

CHINA FOREST POLICY

— Deepening the Transition, Broadening the Relationship



The World Bank
East Asia and Pacific Region
May 2010

Tables of Contents

Summary.....	4
Chapter I. Introduction	7
Chapter II. China's Forest Resources and Institutions.....	10
Forest Resources.....	10
Trends in Forest Area and Structure.....	13
Value of and Investment in Forest Resources	15
Forest Management and Regulation	17
Forest Management Plans.....	19
Logging Operation Management and Reforestation	21
Chapter III. Collective Forest Tenure Reform	22
History of Forest Tenure Reform in China.....	23
Other Related Forest Policies Linked to the Tenure Reforms	26
Village-Level Survey on Tenure Reforms and Their Impacts.....	27
EEPC Survey Conclusions	36
Chapter IV. Forest Supply in the Northeast	39
Resource and Policy Background.....	39
The Supply Model	40
Results and Additional Observations	45
Chapter V. World Bank Role	47
Investment in China's Forestry Sector	47
Components in Support of a Reform Process.....	49
References	51

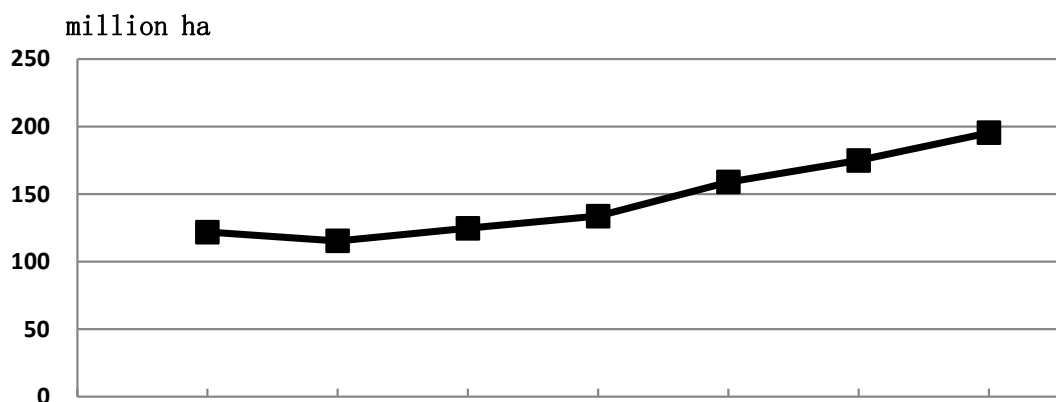
List of Figures and Tables

Figure 1.1 Forest Cover in China 1973-2008	4
Figure 3.1 Forest Fire Incidences in Fujian & Jiangxi Provinces	32
Figure 4.1 China's Northeastern Provinces: Heilongjiang, Jilin, and Inner Mongolia (Highlighted in Green)	41
Figure 4.2 Estimated Sustainable Timber Supply for Heilongjiang Province	44
Table 2.1 China's Forest Resources in Global Perspective	10
Table 2.2 Dispersal of China Land Area.....	11
Table 2.3 China Forest Area and Structure, by Region	12
Table 2.4 Forestland and Stock, by Type and Age	13
Table 2.5 Forested Land, 1973-2008	13
Table 2.6 Forest Stock, 1973-2008	15
Table 2.7 Change in Forest Cover Caused by Afforestation, Deforestation, and Reforestation in China, 1949-2003	16
Table 3.1 Distribution of Tenure Types in 2006 and Change between 2000 and 2006.....	28
Table 3.2 Land Use Rights of Households by Tenure Type as Perceived by Villagers	29
Table 3.3 Length of Land Contract for Different Tenure Types.....	30
Table 3.4 Distribution of Income in 2006 and Change between 2000 and 2006.....	31
Table 3.5 Reforestation Rates in 2006 and Change 2000-2006 by Tenure Type	31
Table 3.6 Participation and Consultation in Forest Tenure Reform	34
Table 3.7 Determinants of Tenure Structure Change in Fujian and Jiangxi (2000-2005)	36
Table 4.1 Forest Regions and Sample Forest Administrative Units	42
in Heilongjiang Province	42
Table 4.2 Estimated Sustainable Timber Supply for Heilongjiang.....	42
Table 5.1 World Bank Forestry Portfolio since 1998	48

Summary

A pattern of forest area loss followed by a period of reforestation is representative of the “forest transition” process. Forest transition has been observed in many countries and is a feature of the development process. China reached its inflection point earlier and faster than most other countries that have gone through the transition. The recovery of forest cover in China is not a mere artifact of economic development. It is the result of deliberate policies going back to the early 1970s that had as their objective the restoration of environmental balance and the securing of raw material supplies. These objectives were primarily pursued through the allocation of large amounts of resources to investment in tree planting across the country.

Figure 1.1 Forest Cover in China 1973-2008



Source: SFA, China Forest Report-the Seventh National Inventory (2009)

More recently, reforms have been occurring in the institutional and regulatory policies; in the systems of resource tenure and control; and in the access of economic actors in the forestry sector to resources, incentives, and opportunities. These open up enormous new opportunities in Chinese forestry, ones for which the responsible agencies of government are not fully equipped and for which the World Bank, the sector’s largest single source of development assistance, has yet to fully define and pursue. This report brings together analysis on selected developments in China’s forestry sector and explores options for deepening and extending the World Bank’s support that goes beyond its primary, and highly successful, emphasis on financing forest plantation establishment.

The report describes the success of reforms to forest resource tenure in collective forest areas. These reforms, which collectively amount to the largest transfer of forest assets in history, have effectively extended forest ownership to a million, mostly poor, rural households. These reforms have increased forest-based incomes, have increased timber harvests, and have done so sustainably by virtue of increasing planting and forest management and resource protection effort. The processes by which forest tenure reform has advanced in different provinces, the labels and terminology applied, the extent of management and financial autonomy assigned to

beneficiaries, and other features shaped the reforms vary, but without significant differences in the overall positive impact. Second generation issues arising from tenure reform include the design of supporting mechanisms for the provision of technical support, marketing services, and financial services (including use of forests as collateral). Indications are that investment resources will not be a significant constraint to the next phase of development in the collective forest areas. Substantial private, in some cases, foreign capital is being attracted to forestry in these areas. Increasingly, care will need to be taken to ensure that public investment in forestry compliments and does not crowd out or compete with private resources.

While reforms to forest resource tenure potentially convey substantial incentives to households and managers, they have also engendered new risks. These arise from the potential for environmental damage due to excessive harvests and to poor-quality forest practices. The governance arrangements to control these risks remain based on pre-reform assumptions about the size and scale of landholdings. The most important of these — the system for determination, allocation, and awarding of timber harvest quota — can act as a brake on the incentives that tenure reforms offer and can raise new governance risks. The complexity of forest regulations, the lack of transparency and predictability that emerged as forest ownership decentralized and diversified, and the relatively broad discretion that accrues to forestry officials are factors behind these trends. Complimentary measures to adjust forest practice regulations to the larger and more diverse ownership structure could help mitigate these risks.

While reforms affecting collective forest areas have had positive impact, the state forest subsector lags. The most commercially valuable forests, primarily in the northeast, remain under the control of state enterprises and forest farms. These enterprises have been insulated from reforms, they continue to be burdened by social obligations that are being effectively financed by over-exploitation of forest resources, and managers have had both insufficient incentives and access to resources to undertake the kinds of innovations that have driven growth in the collective subsector. Economic modeling summarized in this report strongly suggests that if these potentials could be unleashed, there could be a very large supply response from the state forest subsector.

The World Bank work in China's forestry sector has been successful. However, the developments discussed in this report raise new opportunities and challenges. It is no longer clear, for example, that World Bank loans are especially important in relation to the financing of commercial plantations. While the Bank has begun to move its plantation financing to public goods, or ecological plantings, these are other opportunities. This report suggests three broad areas for consideration in the development of future engagement:

- Managing the transition away from direct Bank-finance of commercial, productive plantations in a way that allows continued utilization of the financial infrastructure established within China.
- Development of lending and technical assistance mechanisms to work more broadly with the State Forest Administration and other public entities in the forestry sector on the refinement and strengthening of the institutional and policy reforms that have been put in place in the collective forestry subsector.

- Developing a dialogue and prospective investment operations that would support large-scale reforms and restructuring of the state forest sector. These could include support to transitional arrangements for financing social overhead obligations currently being financed by public enterprises at the cost of forest depletion; financing of forest restoration, rehabilitation, and protection works; and privatization, restructuring, and retooling of forest enterprises.

Chapter I. Introduction

The World Bank and the State Forestry Administration and provinces have installed a highly effective mechanism for transforming financial resources to wood and forest plantations. Demand for Bank investment has been sustained despite increasingly tight lending terms and restriction of plantation investment to ecologically oriented (or public good) forest plantations.

Two major opportunities and challenges face the Bank and Government of China going forward together in forestry: (1) Continue with the success of Bank support to plantations without undue risk of channeling investments in marginal and unproductive sites and without crowding out or otherwise distorting incentives for the private sector; and (2) identify ways for the Bank to support a new round of reforms aimed at lagging dimension of the sector.

This report brings together findings from Bank-supported studies with experience gleaned from Bank support of over \$1 billion in forestry projects. Chapter I introduces the contents and approach of the report. Chapter II summarizes key data and information of China's forest sector and resources. Chapter III presents findings on collective forest tenure reform and Chapter IV, potential forest supply. Chapter V concludes with findings to clarify choices and options available to the World Bank and China for moving ahead in forestry.

China has been the World Bank's largest client in the forestry sector for at least the last two decades. Total commitments by the Bank to forest-related operations since 1998 exceed US\$1 billion. These projects have financed the establishment of over 4 million hectares of plantations of various kinds, roughly 10 percent of the plantation estates of China, the world's largest. Projects have generally been considered highly satisfactory, and two new projects are currently under preparation. As this report discusses, Bank investment in Chinese forestry has evolved substantially since the first projects that were implemented in the 1980s but have probably not changed as significantly or as dramatically as the forestry sector itself. Projects are primarily plantation operations and are structured around largely public or small farmer plantings and are implemented through a series of on-lending arrangements administered by government agencies. Innovations have been introduced into the portfolio, including an emphasis on environmental and public good aspects of forestry, evident in the newest projects and those under preparation. Two projects are provincial operations that do not involve the financial intermediation of the State Forest Administration. There have been other examples of evolution; but largely, the means of Bank engagement have remained stable, reflecting the positive results that have been achieved.

In contrast, the Chinese forestry sector has changed dramatically with some elements of the sector undergoing rapid and effective reforms, and others stagnating. Since the mid-1990s, large areas of natural forest have been withdrawn from commercial logging. China has emerged

as the world's largest importer of logs and sawn wood, and as a major exporter of finished-wood products. China is well advanced in the world's largest redistribution of forest tenure rights, shifting millions of hectares of forestland from public sector control into the hands of individual farm families and community groups. Through several key national programs, government is implementing the largest program of payments for environmental services of forests and for the conversion of agricultural land to forest cover. Significant challenges remain, and there continues to be an enormous scope for investment in Chinese forestry. China remains a serious forest deficit country heavily dependent of imports of raw material and semi-processed wood, much originating in countries where illegal and unsustainable logging is commonplace. Per capita consumption of industrial wood products remains low by any international comparison. There remains a largely stagnant public-dominated subsector in forestry populated by large, inefficient, unprofitable, and unsustainable state-owned farms and forest enterprises.

This report builds on Bank-supported research and policy analysis and a review of Bank-supported forestry projects in China. It aims to help position the World Bank for a discussion with Government and other stakeholders on its role going forward in Chinese forestry. It seeks to raise, in a balanced way, the question of whether the Bank's full potential is being exploited through the current operations, and to raise possibilities for innovations going forward.

A brief synopsis of the discussion in each chapter of the report follows:

China's Forest Resources and Institutions. China is a forest deficit country. It has among the lowest per capita and per unit area endowments of forest resources of any country in the world. Domestic consumption of industrial wood and wood products is also among the world's lowest. These deficits have set the context for an aggressive program of investment and policy reform that have allowed China to move, faster than virtually any other country, into the final stage of what is called the *forest transition* in which deforestation ceases and forest area begins to rise. Along with these changes, China has emerged as a major importer of wood and a re-exporter of wood in processed forms. Regulatory arrangements in China's forestry sector have struggled to keep pace with these developments.

Collective Forest Tenure Reform. Ownership and use rights to collective forests (basically those forests in China that have been under the control of provinces and other non-national authorities) have been the subject of experiments and increasingly aggressive reforms over the last 30 years. These reforms, which parallel those conducted on agricultural lands in China, have had as their objective increasing incentives and unleashing the creative and productive energies of rural households and communities. They amount to the largest transfer of forest wealth ever recorded. The precise reform path followed in different provinces has varied and involves numerous arrangements and options, but most involve provisions to offer individual households a large degree of economic autonomy and forest management independence.

The results of these reforms on beneficiary incomes, timber harvest, silvicultural effort, and other values have been strongly positive and have encouraged provinces to deepen reforms and to explore complimentary activities in technology transfer, marketing, management, protection cooperation, and other areas. Forest practices regulations, in particular the allocation of harvest quota, are among the issues that continue to require refinement.

Timber Supply Response Potential in the State Forest Regions. Inasmuch as the state forest subsector has been largely insulated from the reforms that are sweeping through the collective sector, it is difficult but important to consider the potential if reforms were to be introduced. Chapter IV summarizes an economic model of timber supply from the forests of Heilongjiang, a key province representative of China's northeast industrial forest region. Currently, forest management and utilization in the region is dominated by large state forest farms and enterprises, with intimate linkages to the financing and provision of government services for local communities. As a result of these interdependencies, and because enterprise managers have limited incentives and alternative opportunities, the forest economy in these areas has been in decline and the resource base has been over-exploited.

The timber supply model suggests very significant potential gains from reform. In contrast to a current harvest of approximately 13 million cubic meters per year, the model suggests that with limited reforms and very modest or even no timber price increases, the sustainable output of timber could increase twofold to more than 25 million cubic meters. Unleashing this potential would require a range of institutional reforms in both forestry and financing of public services as well as investments in forest operations, resource rehabilitation, and forest inventory.

The World Bank's Role. World Bank assistance in China forestry has been the most successful of all its forestry work worldwide over the last 30 years. The final chapter considers how the relationship between China and the World Bank could evolve going forward. It is recommended that the Bank engage with the sector leaders and authorities in engagements that focus around 3 themes: (a) transitioning from a plantation investment relationship; (b) addressing second-generation forestland tenure reform issues; and (c) reform and restructuring of the state forest sector.

Chapter II. China's Forest Resources and Institutions

China is a forest-deficit country. It has among the lowest per capita and per hectare concentrations of forests; and industrial wood consumption, while rising, is still far below international comparators. In terms of economic reforms, forestry is recognized by the Government as a lagging sector. Far-reaching reforms have been implemented in the collective subsector, but far less successfully or extensively in the state-dominated sector. This chapter summarizes basic facts and data about China's forests.

