

# Impacts, experience and outlook of the coordinated development of eco-friendly forestry and livelihood-oriented forestry

A review of the decade-long monitoring and assessment of the  
socioeconomic impacts of China's key forestry programs

**2013**



Task force for monitoring and assessment  
of the socioeconomic impacts of  
China's key forestry programs



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# Foreword

In 1998, massive floods occurred in China's Yangtze and Songhuajiang river valleys. In order to reverse the ecological degradation they caused and improve the living conditions of the Chinese people, we launched a number of globally visible key ecological programs, including the National Forest Protection Program (hereafter known as NFPP), the Program for Conversion of Cropland to Forest and Grassland (hereafter known as the CCFP), and the Sandification Control Program for areas in the vicinity of Beijing and Tianjin (hereafter known as SCP). These programs have focused on the role of forestry in restoring and improving the ecosystem, and have significantly contributed to China's efforts to maintain ecological security and promote sustainable socioeconomic development. More than a decade has passed since then. China now boasts constantly expanding and diversifying eco-friendly forestry with growing global influence and remarkable achievements to date.

To push for successful implementation of the key forestry programs, track their progress and implementation, promptly detect the problems during their implementation, and make the decision-making process more scientific, the State Forestry Administration introduced an initiative called Monitoring and Assessment of the Socioeconomic Impacts of China's Key Forestry Programs (or 'Monitoring of Key Programs') in 2003. It aimed to monitor and assess the NFPP, the CCFP, and the SCP. Pilot projects were carried out, which were later rolled out to include more objectives and cover a wider scope. By 2013, ten years after the launch of the work, the scope of monitoring had been extended to the: NFPP, CCFP, SCP, Wildlife Conservation and Nature Reserve

Development Program (hereafter known as NRP). Monitoring sites were scattered in 169 counties, 37 forest-related industrial enterprises, 40 nature reserves, 317 villages (forestry centers) and 1,656 households in 27 provinces, autonomous regions and municipalities in China. The results of the monitoring and assessment exercise, which reflect the achievements and problems of the programs, was an important reference for decision-makers, and has exerted extensive social and academic influence.

In ten years of monitoring and assessment, we have reported the development of China's eco-friendly forestry, depicted the evolution of its livelihood-oriented forestry, and witnessed the historical course of forestry reform and development. The results suggest that all the programs have achieved their intended goals, China's forest resources have increased steadily, the ecosystem of forest – desert, wetland and biodiversity have been effectively

preserved, the ecological situation has been greatly improved, and a national ecological security pattern has been established. The implementation of the key forestry programs have boosted job creation, increased the income of workers and farmers in the forest areas, optimized the industrial mix, safeguarded food and energy security, and promoted agricultural development and rural economic growth. It is clear that the forestry development strategy focusing on ecological development identified by the Central Party leadership and the State Council is in keeping with China's national conditions. As an important strategic measure for the development of ecological preservation, it provides an effective avenue for implementation of China's new forestry development strategy. It has swiftly reversed the degradation of ecological systems, laid a solid foundation for strengthening of socialist ecological civilization, and won the wide acclaim of the international community.

# 1

## A decade of monitoring and assessment The evolution of China's key ecological programs

Xie, Chen; Gu, Zhenbin; Zhao, Jincheng; Zhang, Sheng; Yu, Tao; Peng, Wei

### 1.1 The achievements of the programs

#### 1.1.1 Natural Forest Protection Program (NFPP)

In 2000, China formally launched the Natural Forest Protection Program (NFPP). The purposes are to: preserve the 61.2 million ha of forest in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River by a comprehensive ban on commercial logging of natural forest, reduce the annual output of commercial-use timber by 12.39 million m<sup>3</sup>, cut annual consumption of forest resources by 61.08 million m<sup>3</sup>, increase forest coverage by 8.6667 million ha and in program areas by 3.72% through public-benefit afforestation, and divert and resettle 256,000 surplus workers. In key state-owned forest areas in China's northeastern provinces and in Inner Mongolia, the program aimed to: reduce timber output by 7.515 million ha per year, maintain and preserve the 33 million ha of forest there, divert and resettle 484,000 surplus workers, and achieve strategic transformation of forest-related industrial enterprises and reasonable adjustment of the industrial mix.

In 2011, the second phase of the NFPP was launched, which included 11 counties (prefectures and cities) in Danjiangkou Reservoir Area in the program. In the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River, we continued to ban logging of natural forest for commercial

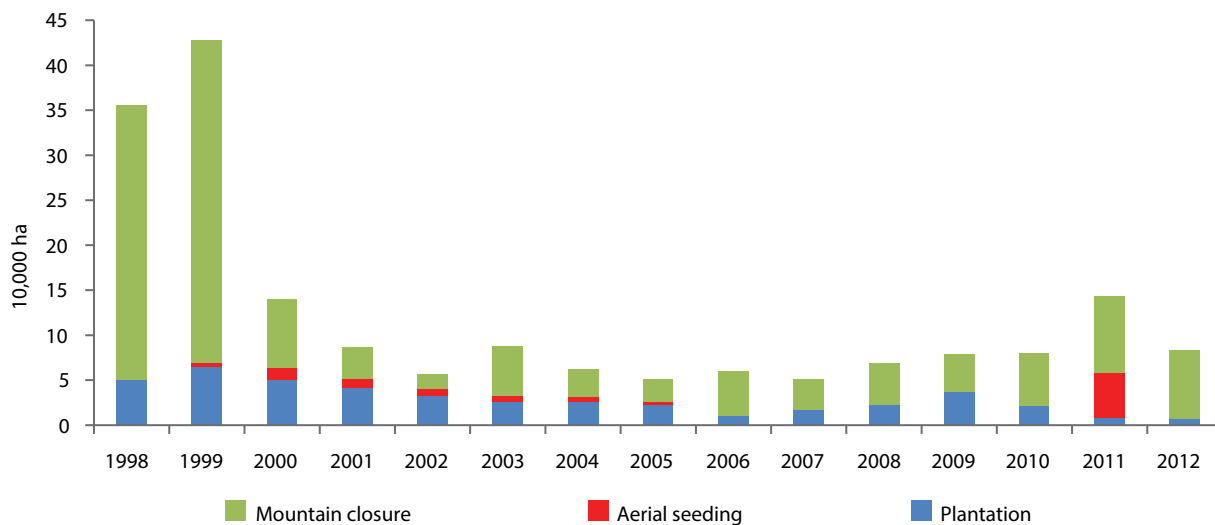


Figure 1.1 Ecological forest planted by 37 sample enterprises (1998–2012).

use, and increased cultivation of state-owned young and middle-aged forest by 4.66 million ha; in key state-owned forest areas in China’s northeastern provinces and Inner Mongolia, we reduced timber output from 10.941 million m<sup>3</sup> to 4.025 million m<sup>3</sup> in the first three years of the 12th Five-year Plan period, and cultivated 12.9333 million ha of young and middle-aged forest, and 3.26 million ha of reserve forest resources.

The results of 37 monitoring samples collected from forest-related industrial enterprises in key state-owned forest areas in China’s northeastern provinces and Inner Mongolia show that, from 1998 when the pilot project started, to the end of 2012, sample enterprises planted a total of 1.8325 million ha of ecological forest (Figure 1.1); maintained and preserved 12.0684 million ha of forest (Figure 1.2), accounting for 98.45% of forest land in 2012. Compared with the period before implementation of the program, forest coverage in areas maintained by sample enterprises reached 58.67%, up by 2.55%. In 2012, timber output of sample enterprises decreased by 5.8148 million m<sup>3</sup> compared with that in 1997, registering an

average annual decrease of 10.59% (Figure 1.3). During the period when the program was being implemented, the number of registered employees in the sample enterprises kept reducing. Most surplus workers were diverted to posts responsible for forest maintenance and preservation, public-benefit afforestation and forest cultivation, and the employment rate of workers kept a rising trajectory (Figure 1.4). When the first phase of NFPP ended in 2010, the number of workers resettled through one-off arrangement by the 35 sample enterprises<sup>1</sup> was 151,400, accounting for 46.29% of the total number of registered employees before implementation of the program, and 89.90% of the reduction in registered employees during the first phase of NFPP. Since the launch of the program, the social welfare system for workers in the forest areas covered by the program has steadily improved. In 2012, the numbers of people enlisted for basic old-age insurance, basic medical insurance, unemployment insurance, work-related

<sup>1</sup> Before 2012, there were 35 forest-related industrial enterprises where samples were collected; one-off reemployment was not arranged at the second phase of the project.



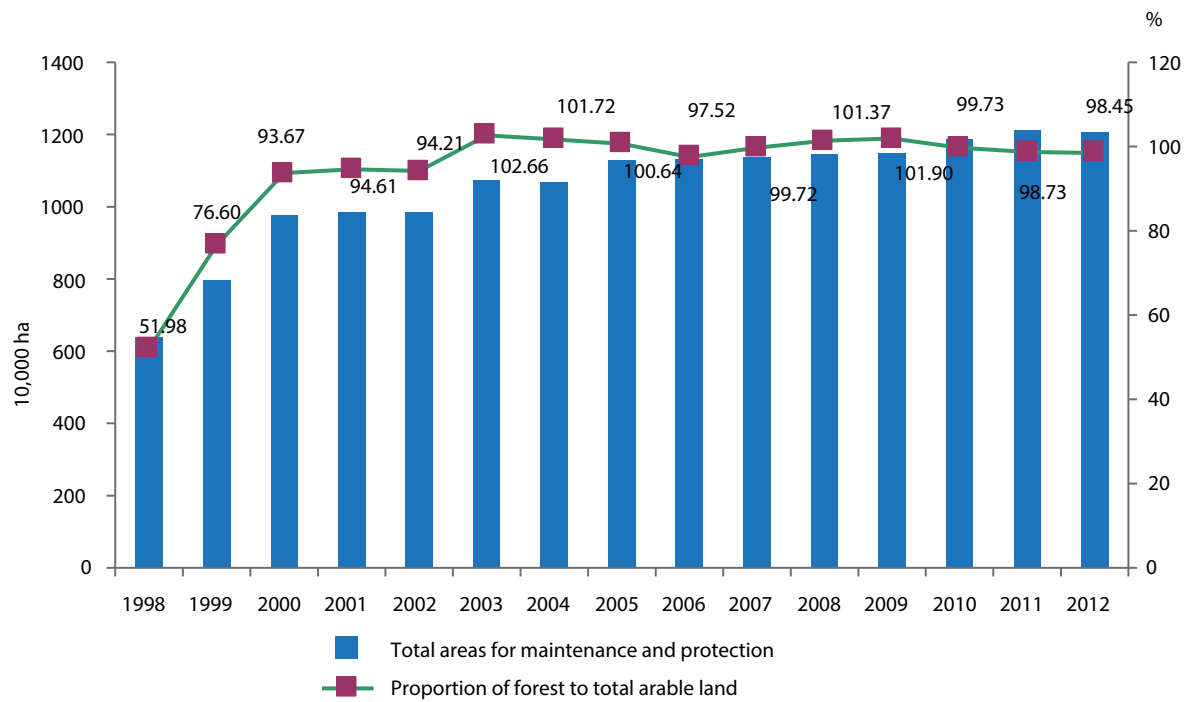


Figure 1.2 Maintenance and protection of forest by 37 sample enterprises (1998–2012).

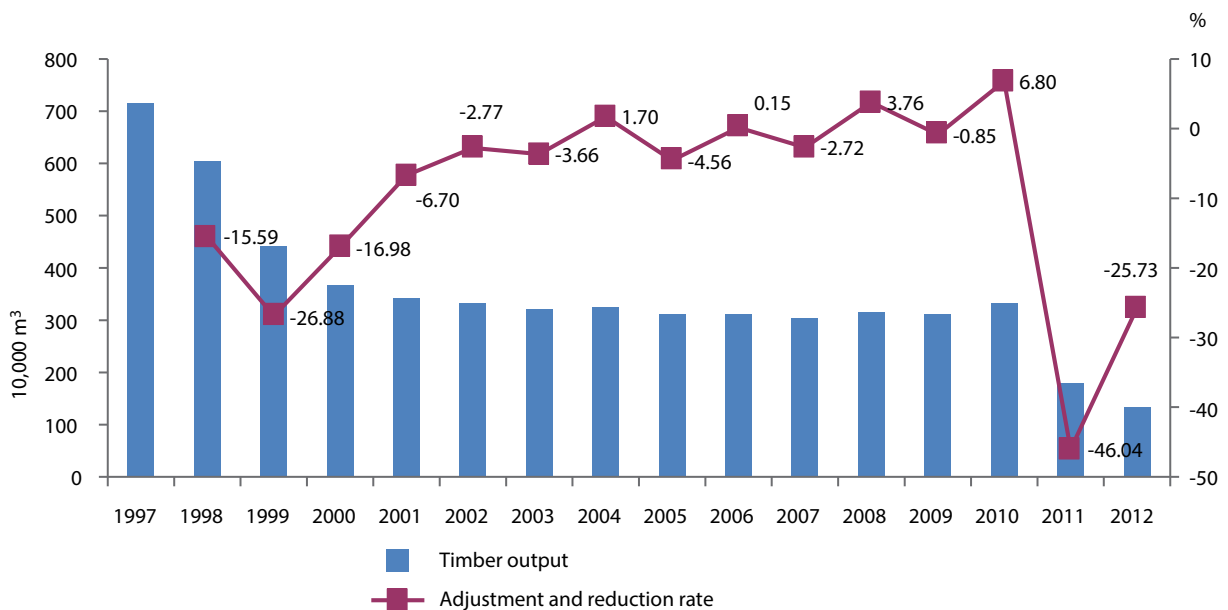


Figure 1.3 Roundwood production of 37 sample enterprises (1997–2012).



Figure 1.4 Employment in 37 sample enterprises (1998–2012).

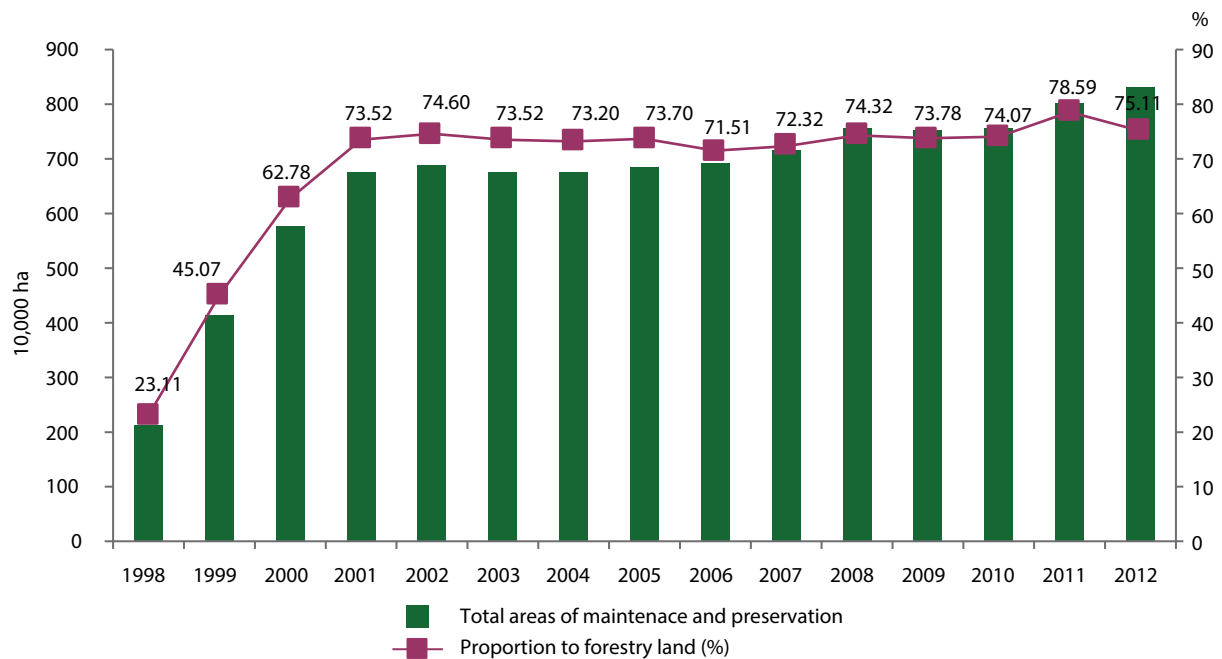


Figure 1.5 Forest maintenance and preservation by 44 sample counties (1998–2012).

injury insurance, and maternity insurance was 85.18%, 92.27%, 100%, 98.85%, and 98.55%, respectively, of all eligible people.

Tracking and monitoring of 44 sample counties in NFPP areas in the upper reaches of the Yangtze River and upper and middle reaches of the Yellow River show that from 1998 to 2012

- sample counties planted 936,900 ha of public-benefit forest;
- the areas of newly planted forest under their maintenance and preservation expanded with its proportion to forest land increasing steadily (Figure 1.5).

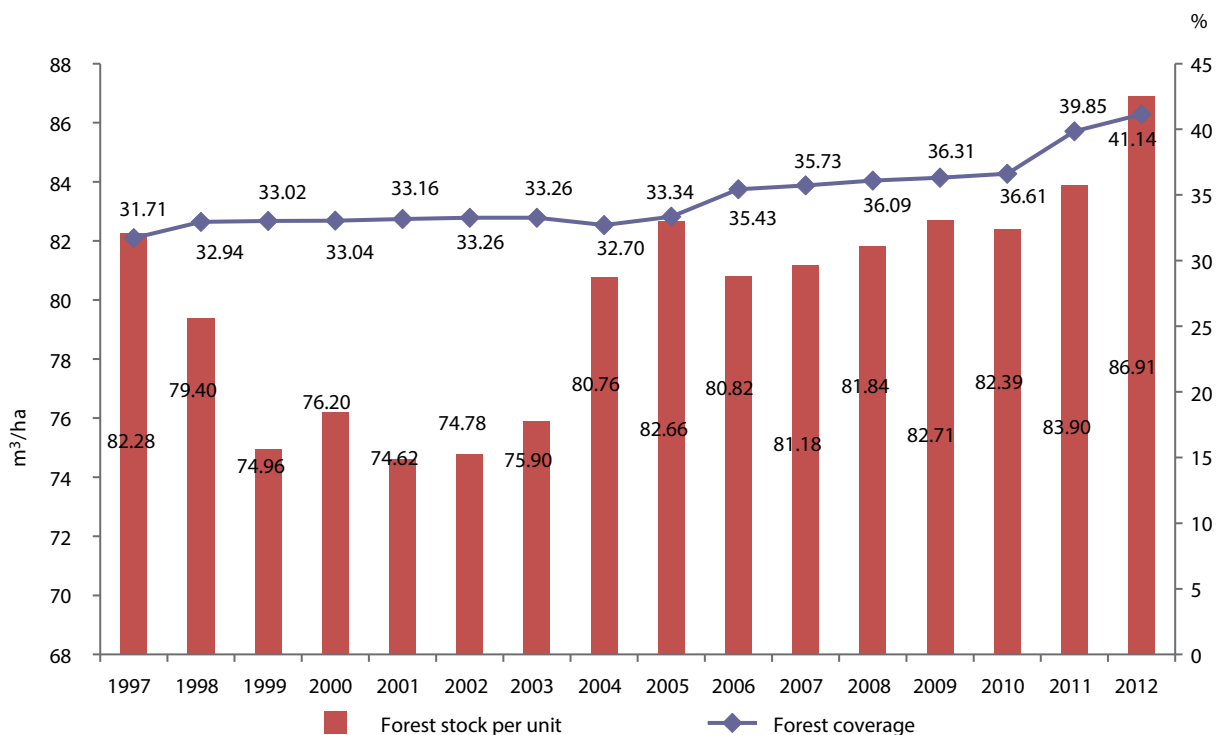


Figure 1.6 Forest resources in 44 sample counties (1997–2012).

- forest coverage of the program areas reached 41.14%, registering an increase of 9.43% over 1997;
- per unit forest stock reached 86.12 m³/ha, a net increase of 3.84 m³ per ha (Figure 1.6).

During the implementation of the program, over half of the employees in sample counties participated in forest maintenance and preservation on a yearly basis (Figure 1.7); and a total of 5,108 people were resettled through a one-off arrangement (Figure 1.8), accounting for 31.88% of the registered workers before implementation of the program.

### 1.1.2 Program for Conversion of Cropland to Forest and Grassland (CCFP)

To address the problems of land degradation and water erosion in key areas, China launched a Program for Conversion of Cropland to Forest and Grassland (CCFP) in 2000 to implement the policy of using grain subsidies as a form of relief. The central budget provided grain and cash (CNY 3150 for Yangtze River Basin and CNY 2100 for Yellow River Basin) to farmers who converted their cropland to forest and grassland, and gave them seedling fees of CNY 750 for each hectare of converted cropland or afforested barren hillside or wasteland.

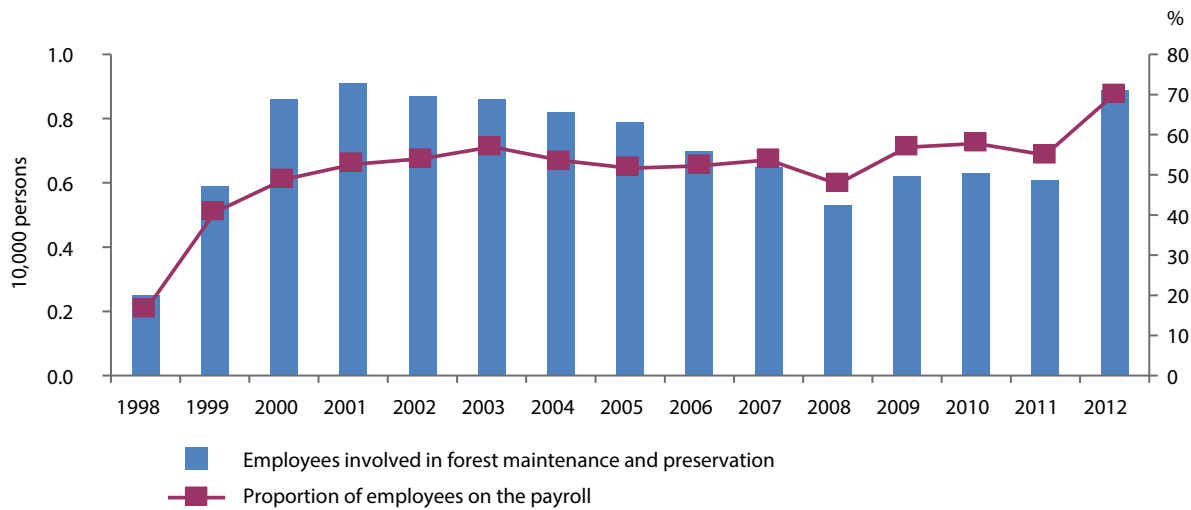


Figure 1.7 Forestry employees' participation in forest maintenance and preservation in 44 sample counties (1998–2012).

