8 974 600	7 579 200	4 839 500	531 300	294 400	601 700	19 200	1 293 100
Jilin	total	8 297 400	7 069 800	5 772 100	0	838 100	34 200	354 800	70 600
	state	6 454 500	5 771 300	4 865 400	0	546 900	2 100	344 200	12 700
	collective	1 842 900	1 298 500	906 700	0	291 200	32 100	10 600	57 900
Liaoning	total	5 674 300	4 510 500	1 993 100	0	619 100	448 500	82 100	1 367 700
	state	670 300	584 200	388 500	0	135 800	0	37 900	22 000
	collective	5 004 000	3 926 300	1 604 600	0	483 300	448 500	44 200	1 345 700
Ningxia	total	1 004 000	146 400	23 600	0	52 800	0	25 200	44 800
	state	320 700	79 300	8 000	0	32 100	0	25 200	14 000
	collective	683 300	67 100	15 600	0	20 700	0	0	30 800
Qinghai	total	3 379 500	308 800	26 000	0	264 400	0	14 800	3 600
	state	3 276 800	282 000	12 000	0	255 600	0	14 400	0
	collective	102 700	26 800	14 000	0	8 800	0	400	3 600
Shaanxi	total	11 974 900	5 920 300	3 060 800	44 800	1 285 800	425 400	153 600	949 900
	state	3 652 200	2 462 400	1 416 800	12 700	854 000	6 400	144 000	28 500
	collective	8 322 700	3 457 900	1 644 000	32 100	431 800	419 000	9 600	921 400

ANNEX 1. *National forestland and forest area by province and ownership (continued)*

Province	Ownership	Forestland (ha)	Forested area (ha)						
			Total	Timber forest*	Bamboo forest	Protection forest	Fuelwood forest	Special use forest	Economic forest
Shandong	total	2 638 400	1 915 200	116 800	0	494 400	11 200	3 200	1 289 600
	state	160 000	116 800	12 800	0	92 800	0	1 600	9 600
	collective	2 478 400	1 798 400	104 000	0	401 600	11 200	1 600	1 280 000
Shanghai	total	23 300	21 800	0	2 300	3 300	0	400	15 800
	state	4 300	3 700	0	100	2 200	0	400	1 000
	collective	19 000	18 100	0	2 200	1 100	0	0	14 800
Shanxi	total	6 764 700	1 835 800	1 085 300	1 600	338 100	15 800	31 600	363 400
	state	2 159 400	1 017 300	755 200	0	210 100	15 800	26 800	9 400
	collective	4 605 300	818 500	330 100	1 600	128 000	0	4 800	354 000
Sichuan**	total	26 579 100	13 301 500	7 593 800	360 400	4 145 500	38 500	199 400	963 900
	state	13 123 300	6 080 700	3 141 400	49 700	2 664 800	0	193 500	31 300
	collective	13 455 800	7 220 800	4 452 400	310 700	1 480 700	38 500	5 900	932 600
Tianjin	total	133 000	85 800	1 200	0	38 900	0	2 800	42 900
	state	10 800	10 400	400	0	6 800	0	2 400	800
	collective	122 200	75 400	800	0	32 100	0	400	42 100
Tibet	total	8 461 600	4 081 500	2 567 600	0	1 485 100	8 800	19 000	1 000
	state	8 461 600	4 081 500	2 567 600	0	1 485 100	8 800	19 000	1 000
	collective	0	0	0	0	0	0	0	0
Xinjiang	total	4 769 100	1 783 700	220 600	0	1 346 200	2 800	150 200	63 900
	state	4 305 600	1 530 600	194 700	0	1 170 500	1 400	150 200	13 800
	collective	463 500	253 100	25 900	0	175 700	1 400	0	50 100
Yunnan	total	23 807 900	12 873 200	7 494 500	105 600	2 965 200	604 600	748 500	954 800
	state	4 658 900	3 353 800	1 645 700	33 600	834 900	57 600	652 500	129 500
	collective	19 149 000	9 519 400	5 848 800	72 000	2 130 300	547 000	96 000	825 300
Zhejiang	total	6 396 600	5 171 800	3 318 000	624 500	67 300	38 500	24 000	1 099 500
	state	219 100	192 700	130 300	2 400	21 600	0	14 400	24 000
	collective	6 177 500	4 979 100	3 187 700	622 100	45 700	38 500	9 600	1 075 500

* not including bamboo forests
** includes the province of Chongqing
Source: SFA 2000