Basic statistics on the forest resources of China and their evolution include measures of areas, stocking, and indicators of China's forest scarcity relative to other countries. These are presented in Chapter II along with descriptions of key features of China's forest policy and institutional framework. And, the process by which key control on forest management and the determination of timber harvest quota is detailed. This aims to set the basis for discussion in the following chapters on how forest reform has proceeded at an uneven pace across the overall forest sector and how this creates opportunity for further reform and support.

Forest Resources

On a global scale, China is a relatively forest-poor country. It accounts for only 4.95 percent of global forestland and 3.16 percent of the world's forest stock. The country's forest cover, at 14 percent, is well below the global average of 30.3 percent (Table 2.1). Nevertheless, China's achievement in terms of forest cover has been quite remarkable, and possibly even unprecedented, in a country that is still at a relatively early and rapidly growing stage of economic development and must also deal with very heavy population pressure.

Table 2.1 China's Forest Resources in Global Perspective

	Forest area (million ha)	Forest stock (billion m³)	Forest cover (%)	Per capita forest area (ha)	Per capita stock (m³)
Former USSR	809	80	47.90	5.66	564
United States	303	35	33.10	1.03	120
Canada	310	33	33.60	9.72	1034
China	195	14	20.36	0.15	10
World	3952	434	30.30	0.62	69
<i>China, as % of world resources</i>	4.95%	3.16%	67.19%	23.24%	14.81%

Source: FAO "Global Forest Resources Assessment 2005". China information was updated based on the Seventh National Forest Inventory (SFA 2009).

Based on 2009 national statistics (NBS 2009), of China's total land area of around 0.96 billion hectares, about 32 percent (304 million hectares¹) of China's land area is formally considered "forestland." In fact, only about 58 percent (175 million hectare) of that area is actually forested (Table 2.2). This figure increases to 64 percent (194 million hectare) by the latest forest inventory (SFA 2009).

Table 2.2 Dispersal of China Land Area

<i>Land type</i>	<i>Area (million hectares)</i>	<i>Share in the total land areas (%)</i>
Total land area	960	100
Cultivated area	122	12.68
Forest area	175	18.22
Fresh water bodies	17	1.82
Grassland Total	400	41.67
Other	246	25.61

Source: National Bureau of Statistics. China Statistical Yearbook 2009.

Note: forest data came from the Sixth National Inventory, to be consistent timewise with other land use types.)

Table 2.3 shows the distribution of forest area and forest structure by geographic region. In terms of total forest area, China's Southern region boasts the largest percentage with 68.43 million hectares, or 38 percent of the country's forests. The Southwest and Northeast have about 22 percent and 24 percent of the total, with about 40 and 44 million hectares, respectively. The North and Northwest have relatively small proportions of the country's total forest resources. The 7th National Forest Inventory (NFI) showed China's forest coverage to be 20.36 percent, up from 18.21 percent in the 6th NFI.

Almost 90 percent of all natural forests are found in the Northeast (31 percent), South (31 percent), and Southwest (27 percent). The North and Northwest regions comprise a small share of natural forests by comparison (5 percent and 7 percent, respectively). Plantation forests are more concentrated, regionally speaking, than natural forests, with 54 percent (28.69 million hectares) found in the South. Plantation forests have increased yearly by approximately 8 million hectares since 2001. China leads the world in area planted to plantation forests, with 61.69 million hectares. Guangxi, Guangdong, Hunan, Fujian, and Sichuan provinces account for 37 percent of China's plantation forests by area and 40 percent by volume.

¹ Based on the Seventh National Forest Inventory, the forest area is 303.7819 million hectares.

Table 2.3 China Forest Area and Structure, by Region

	<i>Forest</i>		<i>Natural forest</i>		<i>Plantation forest</i>	
	<i>Area (million ha)</i>	<i>%</i>	<i>Area (million ha)</i>	<i>%</i>	<i>Area (million ha)</i>	<i>%</i>
Total	181.38	100	119.69	100	61.69	100
Northeast	43.64	24.13	36.75	30.85	6.89	10.56
North	17.33	8.13	6.29	4.89	11.04	17.61
South	68.43	33.89	36.30	30.62	32.13	53.87
Southwest	40.17	24.28	31.95	26.81	8.22	12.4
Northwest	11.81	9.57	8.40	6.83	3.41	5.57

Source: SFA (2009) China Forest Report-the Seventh National Inventory

Note 1: Based on the geographic distribution, China's forest areas are divided into 5 regions. Northeast region includes 3 provinces (autonomous region) namely, Inner Mongolia Autonomous Region, Jilin province and Heilongjiang Province; North region (forest-deficit) includes 7 provinces (municipality) namely, Beijing, Tianjin, Hebei province, Shanxi province, Liaoning province, Shandong province, Henan province; South region (South collective forest areas) includes 12 provinces (region, municipality) namely, Zhejiang province, Anhui province, Fujian province, Jiangxi province, Hebei province, Hunan province, Guangdong province, Guangxi Zhuang Autonomous Region, Hainan province, Guizhou province, Shanghai, Jiangsu province; Southwest region includes 4 provinces (region, municipality) namely, Chongqing, Sichuan province, Yunnan province, Xizang Autonomous Region; Northwest regions includes 5 provinces (autonomous region) namely, Shaanxi province, Gansu province, Qinghai province, Ningxia Hui Autonomous Region, Xinjiang Uygur Autonomous Region.

Note 2: Data in this table does not include data of Hong Kong Special Administrative Region, Macau Special Administrative Region and Taiwan Province.

The age structure of the timber forest is unbalanced in terms of both area and volume. In terms of forest area, there is a preponderance of young and middle-age trees. This is substantially a reflection of major reforestation efforts of the 1980s and 1990s and a significant deficiency in near-mature and mature forests, which are predominantly natural forests. This is a result of extensive clearing of natural forests, which continued until the 1998 logging ban.

The country's total volume of standing stock is 14.55 billion cubic meters (m³), of which 13.36 billion cubic meters is forest stock. The Northeast, South, and Southwest once again have the highest standing stock by volume of all regions. The Provinces of Tibet, Sichuan, Yunnan, Heilongjiang, Inner Mongolia and Jilin together account for nearly 67 percent of the national standing stock. Forty percent of China's forest stock is mature or over-mature, but the older forests cover only 18 percent of forestland. A full two-thirds of the country's forestland is in young or middle-age forest.

Table 2.4 Forestland and Stock, by Type and Age

	Land		Stock		<i>Stock per area (m³/ha)</i>
	<i>Area (million ha)</i>	<i>% of total</i>	<i>Volume (billion m³)</i>	<i>% of total</i>	
Type of forest					
Timber forest	59	37.78	4,227	31.63	71.91
Protective forest	83	53.40	7,350	55.01	88.47
Fuel forest	2	1.12	39	0.29	22.39
Special-purpose forest	12	6.60	1,746	13.07	145.77
Age of forest					
Young forest	53	33.82	1,488	11.13	28.27
Middle-aged forest	52	33.43	3,861	28.90	74.24
Near-mature forest	23	14.82	2,650	19.83	114.94
Mature forest	19	12.03	3,159	23.64	168.80
Over-mature forest	9	5.90	2,205	16.50	239.91
Total	156	100.00	13,363	100.00	85.88

Source: SFA (2009). China Forest Report-the Seventh National Inventory.

Note: Based on the Seventh National Forest Inventory, the forestland area totals 18.138 million hectares, but the timber forest in the table does not include 5.381 million hectares bamboo forest and 20.41 million hectares economic forest.

Trends in Forest Area and Structure

China's achievement in terms of forest cover has been quite remarkable, and possibly even unprecedented in a country that is still at a relatively early and rapidly growing stage of economic development and also must deal with very heavy population pressure. Total forested area was nearly double the estimated level of 1934. Between the censuses of 1973-76 and 2004-08, total forested area increased by about 51 percent. Protection forest has surpassed timber forest and become main forest types (Table 2.5).

Table 2.5 Forested Land, 1973-2008

	<i>(1,000 ha)</i>							
	1973- 1976 (1 st NFI)	1977- 1981 (2 nd NFI)	1984- 1988 (3 rd NFI)	1989- 1993 (4 th NFI)	1994- 1998 (5 th NFI)	1999- 2003 (6 th NFI)	2004- 2008 (7 th NFI)	Net Change 1st-6th NFI
Timber forest	101,150	83,829	83,616	88,719	103,606	83,468	64,162	-36,988
Protection forest	7,850	10,002	14,557	16,073	21,385	54,746	83,084	75,234
Special purpose	670	1,199	3,116	3,348	3,968	6,380	11,978	11,308
Fuel forest	3,670	3,691	4,444	4,289	4,452	3,034	1,747	-1,923
Economic forest	8,520	11,280	13,744	16,099	20,222	21,390	20,410	11,890
Total	119,780	110,102	119,477	128,528	153,632	169,019	181,380	61,600

Source: Data team, Forest Resource Analysis for China's Forestry Supply (World Bank, Draft-0704-2005), and SFA (2009).

A substantial part of the increase in forests was due to the government's major investments in plantation establishment through both "afforestation" and "reforestation." As of the last forest census, plantations accounted for an area of about 61.69 million hectares, 41 percent of which was timber forest, 25 percent was protection forest, 32 percent was economic forest, and 2 percent was fuel forest and special purpose forest. Data cited in Rozelle and others (2000) suggest that between 1986 and 1993 the total area of land reforested after logging or other activities was nearly 4 million hectares, while the total area of land reforested since records were kept is about 7 million hectares. The authors speculate that much — perhaps all — of this reforestation replaced logged natural forest, and significantly diminished the biodiversity value of the national forest estate.

As with forested land, forest stock decreased between the 1st and 2nd NFI. It began to rebound in the early 1990s during the 4th NFI. By 2008, total forest stock had increased by near 5 billion cubic meters. The Southwest region showed the highest absolute growth in forest stock over the 30-year time period, but the North and South had the highest percentage growth of the five regions. Percentage growth in forest stock between the 1st and 7th NFIs was lowest in the Northeast (Table 2.6).

Table 2.6 Forest Stock, 1973-2008

	<i>(million m³)</i>							
	1973- 1976 (1 st NFI)	1977- 1981 (2 nd NFI)	1984- 1988 (3 rd NFI)	1989- 1993 (4 th NFI)	1994- 1998 (5 th NFI)	1999- 2003 (6 th NFI)	2004- 2008 (7 th NFI)	Net change 1st-7th NFI
Northeast	2,831.40	2,941.38	2,892.40	3,002.70	3,178.90	3,293.00	3,542.38	710.98
North	228.33	198.6	258.2	301.7	353.2	427.7	567.5672	339.24
South	1,206.20	1,516.10	1,339.00	1,393.90	1,785.10	2,328.60	2,867.37	1,661.17
Southwest	3,552.80	2,723.60	2,947.40	3,641.70	3,983.20	5,245.20	5,508.35	1,955.55
Northwest	651	635.8	649.2	675.2	767.3	803.1	876.9269	225.93
TOTAL	8,469.80	8,015.50	8,086.10	9,051.20	10,067.60	12,097.60	13,362.59	4,892.79

Source: Data for 1st -5th NFI is from Forest Resource Analysis for China's Forestry Supply (World Bank, Draft-0704-2005), data for 6th NFI from SFA "China Forest Resources", data for 7th NFI from China Forest Report-the Seventh National Inventory

Zhang and Song (2006) provide the following assessment of forest cover changes (Table 2.7) in the past several decades:

Afforestation, deforestation, and reforestation have significantly modified the age structure of forests in China, reflected in the current forest ecosystems dominated by young stands. Reforestation has kept China's forest cover from dramatically decreasing from intensive harvesting. Afforestation is not only the primary factor increasing forest cover in China, but also is an important source of timber supply. Because of the practice of selective logging, impacts of timber harvesting were much more widespread than the reduction in forest cover. The recent rapid increase of forest cover and timber volume indicates that the young forests in China are becoming a carbon sink and will have greater potential in carbon sequestration in the coming decades if properly managed.

Value of and Investment in Forest Resources

In 2005, total output value of China's forest industries was RMB 846 billion yuan, representing an increase of 22.7 percent over the previous year. Of this total amount, primary and secondary forestry industries accounted for 51.5 percent and 41.2 percent, respectively, with tertiary industries comprising the remaining 7.3 percent. Eight provinces (Fujian, Zhejiang, Jiangsu, Shandong, Hunan, Hebei, Guangdong, and Sichuan) accounted for 57.4 percent of the nation's total gross output value of forest industries in 2005 (SFA, 2006a).

Table 2.7 Change in Forest Cover Caused by Afforestation, Deforestation, and Reforestation in China, 1949-2003

	New plantation forests	Plantation forests harvested	Natural forests regenerated	Natural forests harvested	Planted net change	Natural net change	Net forest change
1949	-	-	-	-	-	-	-
1950-1962	0.53	0.0	1.18	(2.38)	0.53	(1.2)	3.21
1963-1972	-	-	-	-	-	-	-
1973-1976	1.94	0.0	2.58	(3.63)	1.94	(1.05)	0.89
1977-1981	0.45	(0.61)	0.69	(1.23)	(0.16)	(0.54)	(0.70)
1984-1988	2.14	(1.22)	0.60	(0.54)	0.92	0.06	0.98
1989-1993	1.34	(1.0)	0.73	(0.13)	0.34	0.6	0.94
1994-1998	1.42	(0.35)	1.08	(0.74)	1.07	0.34	2.63
1999-2003	1.56	(0.89)	0.78	(0.23)	0.67	0.55	1.66

Source: Zhang and Song, 2006.

Note: Units in all columns are in percentages (%) with respect to the country area (960 million ha). Natural net change is the sum of natural forests regenerated and natural forests harvested; planted net change is the sum of new plantation forests and plantation forests harvested; net forest change is the sum of natural net change and planted net change.

The significant growth in forestland and forest stock since the mid-1990s is due in part to a shift in China's approach to forest management, with the primary goal shifting from timber production to ecological concerns. In 1998, the Chinese government instituted a new national forest policy focused on sustainable management of forest resources and environmental protection. The policy is underpinned by 6 major forestry initiatives with a planned investment through 2010 of some US\$85 billion (Zhang and Song, 2006).

The 6 forestry initiatives are:

- Natural Forest Protection Program,
- Conversion of Farmland to Forest Program,
- Beijing-Tianjin Rim Combating Desertification Program (Program for Sand Control and Prevention Around Beijing),
- Shelterbelt Development Program in the Yangtze River Valley and Other Key Areas,
- Program of Establishment of Fast-Growing-and High-Yielding Timber Plantations in Key Areas,
- Wildlife Protection and Nature Reserve Development Program.

The 6 key forestry programs cover almost all of China's counties and target nearly 80 million hectares of land for afforestation. The Natural Forest Protection Program was the first of the 6 initiatives. The State Forestry Administration recaps some of the following results of the programs through 2005 (SFA, 2007):

- The Natural Forest Protection Program has resulted in 14.34 million hectares of public welfare forest, protection of 95 million hectares of forest, and a reduction of 270 million cubic meters of forest resource consumption.