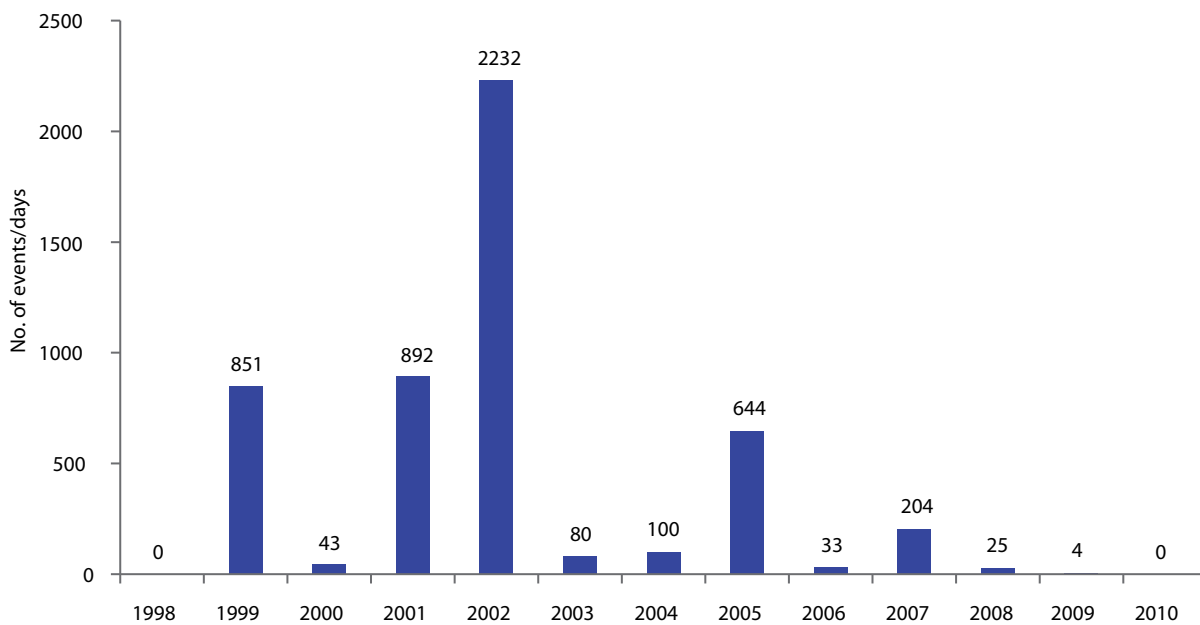


Figure 1.8 Number of forestry employees resettled through one-off arrangement in 44 sample counties during the first phase of NFPP.

The implementation of the program has yielded huge, comprehensive benefits as evidenced by improved ecosystems, increased income for farmers, greater agricultural output and sound rural development. The monitoring and assessment shows that from 1999 to 2012, 3.0471

million ha of cropland in 100 sample counties were converted to forest or grassland, of which 1.0738 million ha were converted to forest and 84,400 ha to grassland. A total of 1.6417 million ha of barren hills and wasteland were afforested. Some 247,300 ha of land on hillsides were closed

to facilitate afforestation. These figures accounted for 11.85%, 10.39% and 9.22%, respectively, of tasks accomplished by CCFP in the entire country (Figure 1.9). Average forest coverage rate of sample counties reached 32.52%, up by 7.34%, with the

areas of forest converted from cropland by farming households registering an eight-fold growth (Figures 1.10 and 1.11). Since the Phase II of CCFP in 2008, a total of 299,900 ha of farmland was upgraded in sample counties, accounting for

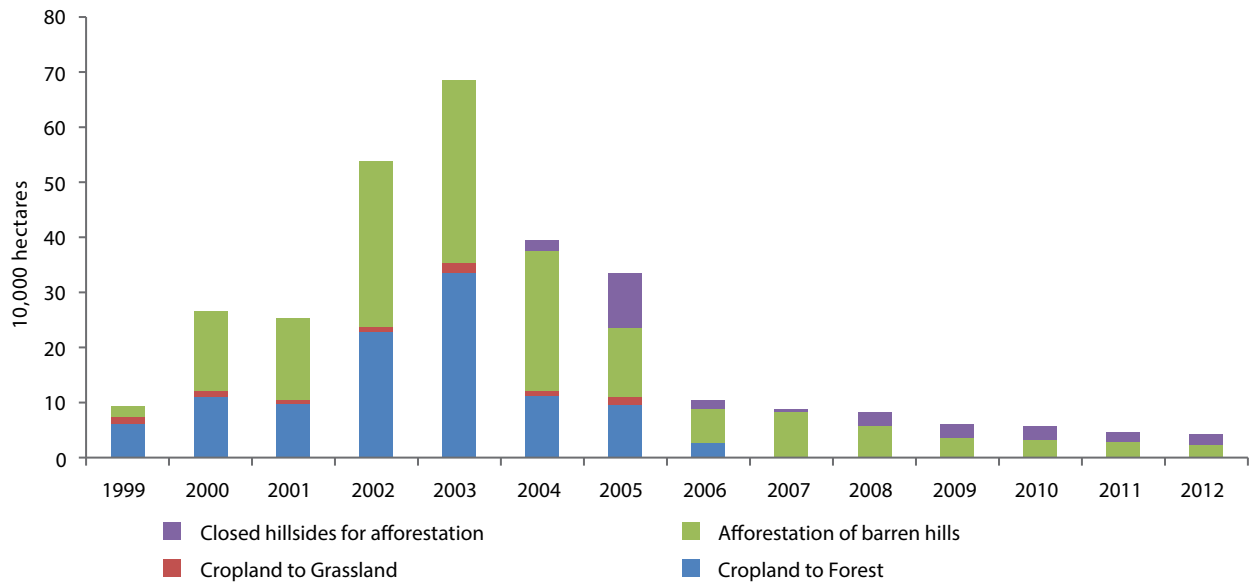


Figure 1.9 Implementation of CCFP in 100 sample counties (1999–2012).

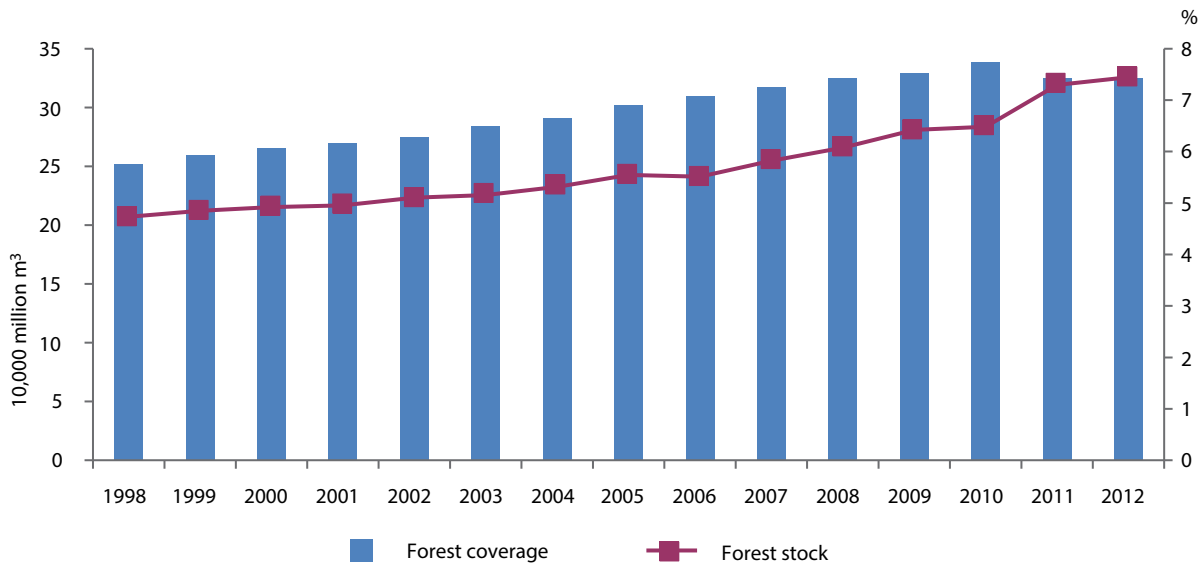


Figure 1.10 Forest resources in 100 sample counties under CCFP (1998–2012).

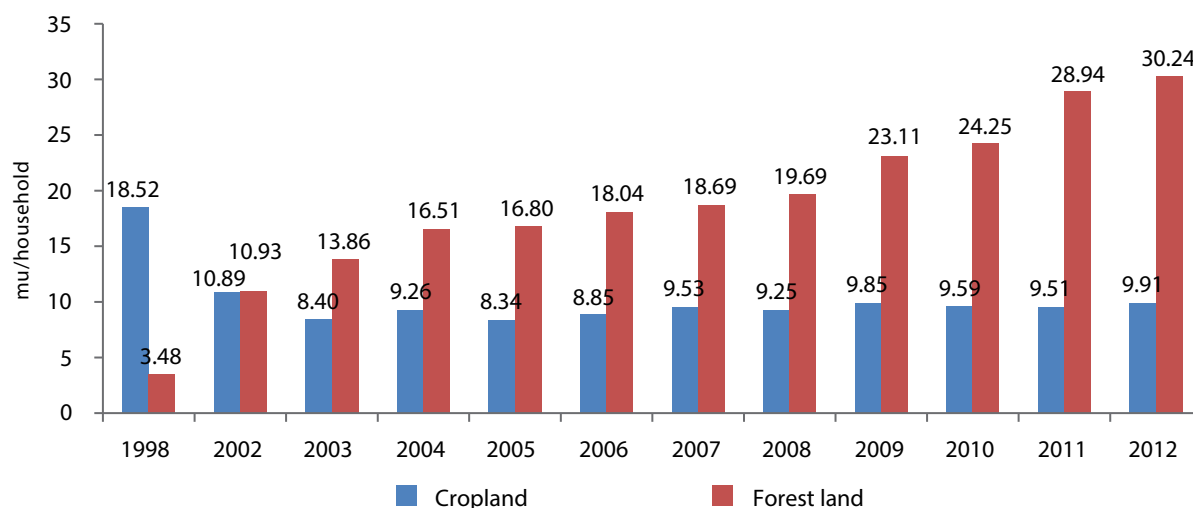


Figure 1.11 Changed land use of sample rural households involved in CCFP (1998–2012).

5.61% of all arable land in these counties; 125,200 people were resettled for ecological protection; 676,900 farmers were trained; 498,900 ha of land was replanted with trees or grass; and 307,300 ha of land was used for crop industries by planting tea-oil trees, fruit trees or traditional Chinese medicinal herbs. Driven by CCFP, the output of timber, yield of fresh and dried fruits and revenue of forest tourism in sample counties grew by 62.23%, 158.26% and 7242.72%, respectively, over the period prior to the implementation of the program.

### 1.1.3 Sandification Control Program for Areas in the Vicinity of Beijing and Tianjin

To reduce the hazard of desertification in Beijing, Tianjin and their surrounding areas, and improve the ecological system and environment, China launched the Sandification Combat Program for Areas in the Vicinity of Beijing and Tianjin (SCP) in 2000 as a pilot project, and formally in 2002. The program includes: conversion of cropland to forest, cultivation of forest, treatment of grassland (including a ban on grazing), construction of greenhouses, purchase of feeds

processing machinery, water source projects, water conservation and irrigation, watershed integrated treatment, and ecological resettlement. In September 2012, the initiative for the second phase of the SCP was reviewed and adopted by the standing committee meeting of the State Council, which extended the areas covered by the program to 138 counties in six provinces (autonomous regions and municipalities); and sand-fixation measures were added to the program as a component of forestry development.

Results of the monitoring show that from 2000 to 2012: a total of 2.2128 million ha of barren hills and wasteland (desert land) were afforested in the 21 sample counties (Figure 1.12) and 911,300 ha of cropland were converted to forest (Figure 1.13). By the end of 2012, 2.142 million ha of newly planted trees had survived in the program areas; the area of forested land and forest stock grew at an average annual rate of 3.26% and 3.40%, respectively; and forest coverage increased by 6.45% (Figure 1.14). The times and days of sand wind and the number of sand dust storm days were reduced by 37.89%, 35.21%, and 43.88%,

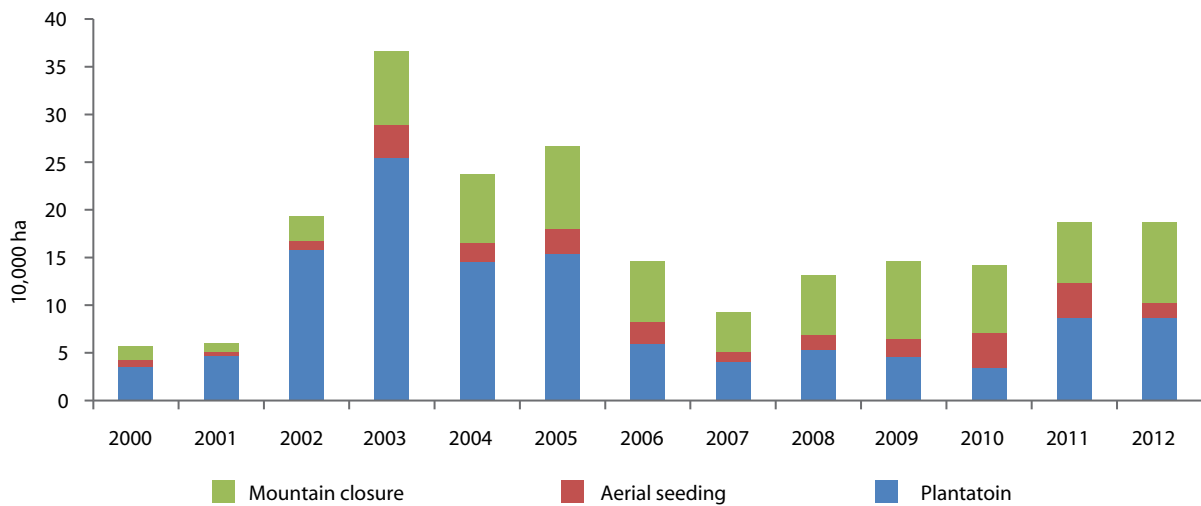


Figure 1.12 Afforestation of barren hills and wasteland (desert) in 21 sample counties of SCP (2000–2011).

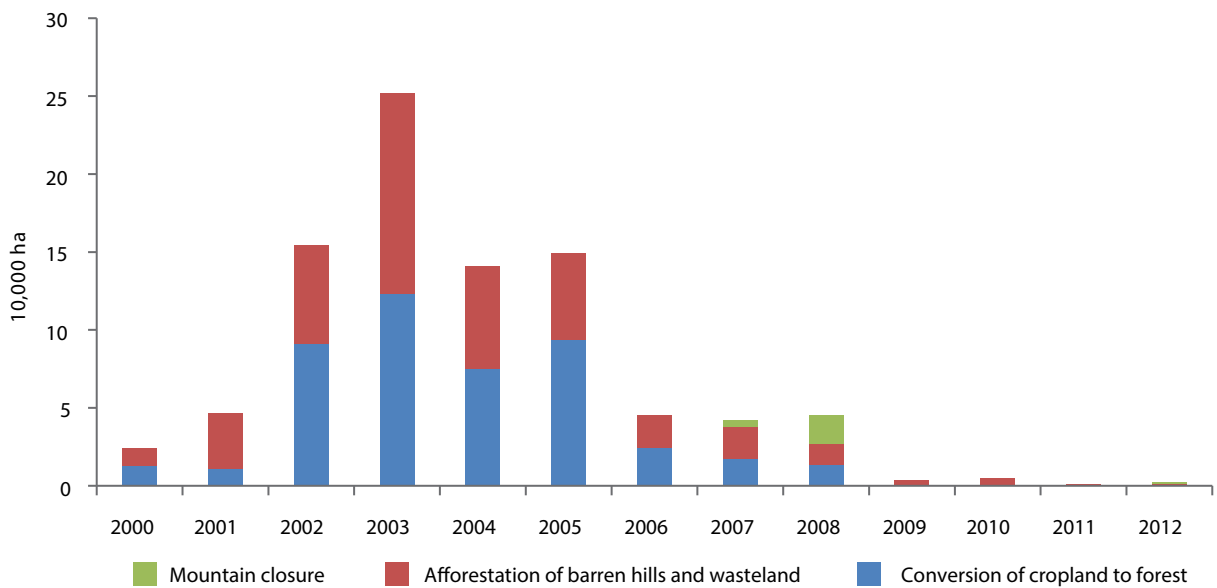


Figure 1.13 Conversion of cropland to forest in 21 sample counties of SCP (2000–2012).

respectively, in the sample counties (Figure 1.15), and areas of water erosion and soil erosion dropped by 13.34% and 1.81%, respectively (Figure 1.16). Thanks to the implementation of the program,

sample counties enjoyed strong industrial growth, with the output of fresh and dried fruits rising by 2.5 times and forest tourism revenue growing by 6.56 times (Figure 1.17).

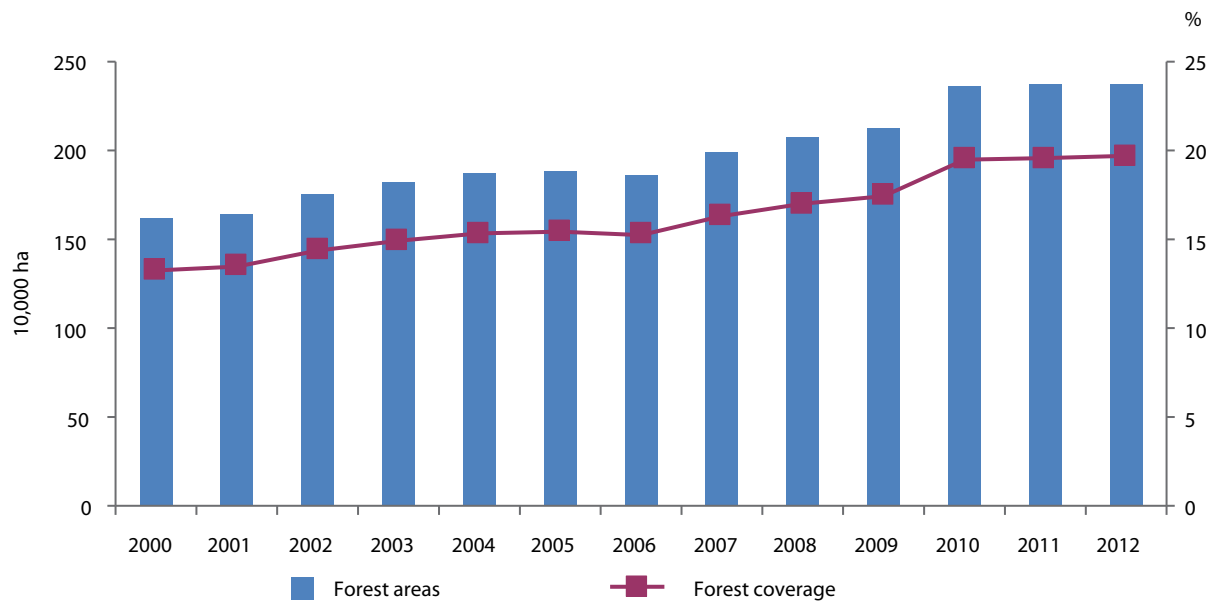
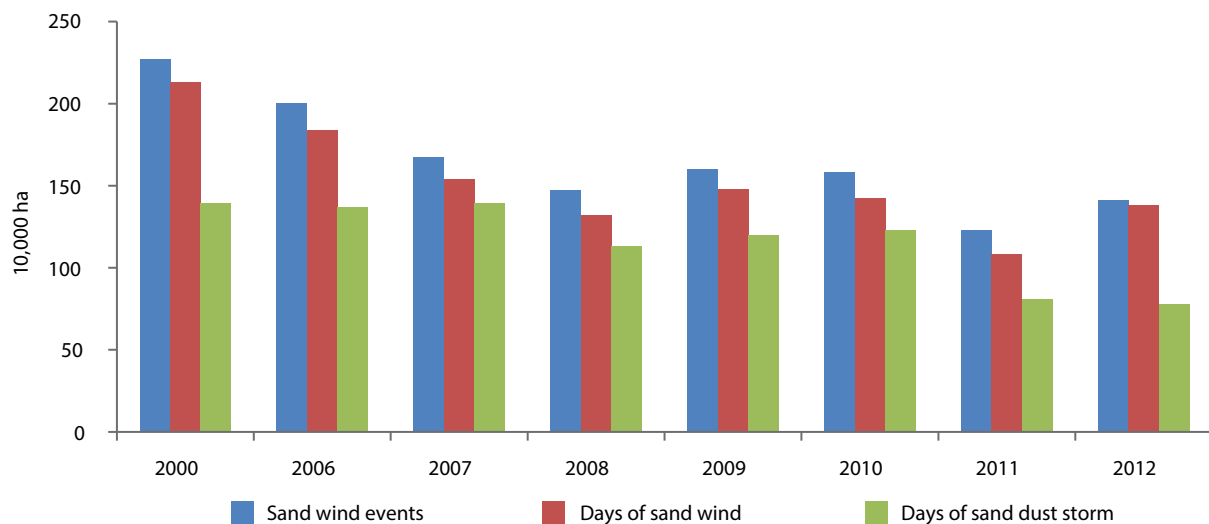


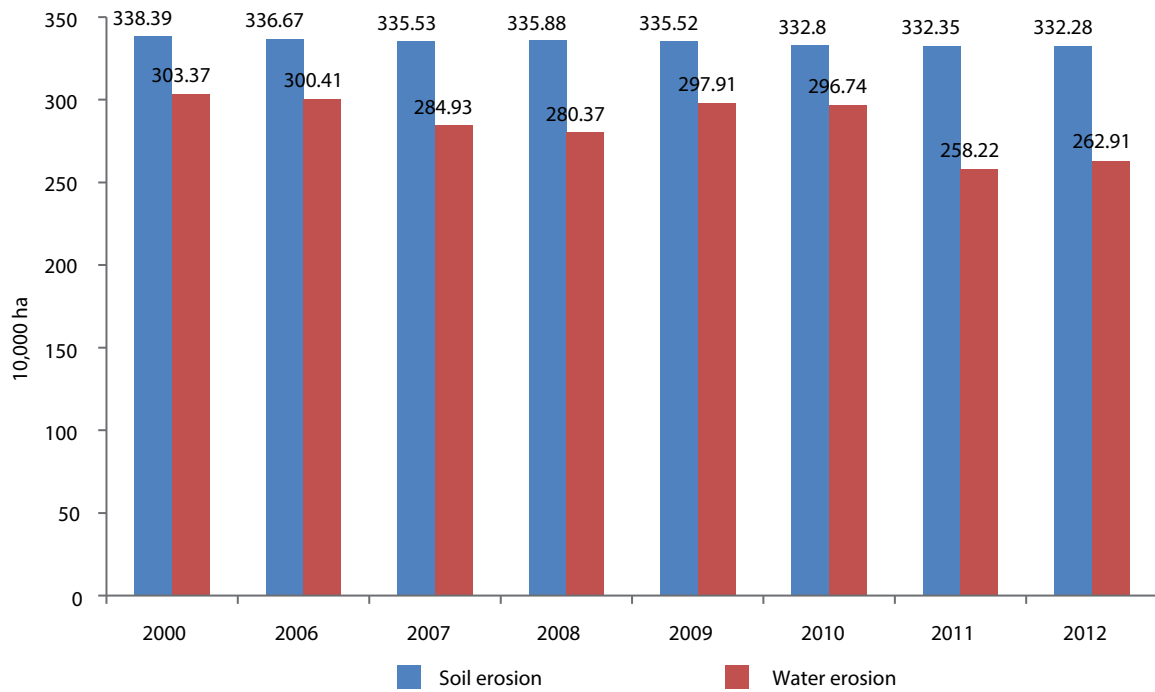
Figure 1.14 Forest resources in 21 sample counties of SCP (2000–2012).