- Through the Conversion of Farmland to Forest Program, the country afforested 20.95 million hectares, including 8.7 million hectares of forest by converting farmland, 10.85 million hectares of forest through afforestation of barren land and mountains in nearby areas, and 1.4 million hectares of forest by afforestation on closed mountains. The State Forest Administration reports this benefited some 30 million farm families.
- The Program for Sand Control and Prevention around Beijing increased forestland by 468,000 hectares, increased pasture by 325,000 hectares, and reduced desertified land by 534,000 hectares, benefiting some 16 million people.
- The Shelterbelt Development Program increased the forest coverage of Yangtze and Pearl River valleys by 3.3 percent and 4.9 percent, respectively. Soil erosion was also reduced, and new and regenerated coastal shelterbelt reached 7,884 kilometers.
- The Wildlife Protection and Nature Reserve Development Program developed 790 new nature reserves, 21 wildlife saving and breeding bases, 5 wildlife protection and provenance breeding bases, and 3 bird migration stations.
- The Program for Fast-Growing and High-Yielding Timber Forests increased forest area by 332,000 hectares and improved 26,000 hectares of timber forest.

Forest Management and Regulation

Regardless of legal ownership, the harvesting of trees in China is subject to an additional layer of legal and regulatory regime: logging quota system.² China's national logging quota system formally began in 1987 following the issuance of a central policy that attempted to restrict abusive logging occurring in some of the southern provinces and to protect China's decreasing forest resources.³ It was decided, as an overarching principle, that the amount of logging must not exceed the amount of forest growth. The State Forestry Administration, upon the approval of the State Council (the highest Executive branch in China), decides on the logging quota for each year and each province in a five-year national plan, which corresponds to the five-year national economy plans developed by the State Council.

The rules concerning logging quota are spelled out in three documents:

- The *Forest Law*, initially adopted in 1984 and revised in 1998 by the National People's Congress;
- *The Implementation Regulation of the Forest Law*, revised and adopted in 2000 by the State Council;
- *Methods on Logging and Reforestation Management*, adopted in 1987 by the State Forest Administration.

Based on the fundamental principle that logging should not exceed growth, all trees with diameters exceeding 5 centimeters are subject to quota requirement. *Forest Law*, article 29: The only exemption is scattered trees in farmers' private mountains or around their residential houses, or fuel wood trees in farmers' private mountains.

² This section is drawn (?) from Zhu Keliang, "The Need for Law and Order: A Governance Review of China's Forest Logging Quota Regime". (Rural Development Institute for the World Bank, 2009).

³ *Directive on Strengthening Collective Forest Management and Resolutely Curtailing Abusive Cutting in Southern Provinces* (CCP Central Committee and State Council, June 30, 1987).

Qualified forestry survey and design institutions play an important role here in predicting and determining the amount of timber stock and growth every year, resulting in a so-called “rational annual cutting limit” for each region. Then all counties (on behalf of all collective or individual forest owners within the county), as well as eligible state-owned forest farms and enterprises, file for their respective logging and timber production plans to the State Forest Administration, which then decides on an annual logging quota for the nation and all the provinces.⁴ The logging quota of each province is then allocated to prefecture and finally to county level.⁵

All logging must be approved by “logging quota permits,” issued by county-level forestry bureaus in the case of collective-owned forestland. When applying for a logging quota permit, the applicant must submit a document detailing the plans for logging and reforestation. A county forestry bureau cannot issue logging permits that exceed its allocated annual logging quota.⁶

After logging is completed, the affected forestland must be reforested according to the requirements of the issued permit. The amount of reforestation must be no less than the amount of logging.⁷ When felled trees need to be transported to another location for sale or processing, a “timber transportation permit” must be obtained from the same forestry agencies.⁸

Starting from 2000, the central government has promulgated a series of policy directives attempting to ease the control of logging quota. The primary reform measure is to make a distinction between ecological forests/public interest forests and planted forests/commercial forests. While maintaining the overall scheme of logging quota allocation, the new measures allow more flexibility in allocating logging quota for planted/commercial forests. These policies include:

- Notice on Adjusting Logging Management for Planted Forests (2002), State Farm Administration. For the forests planted in or after 2000 that reach a certain scale, the Notice allows its logging quota to be determined based on the “forest management plan” (FMP) drafted by the forest operator in accordance with law.⁹ The Notice attempts to include the determination of logging quota under FMP rather than under the rigid logging quota mechanism as prescribed under the Forest Law. Moreover, the Notice adopts a more flexible approach regarding the trees planted by farmers on the land not designated as forestland.
- Decision on Speeding Up Forest Development (2003), Central Committee and State Council. When the quota for planted, commercial timber forest in any given year is used up, additional logging is permitted by using the remaining quota, if any, allocated for natural forest or ecological-protection forest.

⁴ Research has pointed out that the calculation and prediction models that are used to determine the national logging quota suffer considerable flaws. One of the main causes is that the State Forest Administration lacks comprehensive and updated data on some of the major factors concerning forest growth, categorization of forests, etc. See Juxiang and Huihua (2006).

⁵ *Implementation Rules*, article 28.

⁶ *Forest Law*, article 32.

⁷ *Forest Law*, article 35.

⁸ *Forest Law*, article 37; *Implementation Rules*, article 35-37.

⁹ Under the *Forest Law*, forest management plan for collectively owned forest is made by the collective economic organization under the guidance of the local forest administration. See *Forest Law*, article 16. However, it is not entirely clear under the law whether the plan should cover determination of logging quota.

- Opinion on Pushing Forward Collective Forest Rights Reform on a Full Scale (2008), Central Committee and State Council. The Opinion emphasizes improving the logging management mechanism for collectively owned forests. While maintaining strict control over logging of collectively owned public interest forests, it calls for reforming the logging quota system for collectively owned commercial forests. The specific measures of such reform include simplifying logging approval process, and adopting a public notice mechanism with respect to logging approval and FMP formulation.

For the present period, the overall logging quota and policies are set by the Eleventh Five-year Annual Logging Quota Plan, approved by the State Council in December 2005.¹⁰ This plan governs the 2006-2010 period and several points are worth noting:

- The five-year overall quota is 248 million cubic meters, an 11 percent increase from the preceding five-year quota.
- In the past, the national quota was allocated under the 5 categories of forest as defined by the 1998 Forest Law: ecological forest, timber forest, economic production forest, fuel wood forest, and special-purpose forest. Under the new plan, the overall quota is divided into only two categories: a quota for commercial forest (158 million cubic meters, a 36 percent increase from the previous five-year plan) and another for non-commercial forest (90 million cubic meters, a 23 percent decrease from the previous five-year plan).
- Based on the origin of trees, the quota is also divided into two parts: 157 million cubic meters for planted forests, and 91 million cubic meters for naturally grown forests – the planted forest quota roughly corresponds to the commercial forest quota, and naturally grown forest quota to non-commercial forest quota.

Forest Management Plans

Forest Management Plans are the main vehicles through which logging quota is determined and allocated in practice. Generally, each state-owned forest farm, or any other forestry firm or company that reaches a certain scale may qualify as a FMP entity.¹¹ A collective (village or village group) or an average farmer household normally does not reach the requisite scale and cannot become an FMP entity. Thus the rules provide that for almost all the collective forestland, each county will serve as a single FMP entity.¹²

Each FMP entity is entitled to draft an FMP laying out operational and financial timetables. In particular, the FMP includes a logging schedule including amounts, affected locations, reforestation arrangements, etc. After the FMP is approved by the county forestry bureau, the logging schedule proposed in the FMP will constitute the main basis on which later

¹⁰ *Opinions on Forest Logging Quota for Various Regions during the Eleventh Five-year Period* (State Council, Dec 19, 2005)

¹¹ SFA, 2006b, article 7-8. Normally a forest farm or firm with at least 20,000 measurement units (1,333 hectares) of forestland may qualify as an independent FMP entity.

¹² Article 16 of the *Forest Law* provides that local forest administration should provide guidance to “collective economic organizations” in drafting FMP. This could be interpreted that village collectives may qualify as FMP entities. However, according to SFA’s own rule and practices, villages are not treated as entities that are entitled to their own FMPs.

applications for logging quota are decided. As long as the applications do not exceed the specified amount of logging provided by the FMP, county forestry bureaus will approve them and issue logging permits as a matter of course.¹³

An FMP typically covers a time period of 10 years; while for forests that mainly produce raw materials for industrial uses, each FMP period is 5 years.¹⁴ At the beginning of each 10- or 5-year period, an FMP drafting task force needs to be assembled, which consists of the FMP entity, a forestry planning and surveying firm, representatives of forestland right-holders, local forestry bureau (typically county level), and local community representatives.¹⁵ Under the rules, “the FMP entity’s autonomy in deciding how to manage and develop its forestland and resources should be respected,” while the local forestry bureau has the right to approve or veto the plan.¹⁶ Forestry planning and surveying firms, typically operated by forestry bureaus themselves, provide technical assistance and in practice is the main drafter of FMPs.

The legal procedures for drafting an FMP include the following:¹⁷

- (a) **Preparation** includes the collection of preliminary data and the determination of basic economic, ecological, and social parameters.
- (b) **Systematic assessment** is a performance review of the past FMP period, and a process that identifies emerging issues and clarifies the focuses and objectives of the new FMP.
- (c) **Decision-making** encompasses proposed alternatives of solutions based on the above assessment. After comparative cost-benefit analysis and ecological and social impact studies, the best solution will be decided.
- (d) **Public participation**. Government agencies in charge of the task (presumably the county forestry bureau), the FMP entity, and other stakeholders may comment on the selected solution for further modification.
- (e) **Plan design**. Based on the selected solution, details of the management and operation plan are spelled out.
- (f) **Final review and approval**. Typically, the county forestry bureau organizes a review roundtable conference, participated by forestry officials from different levels and forestry practitioners or experts that offer advice on the FMP. Further edits are expected based on the reviews. The finalized FMP will then be sent to the upper-level forestry agencies (prefecture or even province level) for approval.¹⁸

Once an FMP is approved, the logging schedule included in the plan becomes final. Extreme circumstances might justify future modifications, but it will require a new round of administrative review and approval.¹⁹

¹³ SFA, 2006b, note 28, article 23 & 48.

¹⁴ SFA, 2006b, article 3.

¹⁵ SFA, 2006b, article 9.

¹⁶ SFA, 2006b.

¹⁷ SFA, 2006b, article 10.

¹⁸ SFA, 2006a, article 10, 40, 41, & 42.

¹⁹ SFA, 2006a, article 46.

Logging Operation Management and Reforestation

Developing an appropriate FMP and obtaining necessary logging permits does not comprise the entirety of the process. There are two more major steps relating to forest sector governance: logging operation management and reforestation management.

Logging operation is subject to a separate set of regulations promulgated by the State Forest Administration, mainly the *Code of Forest Harvesting*.²⁰ According to the Harvesting Code, there are 4 main methods of logging: clear cutting, selection cutting, low-yield forest cutting, and regeneration cutting.

The actual logging process starts with forestry technical staff, generally from township forestry stations, conducting a field survey and developing the cutting specifications for whoever is responsible for the actual cutting. The cutting specifications include the boundaries of cutting zone, acreage, tree marking, cutting methods, final canopy density, timber output, timber transportation methods, cutting zone clearing, and safety requirements. During and after the cutting is done, the cutting zone will be inspected again by the technical staff for any discrepancies and, if any, possible corrections.

The duty of reforestation is associated with the application for logging permits. An applicant actually must make a security deposit to a designated bank account to ensure that appropriate reforestation will be completed. If reforestation is not done or not done adequately, forestry agencies may complete the job at the permit-applicant's expense (e.g., security deposit and maybe more). Particularly, reforestation must be finished within 18 months after the logging operation if clear cutting is employed.²¹

²⁰ *Code of Forest Harvesting* (SFA, August 16, 2005), effective December 2005.

²¹ *Methods on Logging and Reforestation Management* (SFA, 1987).

Chapter III. Collective Forest Tenure Reform²²

Over the last 30 years there have been significant reforms in forest resource tenure in the regions dominated by collective ownership of forests. In these areas a wide variety of tenure systems have been developed, ranging from virtually private household control with rights comparable to those relating to agricultural land to arrangements for leasing and contracting of forest resources to third parties. The extent of forest tenure reform in China is without parallel elsewhere in the developing world. This chapter summarizes studies and surveys aimed at assessing the effects of reform on farm income, timber supply, silvicultural effort, and other outcomes. Generally, reforms have been successful leading to sustainable increases in incomes and harvests. Reforms can face challenges from lags in regulatory and governance mechanisms related to harvest licensing and quota allocation. An important question to ask, *what is the extent to which reforms can be extended to the state-owned forest sector?*

Climate change has brought issues of deforestation and forestland governance to the forefront. It is now widely accepted that deforestation and associated forest degradation are responsible for about 17 percent of total global carbon emissions — with over 70 percent of these emissions coming from forest burning and clearing in the 5 forest-rich countries of Indonesia, Brazil, Malaysia, Myanmar, and the Democratic Republic of the Congo (Stern, 2007). These countries share not only high rates of deforestation, but also the fact that there is government ownership over essentially all forestlands, except for Brazil, which has over recent years recognized indigenous peoples' land rights and allocated land to settler households.

Recent research suggests that the widespread problem of unclear forest property rights and associated weak local land-use governance is a key driver behind deforestation and degradation and must be addressed in order to effectively reduce deforestation and carbon emissions (Eliasch, 2008; and Chomitz, 2007). Unclear land rights are undermining the ability of forest peoples to adapt to climate change. Approximately 1.2 billion of the world's poor rely on forests for food, fuel, medicinal plants, and income; these people are exposed and vulnerable to the increasing changes in weather, rainfall, vegetation, and the distribution of wild animals that come with climate change (Chomitz, 2007). According to the Stern (2007) Review, likely average mean temperature increases of 1-2 °C could cause the extinction of 15-40 percent of all species and add pressures that would force millions more people into extreme poverty. A growing body of research also highlights the role that clear, locally controlled property rights and governance play in enabling the flexibility and adaptability necessary in achieving resilience against climate change as well as economic and political shocks (Berkes and others, 2003; and Olsson and others, 2004).

²² This chapter is based on research by Jintao Xu and his colleagues at the Environmental Economics Program in China (EEPC), Peking University on Collective Forest Tenure Reform in China: Synthesis funded by PROFOR of the World Bank (Contract No.: 7141913), with supplementary funding from Rights and Resources Initiatives and Ford Foundation.

In this context, China's recent forestland reforms provide an important case study with useful implications for global attempts to reduce forest emissions and decrease forest-based poverty and conflicts. These reforms are arguably the largest ones undertaken in modern times both in terms of area and people affected, as China's collectively owned forests total approximately 100 million hectares and are home to more than 400 million people (Liu and others, 2008). The reforms offer important lessons for other developing countries that have recently begun to address the problem of unclear forest tenure; they have done so with a dominant trend toward legally recognizing the land rights of indigenous peoples and strengthening access and ownership rights of other forest communities and households (Sunderlin and others, 2008). Brazil, which has recognized indigenous peoples' rights to over 100 million hectares of land in the last several decades and more recently granted property rights to millions of households that have settled in the Amazon, is a case in point. In the few countries where large-scale rigorous research has been conducted, the moves toward the recognition and clarification of community land rights have yielded positive results in terms of forest cover (Bray and others, 2008). The indigenous reserves of Brazil, for example, are publicly recognized as a leading bulwark against deforestation as they have lower rates of forest clearing than even national parks (Nepstad and others, 2006).

History of Forest Tenure Reform in China

China's forestland reform differs from this dominant trend in two important ways: (a) it has a different starting point in that the majority of its forested lands (58 percent) are already legally owned by collectives rather than the state with a small portion of these collectives composed of indigenous ethnic communities; and (b) the reform is widely promoted as a step toward private household property, part of the broader social and political trend aiming for the de-collectivization of China's rural landscape and the establishment of free markets.

The term "collective forest reform" refers to a general policy that has been emerging since the early 2000s from national-sponsored pilots and provincial-level initiatives. As is often the case in China, the central government formulated and announced its official policy after the policy had already been initiated and tested at the provincial level. The new national policy was officially publicized by the Central Committee of the Communist Party of China and the State Council on June 8, 2008, and is entitled *Guidelines on Fully Promoting Collective Forest Tenure System Reform*. This reform encourages collective forest owners to reassess and reallocate their forest use rights (not the land itself) based on a majority vote — a two-thirds vote either by the entire village assembly or the committee of village representatives.²³

In the reform, collectives have the option of reallocating forest rights to individual households, collections of households (so-called "partnerships"), or private contractors; alternatively, they may maintain collective management either at the level of hamlets (so-called village clusters, very often natural villages) or at the full community level. Although the reform maintained collective ownership of the land, it does offer a stronger possibility of transferring the

²³ The Village Assembly consists of all village members over the age of 18. The Village representative committee is a subgroup of the village assembly in which 5-15 village households are represented by one person. *People's Republic of China Villager's Committee Organization Law* (1998).

long-term rights that households have to the forest, including the right to transfer and mortgage. In sum, the reform is widely seen as another important step toward increasing the private ownership of the land allocated to individual households. The government has also financed the delimitation, surveying, titling, and registration of the new plots, investing approximately US\$370 million in 2008 alone for these tasks (Lieke, 2008).²⁴

By taking on the allocation of rights within a collectively held property, China's reform can be viewed as anticipating future policy challenges and options of those countries that are shifting land ownership out of the public domain and into the hands of communities. What choices will collectives make, if given the option to reallocate their collective forest rights? It is important to recall that China's land ownership patterns are by and large a product of the country's Communist history, and in a majority of areas this reform is akin to restitution of land to peasant households. In the ethnic minority areas of the country, which have a long history of community forest management, this reform restores some choice to the local community although it also encourages them to formally divide collectively held forest to households, a step they may or may not have undertaken before (Xu and Melick, 2007). Although the reform provides choices to local communities, it is well recognized that — despite important steps toward the democratization of village and collective governance — community decisions undoubtedly remain strongly influenced by local governments and forest authorities.

In announcing the reform, local, provincial, and central governments clearly promoted and expected a shift from the collective management of forest to private household management. Forestland reforms have historically followed those in the agricultural sector, and the agricultural sector has been moving toward individual household-based management since the first reforms of the early 1980s. After several decades of limited action, agrarian land reform has picked up steam in recent years, beginning with the *Rural Land Contracting Law* passed in 2002. This law allowed transfer, inheritance and mortgaging of land contracted by farmers. Further steps were taken in October 2008, when the Central Committee reiterated the much-anticipated policy allowing for the trade in agricultural land rights (Feng, 2008).

The first wave of forest reforms occurred in the mid-1980s and termed the “three fixes”. This reform was a significant step in that it allowed the allocation of collective forest to households on a contractual basis. In practice, there was great policy instability during this period, with forestland rights being allocated in turn to households and various levels of village jurisdiction (Dachang, 2001). This uncertainty over property rights occurred simultaneously with a deregulation of forest harvesting (allowing farmers to harvest almost at will) and a growing market demand for timber. According to government records and policy rhetoric, the combination of an unstable policy environment as well as the deregulated harvesting and market situation led to widespread deforestation (Runsheng, 2003). By the mid-1980s, the government reversed course and established strict regulatory controls on forest harvesting, requiring the acquisition of permits before timber could be logged for village or commercial use. Fujian was the only province not to participate in the “three fixes” policy, choosing to maintain collective management and using a share-holding system to allocate the benefits from forest management

²⁴ Personal communication. Zhu Lieke, Vice Administrator, State Forest Administration, 2008.

to households. Nonetheless, national statistics indicate that in the 6 provinces where collective forest ownership has been the highest, collectives allocated use rights to more than 70 percent of their forests to households.²⁵

By the early 2000s, mounting frustrations and protests over the widespread controls on village forest use and logging, the well-documented growing disparity between rural and urban incomes, and the growing incidences of forest fires — widely recognized as being allowed by local people who saw reduced incentives to manage their forests — led to a growing political crisis over the forest sector (Su, 2007). There was also growing global criticism of China for its booming importation of logs from around the world and public demand for increasing domestic production to help offset these imports (Xu and White, 2004). Constrained forest tenure rights were increasingly criticized as a key impediment to sustainable forest management and increased timber production as well as to poverty alleviation of people living in and around forests (Xu and others, 2002).

The decision of the provincial government of Fujian in early 2003 to abruptly change course and initiate reforms that encourage rather than discourage household tenure added to the growing momentum for change in the central government policy on forests. Tenure reforms progressed rapidly, and by mid-2006 the provincial government in Fujian claimed that 99 percent of the villages completed their reforms toward household forest management (Chai, 2006). The central government reacted to these diverse demands and developments and in mid-2003 formulated a new forest policy, the Resolution on Development of Forestry (the “No. 9 Policy”). This policy is sweeping in its aim to correct the growing rural urban economic disparities and boost domestic forest production by giving stronger rights to households to use and manage their forestlands. In many ways, this policy was an attempt to bring the forest sector up to date with the agricultural sector, since similar reforms had already taken place in agriculture with widely recognized success.

Encouraged by the No. 9 Policy, more than 10 other provinces, with Jiangxi and Liaoning leading the way, have been implementing a new round of forest tenure reforms in village collectives since 2004. The magnitude of land tenure reallocation, compared to that of Fujian, has been much smaller but only because individualization in these provinces was much more aggressive in the first reform period of the 1980s.

By 2006, the central government became convinced of the merits of collective forest tenure reforms and recognized the need for coherent national-level guidance. In January of that year, the Minister of the State Forest Administration announced that collective forest tenure reform was his priority for the year. The formal announcement coincided with the central government’s announcement of the New Countryside Development Initiative, which called for more assistance to rural areas, stronger property rights, and a more favorable policy environment for the rural poor. These policy shifts were clearly a reflection of growing concerns over rural unrest and conflict. In 2006, the last year when data was publicly available, the government reported that there were 80,000 mass protests, the majority of which were over the illicit selling, or taking, of collective land (Buckley, 2009).

²⁵ *China Forestry Yearbook* (Beijing, The Ministry of Forestry of the People’s Republic of China, 1987)

Other Related Forest Policies Linked to the Tenure Reforms

It is worth noting that the recent reforms come at a time when there is a global resurgence of government intervention to maintain natural ecosystems and encourage forest restoration — with governments escalating regulatory controls over private land use and increasing public investments. China has been a global leader on both fronts.

Starting in 1998, in what is popularly called the “logging ban”, the Chinese Government sharply curtailed commercial harvesting in western and northern areas of the country. Although initially focused on public forests where overharvesting was well recognized, the policy was soon extended to collective forests, covering almost 27 million hectares of collectively owned land by 2003 (Miao and West, 2004). In parallel, the Government initiated a forestland-use zoning system in the mid-1990s. The zoning policy was reinforced in early 2000 with the establishment of the category “public benefit forest” where no commercial harvesting was allowed and the simultaneous establishment of the Forest Ecosystem Compensation Program, a public program designed to compensate forest owners for income lost due to the restricted cutting rules (also known as logging ban). As of 2003, collectively owned forest comprised two-thirds of the almost 3 million hectares assigned to the Forest Ecosystem Compensation Program. It is estimated that to date more than 30 percent of all collective forests have been zoned in as ecological forests; one shortcoming of the program is that to date only 40 percent of the owners of these forests have received the limited financial compensation payment (SFA, 2008).

In addition to these policy measures, the Government has dedicated massive investments since 2000 to planting trees and restoring China’s natural ecosystems, with government commitments set to reach US\$59 billion by 2015. China’s forest cover has increased by approximately 40 million hectares since the late 1970s, a feat largely due to the government’s approach of administrative fiat and compulsory land-use zoning. While programs include payments and incentives to landowners for planting trees and maintaining forest cover, the programs are widely criticized for lacking due process or adequate compensation — approaches that are inconsistent with respecting private property rights (Ping and Zhu, 2008).

Although heavy-handed and massive, these extraordinary environmental accomplishments could not have been achieved without the administrative structure provided by the collective structure of forest ownership. However, looking to the future, the question is whether the conventional top-down, coercive government approach to organizing land use will become increasingly at odds with the fuller respect of communal and household land rights. If property rights are respected, compensation for alternative land use should be commensurate with the opportunity cost of land, and due process of consultation and legal recourse and remedies should be followed. Administrative fiat would be increasingly unviable, challenging the government’s ability to reach its own environmental goals.

Village-Level Survey on Tenure Reforms and Their Impacts

The research presented here is the first comprehensive analysis of the choices that collective forest owners have made regarding the allocation of forestland rights. The research was conducted by the Environmental Economics Program in China (EEPC) in the College of Environmental Sciences and Engineering, Peking University. From March 2006 to September 2007, with funding from the World Bank, the Ford Foundation, and the Rights and Resources Initiative, and with administrative support from China's State Forestry Administration, the research team completed village and household surveys in 8 provinces, collecting information for 288 villages and more than 3,000 rural households.

The village-level surveys gathered information on (a) the villages' economic activities, land management, tenure reform process, as well as social, economic, and demographic characteristics, using information obtained in personal interviews with village leaders, covering the period from 2000 to 2006; (b) changes in forest resource and the history of forest production from 1985 to 2006, using information provided by local forestry agencies; and (c) the financial situation of the villages (collective revenue and expenditures) during the period from 1985 to 2006, using information provided by the township government.

Household interviews covered information on social, economic, and demographic characteristics; land-use practices and land rights; the decision making process of tenure reform; the redistribution of land rights; and the impacts of their choices on, among other things, household income, forest harvesting, and forest planting. The research also included an econometric analysis aimed at better understanding the factors related to collective choices over the allocation of land rights.

Key findings of the research are described below:

Allocation of forest rights. The changes in tenure allocation that took place in the 8 provinces between 2000 and 2006 are shown in Table 3.1. Across these 8 provinces, about 70 percent of collective forests were allocated to households by 2006, and the remainder was allocated to groups of households (3 percent), villager clusters (6 percent), or outside contractors (4 percent), with direct management by collectives reduced to 18 percent. Individual household and partnership household management — the 2 tenure types strongly encouraged by Government — increased in Fujian (7 and 5 percent, respectively) and Yunnan (11 and 4 percent, respectively), while individual management increased in Liaoning and Shandong (12 and 8 percent respectively). Forestland allocated to outside contractors increased the most in Jiangxi where land was shifted from the village clusters. No major change occurred in Zhejiang and Hunan due to the fact that individual management had already been implemented in more than 80 percent of the collective forests prior to the onset of the reforms. In Anhui, individual management decreased. South Anhui has been a major tourist destination and, by setting aside a bigger share of forestland as eco-reserve, demonstrated the effort to preserve the tourism value of the forests.

Table 3.1 Distribution of Tenure Types in 2006 and Change between 2000 and 2006

<i>Province</i>	<i>Individual household</i> (%)	<i>Partnership</i> (%)	<i>Villager Cluster</i> (%)	<i>Contract to Outsider</i> (%)	<i>Collective</i> (%)
Fujian	50.63 (7.02)	7.81 (4.86)	5.61 (1.65)	4.72 (0.43)	31.21 (-13.98)
Jiangxi	62.97 (0.74)	2.77 (0.46)	4.15 (-4.77)	9.95 (4.46)	20.14 (-0.91)
Zhejiang	82.65 (0.20)	1.37 (0.00)	7.48 (0.04)	0.25 (-0.02)	8.23 (-0.25)
Anhui	85.06 (-6.75)	0.39 (-0.01)	3.05 (-0.02)	1.28 (-0.30)	10.19 (7.06)
Hunan	92.43 (1.53)	0.27 (-3.15)	4.46 (2.80)	0.74 (0.36)	2.09 (-1.57)
Liaoning	55.21 (12.28)	7.04 (-0.48)	3.07 (-16.20)	11.89 (9.95)	22.77 (-5.57)
Shandong	54.29 (7.71)	0.00 (0.00)	0.00 (0.00)	7.05 (-1.72)	38.64 (-6.00)
Yunnan	69.87 (10.65)	3.67 (3.67)	16.62 (-15.81)	0.44 (0.44)	9.37 (1.03)
Average	69.14 (4.17)	2.92(0.67)	5.56 (-4.04)	4.54 (1.70)	17.83 (-2.52)

Source: EEPF Forest tenure reform survey (2006 & 2007).

Note: Share change (2000-2006) in parentheses.

Shandong was a particularly interesting case in that it is a province in northern China with historically little forest coverage. Reforestation efforts have been focused on establishing shelterbelts surrounding cultivated land. Evidently, a large share of the shelterbelts and some of the collectively managed forests have been transferred to individuals for management. In Yunnan, the share of collective management increased, accompanied by increases in individual and partnership management. The village cluster tenure type generally lost the largest amount of land, averaging a loss of 4 percent across all provinces. The transfers to collective management seemed to occur in places where large areas of forests were affected by the “logging ban” and/or where forestland was zoned as public benefit forest.

China is a large, culturally, biophysically, and economically diverse country. Therefore, on the one hand, it is not very surprising that there were substantial differences in the developments in the 8 provinces. On the other hand, it is more surprising, given the government rhetoric, that there was not a stronger shift toward individual ownership²⁶. Overall, an average of only about 7 percent of the area of forest managed collectively, either at the collective or the smaller village cluster level, was reallocated to the other tenure types. Individual tenure did increase in 7 of 8 provinces, and more than 5 percent in 4 of 8 provinces, but the average increase was only about 4 percent. Contracts to outsiders increased an average of less than 2 percent. This finding suggests that the policy reform was in effect more of a verification and consolidation of existing distributions of land rights than a new and wholesale redistribution. By and large, collectives chose to make marginal shifts in their allocations.

Perceptions of strength and length of property rights. The survey also identified the scope of household rights of use and access under the different tenure regimes (Table 3.2), as well as the average length of term for the different tenure regimes (Table 3.3). The survey examined household perceptions of the use rights that came with each tenure type and asked

²⁶ The background for collective forest tenure reform is that only since 2003 Fujian and Jiangxi provinces began to adopt forest tenure reform. Anhui’s and Liaoning’s reform began later. As for other provinces they took reform even later. Therefore there was not much change in the percentage of individual ownership.

whether those rights existed at all and, if so, whether households could engage that right autonomously, whether they needed approval at the collective level, or whether some other rule governing that right was in place.