Note: Ecological indicator was added in 2007. To show the impacts of the program, the data in 2000 were collected for comparison purposes.

Figure 1.15 Effect of sandification control in 21 sample counties of SCP (2000–2012).





Note: Ecological indicator was added in 2007. To show the impacts of the program, the data in 2000 were collected for comparison purposes.

Figure 1.16 Water and soil erosion in 21 sample counties of SCP (2000–2012).

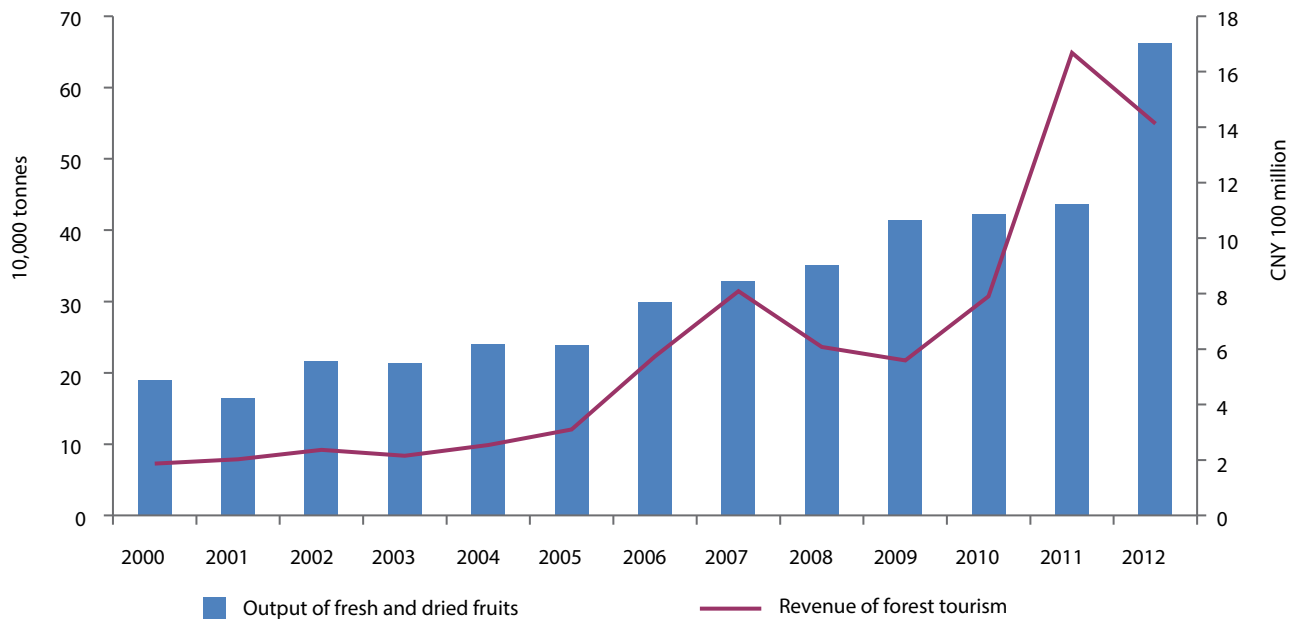


Figure 1.17 Development of forest industry in 21 sample counties of SCP (2000–2012).

### 1.1.4 Wildlife Conservation and Nature Reserve Development Program (NRP)

China formally launched the Wildlife Conservation and Nature Reserve Development Program in December 2001 to: conserve key wildlife designated for protection by the state; expand, improve and build a new group of national nature reserves, hunting prohibition zones, and bases for species and cultivation of precious and rare plants; and restore and develop precious and rare species.

The monitoring results show that from 2001 to 2012, 40 sample reserves built protection stations and wildlife relief stations (Table 1), playing an important role in strengthening capacity building of the reserves and improving the capability of conservation and development. Over the past ten years and more since the implementation of the program, the number and scale of wildlife species

in the 40 sample reserves have increased, and new species have been found in 16 reserves. Fourteen new species of wild animals and 21 new species of wild plants have been recorded to date. Fifteen sample reserves completed specialized investigation of wildlife resources, the results of which further verified the trend of an increase in the variety and number of wildlife species in the reserves. The situation is improving for 30 of 36 endangered species in the reserves. Vigorous efforts have been made to protect the 159 extremely rare wildlife species in 27 nature reserves, resulting in effective protection of those in 7 reserves. Remarkable progress was made in wildlife epidemic and disease monitoring and control, with epidemic and disease monitoring stations being set up in 21 nature reserves. Standing forest stock, forest stock, and forest stock per unit in sample reserves rose at average annual rates of 0.57%, 1.6% and 0.53%,

Table 1.1 Main tasks accomplished by 40 sample reserves (2001–2012).

Constructed contents	Number	Areas of construction (10,000 m <sup>2</sup> )	Constructed contents	Number	Unit
Preservation station	279	7.19	Upgraded habitats	3.25	10,000 ha
Wild animal relief station	39	6.19	Man-made caves	16	
Plant disease and pest prevention and treatment station	23	0.33	Cages and houses for animals	1.85	10,000 m <sup>2</sup>
Bird ringing station	9	0.19	Biological fire belt	963.8	km
Eco-positioning monitoring station	59	1.02	Fire insulation belt	1672.9	km
Meteorological observation station	52	0.73	Fence	1390.2	km
Hydrological monitoring station	31	0.54	Rare plant nursery	377.6	ha
Soil monitoring station	6	0.33	Watchtower for fire prevention	122	
Key species monitoring station	65	0.66	Boundary tablet	2086	
Animal epidemic and disease monitoring station	39	0.27	Boundary stone	15774	
R&D house		3.31	Marking plate	3892	
Publicity house		4.47	Shelter forest (grass) belt	113	km



Figure 1.18 Forest resource in 40 sample reserves (2001–2012).

respectively. Forest stock has been increasing and forest quality is steadily improving (Figure 1.18). At the same time, the implementation of the program created many new jobs for people in the surrounding communities, and increased their income (Figure 1.19). It boosted the local economic growth in the reserve areas (Figure 1.20), raised public awareness of the importance of ecological protection, and created a more favorable social environment for sustainable development of nature reserves. From 2001 to 2012, the nature reserve program created a total of 451,200 jobs, which increased by an average annual rate of 12.33%. In 2012, 7.79 times more employment income was generated than in 2001.

## 1.2 Impact of ecological development

### 1.2.1. Key programs as the main driver for afforestation

It is important to highlight the leading role of the government in developing key forestry programs to drive the growth of ecological development. From 2000<sup>2</sup>–2012, the 200 sample counties (forest-related industrial enterprises) under NFPP, CCFP and SCP accomplished afforestation of 9.8124 million ha of land, of which 5.7311 million ha were key program afforestation, making up 58.41% of total afforestation in sample counties

<sup>2</sup> For the convenience of comparison, the 2000 is set as the first year for monitoring of all programs.

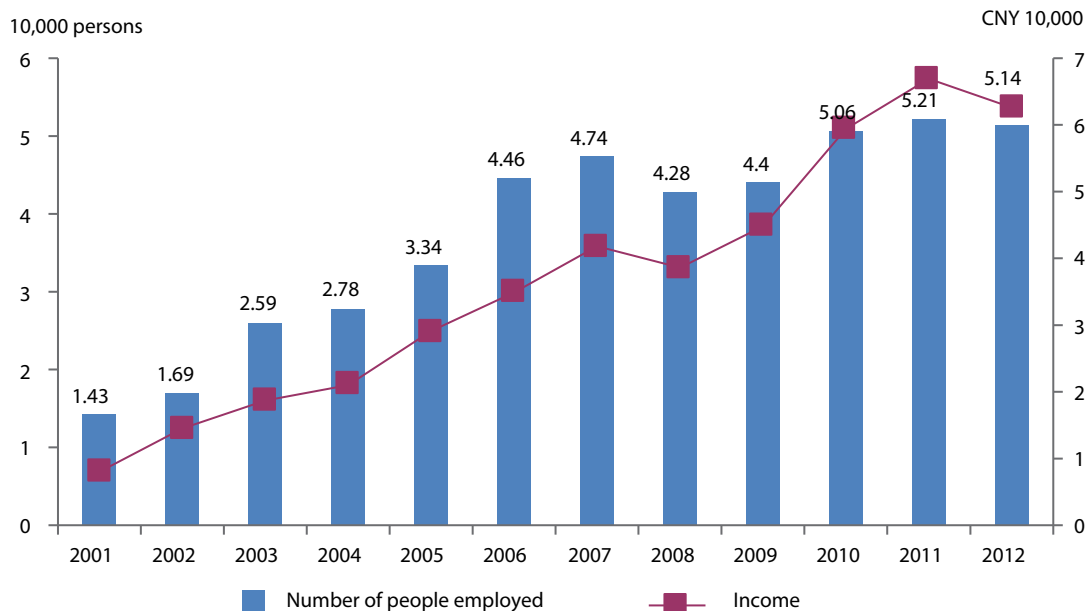


Figure 1.19 Employment and income generated by development of 40 sample reserves (2001–2012).

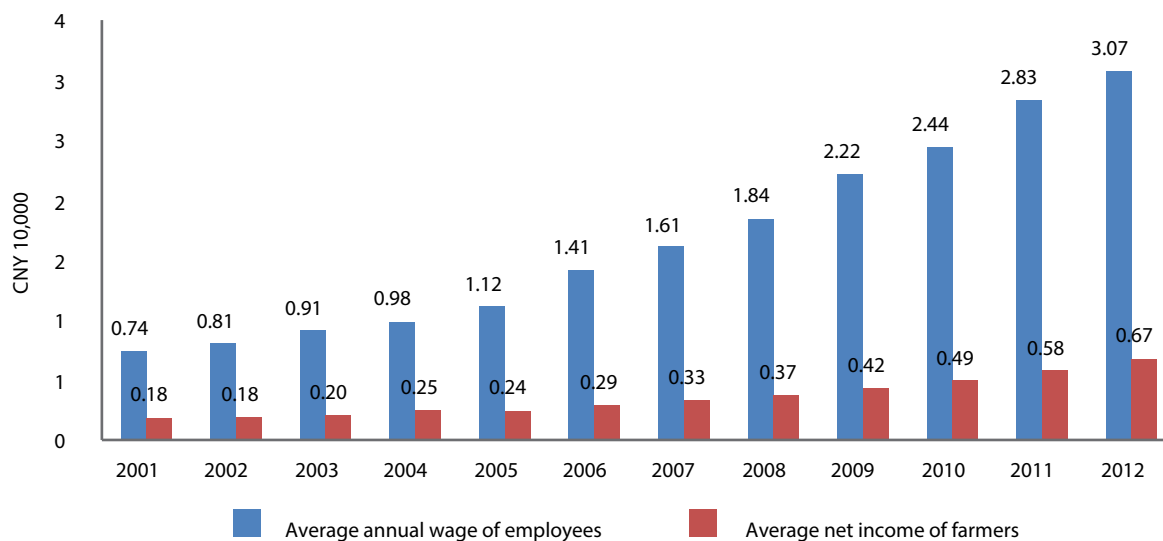


Figure 1.20 Wage of employees and average net income of farmers in 40 sample reserves (2001–2012).

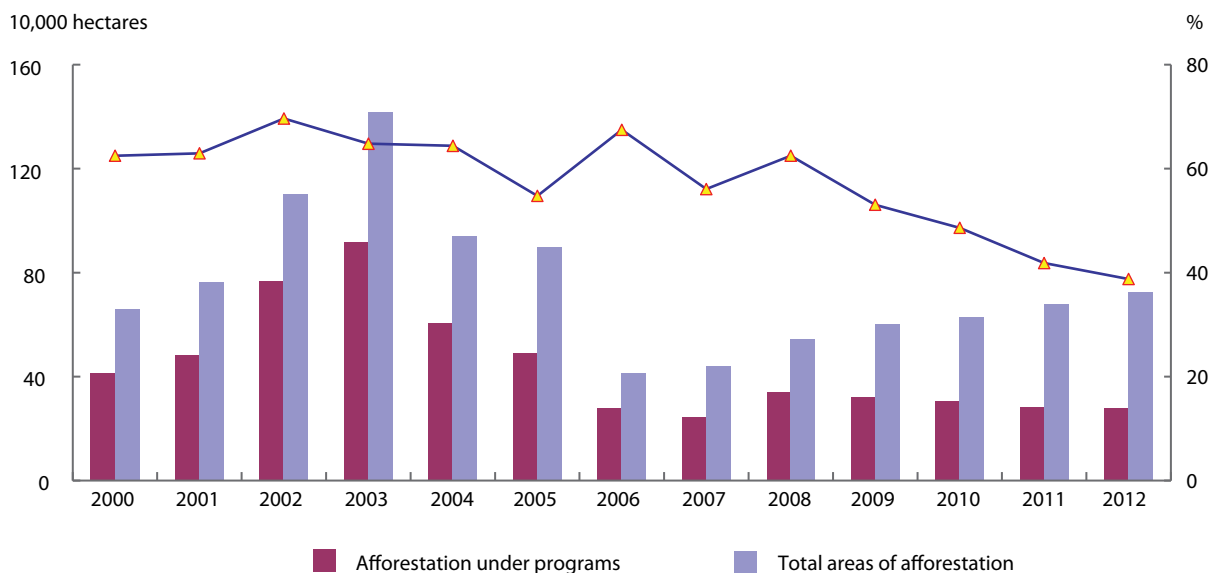


Figure 1.21 Afforestation of sample counties (key State-owned forestry enterprises) (2000–2012).

(and enterprises). Sample counties (enterprises) under NFPP completed afforestation of 1.1859 million ha, all of which were attributable to the program. Sample counties under CCFP completed afforestation of 5.8946 million ha, of which 2.8815 million ha were attributable to the program, accounting for 48.88% of total areas of afforestation in the sample counties. Sample counties of SCP completed afforestation of 2.7320 million ha, of which 1.6638 million ha were attributable to the program, accounting for 60.90% of total areas of afforestation in the sample counties (Figure 1.21).

### 1.2.2 Steady growth of forest resources

NFPP has effectively curbed the long-term trend of excessive consumption of forest resources. Forest resources in program areas have shown a growing trend of recovery, forest stock in the protected areas is improving constantly, and CCFP and the SCP have turned slopes and desertified cropland, that accounted for 7.85% of China's arable land, into forest.

The results of the monitoring (Figure 1.22) show that **forest resources have remarkably increased**. In 2012, forest areas, forest stock and forest coverage in all sample counties (enterprises and reserves) grew by 16.40%, 27.44% and 4.57%, respectively, compared to 2000. Forest areas in sample counties (enterprises and reserves) under NFPP, the CCFP, the SCP and the Wildlife Conservation Program grew by 11.28%, 20.67%, 46.88% and 5.53%, respectively, while forest stocks grew by 26.47%, 29.35%, 49.37% and 20.33%, respectively. The results also show that **the quality of forest resources has improved**. The per unit forest stock has increased. In 2012, forest stock per hectare in sample counties (enterprises and reserves) stood at 84.34 m<sup>3</sup>/ha, an increase of 7.31 m<sup>3</sup>/ha or 9.49% over 2000. Areas of natural forest have increased. In 2012, the areas of natural forest in sample counties (enterprises) reached 13.5192 million ha, an increase of 1.2137 million ha or 9.86% over 2000.

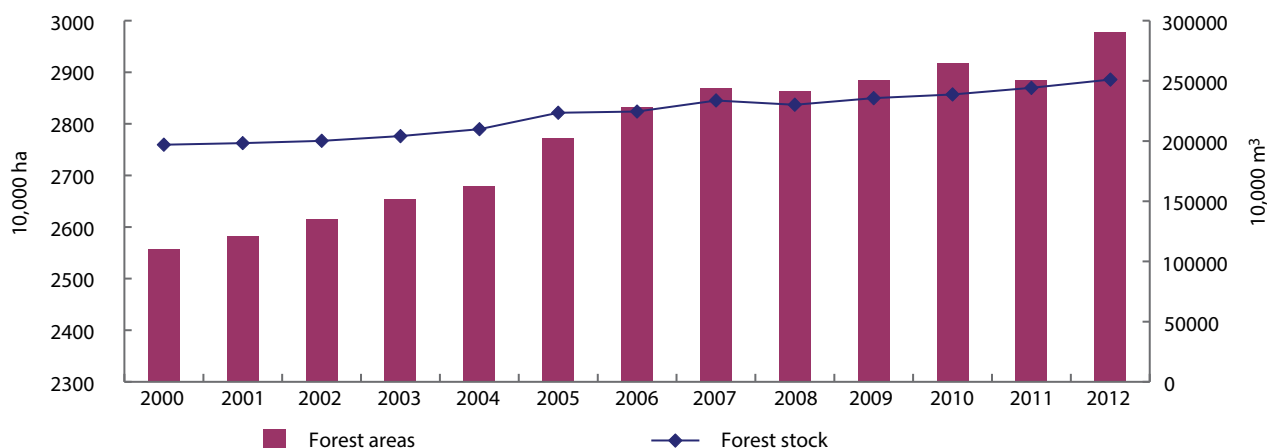


Figure 1.22 Forest resources in sample counties ((key State-owned forestry enterprises and reserves) (2000–2012).

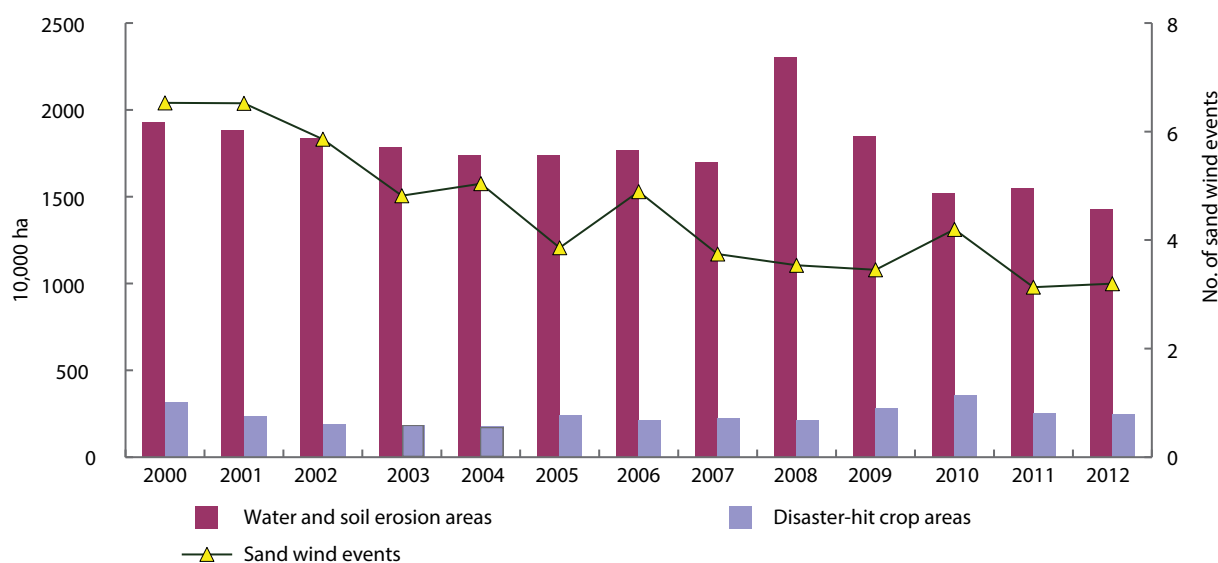


Figure 1.23 Ecological environment of sample counties under CCFP and SCP (2000–2012).

### 1.2.3 Improvement of the ecosystem

By changing the irrational way forest resources were used in the past, the key forestry programs have led to an increase in forest coverage and forcefully reversed the trend of degradation of China's ecological environment.

According to the monitoring (Figure 1.23), **water and soil erosion in key program areas has been reversed markedly**. In 2012, areas of water and soil erosion in the 121 sample counties under the CCFP and the SCP stood at 14.2959 million ha, falling by 5.0064 million ha or 25.94% compared

with 2000. **Sand wind times have reduced.** In 2012, the 121 sample counties recorded 3.20 times of sand wind per year on average, a reduction of 3.33 times compared with 2000. **The capacity for disaster prevention and reduction has greatly strengthened.** From 2000 to 2012, disaster-hit crop areas in the 121 sample counties decreased. In 2012, disaster-hit crop areas in the sample counties stood at 2.4788 million ha, falling by 21.15% compared with 2000, of which the areas of disaster-hit cropland reduced by 24.91%. **The ecological environment of sample reserves and their surrounding areas have further improved.** Compared with 2000, perspiration volume of sample reserves increased by an average annual rate of 0.55%, sand dust storm days fell by 3.72% annually, the number of sample villages hit by natural disasters reduced by 2.07% annually, times of disasters in sample villages fell by 2.12% per year, and 73.33% of rural households that answered the questionnaire believed that the ecological environment was much better than before.

## 1.3 The programs' contribution to improving people's livelihoods

### 1.3.1 The programs have accelerated the pace of poverty reduction in program areas

The key forestry program areas often coincide with concentrated areas that have special conditions and difficulties and where poverty reduction is the main obstacle to ecological development programs. Over the past ten years and more since the implementation of the programs, thanks to the support by the central budget, the programs have effectively preserved and restored forest resources, and increased the family income of rural households and forestry employees. In a short period of time, the program areas escaped the trap of ecological degradation compounded by worsening poverty, and laid the long-term resource and environment foundation for socioeconomic development in the areas. It is in this sense that the first phase of NFPP is reputed to be a 'life-saving

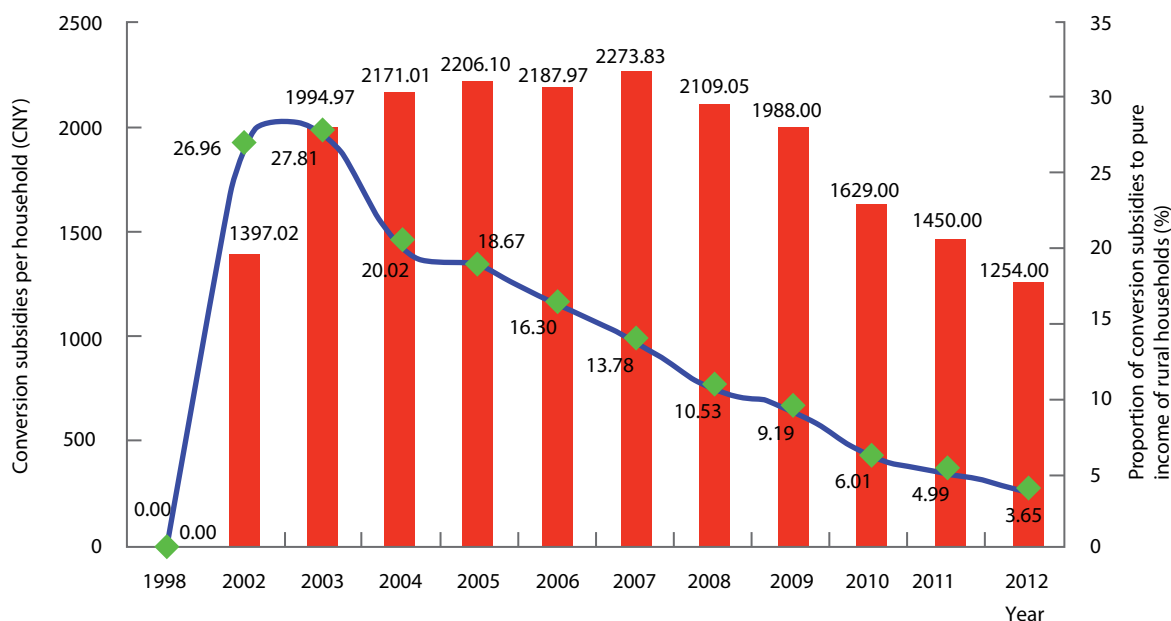


Figure 1.24. Changes in cropland-to-forest subsidies and in their proportion to net income of rural households participating in CCFP.

program’, and the CCFP is known as the biggest and most successful livelihood program.