Table 3.2 Land Use Rights of Households by Tenure Type as Perceived by Villagers

Right	Response	Individual	Partner	Villager Cluster	Outsider	Public Benefit Forest	Collective	Average
<i>Expressed as % of total households interviewed</i>								
Deforest (convert to agricultural land)	Yes (Household right)	35.01	24.32	11.11	18.60	4.17	3.23	16.07
	Yes with Village Approval	1.71	2.70	3.70	0.00	2.08	0.00	1.70
	No	57.77	70.27	79.63	70.93	87.50	51.61	69.62
	Other Rules	5.51	2.70	5.56	10.47	6.25	45.16	12.60
Convert to other forest type (e.g. orchard)	Yes (Household right)	67.44	56.76	59.26	50.00	43.75	19.35	49.43
	Yes with Village Approval	4.77	8.11	14.81	4.65	8.33	0.00	6.78
	No	20.32	32.43	20.37	32.56	39.58	38.71	30.66
	Other Rules	7.47	2.70	5.56	12.79	8.33	41.94	13.13
Freely select tree species for reforestation	Yes (Household right)	74.30	70.27	68.52	63.95	47.92	25.81	58.46
	Yes with Village Approval	3.43	5.41	11.11	4.65	2.08	0.00	4.45
	No	16.03	21.62	14.81	22.09	39.58	32.26	24.40
	Other Rules	6.24	2.70	5.56	9.30	10.42	41.94	12.69
Manage for non-timber forest products	Yes (Household right)	89.84	83.78	88.89	77.91	81.25	54.84	79.42
	Yes with Village Approval	1.96	0.00	1.85	1.16	2.08	0.00	1.17
	No	3.67	13.51	5.56	9.30	10.42	3.23	7.62
	Other Rules	4.53	2.70	3.70	11.63	6.25	41.94	11.79
Mortgage forest plot	Yes (Household right)	52.14	43.24	40.74	27.91	41.67	25.81	38.58
	Yes with Village Approval	5.39	8.11	7.41	4.65	8.33	0.00	5.65
	No	35.25	35.14	31.48	47.67	41.67	54.84	41.01
	Other Rules	7.22	13.51	20.37	19.77	8.33	19.35	14.76
Transfer plot within village	Yes (Household right)	66.10	64.86	46.30	45.35	47.92	61.29	55.30
	Yes with Village Approval	15.30	10.81	14.81	3.49	16.67	9.68	11.79
	No	15.54	21.62	27.78	38.37	27.08	29.03	26.57
	Other Rules	3.06	2.70	11.11	12.79	8.33	0.00	6.33
Transfer plot outside of village	Yes (Household right)	50.18	54.05	38.89	33.72	47.92	48.39	45.52
	Yes with Village Approval	15.06	13.51	5.56	4.65	12.50	22.58	12.31
	No	31.46	29.73	42.59	48.84	31.25	29.03	35.48
	Other Rules	3.30	2.70	12.96	12.79	8.33	0.00	6.68
Harvest trees	Yes (Household right)	78.21	78.38	79.63	60.47	70.83	45.16	68.78
	No	16.03	13.51	16.67	30.23	20.83	19.35	19.44
	Other Rules	5.75	8.11	3.70	9.30	8.33	35.48	11.78

Source: EEPSC Survey (2006 and 2007).

The general tendency was that the rights of households to access and use forests were strongest when the tenure was allocated to the individual household and weaker as the tenure type moved toward collective ownership. This includes rights of deforesting, converting to another forest type, selecting tree species to plant, managing for non-timber forest products, mortgaging the plot, and transferring the plot to other households within the community. The

rights to transfer property outside the village and harvest trees were approximately the same in the individualized tenure as with the partnership and village-cluster tenure types. This pattern demonstrates the desirability, at least from the perspective of a greater level of rights, of household tenure. The partner tenure type was generally the next strongest.

It is also valuable to understand the distribution of use rights across all tenure types. The right to deforest, for example, and convert to agriculture was generally not granted — under any tenure type — with an average of 70 percent of households reporting that this right did not exist. This was the most constrained use right of all studied. The second-most constrained right was the ability to mortgage the property (41 percent); and the transfer of plots, either within or outside the village, was the third-most constrained right (27 and 35 percent, respectively). On the other hand, across all tenure types, a majority of households could autonomously exercise rights to change forest types (70 percent), select tree species (58 percent), manage for non-timber forest products (80 percent), transfer their plots within the village (55 percent), transfer plots outside the village (45 percent), and harvest trees (69 percent). These findings demonstrate not only the great diversity of land use rights but the general strength of household use rights across all tenure types and for all uses, except for the right to clear the forest or mortgage the land.

Table 3.3 shows the findings regarding the duration of land contract type. Although the land law allows for contract lengths for up to 70 years, the average duration across all tenure types — from individual, to partner, village cluster, and outsider contracts — ranged between 35 and 44 years. There was also a remarkable variation in duration across the tenure types, with much greater variation to be found in the length of the individual tenure type than in the contract or collective types. Both of these findings demonstrate that individualized tenure remains a weaker form and under greater control of the collective.

Table 3.3 Length of Land Contract for Different Tenure Types

Description	Individual	Partner	Villager Cluster	Outsider Contract
	In years (average across provinces)			
Mean	35.41	33.32	43.35	43.70
Standard deviation	24.82	20.56	18.59	19.96
Minimum	1.00	1.00	3.00	1.00
Maximum	72.00	70.00	70.00	70.00

Source: EEPSC Survey (2006 and 2007).

Farmer income. During the period of the survey, farmers' net income increased as a whole (Xu and others, 2009). Farmer income from forestry increased in those provinces where rights were allocated to households (Table 3.4). This increase was almost certainly due to an increased harvesting of timber. In Fujian, Jiangxi, Liaoning, and Shandong, income generated from forestry occupied a substantially larger share of total net income than before the reform. Concurrent with the reduction in the amount of forests under household tenure, the share of forestry-derived income declined in Anhui Province. These findings demonstrate that where rights shifted toward households, the reform had a positive impact on income; and where rights were shifted back toward the collective, income from forestry diminished.

Table 3.4 Distribution of Income in 2006 and Change between 2000 and 2006

Province	Forestry (%)	Agriculture (%)	Livestock (%)	Off-farm (%)	Other (%)
Fujian	8.98 (3.71)	10.28 (0.06)	9.21 (-4.08)	65.14 (-0.88)	6.36 (1.17)
Jiangxi	12.62 (9.95)	19.85 (3.01)	12.78 (-7.71)	46.48 (-8.27)	8.24 (2.99)
Zhejiang	9.45 (3.04)	4.68 (0.3)	2.79 (-0.64)	69.59 (-7.08)	13.46 (4.36)
Anhui	17.82 (-19.55)	5.28 (-1.83)	25.57 (19.91)	42.27 (-2.77)	9.05 (4.21)
Hunan	3.95 (0.01)	22.81 (7.01)	11.96 (-6.09)	44.75 (-6.05)	16.51 (5.1)
Liaoning	15.45 (10.3)	14.93 (-6.68)	10.71 (-6.77)	46.44 (-0.01)	12.45 (3.14)
Shandong	4.99 (0.48)	21.2 (-9.65)	21.37 (8.57)	43.89 (-2.44)	8.52 (3.02)
Yunnan	4.49 (1.44)	40.2 (27.16)	10.8 (-1.16)	37.39 (-28.91)	7.09 (1.44)
Average	9.72 (1.17)	17.4 (2.42)	13.15 (0.25)	49.5 (-7.05)	10.21 (3.18)

Source: EEPSC Survey (2006 & 2007).

Note: Share Change (2000-2006) in parentheses.

Reforestation. According to the survey results, reforestation increased by an average of almost 10 percent across the provinces and tenure types between 2000 and 2006 (Table 3.5). Reforestation by individual households accounted for the vast majority of this increase, representing 8.5 of the 9.5 percent increase. Household reforestation increased most in Fujian, Hunan, Liaoning, Yunnan, and Zhejiang. Reforestation in forests under other tenure types also increased in Fujian, Liaoning, and Shandong.

Table 3.5 Reforestation Rates in 2006 and Change 2000-2006 by Tenure Type

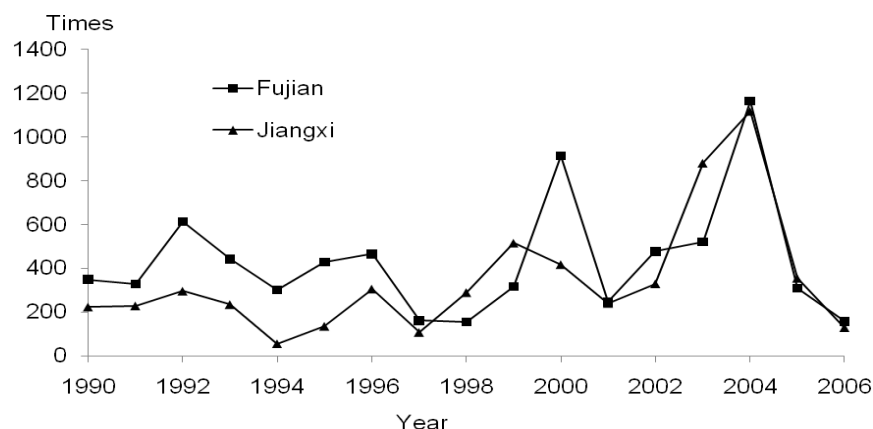
Province	Individual	Partnership	Villager Cluster	Outsider Contract	Collective	Total
<i>Hectares per village</i>						
Fujian	7.15 (5.30)	2.71 (1.22)	1.35 (0.72)	2.55 (2.22)	9.53 (4.82)	23.28 (14.28)
Jiangxi	7.51 (1.80)	0.00 (0.00)	0.00 (0.00)	0.27 (0.27)	0.33 (-0.22)	8.11 (1.84)
Zhejiang	9.29 (6.13)	0.00 (0.00)	0.74 (0.37)	0.00 (0.00)	0.09 (0.09)	10.12 (6.60)
Anhui	1.85 (1.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	1.64 (1.27)	3.50 (2.6)
Hunan	5.33 (4.03)	0.00 (0.00)	0.00 (0.00)	1.11 (1.11)	0.22 (0.11)	6.66 (5.25)
Liaoning	25.38 (7.30)	0.69 (0.44)	0.36 (-1.58)	1.18 (0.96)	2.71 (1.31)	20.32 (8.44)
Shandong	2.27 (0.87)	0.00 (0.00)	0.00 (0.00)	0.53 (0.53)	2.05 (1.61)	4.86 (3.01)
Yunnan	57.52 (41.30)	0.00 (0.00)	0.11 (0.00)	0.00 (0.00)	0.00 (-6.91)	57.63 (34.39)
Average	14.54 (8.47)	0.42 (0.21)	0.32 (-0.06)	0.70 (0.64)	2.07 (0.26)	18.06 (9.51)

Source: EEPSC Survey (2006 & 2007).

Note: Average area change (2000-2006) in parentheses.

Fire incidents. Fire is a regular threat in forest areas and has high economic costs to land owners as well as high political costs to local government officials. The number of incidents and the scale of fires had been generally increasing since especially the mid-1990s, a trend local people often attribute to the increases in harvesting regulations and zoning as well as to the reduced incentives to manage forests or invest in fire prevention. By contrast, after the reform, fire incidents were dramatically reduced in Fujian and Jiangxi, the two provinces which implemented tenure reforms earlier than others and had the largest shift either in allocation of rights or in the share of forest income (Figure 3.1).

Figure 3.1 Forest Fire Incidences in Fujian & Jiangxi Provinces



Source: China Forestry Statistics Yearbook (1990-2006)

Participation and consultation in the allocation of land rights. Given the importance of the reform for the rights and livelihoods of Chinese households, it was important to analyze how this collective decision to reallocate came about, including the degree to which households participated in the decision and how consultations took place. A fundamental difference between this forest tenure reform and those conducted in the 1980s was the rule that reallocation of rights had to be approved by either a village representative committee or a village assembly with a two-thirds vote. Prior to the reform, the village leadership could reallocate land rights without consultation or vote. Now, at least in theory, if the voting procedure is strictly followed, the outcome of the process will be closer to the social optimum than any other decision making mechanism. The opportunity for collective choice led to a wide range of outcomes (including the option of no reform at all).

Table 3.6 presents the findings on household participation in the reform process and indicates how the process was implemented by province. Results show a wide variation in the process across provinces, with 100 percent of villages conducting reforms in some provinces and only 20 percent in others. Similarly, a large majority of households expressed knowledge of the reform in some provinces and less than 1 percent in another. The percentage of households that had their land rights affected also varied tremendously, ranging from 85 percent in Jiangxi to less than 1 percent in Shandong. The percentage of households that had the opportunity to acquire a new plot for themselves also varied significantly, with the highest percentage occurring in those

provinces that had not implemented the “three fixes” in the 1980s (Fujian and Liaoning), but even there it was lower than 40 percent.

The level of consultation, too, varied widely and appeared low overall. Between less than 1 percent and 60 percent of households was consulted, averaging less than 30 percent across the 8 provinces. The number of public meetings was more consistent; between 2 and 7 meetings were held by village representatives and an average of 2 full village assemblies were held. Households attended about half of the representative meetings and the majority of full assemblies.

Analysis of conditions related to collective choices in allocating tenure. In order to better understand the choices made by collectives in the allocation of land rights, a regression analysis was also conducted using data from two provinces, Fujian and Jiangxi, where the political will for reform was strongest in the early 2000s. A reduced form equation was fitted to data from a sample of 90 villages (60 in Fujian and 30 in Jiangxi). Changes in the distribution of tenure types between 2000 and 2005 were used as the dependent variable. The explanatory variables were grouped into 6 categories: (a) village characteristics; (b) market development and opportunity for off-farm income; (c) social capital; (d) tenure security and policy; (e) village politics; and (f) share of total village government revenues derived from forestry activities.²⁷ In addition, the allocation of tenure during the base year and county-level dummy variables were used in the regression as control variables.

The results of the analysis (Table 3.7) show that the correlations, although significant, were few and were not strong. This general finding reaffirms the results of the preceding descriptive analysis that there was much variation in village choices over the allocation of tenure. That said, the significant correlations enable predictions regarding the conditions that favored the different tenure types and the importance of different variables in relation to the choice of forest tenure type.

²⁷ Forest income share is the average share of forestry income generated by the village government in the 20 years before 2000. It is an indicator of the possibility of rent-seeking possibility from forests managed by village governments. As this share declines, village governments have fewer disincentives to support the allocation of rights to households.

Table 3.6 Participation and Consultation in Forest Tenure Reform

Province	Villages conducted reform	Households knew of the reform	Households' use right has changed	Household has right to choose forest plot	Household was consulted in reform	Villagers' representative assemblies convened to discuss reform	Household member attended villagers' representative assembly	Villagers' assemblies convened regarding the reform	Household member attended the villager assemblies
	(%)	(%)	(%)	(%)	(%)	(# times)	(# times)	(# times)	(# times)
Fujian	95.00	76.20	64.03	37.09	38.75	3.28	1.75	1.36	1.24
Jiangxi	100.00	95.33	85.00	21.33	59.00	2.76	1.58	1.48	1.32
Zhejiang	80.56	61.39	41.94	12.78	16.94	1.42	0.88	0.48	0.45
Anhui	20.00	18.67	7.67	3.00	7.33	3.05	1.54	2.31	2.10
Hunan	53.33	49.88	5.30	2.65	4.97	2.12	1.35	1.60	1.55
Liaoning	100.00	85.00	59.67	36.67	56.67	4.45	2.68	3.54	3.33
Shandong	23.33	0.67	0.67	0.00	0.33	7.00	7.00	3.50	3.50
Yunnan	86.67	72.83	32.17	18.17	30.00	2.62	0.74	1.73	1.66
Total	72.83	62.87	38.14	18.51	28.36	2.93	1.45	1.67	1.55

Source: EEPC Survey (2006 & 2007).