The results of the monitoring show that **the policy subsidies of the programs have boosted the rise in income of forestry employees and rural households in the program areas.** By the end of 2012, of the CNY 31.35 billion of program investment in the 44 sample counties and 37 sample enterprises under the NFPP, 78.20% had been used for social insurance, administrative and social expenses and other special-purpose subsidies, representing a main source of income for forestry employees. Each monitored rural household that converted cropland to forest received a total of CNY 20,400 of subsidies, amounting to 14.36% of the net per capita income of the households (Figure 1.24), and the poverty rate of these households fell from 36.14% in 1998, to 6.56% in 2011. **The output of the forest converted from cropland has gradually become the main source of income for the households involved.** At present, forest output is the main source of income for some of the households participating in

the conversion program. In 2012, 58.26% of the income of households that had converted all their cropland to forest came from forest output; the sales revenue of converted land accounted for 42.63% of the household forestry income of the sample households of SCP. **The programs increased the income of people employed by the social programs.** In 2012, the social programs related to the ecological programs in the 40 sample reserves generated a revenue of CNY 87.0235 million, and the income of the relevant employees registered an increase of 7.99 times, or a rise of 20.80% per year.

### 1.3.2 Ecological development has contributed to job creation in the program areas

By increasing the number of posts for tasks such as public-benefit afforestation, forest maintenance and preservation and forest cultivation, and by developing the under-forest economy and other forest-related specialty industries, the key forestry programs have directly or indirectly contributed to job creation in the program areas. This has gradually addressed the resettlement of surplus workers caused by natural forest logging prohibition and

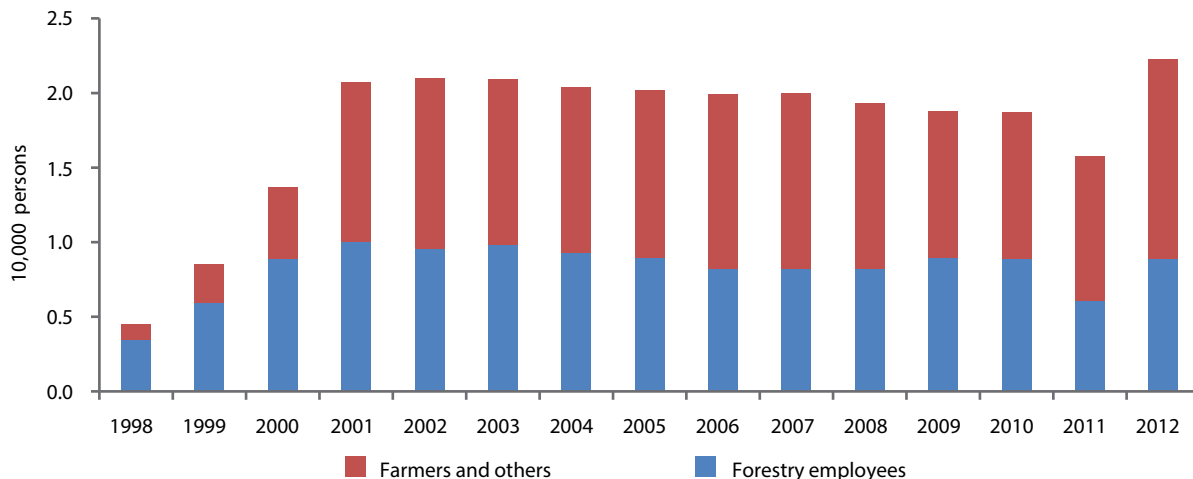
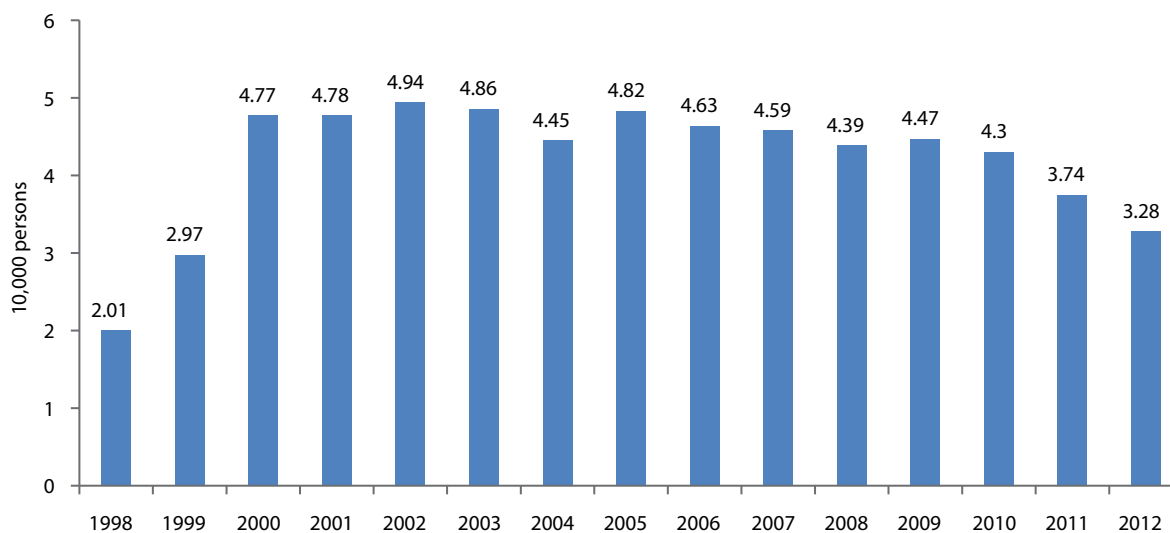


Figure 1.25 Composition of personnel for forest maintenance and preservation in 44 sample counties (1998–2012).





1 Each hectare of afforestation creates 110.9 work days, and 150 work days is counted as a post.

Figure 1.26 People involved in forest maintenance and preservation in 37 sample enterprises (1998–2012).

reduction of timber output and the problem of a surplus rural labor force caused by conversion of cropland to forest, and safeguarded the social stability of the program areas.

The results of the monitoring show that ecological development has directly provided job opportunities in the program areas. Since the implementation of the NFPP, jobs have been created for 17,600 persons annually on average for posts in forest maintenance and preservation in sample counties, of whom 9,400 are local farmers (Figure 1.25). Sample enterprises have created forest maintenance and preservation jobs for 42,000 persons annually (Figure 1.26). Sample counties under the CCFP have provided afforestation posts for 200,800 persons each year. Sample counties of SCP have provided afforestation posts for 110,600 persons each year. Since the implementation of the Nature Reserve Program, 40 sample counties have created jobs for an average of 7,900 persons each year. **The follow-up industrial development has improved the job creation capacity of the program areas.** When

the first phase of NFPP was completed in 2010, the jobs created by the tertiary forestry industry of sample counties increased by 65.31%, compared to 1998, of which forest tourism jobs increased by one-fold (Figure 1.27). The implementation of the Nature Reserve Program has strengthened the capacity of the reserves to generate revenue and fuel the economic growth of the surrounding areas. Revenue-generating projects and economic activities based on the reserves have created 30,400 jobs annually (Figure 1.28).

### 1.3.3 The programs have promoted a shift of energy mix in the forest areas

Implementation of the NFPP has had a direct impact on timber for private use and fuelwood in the rural areas under the program. There has been a continuous drop in fuelwood consumption in the program areas. CCFP, SCP and NRP have also made conservation and use of resources and energy one of their objectives, which have greatly consolidated the achievements of the programs and accelerated the spread and use of new sources of energy in the rural areas.

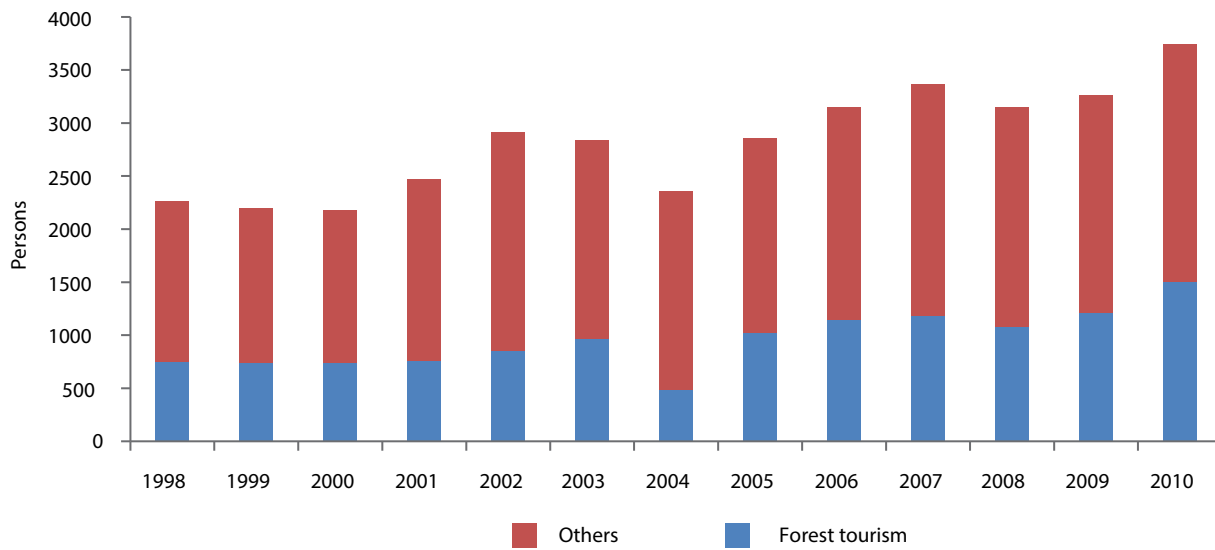


Figure 1.27 Forestry tertiary industry employment in 44 sample counties (1998–2012).

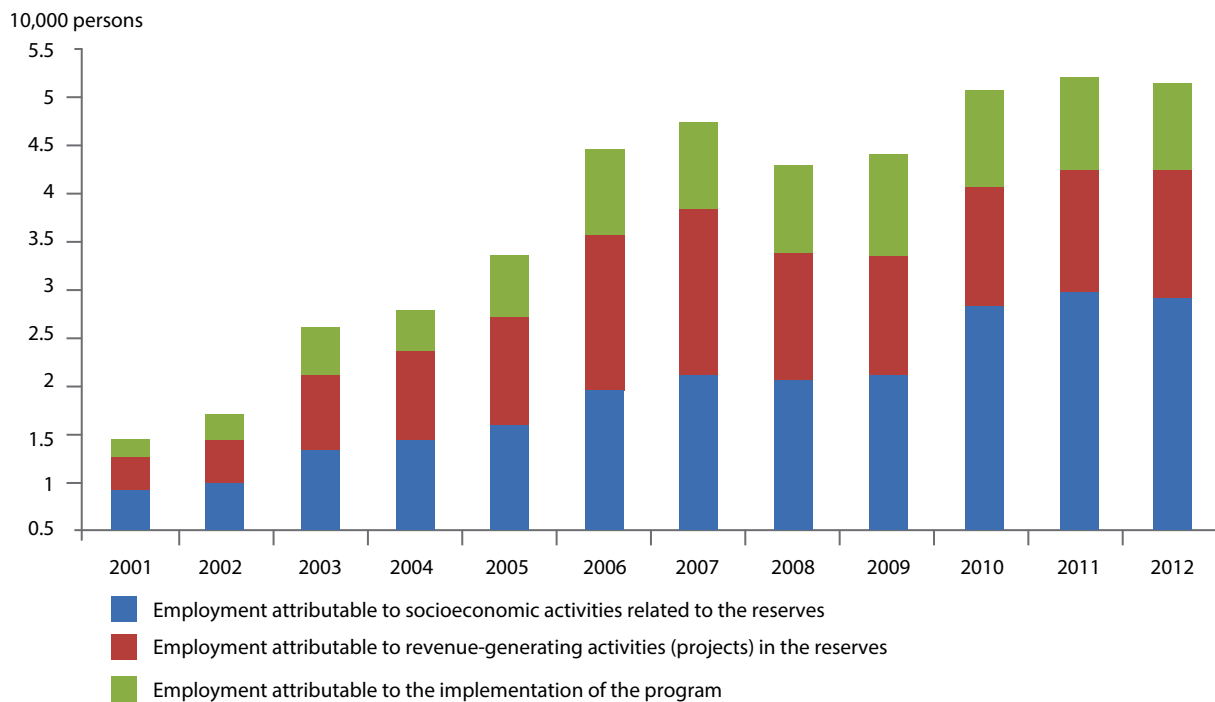


Figure 1.28 Employment driven by (natural) reserve development in 40 sample reserves (2001–2012).

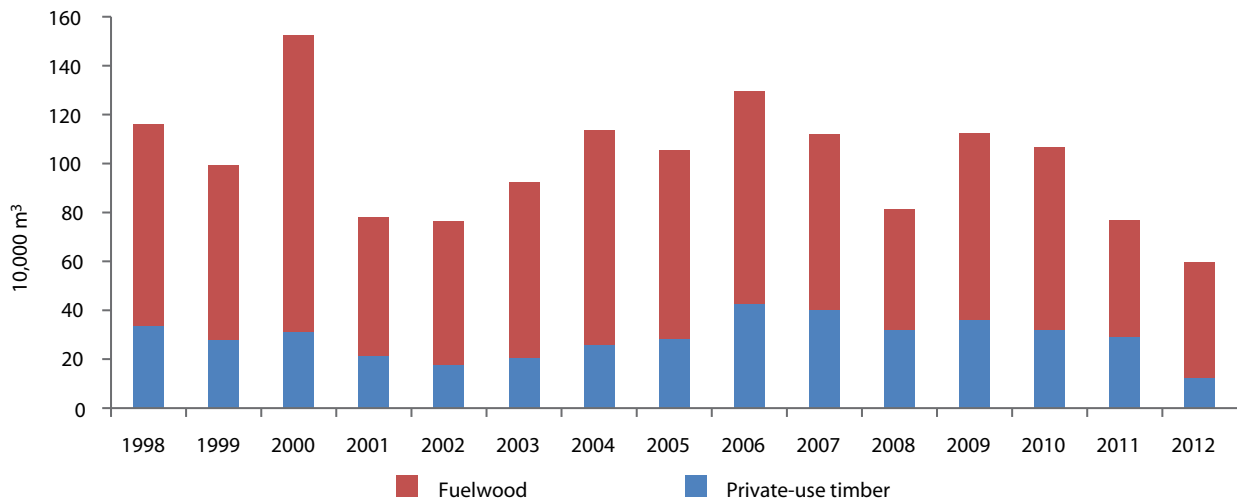


Figure 1.29 Logging and consumption of forest stock for private-use timber and fuelwood by farmers in 44 sample counties (1998–2012).

Monitoring data shows that **logging and consumption of fuelwood and private-use timber in the rural areas have been on the decline**. In 2012, the proportions of fuelwood and private-use timber logging and consumption to forest stock in sample counties under the NFPP dropped by 62.75% and 42.60%, respectively, compared to 1998 (Figure 1.29). **The number of households and people using fuelwood as their main source of energy has reduced**. From 1998 to 2012, the numbers of people and households who used fuelwood as their main source of energy in sample counties under the NFPP fell by 5.41% and 5.18%, on average annually (Figure 1.30). **Use of new energy has been popularized rapidly in the rural areas**. In 2010, compared with 2004, the number of methane tanks in 79 sample villages in the Yangtze and Yellow river valleys under the NFPP increased by 438.73%, the number of households using upgraded fuelwood-saving stoves increased by 67.90%, those replacing fuelwood with coal (electricity or gas) increased by 39.45%, and the number of households using solar energy in their daily lives increased by 551.50%. Since 2008, energy development in

rural areas has been included in CCFP. By 2012, an accumulated 201,500 methane tanks, 209,200 solar energy panels, and 411,500 energy-saving stoves had been built in sample counties; new energy projects focusing on the use of energy-saving roasters, biomass stoves and straw gasification had emerged, and the ownerships of methane tanks, energy-saving stoves, solar energy stoves and solar energy panels by rural households participating in cropland-to-forest conversion was 21.45%, 25.43%, 11.94% and 19.29%, respectively.

### 1.3.4 The programs have improved the livelihoods of the people of the forest areas

Development and improvement of the social welfare system is an important component of the first phase of NFPP, which was further strengthened and upgraded in the planning of the second phase of the program, and has provided a strong guarantee for solidifying the achievements of the ecological programs. Though rural social welfare development is not included in CCFP, its safeguarding role, helps to prevent a relapse to cropping due to poverty.

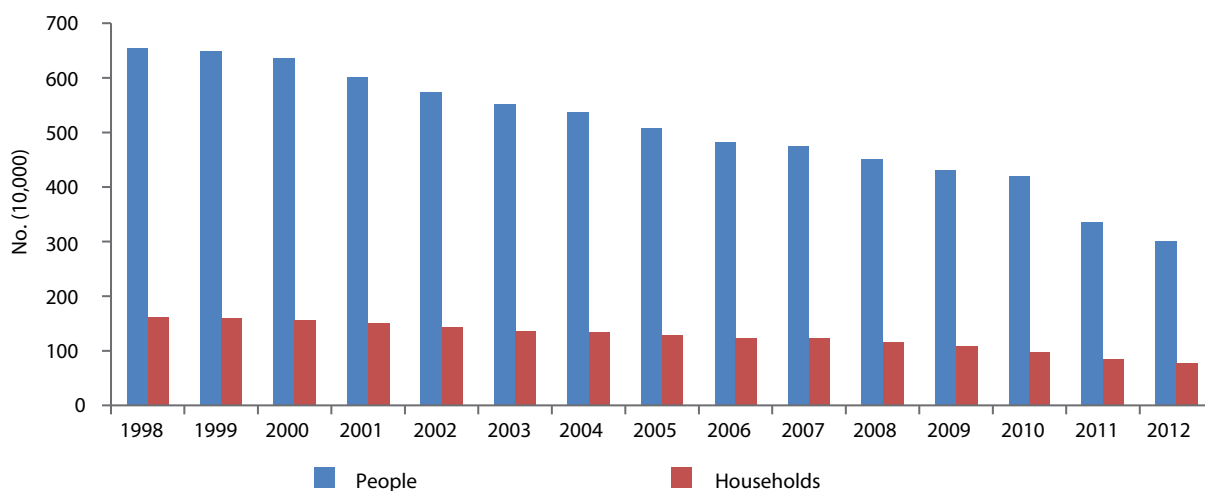


Figure 1.30 Numbers of households and people using fuelwood as their main source of energy in sample counties (1998–2012).

The monitoring shows that **the programs have contributed to the development of the social welfare system in the forest areas.** After the implementation of NFPP, social insurance of forestry employees has been formally included in the integrated social welfare system, and included in the cash subsidy system in 2006. By 2012, sample counties and enterprises under NFPP issued CNY 5.904 billion of social insurance subsidies (Figure 1.31). **The coverage of the social welfare system has expanded.** In 2012, of all the registered employees in the key state-owned forestry enterprises under NFPP, 85.18% participated in old age insurance (Figure 1.32), and 73.80% obtained social insurance subsidies (Figure 1.33). In 2012, in sample counties under CCFP, the proportion of people participating in rural social insurance and cooperative medical insurance to the total rural population was 43.73% and 94.51%, respectively. In 2012, the proportion of people in counties in Beijing and Tianjin participating in rural old age insurance and cooperative medical insurance compared to the total population increased by 69.84% and 33.20%, respectively. **The social welfare level**

**has been rising steadily.** In 2012, each person in sample counties under NFPP received an average of CNY 6261.98 in social insurance subsidies, which represented an increase of 97.21% compared with 1999, when the program was initiated.

### 1.3.5 The programs have accelerated the adjustment of the industrial mix in the rural areas

The implementation of the key forestry programs has reversed the development pattern where the key state-owned forest areas in China's northeast was the sole pillar of forestry, and the growth patterns in China's rural areas were 'extensive cultivation with meagre yield' and 'excessive logging and grazing'. The industrial structure in remote and underdeveloped areas was adjusted, thanks to the launch of these programs, despite the relatively low level of economic development in these areas.

The monitoring data show that land usage in the program areas has undergone remarkable changes, and forest areas have greatly increased. From 2000 to 2012, areas of arable land in CCFP

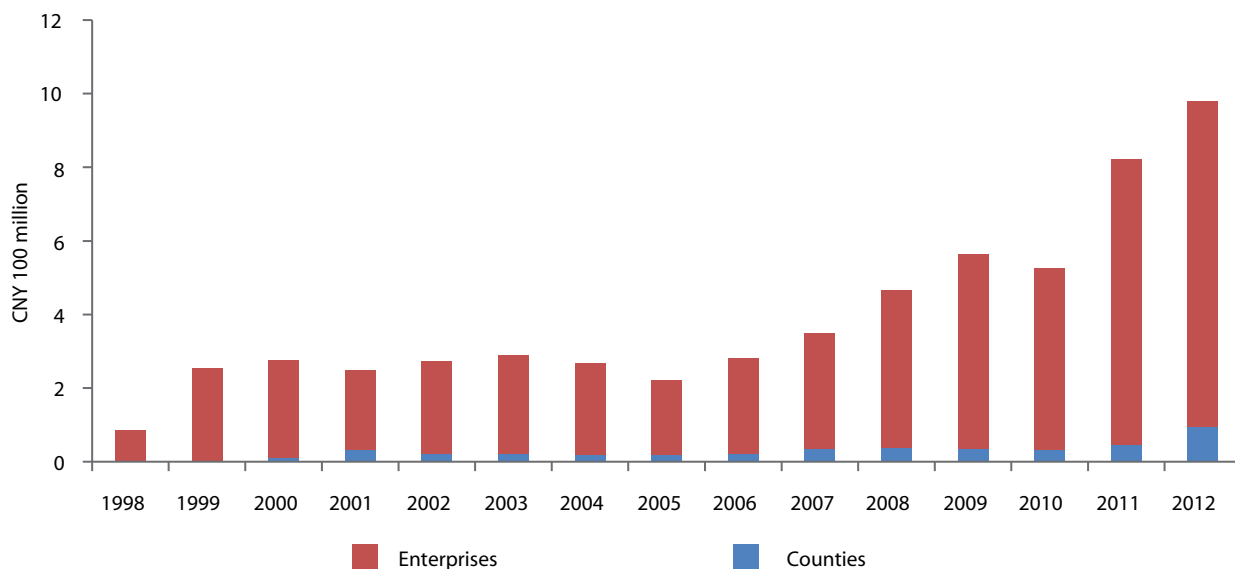


Figure 1.31 Input of social insurance subsidies in sample counties and key state-owned forestry enterprises under NFPP (1998–2012).