The significant correlations and findings regarding each tenure type include the following:

- Individual/household tenure is significantly more likely in villages with higher levels of adult education, lower levels of access to off-farm labor, higher numbers of conflicts, and when forestry represents a lower level of village government revenue.
- Partner tenure is significantly more likely in villages where forestlands are low-sloping, where there are fewer conflicts, and where there is less perceived fairness of the village leadership.
- Village-cluster tenure is significantly more likely when forestland was steeper, when there were higher levels of social capital, when tenure reallocation was more frequent, and when the village revenue from forestry was higher.
- Contracts to outsiders were predicted in cases of higher levels of adult education, steepness of forestland, less importance of agricultural production, and lower perceived fairness of the village leadership.
- Collective management was significantly more likely when there were fewer active laborers in the village — suggesting this as a default option for villages when the population was dominated by the elderly or children.

The significant correlations regarding the importance of different variables include the following:

- Higher adult education tended to predict individual and outsider contract tenures.
- In collectives where social capital is strong, management by hamlets (villager cluster) is the preferred choice.
- In collectives where alternative off-farm sources of income exist, demand for allocation to households tends to be low.
- In collectives where land rights are insecure (due to frequent changes in tenure arrangements caused by local governments or government intervention in the form of land-use zoning for conservation), forest tends to be managed by village clusters, as the cluster can adapt to land adjustment more easily.
- Poor village leadership had a very limited effect on tenure allocation but did tend to decrease the chances for partner and contract tenure.
- High rates of village revenue from forests tended to decrease chances for individualized tenure and increase likelihood of the village cluster type.

Table 3.7 Determinants of Tenure Structure Change in Fujian and Jiangxi (2000-2005)

Variable	Individual	Partner	Villager Cluster	Outsider Contract	Collective
Village characteristics					
Share of active laborers in adult population	0.218	0.092	-0.080	0.051	-0.329**
Level of adult education	0.543*	-0.063	-0.089	0.269**	-0.075
Slope of forestland	0.001	-0.039**	0.051*	0.034*	-0.011
Market development					
Share of agricultural crops that are grown for commercial market	0.102	-0.031	0.097	-0.081*	0.043
Off-farm labor rate	-0.589**	0.002	0.140	0.044	0.200
Social capital					
Ease of access to informal credit	-0.202	0.014	0.324**	-0.016	-0.030
Tenure security					
Frequency of reallocation of agricultural tenure	-0.004	-0.000	0.008***	-0.000	0.001
Area of collective forest zoned to public benefit forest	-0.004	0.006*	-0.001	0.001	0.003
Forest boundary conflicts (number of reported disagreements among farmers in the village over forest boundaries in 2000)	0.073**	-0.035**	-0.024	0.022	-0.039
Village politics					
Perceived fairness of village leadership	0.014	-0.017*	-0.004	-0.015*	0.018
Village revenue from forestry					
Forestry revenue share	-0.120*	-0.026	0.150***	0.030	0.013

Source: EEPC Survey data.

Note: * significant at 10%; ** significant at 5%; *** significant at 1%

EEPC Survey Conclusions

Flexibility in household and collective management. A key finding of the survey is that forest tenure reform is clearly evolving differently among different provinces in China — with most provinces demonstrating a small shift toward individualized (household) tenure, but others demonstrating a shift toward more collective management. Moreover, rather than a major one-off shift from collective to household, the reform resulted in a situation where collectives had the opportunity to reassess and reallocate, and many took advantage of this authority to flexibly allocate tenure rights. Notably, there were provinces where forest tenure was shifted from households back to collective management. That this shift back to collective management took place in Anhui Province, which was widely recognized as the home of the land reform movement in the 1980s, is particularly interesting. That said, the variation in allocation decisions

across the provinces is due in large part to history, with provinces that changed the least in the 1980s changing the most now. In addition to these differences in patterns at the provincial level, the regression analysis demonstrates that within provinces, collectives were choosing between tenure types in response to local social and economic conditions.

This officially condoned flexibility will allow collectives and households to adjust not only to changes in markets and in policies in the future, but also to the shifts in land capability and land value that will come with climate change. Many newly created and emerging tenure types, such as the partnership type and outsider contracts, are likely to be temporary arrangements. When socio-economic and market conditions change, the interests of households will change and thus likely lead to different tenure arrangements. Some of the partners will likely evolve, either separating or increasing in size or number of parties. When a contract period ends, the outsider contracts will have to be renegotiated and the forestland may be returned to households. All these changing factors will lead to calls for regularly adjusting land management rights.

Participation in land rights decision making. There is clearly a need to improve the participation of households in the collective decision making process. The survey analysis suggests that the reform process fell short of the emerging global standard of obtaining free, prior, and informed consent of households and communities before their land rights are altered. The consolidation of household rights and formalization of processes to shift land to households is a major step toward a private market for forestland and will result in hundreds of millions of new forest owners. The limited amount of participation and consultation in the allocation of land rights raises concerns that the forestland market is being liberalized before a regulatory environment is in place which clearly guides land allocations and contracts and ensures adequate judicial processes for grievance and redress. Establishing this framework and informing landowners of their rights and duties as well as establishing legal options have become a priority in the rural sector. Establishing this legal and judicial framework and informing landowners of their rights and duties as well as legal options has become a priority in the rural sector. It has also become urgent to establish the legal and regulatory framework governing land acquisitions, contracts between households, and larger associations of farmers. A next generation of reforms will not only be necessary to protect households against more powerful actors, but also to enable them to access credit markets, allowing them to increase their production and incomes.

Challenge to policy edits. The clarification and strengthening of rights at the collective and household level will also challenge the established practice of policy edicts and regulatory takings to control land use. This policy approach was conceived and implemented in an era when forest owners' property rights were not so highly respected. It can be expected that local owners will increasingly challenge this type of regulatory takings as the tenure reform process advances. In this emerging context of recognized property rights, public programs designed to reimburse forest owners for income lost due to regulations and zoning as well as schemes to compensate owners for the publicly valuable ecosystem services that their forests generate — such as the Forest Ecosystem Compensation Program — will increase in importance.

Forests and economic growth. While a large part of the developing world is still struggling with rapid deforestation and degradation, China and a few other countries are

seemingly moving in a bold new direction by clarifying local land rights, encouraging local collective choice over allocation of those rights, and enabling communities to allocate land to households. These reforms are showing promise for increasing incomes, reforesting forests, and reducing conflict. However, its full effects on land ownership, livelihoods, and local governance are not yet known. It is likely that with greater market integration there will be a consolidation of small farm holdings, more contract farming, and an exit of marginal producers to other pursuits. There is a high risk that the more powerful actors at the local level are controlling land allocations and will benefit disproportionately. There is also still inadequate information regarding the effect of these reforms on the ethnic peoples who traditionally own and manage their forests collectively. China's rapid growth combined with a strong infrastructure, access to large domestic and international markets, as well as active labor markets imply that the secure property rights to forestlands will likely have more positive effects in the long term than in countries where these conditions do not prevail. China's reform efforts can potentially be a positive and useful example for other developing countries.

Chapter IV. Forest Supply in the Northeast

While reforms have advanced in the collective forest sector, reforms affecting state forests have been limited. While reforms in collective areas seem to have had positive impacts on timber supply, there is essentially no information with which to assess the potential supply response on state forest areas. This chapter summarizes results of an engineering economic model of timber supply in Heilongjiang Province, one of the most important centers of industrial forest production in China. Results suggest that modest changes in economic incentives and institutional arrangements could help unleash an enormous potential for a sustainable increase in timber production in the province. Model results accord well with expert opinion on the scope for reform and for the potential for rehabilitation of the resource base. These findings help set and recommend the basis for a broadening of the World Bank's engagement.²⁸

While China's forest sector has undergone large and rapid change in the last three decades, the state-owned subsector has remained largely insulated. Over the next few decades, the greatest changes are anticipated to be in China's Northeast, the geographic center of its industrial forestry sector, a region largely characterized by state-owned forests. The state-owned industrial forests of China's Northeast remain physically understocked although performance has been sluggish, and many of the firms in the processing sector of the region are in financial arrears. The potential timber supply of the Northeast under the new conditions expected after 2010 is a crucial question for the industry, the region, China, the countries that supply its new imports, and the global environmental as well. The objective of this chapter is to examine the long-run timber supply potential for this crucial region.

Resource and Policy Background

China's Northeast — the provinces of Heilongjiang, Jilin, and Inner Mongolia — has been the country's major source of timber and forest products output for 50 years. The natural productivity of forestland in the region is rated at 3 cubic meters per year. This is about the national average and in addition, because of good terrain, the Northeast has the advantage of good logging conditions (PDRHG 2006, FAO/UN 2001). The region is the home of China's largest state-owned forest enterprises, many of them integrated operations that include forest farms, logging operations, and wood processing facilities. State-owned forests account for 85 percent of the forestland in the region; and this region, more than China's other 4 major forested regions, is characterized by state-owned forests.²⁹

²⁸ This section is based on Zhang Lei, Zhang Sheng, Zhang Kun, Zhang Zhitao, Chan Xuequn, Zhou Shaozhou, and Dai Guangcui, "China Forestry Supply: A Case Study in Heilongjiang Province" (China National Forestry Economics and Development Research Center, SFA, Beijing, 2008).

²⁹ Commercial forest production predominantly originates in 5 regions: The northeastern forest region, the southern and south-central forest regions (which are combined in some assessments), the southwestern forest region, the north-central forest region, and the northwestern forest region.

In the past, the state-owned forests of the Northeast had been operated to provide wood for the region's mills, and insuring employment in the mills was a key objective. Overtime, the region's forest inventories declined. Accessible mature forests in the Northeast declined from 12 million hectares and two billion cubic meters in the 1950s to 5.6 million hectares and 0.6 billion cubic meters in the 1990s. Eighty percent of the state forest bureaus of the region had logged out their accessible mature resources (Zhang, 2000). Of course, production in the mills also declined. The National Forest Protection Program addresses these issues by restricting harvests and providing financial assistance for nurseries and the reforestation of 33 million hectares in the Northeast.

The economic experience in agriculture and elsewhere in forestry, and the political motivation that accompanies it, are reasons to be optimistic about change in forestry in the Northeast. The future timber supply from China's northeastern state-owned forests will be very different from what it is now. The engineering approach to estimating supply is designed for such cases of major change (Vaux, 1973; Hyde, 1980).³⁰ The engineering approach builds the supply function from known costs and outputs associated with each identifiable forest management activity (e.g., natural management with minimal inputs, planting, thinning, etc.). It arrays forest management activities from least to most costly per unit of production. This exercise is repeated for each species, land class, and land administrative category. This procedure adds an estimated increment of production for each increment in cost — with the increments representing shifts to a higher level of management within a species and land class, or to new species and new land classes, as each becomes financially feasible at higher levels of input costs.

This provides a measure of cost per unit of harvest volume as measured on the vertical axis of economic supply curves. The second step is to calculate the sustainable harvest flow obtained from the region at this unit cost. This provides a matching coordinate for the horizontal axis of the common economic supply curve. Arraying these from least to most costly per unit of volume creates the anticipated sustainable supply curve for the region, which shows the sustainable harvest volume forthcoming for any particular cost per unit of timber volume.

The Supply Model

The data for this analysis comes from actual timber management and harvest experience in Heilongjiang Province in 2006. Heilongjiang contains almost 38 million hectares of forest, the second largest forest area for any of China's provinces and 45 percent of the total forest in the three northeastern provinces, shown on the map in Figure 4.1. State-owned forests, the administrative category likely to be most responsive to policy reform in the industrial northeast accounts for 93 percent of the Heilongjiang forest. These state-owned forests are further sub-divided as commercial and ecological forests. The latter are protected for various environmental and other social values, but limited timber management and harvesting is

³⁰ The common alternative, broad statistical norms taken from prior production experience, would produce extreme underestimates.

permitted on some of them. In total, 79 percent of Heilongjiang's state-owned forests, or almost 28 million hectares, are available for timber harvest and management.

Figure 4.1 China's Northeastern Provinces: Heilongjiang, Jilin, and Inner Mongolia (Highlighted in Green)



There are four major forested regions, in Heilongjiang: Daxinganling Mountains, Xiaoxinganling Mountains, Wandashan Mountains, and Changbaishan mountains (Table 4.1). For purposes of this report, cost and yield data were collected from one forest enterprise (affiliated with a provincial state-owned forest enterprise group) and one forest bureau (affiliated with the provincial forest bureau) in each region. The regions contain 6 commercial timber species or forest types: poplar, larch, birch, Mongolian pine, Mongolian oak, and mixed species; and these occur on land that falls in 5 productivity classes, arrayed from most to least productive as site classes I-V. All 6 species/forest types are managed as natural stands, receiving minimal management inputs on most sites. Two species, poplar and larch, receive more intensive plantations management on the best sites and, as a result, produce greater final harvest volumes on these good sites. The data collected for this sample is shown in Table 4.2.

Table 4.1 Forest Regions and Sample Forest Administrative Units in Heilongjiang Province

Forested region	Administrative Unit
Daxinganling Mountains	Xinlin Forest Enterprise Tahe Forest Bureau
Xiaoxinganling Mountains	Tieli Forest Enterprise Yilan Forest Bureau
Wandashan Mountains	Dongfanghong Forest Enterprise Baoqing Forest Bureau
Changbaishan Mountains	Hailin Forest Enterprise Muling Forest Bureau

Altogether, this accounts for 40 individual observations (6 species/forest types, each on 5 site classes, plus plantation observations for 2 species, each on 5 sites). The 4 regional locations multiply these to 160 total observations, although many sites and species are absent in some regions. Some cells are empty because some species/forest types do not grow in some regions or on some sites. On the other hand, there are multiple observations for many cells. The differences in the latter are generally small, and they are useful as confirming observations. After eliminating null cells, the final yield is 55 region/species/site-class observations of cost and yield pairs.