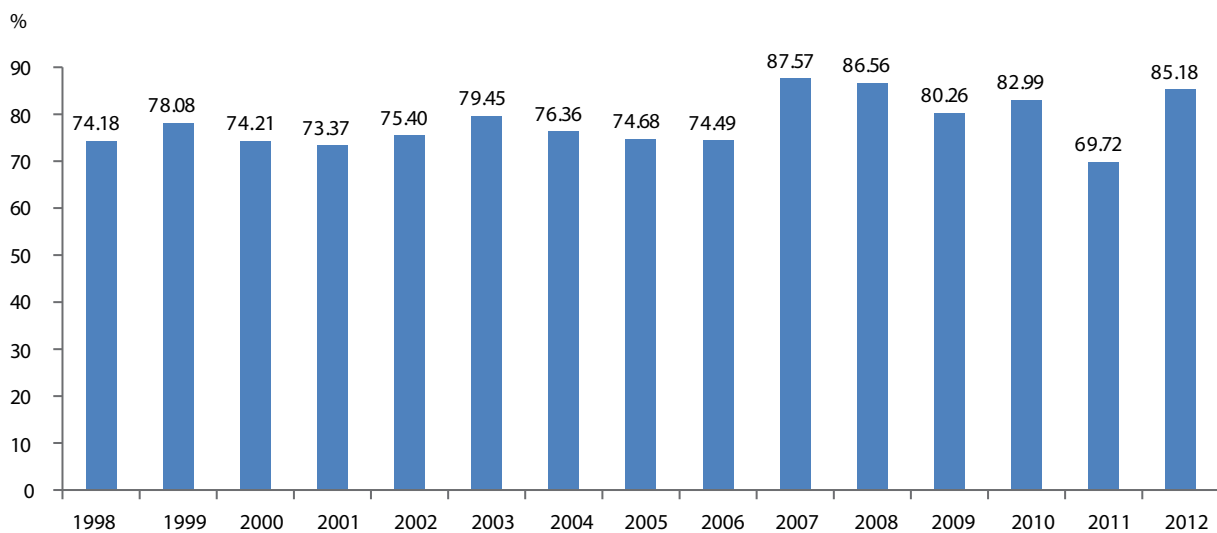


Figure 1.32 Proportion of employees participating in basic old-age insurance to registered employees in 37 sample enterprises (1998–2012).

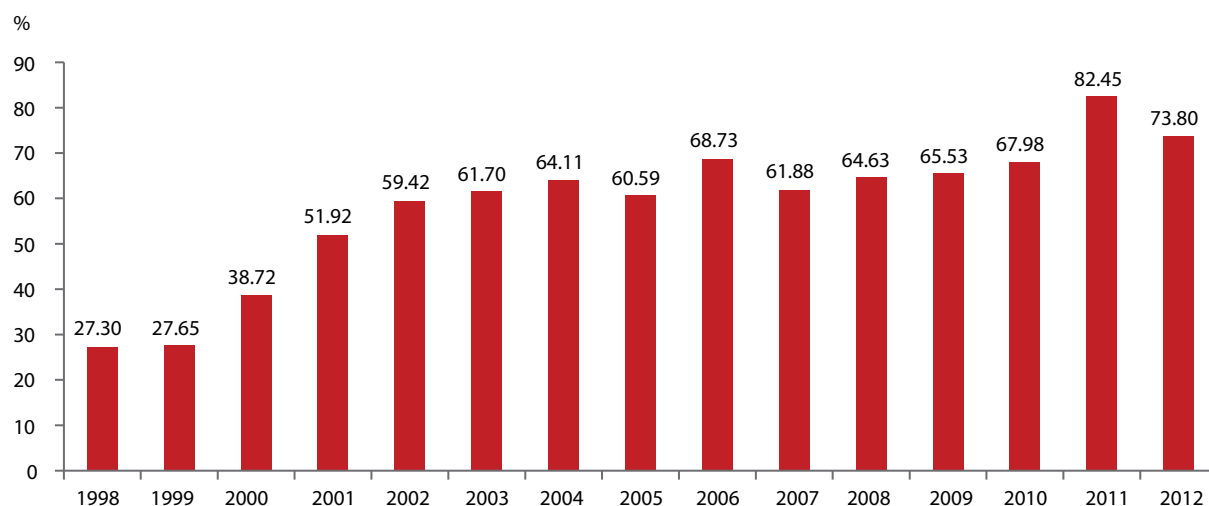


Figure 1.33 Proportion of employees obtaining social insurance subsidies to registered employees in 44 sample counties (1998–2012).

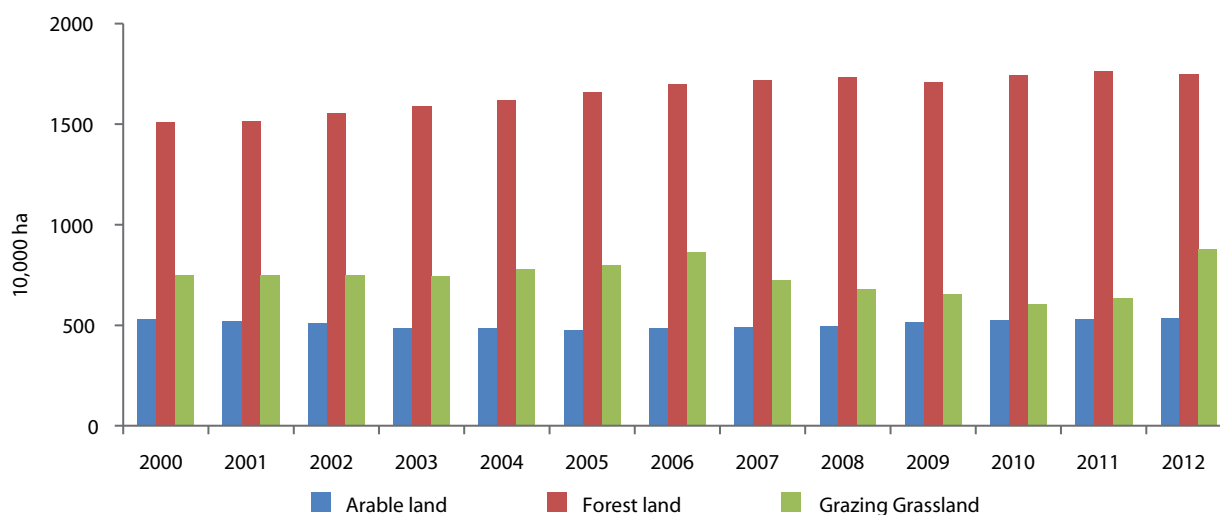


Figure 1.34 Change of land usage in 100 CCFP sample counties (2000–2012).

sample counties decreased by 1.15%, while forest areas and grazing grassland increased by 15.72% and 16.94%, respectively (Figure 1.34); and compared with the period prior to the conversion program, forest areas for sample rural households increased by seven times and more. Arable land in 21 sample counties in Beijing and Tianjin fell by

6.27%, of which desertified arable land dropped by 58.91%, forest areas and grazing grassland increased by 132,100 ha and 1.5242 million ha—an increase of 37.50% and 2.19%, respectively (Figure 1.35). The forestry industrial mix of the program areas has been effectively adjusted. Since the implementation of NFPP, the proportions of

economic forest and under-forest economic output in sample enterprises under the program increased from 10.20% in 1998 to 31.31% in 2012 (Figure 1.36). The proportion of the value of traditional industries such as logging and transportation of timber and bamboo to total forestry value in

sample counties dropped from 16.15% in 1998 to 5.30% in 2012 (Figure 1.37). Compared with the period prior to CCFP, the proportion of forest output to total value of agriculture, forestry, animal husbandry and fishing increased by 1.44% in the sample counties, and the proportion of agricultural

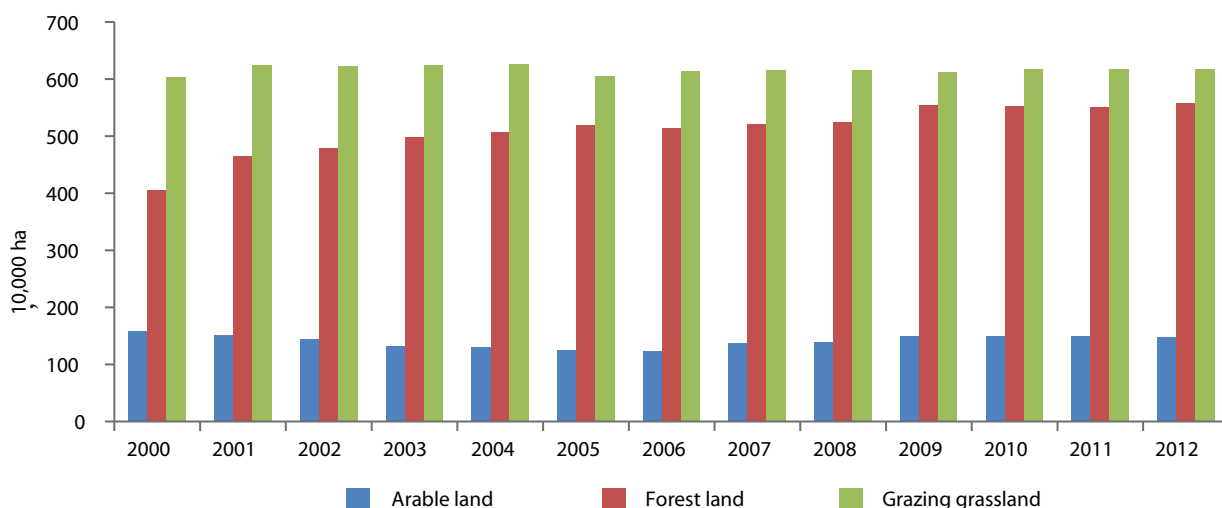


Figure 1.35 Change of land usage in 21 sample counties of SCP (2000–2012).

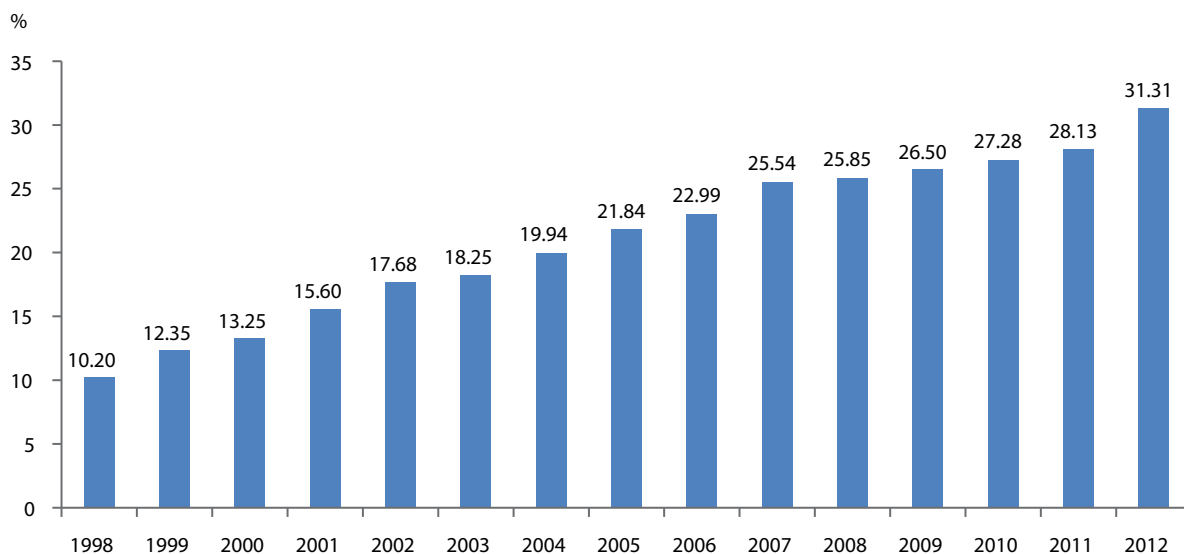


Figure 1.36 Proportion of economic forest and under forest economic output to total industrial value in 37 sample enterprises (1998–2012).

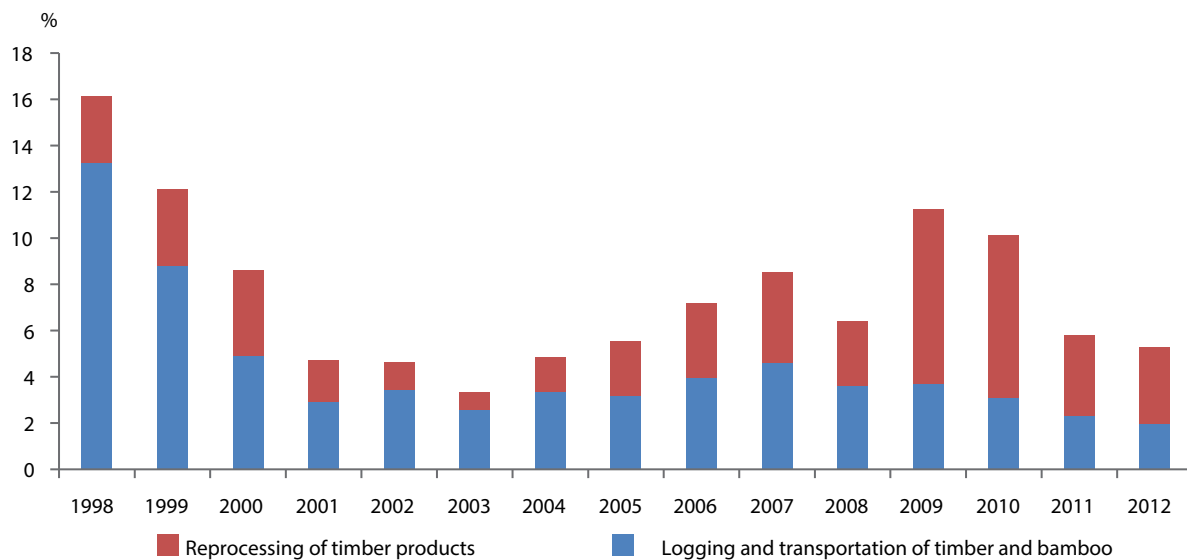
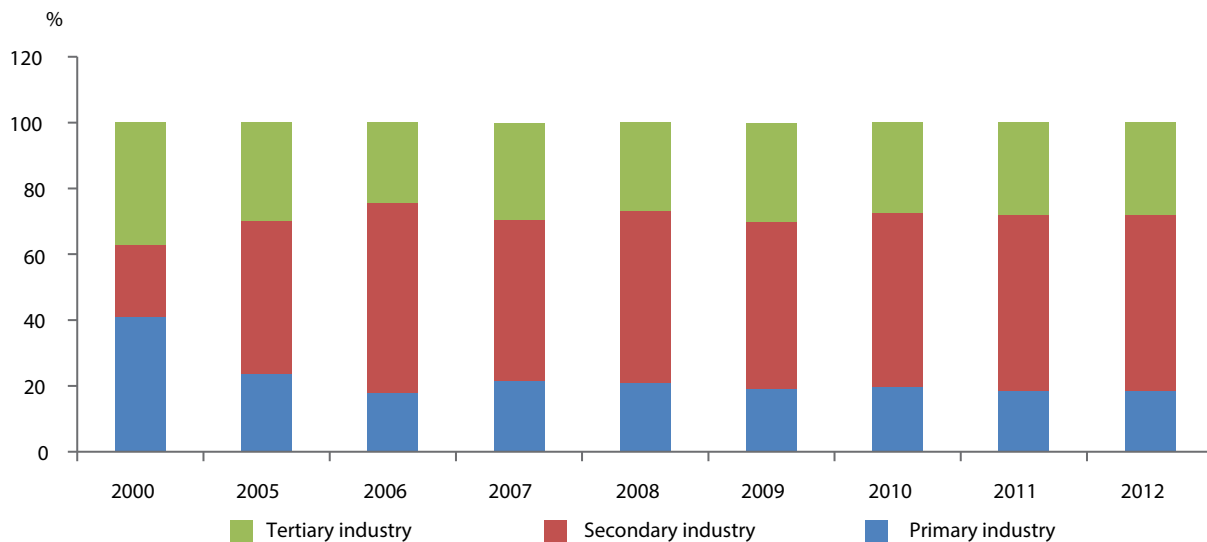


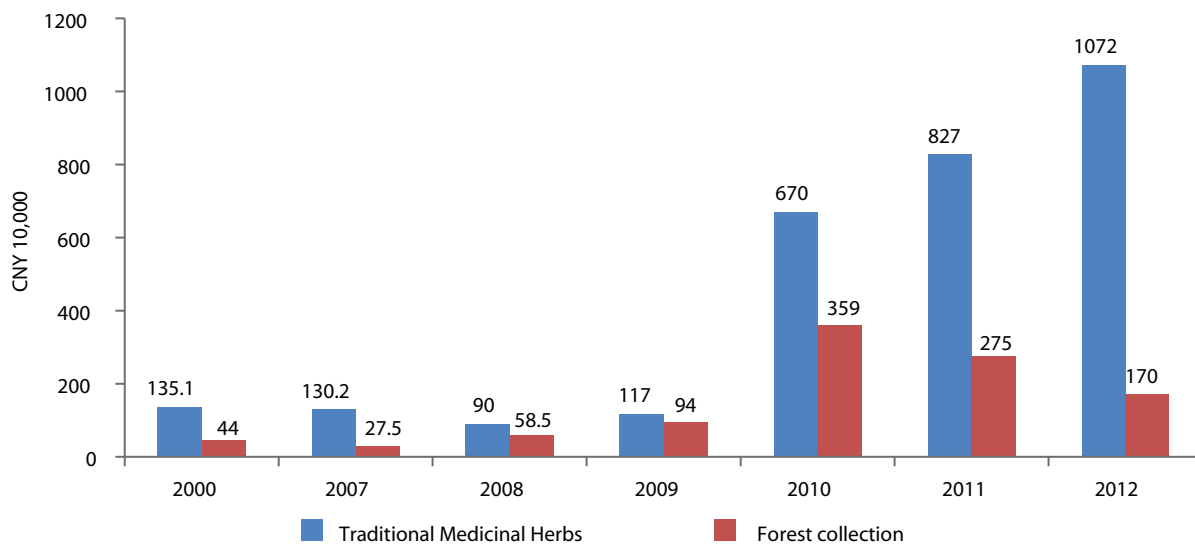
Figure 1.37 Proportion of the value of traditional forestry industries to total forestry industrial value.



Note: Output indicators were included in 2006, and the data in 2000 before the launch of the program were also collected.

Figure 1.38 Industrial mix of 21 sample counties of SCP (2000–2012).





Note: Data on the two indicators started to be collected in 2007.

Figure 1.39 Value of traditional medicinal herbs and forest collection in 40 sample reserves (2000–2012).

output fell by 7.78%. Compared with 2000, in 2012, the proportion of tertiary industrial output in sample counties of SCP increased by 27.13%, and the value of primary industry dropped by 41.52% (Figure 1.38). New industries have grown

rapidly. In 2012, the growth of traditional Chinese medicinal herbs and output of collected forest products in the reserves increased by 7.9 times and 3.3 times, respectively (Figure 1.39).

# 2

## A decade of monitoring and assessment Witnessing policy improvement and institutional innovation for forestry ecological development

Xie, Chen; Gu, Zhenbin; Zhao, Jincheng; Zhang, Sheng; Yu, Tao; Peng, Wei

Since the inception of reform and new policy, China's forestry has experienced spiraling development marked by a shift in focus from economic growth to ecological development, and then to a dual emphasis on both ecological and economic development. The key forestry programs were launched during the rise of China's economy in the 1980s and 1990s. The major task of forestry during this period was to provide timber and accumulate capital for the growth of the national economy, and provide resources and revenue to improve people's livelihoods and meet their needs. This period was characterized by excessive consumption of resources. Due to excessive logging of wood, key state-owned forest areas in China were plunged into economic and resources crises in the late 1990s, coupled with worsening soil erosion in the Yangtze and Yellow river valleys and other manifestations of ecological degradation. To reverse the trend of ecological degradation, China launched the Natural Forest Protection Program and other key forestry programs at the end of the 1990s. The focus of forestry development has since shifted from timber production to ecological development, and a strategy that gave top priority to ecological development has dominated forestry development in this period. The forestry ecological situation has improved thanks to over a decade of development. The cropland-to-forest conversion policy which consolidates the long-term livelihoods of farming households and the major tilt towards

improving people's livelihood and welfare in the second phase of the Natural Forest Protection Program means that China's forestry has now entered a stage that places emphasis on both the ecology and people's livelihoods.

In the process of spiraling development, as a result of China's national conditions and forestry reality, the key forestry programs have adopted the strategy of driving ecological development through the implementation of big programs. Through policy and institutional innovation, program implementation and sustainable development, China's forestry has traversed a path of ecological development and rehabilitation with Chinese characteristics. It has broken the vicious cycle of the symbiosis of ecological degradation and poverty, and in a short period of time, managed to achieve an overall increase in forest resources and a shift to quality improvement. The objectives, scale and length of the programs are all unprecedented and of profound influence in the world.

## 2.1 Highlighting the institutional advantages

The institutional guarantees (planning, funding and organization) are the basis of the successful implementation of the key forestry programs.

- 1. The key forestry programs were included in national development plans to provide a legal basis for their implementation.** NFPP, CCFP, SCP and other key forestry programs were included in the Tenth, Eleventh and Twelfth Five-year Plans of the National Economic and Social Development Plan, respectively. This has elevated forestry ecological development to the level of state behavior, and secured land, capital, organizational and other institutional supports for the implementation of the programs.
- 2. Government-led, inter-agency cooperation was carried out to ensure implementation of the policies related to the programs.** Since the beginning, NFPP has established and implemented a system of holding the relevant provinces accountable for the objectives, tasks, capital and responsibilities related to the programs. The provincial government assumes overall responsibility for the implementation of the program and local governments at various levels are responsible for carrying out the tasks of development, and regular evaluation is conducted to ensure the smooth execution of the program. CCFP holds the provinces accountable for the objectives, tasks, funding, food and responsibilities of the program, with the provincial government assuming overall responsibility. CCFP and SCP programs both established a provincial interministerial joint meeting system to coordinate interagency cooperation among the departments in charge of issues such as development and planning, fiscal policy, agriculture, forestry and water conservation, and major issues emerging in the implementation of the programs.
- 3. Strong public financial support was provided to ensure stable financial sources for the programs.** As soon as the key forestry programs were launched, the government established the mechanism of supporting them mainly with public financing, which has guaranteed the financial support for their smooth implementation. CCFP and SCP programs are mainly funded by the central budget. The second phase of NFPP is no longer supported by the local governments and is exclusively financed by the central budget. From 2000 to 2012, investment in the 240 samples under the key programs increased by 6.38 times.