Table 4.2 Estimated Sustainable Timber Supply for Heilongjiang

	Cost – 4% Yuan/m ³	Yield m ³ /ha./yr	Forestland ha	Total Yield m ³ /yr	Cumulative Yield Million m ³ /yr
Poplar-N- I	27.84	5.50	103,992.86	571,960.73	0.57
Poplar-N- II	28.38	4.45	71,255.21	317,085.67	0.89
Mixed soft broad-leaf-N- I	29.55	5.95	89,212.96	530,817.11	1.42
Mixed soft broad-leaf-N- II	29.95	5.00	233,823.70	1,169,118.50	2.59
Poplar-N-III	30.13	2.75	135,668.58	373,088.60	2.96
Poplar-N-IV	31.15	2.25	17,885.86	40,243.19	3.00
Mixed soft broad-leaf-N-III	31.59	3.03	724,868.50	2,192,727.21	5.20
Mixed soft broad-leaf-N-IV	31.81	2.88	814,346.20	2,341,245.33	7.54
Poplar-N- V	31.85	2.00	17,051.49	34,102.98	7.57
Birch-N- I	32.12	4.45	114,062.82	507,579.55	8.08
Birch-N- II	32.17	4.38	377,234.19	1,650,399.58	9.73
Mixed soft broad-leaf-N- V	33.03	2.25	378,020.50	850,546.13	10.58
Birch-N-III	33.87	2.75	1,080,065.10	2,970,179.03	13.55
Birch-N-IV	35.59	2.00	908,501.90	1,817,003.80	15.37
Birch-N- V	36.49	1.75	180,185.28	315,324.24	15.68
Mongolian oak-N- I	37.86	2.42	34,162.97	82,560.51	15.76
Mongolian oak-N- II	38.17	2.33	37,447.14	87,376.65	15.85
Mixed needle-leaf & broad leaf-N- I	39.71	4.47	78,624.55	351,189.66	16.20
Mongolian pine-N- I	39.81	2.65	358.25	949.36	16.20
Mongolian pine-N- II	40.28	2.50	1,057.70	2,644.25	16.21
Mongolian pine-N-III	40.74	2.42	144,154.58	348,373.57	16.55
Mixed needle-leaf & broad leaf-N- II	41.01	3.50	206,071.80	721,251.30	17.28

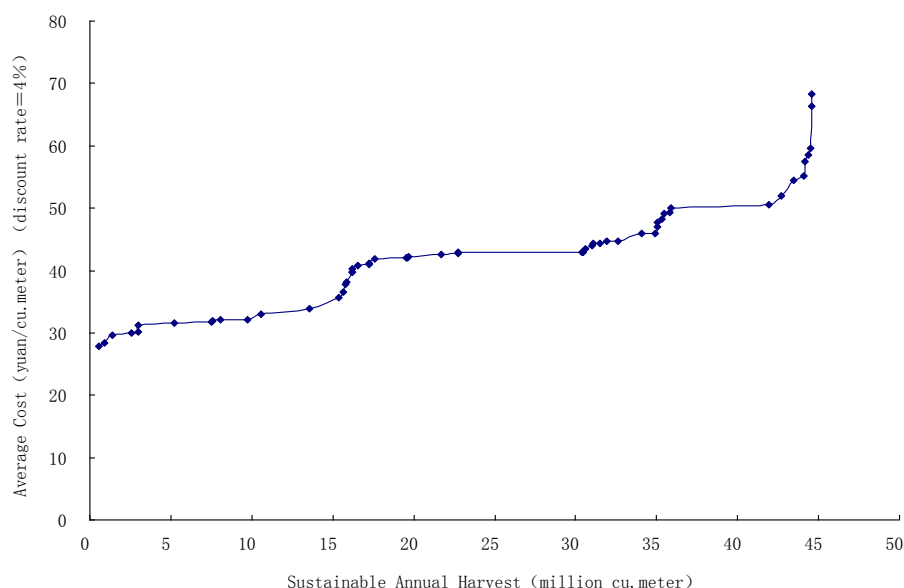
	Cost – 4% Yuan/m ³	Yield m ³ /ha./yr	Forestland ha	Total Yield m ³ /yr	Cumulative Yield Million m ³ /yr
Mongolian pine-P- I	41.22	6.57		1,403.15	17.28
Mongolian oak-N-III	41.93	1.67	209,277.78	348,796.30	17.63
Mixed needle-leaf & broad leaf-N-III	42.01	3.00	638,836.00	1,916,508.00	19.54
Mongolian pine-N-IV	42.04	2.07	34,904.17	72,135.28	19.61
Larch-N- I	42.19	2.65	32,894.27	87,169.83	19.70
Mixed needle-leaf & broad leaf-N-IV	42.65	2.75	717,693.90	1,973,658.23	21.68
Larch-N- II	42.66	2.50	429,045.01	1,072,612.53	22.75
Mongolian pine-P- II	42.85	5.80		3,490.41	22.75
Larch-N-III	42.95	2.42	3,173,402.60	7,669,056.28	30.42
Mixed needle-leaf-N- I	42.95	3.45	15,934.36	54,973.54	30.48
Mixed needle-leaf-N- II	43.53	3.15	41,763.32	131,554.46	30.61
Mixed needle-leaf-N-III	44.07	2.92	129,469.00	377,617.92	30.98
Larch-P- I	44.30	6.57		128,835.91	31.11
Larch-N-IV	44.43	2.07	194,094.73	401,129.11	31.51
Mixed needle-leaf-N-IV	44.70	2.68	145,450.70	3902,92.71	31.91
Mixed needle-leaf & broad leaf-N- V	44.71	2.17	333,154.40	721,834.53	32.63
Larch-P- II	45.90	5.80		1,415,848.53	34.04
Mongolian oak-N-IV	45.98	1.25	701,391.02	876,738.78	34.92
Mixed needle-leaf-N- V	47.03	2.07	67,518.37	139,537.96	35.06
Mongolian pine-N- V	47.64	1.33	13,391.88	17,855.84	35.08
Mongolian pine-P-III	48.34	4.33		276,296.28	35.35
Mixed hard broad-leaf-N- I	49.12	3.27	42,046.39	137,351.54	35.49
Mixed hard broad-leaf-N- II	49.36	3.15	110,201.90	347,135.99	35.84
Larch-N- V	50.02	1.33	28,142.19	37,522.92	35.88
Larch-P-III	50.54	4.33		6,082,354.98	41.96
Mixed hard broad-leaf-N-III	52.03	2.25	341,633.10	768,674.48	42.73
Mongolian oak-N- V	54.39	0.83	884,257.99	736,881.66	43.46
Mixed hard broad-leaf-N-IV	55.18	1.68	383,804.30	646,070.57	44.11
Mongolian pine-P-IV	57.53	2.90		29,086.81	44.14
Mixed hard broad-leaf-N- V	58.46	1.33	178,162.40	237,549.87	44.38
Larch-P-IV	59.61	2.90		161,745.61	44.54
Mongolian pine-P- V	66.37	2.20		11,606.30	44.55
Larch-P- V	68.34	2.20		24,389.90	44.57

The measures of timber harvests for these sites are the harvest levels currently observed at the rotation ages of current harvests.³¹ In many cases there were multiple observations of the same species and site class. In these cases the average yields and average rotation lengths from the multiple observations were used. The forest enterprise and forest bureau observations include numerous timber stands of multiple hectares of the same approximate site and species

³¹ These figures are found in the Forest Resource Files of forest bureaus and forest enterprises (Table 5.1). The files comprise numerous cards or pages catalogued by the number of the forest subcompartment. Each subcompartment is a land unit of relatively uniform forest. Each subcompartment file contains stand age, species or forest type, standing volume, and series of management activities and cost applied in that sub compartments.

category. The final harvest levels for each timber stand were divided by the number of hectares in the stand to create a measure of yield for a standard one-hectare site. Then the one-hectare yields were divided by the number of years in the observed timber rotation to obtain an average annual sustainable yield in cubic meters for standard one-hectare stands of each site and species/forest type class. Finally, the number of cubic meters was multiplied by the total number of hectares in the province in that site and species/forest type class to obtain the sustainable yield for Heilongjiang province for that site and species/forest type. This is the horizontal coordinate in the long-run sustainable economic supply curve (Figure 4.2).

Figure 4.2 Estimated Sustainable Timber Supply for Heilongjiang Province



The yields used in Figure 4.2 are underestimates of expected future yields from stands that will have benefitted from a full growth period at the new higher levels of management. Many current harvests are taken from timber stands in excess of 80, 100, 120, or even 140 years in a few cases. The average annual yields are further underestimates of potential in these cases because annual growth is so very small in the later years of these long rotations. The younger stands growing under more active current management regimes can be expected to produce considerably larger sustainable annual yields under future conditions of shorter rotations.

The measures of annual costs for each category of timber stand are taken from the financial management records of the forest enterprises and forest bureaus. Costs range from the minimum under natural forest management, the cost of general annual oversight plus annual costs for fire and insect protection, to also include site survey and design for afforestation, planting, and tending for more intensive plantation management. All timber stands include costs elements for logging preparation, road maintenance, loading, and hauling in the years approaching final harvest. Each individual cost back was discounted to year one in the timber rotation and then added with all discounted cost elements for each timber stand. These accumulated discounted costs for each timber stand were also divided by the number of

hectares in that stand to create a measure of cost for a standard one-hectare site. Finally, these discounted and accumulated one-hectare costs were divided by the average annual yield per hectare to obtain a discounted and accumulated cost per cubic meter of sustainable wood for each site and species/forest type class. This is the vertical coordinate in the long-run sustainable economic supply curve (Figure 5.2).

Results and Additional Observations

Figure 4.2 shows that sustainable output is strongly elastic for the broad range of timber supply between 3 million and 40 million cubic meters per year. This output will be available at a price in the neighborhood of 40 to 50 yuan per cubic meter.³² Only the poorer productivity sites and less productive species/forest types remain available to add productivity above 40 million cubic meters per year. These sites add little to annual production and only at much greater cost. Therefore, output becomes very inelastic as these final sites are added. For comparison, the annual harvest level for Heilongjiang in 2006 was a modest 13.05 million cubic meters, a level that is well within the elastic range of sustainable production shown in Figure 4.2.

These findings contrast with the current annual harvest level for Heilongjiang, 13.05 million cubic meters, at a much higher current price of approximately 670 yuan per cubic meter. They suggest that more than a three-fold increase in annual production could be sustainable in Heilongjiang. However, the sharp contrast between current and expected levels of sustainable output — and also price — raises a couple of issues:

Contrast between current and sustainable output levels. Timber harvest levels in Heilongjiang are low at present because the standing forest had been drawn down severely in the past and because the government put restrictions on harvest levels while the forest recovers. However, even in the 1990s, before the recent restrictions, annual harvest levels were only in the neighborhood of 24 million cubic meters (SFA, 2001: 108-9). These results suggest that, once the forest recovers, it can be a very productive forest capable of a much greater level of timber production and thereby capable of supporting a strong regional forest industry and contributing to a strong aggregate economy in Heilongjiang.

Difference between the projected output at 40 to 80 yuan and the 2006 price of approximately 670 yuan per cubic meter. There are at least three sources of associated costs. The first is fees charged at 20 percent of the price of timber from the natural forest and 25 percent of the price of timber from plantations. The second is a required transfer of forest bureau and forest enterprise revenues to the higher administrative agents of these organizations. This transfer is intended to cover administrative costs and is intended to be a share of retained earnings. In 2007 it amounted to almost 200 yuan per cubic meter for some forest enterprises. The third source is the retained earnings of the forest bureau or forest enterprise, approximately 100 yuan per cubic meter in 2007. At current prices, these three

³² This is comparable to other findings of long-run timber supply elasticities. Hyde and others (1991) and Buongiorno and others (2003) provide tables of reported timber supply elasticities.

sources reduce the average net revenues collected by the forest bureau or forest enterprise by approximately 435 yuan to approximately 215 yuan per cubic meter.

The 215 yuan per cubic meter is more comparable, even if still greater than, the estimated sustainable timber production costs for Heilongjiang. It suggests each of three possibilities. Some, and perhaps most of the difference is due to temporarily high current prices caused by the mandated logging moratorium. In addition, it is possible that there are either (a) omitted significant input cost items or (b) the financial accounts available were incomplete. However, none of these possibilities alters the fact that the transfer from the forest bureaus and forest enterprises to their higher administrative agents accounts for the largest share of the difference between the 2006 price and the expected sustainable production cost — raising the question Was this large transfer a valid payment for services?

Prior to establishment of the Natural Forest Protection Program, the objective of the forest bureaus and forest enterprises was to provide a flow of wood sufficient to insure employment in the mills. With mill employment as the overall objective, the standing forest was drawn down without sufficient compensation to insure continued timber management and production. Both timber and financial resources flowed to the mills and their employment objective. With the Natural Forest Protection Program, the Government assured the forest bureaus and forest enterprises of its financial support as it rebuilt forest reserves. However, the Government has instructed that its support would not be permanent and that the forest bureaus and forest enterprises are expected to revise their own operations to become financially self-supporting. As they do so, will they revise the transfer downward? In fact, in 2008 the transfer to higher administrative units will be decreased by one-third. If and as this downward revision continues, it is anticipated that forest management in Heilongjiang will become a much more financially viable activity, and sustainable production levels at prices comparable to those predicted over the broad range of the reported timber supply curve will become feasible.

This chapter set out to project long-run sustainable timber supply for the state-owned forest of Heilongjiang province in China's Northeast. The inventories of these forests had been drawn down in the past to support the mills of the large forest industry in the region. However, the Government restricted production as part of the National Forest Protection Program beginning in 1998, with the expectation that a temporary reduction in harvests plus financial assistance from the central government would allow the forests to recover and also allow the forest bureaus and forest enterprises time to reform their own internal operations.

The reported projections for financially reformed state-owned forests in the province suggest that a strong economic future is possible. With continued economic reforms, the state-owned forests and the forest industry as well can recover. The strong recovery of this leading industry in China's Northeast would be welcome news for the aggregate economy of that region. Furthermore, as the state-owned forests recover and sustainable timber harvests expand to levels like those projected, some substitution of domestic production for China's recent and increasingly large volumes of roundwood imports can also be anticipated.

Chapter V. World Bank Role

In most respects, the World Bank's role in China's forest sector has been remarkably successful. The Bank has financed the establishment of over 4 million hectares of plantations and has contributed to improvements in technical quality and productivity through practices that have been applied outside of Bank-financed plantings. The Bank's investment support has been appreciated by the Government and demand for lending to forestry has remained strong despite the shift from IDA to IBRD lending terms and the application of Bank policies on financial intermediation, which have meant that Bank support has had to reorient from commercially viable plantings to environmental or public good forestry. Leading to the questions: *How can the Bank continue to supply investment resources for plantations in increasingly private sector-dominated "collective" forest areas? How can the Bank help address second-generation issues of regulatory and governance reform? And how can the Bank help catalyze reforms in the state-owned forestry sector?*

The World Bank-supported forestry program in China has been mostly driven by demand. Projects have evolved from relatively simple support to forest plantations on state and collective farms to more complex projects with objectives ranging from poverty alleviation to farmer participation and to management of protected areas and biodiversity. The Bank-supported forest projects have been successful by most measures and have contributed to the successes of China's forest sector. The Bank's implementation completion assessments have concluded that all of the completed projects have high economic and financial rates of return, often exceeding appraisal estimates, and have had positive impacts on the Chinese Government's forest plantation programs. In contrast to investment, the Bank's forest policy engagement in China has been limited.

Investment in China's Forestry Sector

From 1980-1998, the World Bank approved nearly US\$1 billion in forest sector credits in China. Since that time, the Bank has approved 11 additional projects with significant forestry components. There are 4 additional projects in the pipeline. These projects total just over US\$1.3 billion in Bank commitments, with US\$1.046 billion in active or now-closed projects and an additional US\$265 million in proposed projects.