4. **A top-down organizational structure for implementation of the programs was established to ensure their long-term, effective operation.** Forestry ecological development often has a long life cycle. To ensure smooth implementation of the programs, specific departments at the national, provincial, municipal and county levels have been established to take charge of the programs. In the early days when NFPP and CCFP were launched, specialized management agencies were set up, staffed with managerial teams to study and coordinate major issues related to the development of the programs. SCP and the Nature Reserve Program have been managed and supervised by the relevant functional departments.

## 2.2 A shift in development patterns

A review of the policies for the first and second phases of the NFPP, the policy for CCFP and the updated policy for the program shows that over the past ten years and more, there have been remarkable changes in the objectives, components and modalities of China's forestry ecological development, with improvement in people's livelihoods being a salient feature.

1. **The objectives of forestry development have shifted to equal emphasis on the ecology and on people's livelihood.** China's forestry ecological development was launched when the country was still underdeveloped economically, and the tasks of the programs were mainly undertaken by those living in the remoter and poorer areas. Since the beginning, the programs have been charged with the dual tasks of restoring the ecological system and improving people's well-being. Striking a balance between ecological protection and improvement of people's lives is a long-term mission for the key forestry programs. The purpose of the first phase of NFPP was to protect the ecological environment

and preserve biodiversity, and the goal was to protect the existing natural forest resources. The objective of the second phase of NFPP has changed to maintaining and improving people's livelihoods. CCFP initially intended to give top priority to ecological profits while ensuring sufficient food and higher incomes for the people and boosting local economic growth. The updated policy for the program identified its two objectives as ensuring consolidation of the program's achievements and effectively addressing the long-term livelihoods of the farming households involved.

2. **The modality for forest protection and rehabilitation has shifted from merely stressing protection and rehabilitation to equally emphasizing both protection and cultivation, and from extensive operation to sustainable operation.** The first and second phases of NFPP included reduction of timber output and prohibition on felling of natural forest for commercial use. The categories of forest land were changed from prohibition areas, limited areas and commercial areas in the first phase, to national public-benefit forest, local public-benefit forest and commercial forest. The change of names and differences in demarcation represent a shift from the simple and extensive protection modality to an approach that is in line with sustainable operation of forests. The second phase of NFPP has included forest cultivation and reserve resource cultivation, emphasizing sustainable forest operation. The policy for CCFP has shifted from mainly emphasizing afforestation to better managing of the forest resources.

3. **Policy measures have shifted from mostly administrative means to more economic incentives.** To effectively put an end to felling of natural forest in the upper and middle reaches of the Yangtze and Yellow river valleys, and strengthen protection of forest resources, the first phase of NFPP adopted measures such as: issuing of felling bans, withdrawing the work force, sealing off felling

equipment, closing up hills and roads, erecting blockades, revoking timber markets in forest and nearby areas, and closing down timber reprocessing centers. A series of stringent administrative means such as NFPP Action I and NFPP Action II were carried out. The second phase of NFPP uses economic measures such as compensation for planting public-benefit forest, and subsidies for forest cultivation. The Beijing-Tianjin Program has adopted an integrated approach, combining ecological migration, watershed treatment, water conservation measures and forestry development to realize desertification control.

**4. There has been a shift from conflict between population and resource protection to coordinated development of population, resources and the ecological system.** During the first phase of the NFPP, forest population and surplus employees of the relevant enterprises were regarded as the source of resource crisis and economic difficulties, and reducing the number of surplus employees to increase efficiency and arranging for their diversion and resettlement have been important components of the program. According to the planning for the first phase of NFPP, the proportion of surplus employees in state-owned forestry-related industrial enterprises in China's northeast and Inner Mongolia was 43.02%, and that in state-owned forestry enterprises in the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River was as high as 75.29%. Appropriately diverting and resettling these surplus employees has become a key issue for the smooth implementation of the program. When the program was launched, under the pressure of the tense relations between population, and the resources and the environment, the policy regarded population and resource protection as conflicting issues. Although due attention was given to the public interest of turning those who cut trees into those who protect trees, the policy failed to give full consideration to the price paid by forest workers

who lost their jobs due to the implementation of the program and the pains suffered by the society in the process. The policy also failed to fully realize the significance of employment for economic growth in the forest areas and the development of the entire national economy. Having realized the limitations of the policy in the first phase of NFPP in handling the relationship between protection of forest resources and job creation, the second phase of NFPP set safeguarding and improvement of people's livelihood as its objective. It has allocated over half of its funds for improving people's lives, relinquished the one-off arrangement policy, and redressed and compensated the losses caused by the one-off arrangement to the relevant employees. At the same time, it offered jobs to former forest employees and others in areas such as: maintenance and preservation of forest resources, public-benefit afforestation, forest cultivation, and reserve resource cultivation. The program will provide employment for 205,300 people in the Yangtze and Yellow river valleys and resettle 443,200 people in the forest areas in China's northeast and Inner Mongolia. The policy has turned the relationship between population and resources and environment from one of conflict into one marked by coordinated development. The monitoring shows that the employment rate in sample enterprises under the NFPP increased from 65.84% in 1998 to 71.39% in 2012, and the resettlement rate for laid-off workers dropped from 23.84% to 11.02% in the same period.

## 2.2 Providing property safeguards

Defining and reforming property rights provides strong institutional safeguards for the development of the key forestry programs. The property rights for ecological protection and recovery were defined by the programs after they were launched, and such efforts have been further intensified along with the implementation of the program. This has played an important role in defending the interests of

producers engaged in forestry and motivating those involved in afforestation and forest protection. The first phase of NFPP formulated a clear-cut property policy for maintenance and preservation of state-owned and collectively owned forest, and adopted the principle of “allowing those who plant the trees to manage the forest and those who maintain and preserve forest to gain the benefits”. The maintenance and preservation of state-owned forest was entrusted to specialized teams or contracted to individuals, and a maintenance and operation responsibility system was put in place that linked the responsibilities with rights and interests. Collectively-owned forest was maintained and preserved according to the will of the people, either by individuals or through contracts with individuals or through unified and organized efforts by local villages or farming teams. By adhering to the individual contracting mechanism and striking a balance among responsibilities, rights and interests, the program has ensured that the farming households who convert their cropland to forest enjoy the ownership of the forest that they have planted on the converted land, barren hills and wasteland, go through procedures to change land usage in accordance with the law, and obtain forest ownership certificates issued by the people’s governments at the county level. Once the converted land, barren hills or wasteland are afforested, the duration of the contract can be extended to 50 years, the forest can be inherited and transferred in accordance with the law, and the contract can be extended under the relevant laws and regulations.

The monitoring data shows that from 2007 to 2012, forest land owned by sample farming households kept growing, with per household forest area increasing from 18.68 metric units (mu) in 2007 to 30.24 mu in 2012, and collectively converted land contributing to a 43.20% increase in monitored forest land.

## 2.3 Innovating ecological compensation

A common feature of the key forestry programs is financing by the state, which ensures that ecological compensation is provided throughout the implementation of the programs. To improve the efficiency of the investment of public financing, the programs have set out and implemented various mechanisms for fund use and ecological compensation. Subsidies such as cropland-to-forest conversion subsidies, insurance subsidies for ecological migration and NFPP employees, subsidies for forest cultivation, and compensation for public-benefit forest, have been unveiled and improved. This helps to form a forestry ecological compensation system with Chinese characteristics. Investment in the NFPP can be divided into two parts, one for ecological compensation for those who give up felling of natural forest, and the other is investment in public-benefit afforestation. In the first phase of the NFPP, this was implemented through investment in the program. In the second phase, thanks to the inclusion of forest cultivation and public-benefit forest compensation in the program, the objects of compensation were more clearly defined, and a higher proportion of the program fund is now used for ecological compensation. Subsidies under CCFP have been designed as a mechanism for ecological compensation as soon as the program was launched. The policy adopted immediately after the launch of the program that allows the subsidies to reach the households directly has prevented the capital from being withheld or transferred, avoided other problems in the usage of public financing, and provided an institutional guarantee for the implementation of this the biggest livelihood program.

## 2.4 Strengthening managerial mechanisms

Standardized program management lays the foundation for sound implementation of the key forestry ecological programs. Since the key forestry programs were implemented, there has been continuous innovation in the managerial mechanisms used for the programs.

1. A strict evaluation, awarding and punishment mechanism has been established. NFPP has held the relevant provinces accountable for evaluation of the program, established evaluation and reporting systems and strengthened incentives. CCFP has set up a supervision system that combines examination and approval, law enforcement supervision and social scrutiny, and established a village disclosure and petition system to receive the supervision of the whole society. SCP has adopted a responsibility system that holds the relevant provinces accountable for tasks, objectives, responsibilities, fund, and food related to the program, and clearly defined the tasks and responsibilities of the program.
2. Managerial rules and regulations for the programs have been improved. The managerial departments at various levels of NFPP have improved and substantiated the systems and managerial methods for the program, and unveiled rules and regulations such as the:

- Evaluation Methods to Ensure Provinces Taking Responsibility for the NFPP
- Methods Concerning Forest Maintenance and Preservation under the NFPP
- Regulations on the Management of the NFPP Fund, and Evaluation Methods for the Second Phase of the NFPP.

The CCFP has unveiled laws, regulations and regulatory documents such as the *Regulations on CCFP, and Evaluation Methods for the CCFP*. The Nature Reserve Program has unveiled policy documents such as *the Protection of Wild Animals and Plants in China, the 12th Five-year Plan for the Development of Nature Reserves, and Suggestions on Further Strengthening Management of Nature Reserves*.

3. Various channels have been opened up in the process of the implementation of the programs to collect resources, and conduct ecological and socioeconomic monitoring and evaluation in a timely manner from all stakeholders and form an effective policy feedback mechanism. This has facilitated adjustment and improvement of the policies and ensured implementation of the programs, in keeping with the set objectives.

# 3

## A decade of monitoring and assessment Challenges and prospects

Xie, Chen; Gu, Zhenbin; Zhao, Jincheng; Zhang, Sheng; Yu, Tao; Peng, Wei

**E**cological development is a long-term undertaking. The key forestry projects provide an important platform and carrier for ecological development. China's key forestry projects are still at a difficult stage and must overcome many obstacles and win an uphill battle. Due to the changed environment of the socioeconomic development, irregular, unreasonable and unscientific factors in the development of the projects are on the increase. Nevertheless, such a stage also promises great hope. The key forestry projects should adapt to the changing circumstances, come up with innovative mechanisms and policy measures, combine government leadership with market operation, make use of both direct and indirect investments, align the projects with rural poverty reduction, reform and development efforts, consolidate achievements, improve quality, and strengthen capacity and services. In this way, the key projects will make even greater contributions to finishing the building of a society of initial prosperity and ecological civilization.



## 3.1 Challenges

### 1. Greater difficulty in afforestation.

At present, the key forestry ecological projects are faced with three types of difficulties – lack of land for afforestation, difficulty in afforestation on the available land, and unwillingness to engage in afforestation on the available land.

- **With all suitable land having been afforested, there is scarcely any land available for afforestation.** The forest coverage in the sample areas has reached over 80%, leaving no land available for afforestation in these areas.
- **Land that is suitable for afforestation is often located in remote areas with harsh natural conditions.** With the completion of the first phase of NFPP, most of the land suitable for afforestation in the upper reaches of the Yangtze River is located in high-altitude river valley areas that are either bitterly cold or too hot and dry. These areas are not fit for planting trees and the trees planted will find it hard to survive there. Afforestation in the areas with harsh ecological conditions often entails serious degradation of major plant species, which may lead to the formation of defective forest and a reduced stock of shrubbery resources. As a result, the second phase of NFPP has slowed down the development of public-benefit forest, and acutely reduced scheduled annual tasks for afforestation.
- **The irrational investment mechanism has resulted in a lack of funds for afforestation.** In recent years, the Beijing-Tianjin Project has suffered from severe spring drought, which not only has a big impact on the survival rate of newly planted forest, but also poses a threat to existing forest. This has resulted in a heavy task of reforestation. In some areas, it often takes three years of reforestation efforts to accomplish the afforestation target set by the country for one year. In addition,

as reforestation fees are not included in the planning of the project, the relevant work cannot be carried out.

- **Due to low subsidies, people are reluctant to engage in afforestation.** In some project areas, afforestation subsidies only account for 30% of the actual costs of afforestation. Some farming households claimed that the more trees they plant, the more investment they make and the more debts they are in. As the profits of afforestation are apparently lower than investment, households do not want to engage in afforestation.
  - **The irrational forest structure has dampened people's incentive to engage in afforestation.** After contracting the collectively owned forest, the farming households concerned wish to grow commercial forest on the forest land they own, and develop under-forest economy on existing forest land. But most of the project-mandated forest is for public benefits, whose usage is strictly restricted. As the project-mandated afforestation fails to meet the demand of farming households for job creation and more income, farmers are not willing to plant trees in accordance with the requirements of the projects.
- ### 2. Increasing difficulty in maintaining and preserving forest.
- Of all the difficulties, maintenance and preservation of resources is becoming a major problem, and is exerting mounting pressure on consolidating the achievements of the projects.
- **The ecological red lines initially established were not fully materialized and land requisition is a big issue.** Investigation shows that forest land is turned into cropland to achieve a balanced sharing of cropland; stone and mineral mining in the forest land destroys forest and vegetation; forest is destroyed and used as cropland in areas where forest and cropland meet.

- **As forestry-generated incomes of farmers are low, there is a growing tendency for resource destruction.** About 60% of sample households engaged in cropland-to-forest conversion plant ecological forest. Owing to the low profits generated by public-benefit forest, there is a tendency to cut public-benefit forest and grow commercial forest. The agricultural subsidy policy has increased the price of grains, and coupled with a reduction of the extended subsidies of CCFP, farmers have more incentive to grow grains. Some farming households have declined to renew the cropland-to-forest conversion contracts after expiration of the subsidies.
- **With low income and poor conditions, forest maintenance and preservation is understaffed.** In 2012, the income of forest maintenance and preservation of forestry employees under NFPP was merely 79.47% of the average disposable income of urban residents in China. As the number of people seeking jobs elsewhere increases, there is a growing gap for a useful work force for forest maintenance and preservation, and 42.93% of the land converted from cropland in sample households is maintained by the elderly and women.
- **There are insufficient funds for forest maintenance and preservation.** Maintenance and preservation fees are not listed as a separate investment in the planning of the Beijing-Tianjin Program, resulting in lack of financial guarantee for forest maintenance and preservation. The post-conversion management and cultivation of the forest is the responsibility of local governments. However, the counties charged with desertification control are impoverished counties, who find it difficult to raise the funds. As a result of such an investment modality that only “cares about afforestation, not maintenance”, the survival of the planted trees in these areas is entirely at the mercy of nature.

**3. Mounting development costs.** In recent years, the rise of commodity prices has pushed up the costs of labor and materials. The natural conditions of the regions suitable for afforestation are getting worse, thus driving up the costs of afforestation and forest maintenance and preservation. Nevertheless, as the dynamic investment mechanism for the key forestry programs is yet to be fully established, the increase of development costs of the programs far outweighs the rise in investment subsidies. As a result, investment subsidies account for a smaller and smaller proportion of the total costs of the programs, and play an increasingly smaller role. Take the afforestation of SCP for example. From 2000 to 2008, the standard afforestation subsidies from the central government stood at CNY 100 per metric unit (mu). In 2009, the figure was upgraded to CNY 200 per mu. In 2000, the cost of afforestation of SCP was CNY 135.93 per mu in sample counties (banners), and the afforestation investment subsidies accounted for 73.57% of the actual cost. In 2012, the cost reached CNY 662.62 per mu, and the afforestation investment subsidies only amounted to 30.18% of the actual cost. From 2000 to 2012, the afforestation cost in sample counties (banners) increased by 5.63 times, while investment subsidies only rose one-fold. With the rise in development costs, undertaking desertification control projects is barely profitable, so fewer and fewer companies have come forward to bid for the projects. Administrative means using local CPC committees and governments at various levels is the only way to implement the projects, which to a great extent has adversely affected the quality of the program. The investment standards of the Nature Reserve Development Program were set too low. Nature reserves are often located in the remote mountainous regions, where the costs for the program are higher than other regions, and the projects can hardly be completed as well as expected. In addition, due to insufficient capital input in the Nature Reserve Development Program, the infrastructure development in 50% of the sample reserves and the R&D facilities in

nearly 90% of the sample reserves cannot meet the needs of the program.

**4. Heavier development tasks.** The history of the programs shows that the shift from purely ecological tasks to combining both ecological tasks and socioeconomic development tasks means that the programs are gradually shouldering heavier tasks.

- **The programs are substantiated.** The key forest programs are implemented mainly in areas that are home to large numbers of poor farmer populations. In the counties participating in NFPP, 93.69% of the poor live in the program areas. Forest areas often have a high poverty rate and people there are more vulnerable to poverty; once impoverished, they often find it hard to get out of poverty. To mitigate the pressure of ecological resources on poverty reduction, the programs not only focus on ecological forestry development, but also consider the livelihoods of the people living in the forest areas (see Table 1).
- **Higher requirements are set for the programs.** Take the Desertification Control Program for Areas in the Vicinity of Beijing and Tianjin, for example. The program undertakes the task of desertification control and answers the ecological needs of the cosmopolitan development of Beijing and Tianjin, and responds to the strategic needs of building a green ecological area in north China while safeguarding the ecological security of the homeland.
- **More areas are included in the programs.** The main tasks identified by the 12th Five-year Plan for National Wildlife Preservation and Nature Reserve Development include: conservation and rehabilitating extremely endangered wild animals, conservation and rehabilitation of plant species with extremely small populations, and prevention and control of wild animal related epidemics and their sources.

**5. More profound influence of the reform.** At present, China is implementing institutional reform of collective forestry rights. Reform of state-owned forest that is being experimented on and reform of state-owned key forest areas will exert important and far-reaching influences on the development of the key forestry programs.

- **Reform of collective forestry demands that the programs highlight the mechanism for sharing of key achievements.** Some of the forest land under the key forestry programs is still collectively owned. For example, a fifth of the land in sample nature reserves is collectively owned, only a part of which has provided very low levels of compensation. Since the comprehensive implementation of collective forestry reform, farmers now have a more urgent demand for an increase in the compensation standards, which puts tremendous pressure on the management of the nature reserves. Some nature reserves have explored alternatives such as: leasing, buyout, exchange and raising compensation standards to address the problems concerning the collectively owned forest in the reserves. Their experience and practice should be rolled out along with the deepening of the reform process. For collectively owned forest included in the nature reserve program, higher compensation standards should be gradually adopted through consultation. Meanwhile, more jobs should be created to ensure sharing of the outcomes of the reform.
- **Reform of state-owned forest demands that the programs highlight the mechanism of market operation.** At present, a key feature of reform of state-owned forest is categorization reform, namely, categorizing the existing state-owned forest into public-benefit forest and commercial forest. For the commercial forest in the program areas, the original planning decrees, supervision, examination and other means of program management,

will lose effect. The programs need to use market-oriented management methods in task allocation, fund appropriation, quality control and resource management, among others.

- **Reform of key state-owned forest areas demands that the programs highlight the importance of people's livelihoods.** At present, although the reform of key state-owned forest areas is still at an exploratory phase, the general trend is to stress the resource management system and the business operation mechanism. Under the resource management system, development, management and cultivation of resources should be separated; development and management can be integrated, while cultivation should be separated from the other two. Under the business operation mechanism, with the separation of public benefits and profits, big changes should be made to the main players, scope and means for the implementation of the programs. This requires that the programs should continue to strike a balance between the two main tasks of improving the ecology and people's livelihoods. In this sense, efforts need to be made to ensure the smooth implementation of the reform, while at the same time accomplishment tasks such as: employee diversion and resettlement, job creation, social welfare and promotion of the harmonious development of forest areas.

## 3.2 Prospects

**1. Continue to adopt the program-oriented development model in compliance with the law of nature.** Generally speaking, ecological development can be divided into three stages, (i) rapid rectification, (ii) appropriate rectification and (iii) natural rehabilitation. When the

ecological environment is becoming degraded, it is important to follow the program-oriented development model to: marshal together human, physical and financial resources, tackle ecological problems in a holistic manner, detect and make up for the deficiencies and strive for speedy results, in order to immediately address the threats of ecological degradation and socioeconomic development. When ecological degradation is fundamentally reversed, apart from program-oriented rectification in some areas, this model should phase out in other areas. Consolidation of program achievements should be included in the forestry support and protection system, with a view to establishing a long-term mechanism for ecological rehabilitation. Compared with other ecological rectification models, the program-oriented development model is more focused and targeted, easier to develop and regulate, more workable and manageable and more effective in the long-term. History and the experience of other countries show that forestry ecological development should follow the program-oriented model, which can address the problem of investment shortages, enhance the standing and influence of forestry and greatly promote forestry development. Over a long period of time, the program-oriented ecological development model, and even the program-oriented ecological rectification and development strategy should be followed.

**2. Diversify investment and establish an investment and financing mechanism combining government leadership with market operation.**

As a public-benefit undertaking, the key forestry programs should ensure that the government plays a leading role in their development. At the same time, market means should be used to attract funds from society to participate in ecological development. When we consider the total amount of government investment,

we should draw on international experience to establish a dynamic GDP-associated investment mechanism and strengthen the government's responsibility for making investments. In terms of investment means, apart from government direct investment, other means such as government purchased afforestation, and leased afforestation can be explored to reduce the financial pressure on, and managerial costs of, the government, and to improve the efficiency of fund usage. In terms of government leadership, we must sum up the market-oriented financing measures that are explored and implemented in other parts of the world, such as: carbon offset transaction, biodiversity transaction, coal (mineral)-for-forest plan, and the plan for downstream industries to make up for the loss of upstream industries, and strengthen the role of the market in allocating ecological resources. Market means, including stocks, bonds, BT and BOT, should be put to full and integrated use to attract the participation of social funds in ecological development, and achieve the goal of reducing fiscal pressure and increasing the efficiency of funds. Drawing on the experience of agricultural development, a financial program for the green industrial chain should be adopted to provide financial services to all ecological industries, and meet the financial needs of the multiple participants in the ecological industrial chain such as: farming households, key enterprises and small companies.