With the exception of the two new projects under preparation, Bank support for plantations was primarily channeled toward plantations with commercial or industrial objectives. Projects functioned as financial operations, channeling loan proceeds through a series of on-lending steps to planting and management entities, but avoiding established financial institutions. Moving forward, it was concluded that the Bank's forestry plantation

investments should be aimed at non-commercial objectives such as soil and water and ecological services.

Table 5.1 World Bank Forestry Portfolio since 1998

Project Title	Bank Commitment (US\$ million)	Status
Second Loess Plateau Watershed Rehabilitation Project	150.0	Closed
Irrigated Agriculture Intensification Loan II	300.0	Closed
Water Conservation Project	74.0	Closed
Sustainable Forestry Development Project (Natural Forest Protection)	16.0	Active
Sustainable Forestry Development Project	93.9	Active
Irrigated Agriculture Intensification Loan III	200.0	Active
Changjiang/Pearl River Watershed Rehabilitation Project	100.0	Active
Facilitating Afforestation Project	2.0	Active
Guangxi Integrated Forestry Development and Conservation Project	100.0	Active
Guangxi Integrated Forestry Development and Conservation Project (GEF)	5.25	Active
Mainstreaming Climate Change Adaptation in Irrigated Agriculture Project	5.0	Active
Integrated Forestry Development Project	100.0	Pipeline
Shandong Ecological Afforestation	60.0	Pipeline

A continuation of Bank involvement in Chinese forestry based on “public good” plantings will not address either the second-generation reform issues on collective forest areas or the reforms needed to tap the potential for revitalization of the state forest sector. To work with Government on these issues, the World Bank needs to engage with new interlocutors in the sector, including officials from units of the State Forestry Administration not currently involved in Bank investment work and with authorities. Such engagement could focus around 3 themes:

- (a) ***Transitioning from a Plantation Investment Relationship.*** The reforms to tenure have largely obviated the need for direct public sector support for investment in commercial forest plantations. Nevertheless, there remains a large potential demand for plantation investment; but there are serious gaps in the access of financial institutions and private investors, including potential foreign investors. Rather than simply withdrawing from this aspect, the Bank could play an important role in helping identify and develop institutions, regulatory arrangements, and policies that could support a sustainable transition.
- (b) ***Addressing Second-generation Forestland Tenure Reform Issues.*** Forestland tenure reform in collective forests provides a unique opportunity for the World Bank to support the Government’s efforts in reforming forestland tenure into a more flexible and more sustainable system. According to the needs identified by the local communities and forest agencies, the proposed project should support reform process by (i) helping to extend the areas for which forestland use rights

certificates are to be issued; (ii) providing needed resources to support capacity building in forest technical services, including training forest extension staff and farmers; (iii) providing technical support for the development of farmers' associations in areas where demand is strong; (iv) pilot forest management plan development involving local forest authorities, village leaders, and farmers to facilitate policy transition. This would be the tool needed to replace existing logging quota systems which are one of the key constraints facing the sustainable management of both timber forests and ecological forests.

- (c) ***Reform and Restructuring of the State Forest Sector.*** The analysis of the timber supply potential of the Northeast suggests that the long-run sustainable harvest of wood could be doubled or more of the current harvest at reduced prices. Nonetheless, the region remains trapped in a continuing decline because of the linkages between the structure of forest enterprises, the condition of the forest resource, and the financing of local government services. The region's large state-owned forest enterprises are intimately mixed with local administration and with the financing and delivery of a wide range of services including education, health care, and other social services. Because of this, and because the enterprises and forest areas are directly under the control of the State Forestry Administration (as opposed to collective forests in other regions of China), they have been protected and insulated from impact by the Government programs and policies that have encouraged restructuring and reform in other forest regions (including the Natural Forest Protection Program, and reform of collective forest tenure). These programs have, among other things, included financial support intended to facilitate reform but which has instead largely subsidized the status quo. Indications are, however, that this protection is weakening and that the second phase of the Natural Forest Protection Program (now being planned) could involve significant changes.

Components in Support of a Reform Process

An adjustment program with three key components could support a reform process that would help the Northeast emerge with richer and healthier forests, a more vibrant and diversified forest-based economy, and more sound public finance systems. One component would be *restructuring of social support arrangements* that would reduce or eliminate direct dependence on state-owned forest enterprises as sources of finance and replace them with a sustainable source of tax and other revenues. For a transitional period, a significant financing gap would need to be bridged for schools, health centers, pensions, and other public services.

A second component, *a forest industry restructuring program*, would need to be designed and implemented. Some enterprises, especially those have excessively depleted the accessible resources, would be targets for closure; and redundancy packages, pensions, retraining, and resettlement provisions would need to be financed. Viable enterprises could merit support for retooling and modernization. Support for new enterprises based on non-consumptive uses of the forest (e.g., tourism) could be justifiable.

Along with the forest industry restructuring program, the third component, a *program of forest ecosystem rehabilitation* consisting of thinning, plantings, and other treatments, would be implemented. This program would aim to restore forest composition and health, contributing to recovery of wildlife populations, and reduce susceptibility to fire, pest, and disease (including risks associated with climate change). The forest treatment program would generate employment opportunities for idled workers and could be furthered with investments to support marketing of residues and pre-commercial thinnings (e.g., wood-energy systems).

References

- Berkes, Fikret, Johan Colding and Carl Folke (2003). "Navigating Social-Ecological Systems, Building Resilience for Complexity and Change", Cambridge, MA: Cambridge University Press.
- Bray, David. B., Elvira Duran, Victor H. Ramos, Jean-Francois Mas, Alejandro Velazquez, Roan Balas McNab, Deborah Barry and Jeremy Radachowsky (2008). "Tropical Deforestation, Community Forests, and Protected Areas in the Maya Forest", *Ecology and Society* 13 (2): p56 [online], <http://www.ecologyandsociety.org/vol13/iss2/art56/>.
- Buckley, Chris. (2009). "How Far Will Unrest Escalate in China in 2009?" http://www.financialmirror.com/Columnist/Global_Markets/252.
- Buongiorno et al. (2003), Chapter V
- Chai, Xitang, (2006). "Collective Forest Tenure Reform in Fujian", International Workshop on Forest Tenure Reform: Beijing, China, 21 September 2006.
- Chen Peng. (200?) "Inside Investigation of Yunnan Logging Secrets", Bimonthly Forum. January 28, 200?
- China News Net (2006). "How Former Forest Police Chief of Yunnan Province Ma Sheng Got Rich" (September 14, 2006), http://news.china.com/zh_cn/news100/11038989/20060914/13624950.html.
- Chomitz, Ken (2007). "At Loggerheads: Agricultural Expansion, Poverty Reduction, and Environment in Tropical Forests", Washington DC: World Bank.
- Chu Wanzhong (2007). "Reasons for Frequent Occurrence of Malfeasance Crimes with Yunnan Forestry Management Agency", *Legal Daily (China)*, April 3, 2007.
- Christy and others, Footnote 40, p.39
- Dachang, Liu. 2001. Tenure and Management of Non-State Forests in China since 1950: A Historical Review. *Environmental History* 6(2): p239-263.
- Democracy & Legal Times (2007). "Former Director General of Anhui Provincial Forestry Bureau Tang Huaimin Took Bribes for Fear of Offending People.", January, 22, 2007, available at <http://news.sina.com.cn/c/2007-01-22/100112103028.shtml>.
- Department of Policy and Legislation, State Forestry Administration, 2008.
- Eliasch, Johan (2008). "Climate Change: Financing Global Forest", London: Office of Climate Change.
- Feng Haifa (2008). "Farmers' income can be doubled by 2020", *China Daily*, November 4, 2008. http://www2.chinadaily.com.cn/bizchina/2008-11/04/content_7172158.htm.
- FAO/UN (Food and Agriculture Organization/United Nations), 2001.
- FAO (2005). "Global Forest Resources Assessment 2005", FAO Forestry Paper 147, FAO: Rome.
- Guo Yong (2007). "Economic Transition, Institution and Corruption", *Social Sciences Academic Press (China)*, p. 199-200.
- Hyde and others (1991). Chapter V.
- Hyde (1980). Chapter V.
- Jiang Hua, et al. (2007) "Economic Analysis on the Institution of Forest Felling Quota", *Problems of Forestry Economics* vol. 27(3): 255.
- Jikun Huang (2000). "Land Degradation in China: Erosion and Salinity", Center for Chinese Agricultural Policy Chinese Academy of Agricultural Sciences, Report for the World Bank.

- Juxiang, Chu, and Zhang Huihua (2006). "Probing into the Issues about the Rational Annual Forest Harvest Calculation of the Eleventh Five-year Plan Period", *Forest Resources Management*.
- Kaimowitz, David (2005). "Forests and Conflicts". *European Tropical Forest Research Network Newsletter*, pp.43-44.
- Li Zuyi, et al (2006). "Forest Resources Operation and Logging Management Solutions after the Collective Forestland Reform in Fujian Province", *Forest Resources Management* Vol 6: 14.
- Lieke, Zhu (2008). Personal communication, Vice Administrator, State Forestry Administration.
- Liu, Jianguo, Shuxin Li, Zhiyun Ouyang, Christine Tam, Xiaodong Chen. "Ecological and Socioeconomic Effects of China's Policies for Ecosystem Services", *Proceedings of the National Academy of Sciences*. July 15, 2008.
- Liu Deqin . footnote page 29
- Magrath et al. Chapter IV
- Miao, Guanping, and Anders West (2004). "Chinese Collective Forestlands: Contributions and Constraints", *International Forestry Review* Vol. 6 (3-4): 282-98.
- Nepstad, Daniel C., Stephan Schwartzmann, Barbara Bamberger, Marcio Santilli, Deepak K. Ray, Peter Schlesinger, Paul A. Lefebvre, Ane Alencar, Elaine Prinz, Greg Fiske and Alicia Rolla (2006). "Inhibition of Amazon Deforestation and Fire by Parks and Indigenous Lands", *Conservation Biology* 20 (1): 65-73.
- National Bureau of Statistics (2009). *China Statistical Yearbook 2009*, China Statistics Press; Beijing.
- Olsson, Per, Carl Folke, and Fikret Berkes (2004). "Co-Management for Building Social-Ecological Resilience", *Environmental Management* 34 (1): p75-90.
- PDRHG (2006).
- Ping, Li, and Keliang Zhu (2008). *A Legal Review and Analysis of China's Forest Tenure System with an Emphasis on Collective Forestland*, Washington, DC: Rights and Resources Initiative.
- Roberts, J. Timmons, and Bradley C. Parks (2007). *A Climate of Injustice, Global Inequality, North-South Politics, and Climate Policy*. Cambridge, MA: MIT.
- Rozelle, Scott, Jikun Huang, Syed Arif Husain, and Aaron Zazueta (2000). "China: From Afforestation to Poverty Alleviation and Natural Forest Management", *OED Evaluation Country Case Study Series*, Washington D.C.: World Bank.
- Runsheng, Yin (2003). "Measures of the Effects of Improved Property Rights, a Stable Policy Environment and Environmental Protection", In Hyde, William F., Brian Belcher and Jintao Xu, eds. *China's Forests: Global Lessons from Market Reforms*. Washington, DC: Resources for the Future.
- SFA (State Forestry Administration, People's Republic of China). 2008. *Investigation Report on Regional Forest Ecological Benefit Compensation Policy*, <http://www.forestry.gov.cn/distribution/2008/05/29/kjyj-2008-05-29-275.html> .
- SFA (2007). *China's Forestry, 1995-2005*, Beijing: China Forestry Publishing House.
- SFA. 2006a. *China Forestry Development Report 2006*.
- SFA. 2006b. *Guidelines on the Compilation and Implementation of Forest Management Plans*.
- SFA. 2009. *China Forest Resource Report-the Seventh National Inventory*.
- SFA. 2001. Page 49
- Shi, Peili, and Jintao Xu (2000). *Deforestation in China*.
- Stern, Nicholas (2007). *The Economics of Climate Change: The Stern Review*, London: HM Treasury.

- Su, Yongtong (2007). "China Will Go All Out in the "Third Land Reform". Southern Weekend, July 16.
- Sunderlin, William D., Jeffrey Hatcher, and Megan Liddle (2008). "From Exclusion to Ownership? Challenges and Opportunities in Advancing Forest Tenure Reform", Washington DC: Rights and Resources Initiative.
- UNDP (United Human Nations Development Programme) (2007). Development Report 2007/2008: Fighting Climate Change, Human Solidarity in a Divided World. New York: UNDP.
- Vaux, Henry J. (1973). "How Much Land do we Need for Timber Growing?" *Journal of Forestry*, 71, pp. 399-03.
- Wang Jiannan, and Chen Yongfu (2007). "Research on Huzhou City's Non-state-owned Forest Logging Policies", *Journal of Zhejiang Forestry Science & Technology* vol. 27(1): 72.
- Wang Lijie, and Ma Ping (2007). "Solving the New Problems concerning Collective Forestland Logging Quota", *China Forestry* vol. 2007 (11B): 32.
- Wily, Liz Alden (2008). "Custom and Commonage in Africa: Rethinking the Orthodoxies." *Land Use Policy Journal* 25: 43-52.
- Wily, Liz Alden (2008). *Whose Land Is It? Commons and Conflict States: Why the Ownership of the Commons Matters in Making and Keeping Peace*. Humanitarian Policy Group Conference Uncharted Territory: Land, Conflict and Humanitarian Action. London, United Kingdom, February 7, 2008.
- Xu, Jianchu, and David R. Melick (2007). "Rethinking the Effectiveness of Public Protected Areas in Southwestern China." *Conservation Biology* 21 (2): 318-28.
- Xu, Jintao, and Andy White (2004). "Editorial: Understanding the Chinese Forest Market and its Global Implications." *International Forestry Review* Vol. 6 (3-4): p.ii-iv.
- Xu, Jintao, Eugenia Katsigris, and Thomas A. White (2002). "Implementing the Natural Forest Protection Program and the Sloping Land Conversion Program: Lessons and Policy Recommendations", Beijing, China: China Forestry Publishing House.
- Xu, Jintao, Xuemei Jiang, Yan Sun, and Ling Li (2009). *Study of Collective Forest Tenure Reform in China: Synthesis Report to the World Bank, PROFOR Project (Contract No.: 7141913), Report No. 1*.
- Yang Anqi (2008). "Township Forestry Stations Becoming Hot Spots of Malfeasance Crimes." *Guangdong Procuratorate*, December 7, 2008.
- Ye Shanwen (2007). "Discussion of Forest Management Reform under the Background of Collective Forestry Property Reform", *China Forestry Economy* vol. 84: 52.
- Zhang (2000). Chapter V
- Zhang Jian, et al (2008), "Structuring and Improving Forestry Prosecutorial Mechanism", *People's Prosecutorial Monthly* vol. 22: 62.
- Zhang, Yuxing, and Conghe Song (2006). "Impacts of Afforestation, Deforestation, and Reforestation on Forest Cover in China from 1949 to 2003." *Journal of Forestry*, October/November 2006: 383-87.
- Zhou Jingwei, and Wen Bing (2004). "Analysis on Rent Seeking Behavior toward Forest Felling Quota Policy and Classified Management of Forest Resources." *Journal of Southwest Forestry College* vol 24(4): 52.