**3. Accelerate the sustainable development of forest business operation through both preservation and cultivation.** Forest business operation is a constant theme of forest development. As the area of land suitable for afforestation reduces and afforestation gets more difficult, the objectives of the key forest programs should further highlight increasing both the quantity and quality. The development tasks should be identified

in a way that further increases the proportion of tasks, such as forest cultivation and nourishing of reserve resources. In terms of managerial methods, a fiscal subsidy and incentive mechanism should be established to further highlight the role of fiscal funds as rewards to replace compensations and place emphasis on the management of the program achievements. The mechanism for resource maintenance and preservation should concentrate on the role of specialized farmers' forestry cooperatives and specialized farmers' forest protection teams to ensure specialized maintenance and preservation of forest resources and increase in job opportunities and incomes for farmers. Appropriate use of the grasslands of DCP will contribute to rehabilitation of the grasslands. Preoccupation with prohibition leads to unscientific use of grassland resources, and is detrimental to ecological rehabilitation of the grassland. It even occurs in cases where grazing is banned during the daytime but practiced at night on some grasslands. In areas where ecological protection is extremely important and development must be prohibited, the resources should be strictly protected. The forest resources in other areas should be utilized under the principle of appropriate timing, quantity and intensity through the development of under-forest economy and integrated operation to improve the comprehensive output and productivity of forest land. The forest logging management system should be finalized to allow for appropriate logging of public-benefit forest and promote effective upgrading of forest resources.

**4. Deepen reform and establish a mechanism for sharing the outcomes of ecological development.** As the implementation areas and forest areas of the key forestry programs are inseparable from the rural communities geographically, local farmers find it hard to leave their homeland, and farmers are the real property actors of some forest land, developing

the following profit-sharing mechanism between forest areas and farming communities on the basis of appropriate roll-out of the ecological migration policy should be a priority. It would involve

- improving the compensation standards for ecological benefits and individual households' access to compensation funds to ensure that farmers would not cut down trees and would avoid slipping into poverty;
- using the method of stock options to tap into tourist resources through cooperation and ensure that farmers share the dividends as stock owners;
- attracting the participation of farmers in ecological maintenance and preservation through maintenance and preservation agreements;
- applying subcontracting and other means of forest land circulation to ensure that farmers enjoy the property-related profits from the land.

It is important to seize the opportunity of the reform of forest property system, and promote such means as: franchised operation rights, fee collection

rights, and transfer of usage rights in ecological project development, and open more channels for the main actors of ecological development to benefit from their work. Efforts should be made to draw on the experience of state-owned enterprises in terms of exploring the possibility of allowing employees in forestry-related industrial companies to participate in stock and option mechanism of ecological development, increase their property-related benefits, and enhance their interest in afforestation and forest maintenance and preservation. It is necessary to study and formulate regulations on the implementation of the key forestry programs, substantiate the concept of forest resources, and reduce the restraints caused by the concept of timber resources. It is important to clearly identify the ecological red line to curb unauthorized grabbing of forest land. The idea of categorized management of forestry should be emphasized so the forest land that is brought under control is managed well, the regulation on other types of forest land is loosened, the land that can be used is made good use of, ecological development is carried out under the rule of law, and the lawful rights and interests of various property owners is safeguarded.

# 4

## Monitoring report on the socioeconomic impacts of the natural forest protection program (NFPP) in key state-owned forestry enterprises

Zhang, Sheng; Zhang, Kun; Xu, Kai; Li, Yang; Zhao, Jinyong

The second phase of the Natural Forest Protection Program (NFPP II), was started in 2011, and 2012 was a key year, when we reinforced policy implementation, transferred to a new development mode, pushed reform in state-owned forest region, explored new mechanisms of forest protection and management, cultivation, and construction of ecological forest, and further promoted people's livelihoods in forest regions. Several administrative rules based on the five major policies of NFPP II were issued or improved in 2012. The incomes of forestry staff and forest farmers were increased because of a combination of forest protection with developing forestry economy. An on-site meeting of ecological forest protection and forest silviculture in NFPP area was held to exchange experiences between different regions. The innovative modes of forest management in state-owned forest region and forest protection in Heilongjiang, Jilin and Yunnan provinces provided helpful experiences for key state-owned forest region's reform and development.

During the important transition stage, the 2012 monitoring report is a basic structure for: reflecting the implementation of NFPP policies in key state-owned forest regions, analyzing the socioeconomic effects, and finding the obstacles to the implementation of NFPP on ecological construction

and livelihoods of forest staff and farmers, and supplying recommendations for decision-making. The paper also reviews ten years work of NFPP in key state-owned forest regions.

The monitoring methodology is the same as that used in previous years. Monitoring samples in 2012 covered two levels that were: 37 state-owned forestry enterprises (hereafter referred to as the sample enterprises) and 79 forest farms (hereafter referred to as the sample farms) affiliated with forestry enterprises. Thirty-seven sample enterprises were located in nine provinces (autonomous regions), which was 23.87% of 155 national key state-owned forestry enterprises.<sup>1</sup> Monitoring methods combined data collection in former years with field investigation on special topics, such as investigation on staff livelihoods, residential buildings' modification of state-owned forest region in Jilin Province and social insurance system of forestry staff in Heilongjiang state-owned forestry enterprises in 2012. There are a total of 480 indicators centering around nine aspects as follows: timber harvest; forest protection and management; ecological forest construction; forest tending; employment and income of forest staff; social insurance system; industrial development; modification of residential buildings; and expenditure of its investment to reflect policies' implementation and effects.

## 4.1 Progress and policy implementation

Compared to the first phase of NFPP policies (NFPP I), NFPP II continued the policies of: decreasing timber production, protecting forest and constructing ecological forest, with focus more on tending and protecting natural forest, promoting forest growth by forest silviculture, and forest tending and thinning.

<sup>1</sup> Including 135 harvesting enterprises and 20 key silviculture bureaus in state-owned forest region.

### 4.1.1 One-fourth of timber deduction and 100% of forest under protection

Roundwood production from 37 sample enterprises in 2012 were 1.33 million m<sup>3</sup>, representing a reduction of 0.46 million m<sup>3</sup> or a decrease of 25.73%, compared to that of 2011. The average roundwood yields were 14.69 m<sup>3</sup> per ha. Harvest of forest was 0.20% of the total forest volume, accounting for 14.99% of net growth of forest volume. Harvest was much lower than the net growth of forest volume, which is helpful for restoration of forest ecological function. Roundwood production of 24 sample enterprises in northeast and Inner Mongolian key state-owned forest regions was 1.28 million m<sup>3</sup>, which was a reduction of 0.45 million m<sup>3</sup> or a decrease of 26.21%, compared to 2011, and accounted for 98.46% of the total deduction. Roundwood production in 13 sample enterprises in the upper branches of Yangtze River and mid upper branches of Yellow River was 52,700 m<sup>3</sup>, which was a 7100 m<sup>3</sup> reduction or a decrease of 11.89%.

The main task of NFPP is to protect the existing forest. The forest under patrol protection in sample enterprises was 12.07 million ha, or 98.45% of the total forest area. The number of staff involved was 32,800. The average forest area for each staff was 367.94 ha, which is lower than the limit.<sup>2</sup> A protection station (team) was the major mode of forest protection. Protection station (team), professional and contract protection, family protection and other modes were: 81.14%, 8.71%, 1.58%, and 8.57%, respectively (Figure 4.1).

From the field investigation, new forest protection modes were started in different regions according to local conditions, to promote effects of forest protection. Professional forest protection teams were set up in forestry enterprises of Jilin Province.

<sup>2</sup> According to the policy, limitation of patrol protection of each person is 380 ha in northeast and Inner Mongolian state-owned forest region and 384.49 ha in Upper branch of Yangtze River and mid and upper branches of Yellow River.



Table 4.1 Protection mode of state-owned forest in NFPP II.

Mode	Concept
Protection station (team)	Organize specialized teams, construct protection stations, sign responsibility contract to fully implement protection tasks in the forestry bureau. A system of 'Information card for protection effects' is used to monitor the process.
Professional and contract protection	A professional team is set up to patrol the far mountain forest. Contract protection is used in mountain forest areas close to residential areas with convenient transportation.
Family protection	Family members patrol the forest with right of managing and using under-forest resources. It includes family ecological forest farms and family trusteeship protection.
Others	It includes forest protection between forests, farms, villages, towns and farmers.

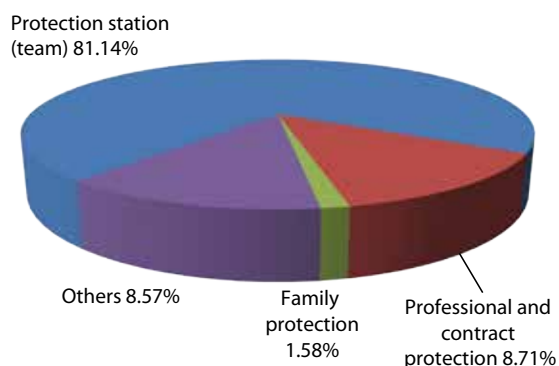


Figure 4.1 Structure of forest protection in 2012.

Contracts were signed between foresters and professional forest protection team instead of forest farms. Sanchazi Forestry Enterprise signed forest protection contracts with mining companies, prospecting units, dead wood and branch collecting contractors, and contractors managing trenches and valleys within its administrative area forest. Wangqing Forestry Enterprise in Jilin Province set up four layer forest protection mechanisms, and included Leader Team, NFPP Center, Forest Protection Central Station and Forest Protection Branch Stations, which had different responsibilities. The forest protection team (under the administration of NFPP center) is responsible for making a protection plan, an annual scheme, a management system, and monitoring, inspecting, guiding and comprehensively assessing

the implementation of forest protection. It also plans and organizes the construction of protection infrastructure. In Xinjiang Autonomous Region, the local government of Yili state signed a responsibility contract on targets of NFPP with Tianxi Forestry Enterprise, reflected the supervising role of local government in protection of natural forest.

#### 4.1.2. There was a substantial increase in nursing reserve forest and tending area was increased by 10%

Reinforcing forest nursing has been always the main topic of modern forestry development and the new task in NFPP II. In 2012, sample enterprises reinforced reserve forest nursing, optimized forest structure to improve forest quality. Total nursing reserve forest was 25,800 ha, with an increment of 6,900 ha, increased by 36.70% compared to 2011. There were 2500 ha of plantation, 23,300 ha of low quality forest transformed, an increase of 9.69% and 90.31%, respectively. As a whole, transforming low quality forest was considered to be the main way of nursing the reserve forest and replanting was the main way of transforming low quality forest.

Sample enterprises finished tending 361,600 ha in 2012, which increased by 10.65% compared to

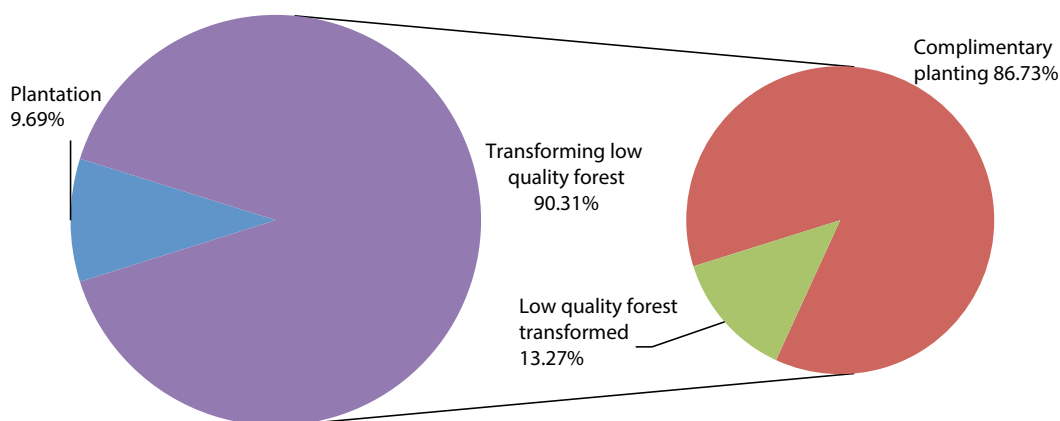


Figure 4.2 Reserve forest nursing in sample enterprises in 2012.

2011. Finished tending area accounted for 58.96% of the planned tending area and 12.92% of the urgently needed tending area. From the results, although sample enterprises' tending area increased greatly last year, it still lags behind the required quantity and planned tasks. The structure of the tending area is shown in Figure 4.3. Production of roundwood from tending was 400,400 m<sup>3</sup>, or 8600 m<sup>3</sup> of fuelwood. It is on average 1.74 m<sup>3</sup> of roundwood per ha.

Some sample enterprises used tending measures to enhance tending quality. Xiaolongshan Forestry Enterprise in Gansu Province typically emphasized 'four combining methods' for forest tending such as: tending exiting forest with managing new plantations, growing large diameter seedlings, exploring ecotourism, and managing under-forest resources. Xiaolongshan Forestry Enterprise innovated five forest operation models for natural and healthy forest management, managing forest for multiple functions and structural optimization of forest such as: new growth model, crown layer's thinning and released thinning model, structural adjustment model, ecological restoration model, and landscape optimization model. Daxinganling Forestry Enterprise carried out comprehensive tending measures, which combined thinning,

cleaning, shrub cutting and replanting. They implemented tending according to 'four priorities' principles, that is tending priority was given to those forests with a higher density and plantations with diseases and insects' problems, plantations under forest, and seedlings and young naturally regenerated all-purpose species trees. Light thinning was carried out in young forest.

#### 4.1.3. 70% staff changed position to be reemployed and there was a higher degree of social insurance participation

Newly redundant staff caused by the further reduction in timber production of NFPPII were reemployed in: forest protection, planting, tending of middle and young aged forest, transforming low quality forest and social service positions. Until the end of 2012, there were 117,400 staff, 12,700 redundant staff and 28,900 staff leaving their positions with effective labor contracts, which accounted for 71.39%, 11.01% and 17.60%, respectively of the total enrolled staff. Therefore, more than 10% of redundant staff needed to be reemployed. The structure of employment is as follows: 31,000 staff working in forest protection, 27,700 staff in social services positions, 24,600 staff in harvest and wood processing, 19,100 staff in afforestation and 14,900 staff in horticulture and

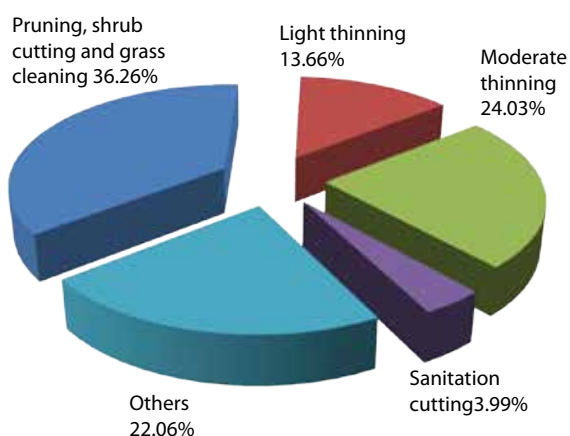


Figure 4.3 Structure of forest tending in 2012 in sample enterprises.

animal husbandry under forest, which accounted for 26.49%, 23.59%, 20.95%, 16.27%, and 12.70% of all staff, respectively.

In 2012, the number of staff with basic pension insurance was 140,000, which was 85.18% of the total enrolled staff, an increase of 5.21% compared to 2011. The number of staff with basic medical insurance, unemployment insurance, work-related injury insurance and maternity insurance was: 211,700, 126,100, 138,200 and 124,500, respectively. The uptake of the four insurance schemes was: 92.27%, 100%, 98.85% and 98.55%, respectively. The uptake of basic medical insurance and unemployment insurance in 2012 decreased by 7.39% and 1.02% compared to that of 2011. The uptake of work-related injury insurance and maternity insurance increased by 2.99% and 3.32%. Overall, it showed that the participation ratio of social insurances in sample forestry enterprises was high and planned tasks were accomplished well, but the participation ratio of some insurance schemes was not steady and even in decline.

Analyzing the social insurances of forestry enterprises in nine sample provinces, Sichuan

provincial government provided the highest support for the social insurances in the state-owned forest region. Continuing NFPP I's support policy, Sichuan provincial government subsidized state-owned forestry enterprises by CNY 84.75 million and CNY 39.58 million annually to ensure over 60,000 retired staff received their full pension on time and had medical insurance. Sichuan provincial government also subsidized Aba State Forestry Enterprise by CNY 10 million to cover their staff medical insurance.

#### 4.1.4. Increase of accomplishment rate and rate of investment

In 2012, the total amount of investment in sample enterprises was CNY 5.14 billion, a dramatic increase of 33.48% compared to that of 2011. The rate of investment was 95.55%, an increase of 6.45%. Total expenditure was CNY 5.53 billion, an increase of 42.29%. This substantial increase in expenditure was caused mainly by more expenditure in residential buildings reconstruction, subsidy of forest tending and social insurance.

The expenditure on: residential buildings reconstruction, resource management and protection, social insurance subsidies, social service subsidies, forest tending subsidies and ecological forest construction and others amounted to 28.70%, 17.82%, 16.03%, 14.65%, 9.62% and 13.18%, respectively, of the total project funds. Among social insurance subsidies, the subsidy for basic pension insurance, basic medical insurance, unemployment insurance, work-related injury insurance and maternity insurance accounted for 60.33%, 29.31%, 4.43%, 4.17% and 1.76%, respectively. The subsidy for basic pension insurance and medical insurance was 89.64% of the total subsidy and more than 80% of the staff participated in the leading two insurance schemes. The social insurance covered the grassroots and played an important role in ensuring a harmonized society in the forest regions.

## 4.2 The socioeconomic impacts

Since NFPP, people's livelihoods have improved. Residential buildings reconstruction has been carried out successfully and staff income in forestry enterprises has increased rapidly. The social insurance system has been set up, and the social burden of forestry enterprises has decreased further. Social services in forestry enterprises were further reduced. The social service organs are: public security organs, procuratorial organs, people's courts, judicial organs, education, training, science and technology and cultural organs.

### 4.2.1 Increase of employment and decrease in the rate of employment for enrolled staff

Total employment in 2012 was 117,400 in sample enterprises, an increase of 1.63%, which was 71.39% of the total enrolled staff, a reduction of 0.90% compared to that of 2011. The main cause of the reduction was a large decrease in roundwood production in 2012, which caused a large amount of workers to lose their jobs. Employment in the tertiary industries and livestock breeding decreased by 46.24% and 29.19%, respectively as the industries were in recession.

It's worth mentioning that forest silviculture and tending policy supplied new employment opportunities for both employed and unemployed staff, even with the reduction in roundwood production. In 2012, there were 34,400 staff working in forest tending, accounting for 20.91% of the total enrolled staff and 3100 unemployed workers were reemployed, accounting for 17.29% of the total unemployed. Forest tending obviously helped the reemployment and with the further implementation of a policy on reserve forest nursing, there is potential to further increase the numbers of forest staff employed.

### 4.2.2 Rapid increase of staff's income and decrease of enterprises' social burden

The total salary of forestry staff was CNY 0.28 billion, an increase of CNY 57 million, or 25.56%,

compared to that of 2011. The average salary of each staff was CNY 23,900, an increase of CNY 4,900, (25.79%). In NFPP II, many enterprises combined forest nursing, industrial development with an increase in staff incomes. In 2012, Songjianghe Forestry Enterprise targeted salaries, income and profit and tried to industrialize their silviculture. They took forest silviculture and management as a basic industry to enhance the forest quality and output of forest. Taking exploration of forest land as a key area, non-forest and non-wood industries were developed with the full participation of staff. The average income in this enterprise was CNY 36,400, which was 19.58% higher than the local average income and 1.52 times of that in other enterprises.

In 2012, the social service function of sample enterprises was further reduced and social management in forest regions was reinforced. There was 4000 staff working in public security, procuratorial services, people's courts and judicial sectors, 7700 staff in education, training, science and technology, and culture sectors, and 3,500 staff in the health, medical sector and sports sector in 2012, a decrease of 0.07%, 0.30% and 12.52%, respectively compared to 2011. Among all the social service functions, health, medical and sports service were largely removed from sample enterprises. Removal of social services from sample enterprises did not weaken the service in forest regions. With the financial aid of central government, total expenditure in social services actually increased but the proportion in enterprises decreased. In 2012, total expenditure on social service in sample enterprises was CNY 773.00 million, an increase of 1.45%. This included a special financial subsidy of CNY 631.00 million, or 81.69 million, an increase of 10.16% and enterprises at 18.31% or a decrease of 6.66% compared to 2011.

### 4.2.3 Further improvements in social infrastructure and 90% of dilapidated buildings reconstructed

The infrastructure in sample enterprises was further improved with the implementation of NFPP. The problems of lack of drinking water, electricity and transportation roads were addressed. At the end of 2012, there were 248 forest farms with potable drinking water, accounting for 68.89%, an increase of 14.37% and 349 forest farms with electricity, accounting for 96.94%, an increase of 2.80%. More forest roads were built, totaling 44,800 km, an increase of 13.24% on 2011.

Forestry staff living condition were improved with the introduction of a project to reconstruct residential buildings. Transformed and reconstructed buildings reached 4.26 million mu, accounting for 91.35% of the total dilapidated buildings (shelter-like houses) present, which benefited 254,200 staff households, accounting for 36.30% of the total population. Songjianghe Forestry Enterprise in Jinlin Province started a new forest regions building program which included residential buildings reconstruction, relocation of forest farms, returning residential areas to forest and building central forest farms. Four central forest farms were reconstructed and another 11

forest farms were moved and combined with the headquarters of the forestry enterprise. Up to the end of 2012, reconstructed residential buildings were 231.40 mu in area, and benefited 5400 staff households. The proportion of households in dilapidated buildings decreased from 86.41% to 25.33%, a reduction of 61.08%.

### 4.2.4 Increase of enterprises' output value and adjustment of economic structure to the secondary and tertiary industry

In 2012, the overall economic situation in sample enterprises was healthy; there was a large increase of output value, and economic structure was optimized. Total output value of sample enterprises was CNY 18.51 billion, a rise of CNY 2.60 billion over 2011, or an increase of 16.36%. The output value of the primary, secondary and tertiary industries was CNY 7.86 billion, CNY 6.80 billion and CNY 3.84 billion, or a rise of 42.49%, 36.74% and 20.77%, respectively. Compared to 2011, the proportion of primary industries continuously decreased, and secondary and tertiary industries both increased, with tertiary industry's development increasing the most, strongly pushed the increment of total output value.

Among the output value of the sample enterprises, the output values of economic forest, diversified economy under forest and timber processing increased strongly, played an important pulling function for enterprises' economy development (Figure 4.4). Compared to 2011, the output values of economic forest, diversified economy under forest and timber processing increased by 83.56%, 23.77% and 20.88%, respectively. The output value of timber harvesting and transportation decreased by 13.83%. The diversified economy under-forest, timber processing, economic forest products, timber harvesting and transportation contributed to the growth of total output by 6.05%, 2.70%, 2.25%, -1.86% and 7.22%, respectively.

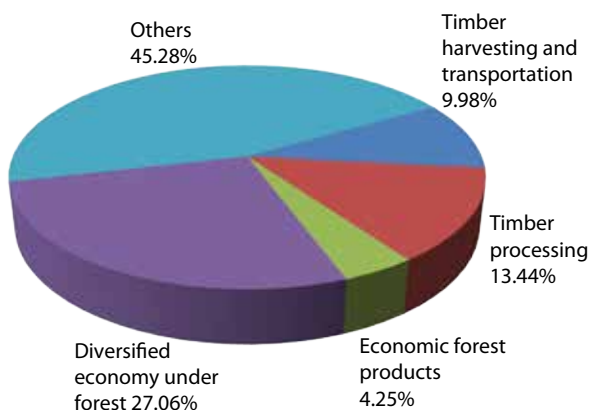


Figure 4.4 Output value of industries in sample enterprises.

The ratio of total assets to industrial output value, ratio of capital hold and rise and ratio of cost profit was 2.86%, 106.86% and 7.03%, respectively in 2012, a rise of 0.58%, 4.97% and 1.81% over 2011. The asset-liability ratio was 65.74%, a rise of 3.19% over 2011 and the sales ratio of industrial enterprises was 86.36%, a decrease of 5.99% over 2011. Overall labor productivity was CNY 18,860 per person, a deduction of CNY 5,130 per person, or a decrease of 21.37% (Table 3). In general, the economic benefit was not clearly recovered because of a reduction in roundwood, adjustment of economic structure, and the state of the economy, which was in a fluctuating situation.

### 4.3 Overview of ten years of monitoring in NFPP

NFPP plays an important role in securing ecological and wood safety and harmonizing socioeconomic development in forest regions. Natural forest areas in NFPP region account for 60% of the total area. The overall investment of the government in NFPP is 27% of total forestry investment in the last ten years. NFPP covers almost the entire state-owned forest region, water conservation areas and ecological security areas. The effects of NFPP have an important role. From the monitoring results, implementation of the NFPP has helped to achieve

#### **Box 1. Residential buildings' reconstruction project (RBRP) in Wangqing Forestry Bureau and Lushuihe Forestry Bureau were popular with forestry staff**

Both Wangqing and Lushuihe Forestry Bureaus are early exploited wood production basis in key State-owned forestry enterprises. At the beginning, forestry staff built simple shelters as residential dorms close to the open area of the forest region, which gradually developed into residential buildings.

Before RBRP, most of the buildings in the sheltered residential area were more than 30 years old and most of the walls had cracks. As many as 40.24% of the houses were dilapidated and unsafe, and dark and dank, as the floor inside houses was 20 to 40 cm lower than the outside the yard. As many as 60.75% of the residential buildings were located in forest farms, far from the city and towns, without convenient transportation, processed drinking water and basic infrastructure, such as drainage facilities or streetlights. From the investigation, the quality of life of forestry workers living in sheltered residential dorms was comparatively poor. And there was usually one person holding steady employment in each family and average income was CNY 921,050 per month per person. As many as 70% of the residents were on low incomes and found it hard to change their living conditions by themselves.

There are two kinds of houses in RBRP, renovated old houses and new houses. From the results of household investigations, 63.41% of interviewees benefited from RBRP, of which 32.93% got new houses. New houses were constructed after implementation of RBRP from 2009 and 100% of them were brick-concrete in structure. Average per capita living space was 17.11 m<sup>2</sup>, 1.11 m<sup>2</sup>, more than that before RBRP. As many as 76.92% of new houses were built in cities and towns where headquarters of forestry bureau was, and 87.27% of interviewees thought their new surroundings were better than before. The majority (90.0%) of interviewees thought the transportation conditions after RBRP had improved. New residential houses had a supply of processed pipe drinking water, electricity and heat.

Most (80.0%) of interviewees thought the allocation of houses under BRBP to be fair and transparent. Most (91.25%) of them said that their houses' allocation was publicized through meeting, posters, broadcasting of radio and TV, among which 85.00% thought the process it to be transparent and public, 78.05% thought it to be fair and reasonable, and 78.05% thought implementation of RBRP was well carried out.

Table 4.2. Industrial structure of sample enterprises from 2010-2012.

	Unit %				
	2010	2011	2012	Increasing rate 2011/2010	Increasing rate 2012/2011
Primary industry	48.95	44.80	42.49	-8.48	-5.16
Secondary industry	32.93	35.92	36.74	9.08	2.28
Tertiary industry	18.12	19.28	20.77	6.40	7.73

forest recovery growth in key state-owned forest regions, improvement of ecological conditions, and steady recovery of the forest economy.

#### 4.3.1 Focus on ecology and people's livelihoods, continuously increase investment

NFPP views ecological forestry and people's livelihoods as a major investment target. Investment, forest protection and afforestation have been greatly reinforced and people's livelihoods have been provided for and enhanced.

From 1998 to 2012, total investment in sample enterprises was CNY 28.05 billion, or CNY 1.87 billion per year. The average input in each enterprise over the 15 years was CNY 758.00 million and the average input was CNY 3,090 per ha of forest. The proportion of investment in ensuring and improving people's livelihoods was relatively high, which directly relieved the pressure on forest resources, while addressing the needs of social and economic development and helping forest recovery. In 15 years, there was CNY 8.81 billion invested in afforestation, forest protection and tending in sample enterprises, CNY 14.38 billion invested in subsidizing social insurance and social services expenditure, and CNY 4.86 billion invested in others, accounting for 31.41%, 51.28% and 17.31%, respectively of the total.

Investment has increased over the past 15 years in the sample enterprises (Figure 4.5). Input in 2012 was CNY 5.14 billion, which was CNY 4.59 billion more and 8.27 times more than in 1998, an annual increase of 17.24%. The expenditure structure changed between 1998 and 2012. The first three on the expenditure list was afforestation, subsidy on social services and forest protection, accounting for 18.60%, 17.48% and 16.94% of the total in 1998, respectively. Residential buildings reconstruction, forest protection and social insurance accounted for 28.70%, 17.82% and 16.03%, respectively in 2012. Comparing the two groups of data, NFPP has continuously improved people's livelihoods in forest regions in the last 15 years by reconstruction of large numbers of old and dilapidated houses, reinforcing forest protection and setting up social insurance systems.

The impacts of the investment were obvious. Forest volume has increased by 175 million m<sup>3</sup>, equal to 1 m<sup>3</sup> of net increment for a CNY 160.32 investment within the past 15 years. According to the average outturn percentage in key state-owned forest regions, the net increment of forest volume equals to an increase of 112.00 million m<sup>3</sup> of roundwood reserve. According to the national average price of roundwood<sup>3</sup> from 2001 to 2012,

<sup>3</sup> The average price of roundwood was CNY 588.67 per m<sup>3</sup> from 2001 to 2012 according to China's Forestry Yearbook of Statistics.

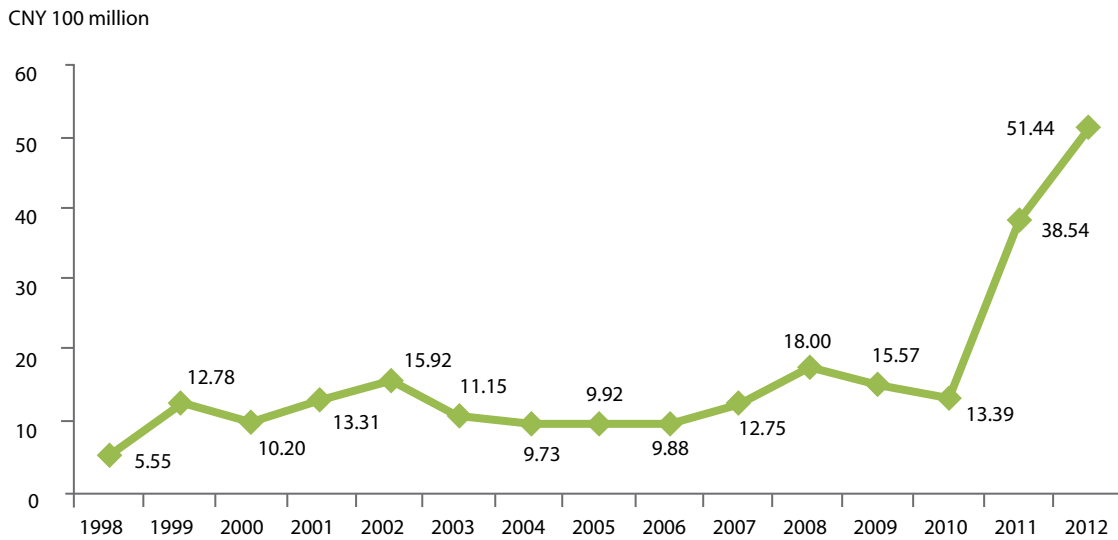


Figure 4.5 Annual investment of NFPP in sample enterprises.

Table 4.3 Major economic indicators of sample enterprises.

Indicators	2012	2011	Increasing rate over 2011(%)
Ratio of total assets to industrial output value (%)	2.86	2.28	25.44
Ratio of capital hold and rise (%)	106.86	101.89	4.88
Ratio of asset to liability (%)	65.74	62.55	5.10
Velocity of liquid assets (times)	0.61	0.66	-7.58
Ratio of cost to profit (%)	7.03	5.22	34.67
Overall labor productivity (CNY/per.)	18,864.79	23,992.13	-21.37
Sales rate of industrial products (%)	86.36	92.35	-6.49

sample enterprises added an equivalent of CNY 65.93 billion of state-owned assets for the country, about 2.35 times the financial investment. The NFPP encouraged the transition of the enterprises' economy and developed the forest region's economic development, while taxation from enterprises increased national financial income. The total taxation income was CNY 8.37 billion from sample enterprises in 15 years, accounting for 29.84% of the total input.

### 4.3.2 Focusing on forest protection and tending, being a vanguard of ecological construction

In 15 years, NFPP have curbed forest rebuilding in northeast China and Inner Mongolian key state-owned forest regions and ensured forest ecological restoration in the mid and upper branches of the Yangtze and Yellow River by continuous reduction of roundwood production. The production of roundwood in 37 sample enterprises was 1.33



million m<sup>3</sup> in 2012, a reduction of 4.70 million m<sup>3</sup> (77.91%) (Figure 4.6). Harvest consumption of forest resource decreased by 7.71 million m<sup>3</sup>, which led to a CNY 2.77 billion reduction in aggregated sales income from enterprises. Simultaneously, key state-owned forest regions supplied wood for the country and the wood supply plan completion rate of most enterprises was 90% from 1998 to 2012, ensuring the wood supply for social economic development.

The aggregated plantation, aerial sowing and closing land area for natural regeneration have been 0.44, 0.10 and 1.29 million ha, respectively, in sample enterprises from 1998 to 2012. Middle and young aged forest have increased by 94.54% and forest coverage rate has increased by 5.25%. Total middle and young aged forest under tending, area of replanted and complimentary planting, and transformed forest was 0.89 million, 30,000 and 3,700 ha, respectively. Compared to 1998, forest

area in 2012 increased by 0.32 million ha (3.68%). Forest volume increased by 175.00 million m<sup>3</sup> (19.58%). Forest volume per ha was 117.75 m<sup>3</sup>, an increase of 15.33%. The annual growth of forest area, forest volume, and average forest volume per unit was 0.36%, 1.80% and 1.44%, respectively.

Although forests grew overall, the condition of unreasonable and imbalanced forest structure in sample enterprises has not been changed and is getting worse. Forest area structure of mature and over matured forest, near matured forest, middle and young aged forest in 1998 was 32.36%, 12.06% and 55.58% in 1998, and 23.33%, 15.46% and 61.21% in 2012. Forest volume structure of the abovementioned age group forest was 46.91%, 12.03% and 41.06% in 1998 and 39.65%, 16.67% and 43.68% in 2012. During the past 15 years, allowable sustainable harvest forest has remained at low levels and is in serious decline.

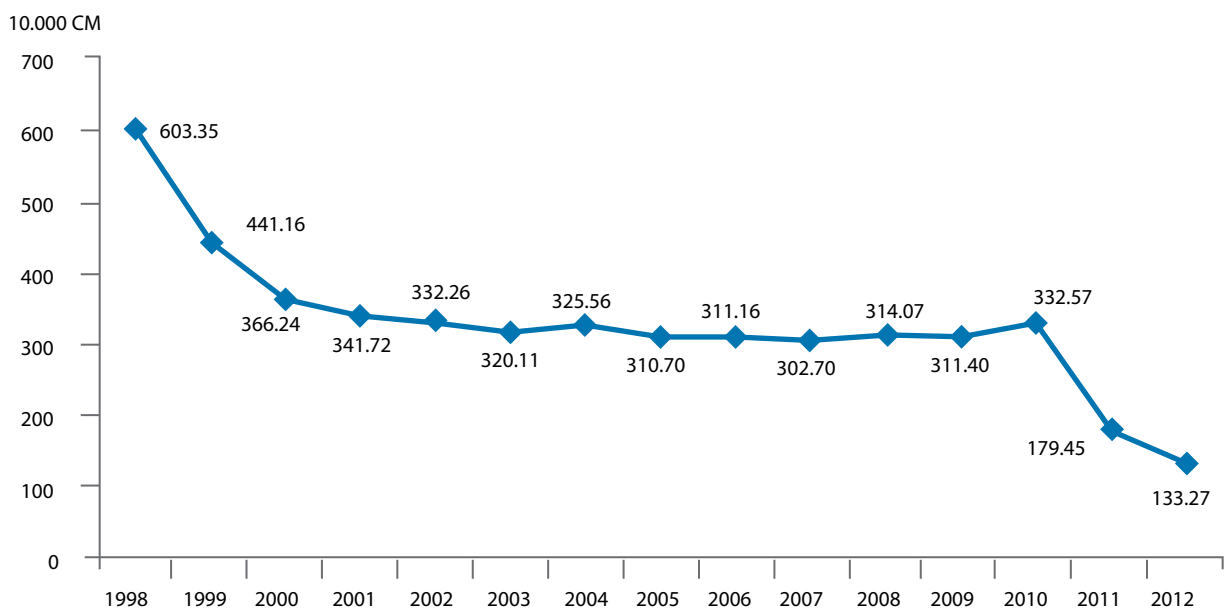


Figure 4.6 Production of roundwood in sample enterprises.

### 4.3.3 Focusing on employment and income to improve people's livelihood

Improving people's livelihoods is one of the main purposes of forestry development. NFPP is different from other ecological projects as it designed subsidies for staff working for social services, staff social insurance and residential buildings' reconstruction as its main policies. It encouraged forest tourism, horticulture and animal husbandry under forest, combined with forest protection, to explore a mechanism of the regional economy's development to fully enhance forestry staff employment and income, to try to reemploy redundant staff and improve the social insurance system of forestry staff.

As the reduction of roundwood production, enterprises relied on NFPP policies to greatly develop regional economy, encourage reemployment and enhance employment ability of staffs after large amount of training. The rate of employed staff to enrolled staff was 65.84% in 1998 and 71.39% in 2012, an increase of 5.55%.

The rate of unemployed staff to enrolled staff was 23.84% in 1998 and 11.02% in 2012, a decrease of 12.82% (Figure 4.7). The changes showed the impact of reemployment in enterprises. From the employment structure, forest tending policy supported by central finance obviously enhanced reemployment. After forest tending policy in 2009, 2.71% of the unemployed were reemployed, or 37.50% in 2011 and 17.29% in 2012.

Implementation of NFPP greatly increased staff income. The average annual salary of working staff in sample enterprises was increased from CNY 4640 per person in 1998 to CNY 23,870 per person in 2012, an increase of 4.14 fold. In the same period, the average annual salary of other local industries increased 3.73 fold. Salaries of forestry staff increased faster than the staff of other industries, which helped to narrow the wage differences between forestry staff and other industries' staff. The average income of forestry staff was only 73.25% of the local average income in 1998 and 79.56% of that in 2012. The reasons for

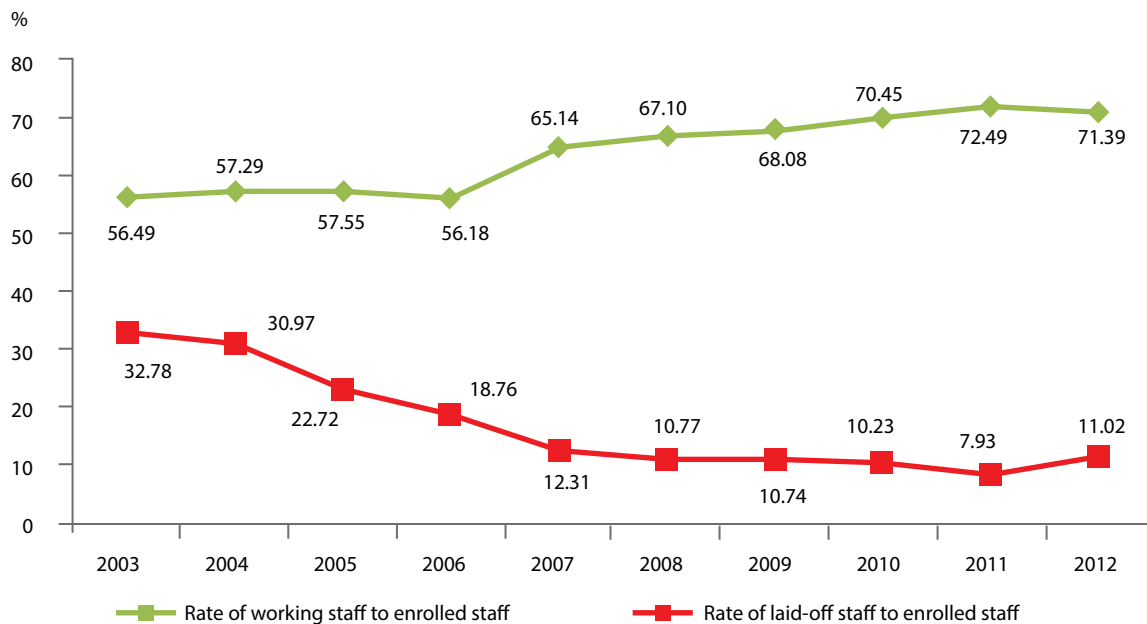


Figure 4.7 Employment of enrolled staff in sample enterprises.

a rise in income are two-fold. One reason is because the investment level of NFPP II increased, which paid higher salaries for local staff participating – the investment standard of forest protection for each hectare was CNY 1.75 in NFPP I and CNY 5 in NFPP II, an increase of 1.86 times. The other reason for a rise in income is because NFPP II increased employment opportunities for staff, and created favorable conditions to develop horticulture and animal husbandry under the forest and family economy. In 2011, Daxinganling Forestry Enterprise employed 16,870 staff in forest tending, which gave each person CNY 2800 in the production season.

The NFPP helped to set up a basic social insurance system for forestry staff. NFPP II further clarified the policy measures for subsidizing social insurance. First, central finance continued to subsidize staff basic pension, and medical, unemployment, work-related injury and maternity insurances with a higher subsidy standard. Second, local government subsidized social insurances of those people under current employment policies. Therefore, social insurance in the forest region has been substantially increased. In 1998, forestry staff only had basic pension insurance in sample enterprises and the enrolled staff participation rate of insurance was 74.18% in 1998. Social insurance systems including abovementioned five types was set up and covered almost all of the forestry staff in forest regions. Enrolled staff participation rate of pension insurance was 85.18% in 2012 and that of medical, unemployment, work-related injury and maternity injury was 100%, 76.66%, 84.05% and 75.74%, respectively.

The residential buildings reconstruction project is a popular project, which started in 2009 and has improved forestry staff living conditions. The reformed and reconstructed residential buildings was 47.40 thousand mu in 2009 and 4.28 million mu in 2012 which benefited 25,400 staff households, or 96.93% of the total number of

households. Staff in forest farms and extremely poor staff were considered to have priority in residential buildings' reconstruction and received subsidized rent and other measures in sample enterprises. The reconstruction of residential buildings project also considered the state-owned forest farms location, urbanization of forest regions, and other social reform work.

## 4.4 Conclusions

NFPP is a systematic program on ecological and socioeconomic development and affects: national ecological safety, wood supply safety and social harmonization of forest regions. As it has strong policies, large investment and a long construction period, the program design, normative rules, optimized mechanism, and steadily developed industry, are all key points requiring careful consideration, and are important to ensure successful implementation of NFPP.

### 4.4.1 Scientific design based on reality is a strong basis for implementation of NFPP

NFPP followed the guidelines of 'two growth, two deduction, two combination' to help forest recovery. Two growth means increase in forest area and volume via planting ecological forest, protecting forest and carrying out forest tending. Two deduction means stopping or decreasing logging and decreasing staff livelihoods that rely on the forest. Two combination means combining planting and closing land for natural regeneration and combining green types of trees, shrubs and grasses. And monitoring proved that above guidelines were realistic and possible.

### 4.4.2 Strong program management based on renovation is key to ensuring implementation of NFPP

NFPP implements a responsible system on two levels in term of service in implementing units, which are the responsibility of enterprises and

forest farms heads and government administrators. There are tasks contracts in term of services, including targets in term of service, responsibilities, fund, between different levels of governors and different level of competent forestry authorities, which played an important role in NFPP's successful implementation. Strong independent institutional organizations were set up in different level of forestry department and enterprises, which were responsible for explanation of policies, management of the program and follow-up checking of the fund.

#### 4.4.3 Improvement of practice mechanism based on changing needs is the power of implementation of NFPP

Some enterprises renovated new protection mode of forest protection, built contracting forest protection responsibility, regional cooperation on forest patrol protection, professional and non-professional and voluntary forest protection. There were renovations on program management, such as bidding of project implementation, lifelong responsibility system on programming, designing and inspecting examination, etc. Renovations greatly motivated the activities of forest protection and afforestation.

#### 4.4.4 Science and technology is the necessary support to increase quality of NFPP

Science and technological support was important in ecological forest. Some enterprises reinforced key science study and renovation to support NFPP,

such as afforestation technology on land hard to plant, bioenergy base building, construction of steady and efficient multiple function of forest ecosystem. Some enterprises used some advanced afforestation technology to help root growing and planting in dry area to increase survival rate of plantations. Some provinces built their own monitoring team on ecological effects of NFPP to supply data for decision-making.

#### 4.4.5 Legally and institutional practice is the insurance of program management

A series of regulations and rules were set up to efficiently manage program and increase management quality, such as the *State Forestry Bureau's guidelines on ecological forest management in NFPP region*, etc.

#### 4.4.6 Development of follow-up industry is the key support on implementation of NFPP

Some forestry enterprises took advantages of their own special resources, developing both ecological function and industrial benefits to push industrial transition in the forest region. In general, flower horticulture, greening projects, electricity power, mineral bottle water, ecotourism, horticulture and animal husbandry under forest and mining were the new economic opportunities to be explored.

#### 4.4.7 Reform of the system is important in implementing NFPP

All types of reform were gradually carried out in state-owned forest regions relying on NFPP. Jilin

### Box 2. Residential buildings reconstruction in state-owned forest regions

Total investment consisted of the: central financial subsidy, provincial financial subsidy, enterprises' fund and staff households' fund..

A standard subsidized apartment is 50 mu for each household and an area over that would not get a subsidy. A total of CNY 15,000 and CNY 10,000 were provided from central and provincial government, respectively. The amount from enterprises and for staff households is decided according to the local reality and the costs of construction.

Forestry Enterprise group was fully reconstructed. The social services of Inner Mongolian Forestry Enterprise Group was moved to local government and their social insurance system covered all staff. Provincial forestry enterprises, forestry bureaus (farms) under the administration of cities and counties, as well as the Tianshan Forestry Enterprise, Arertai Forestry Enterprise in Xinjiang Autonomous Region and Bailongjiang Forestry Bureau in Gansu Province were transformed into state-owned forest farms wholly supported by public finance in 2010.

## 4.5 Main issues

Some problems still exist even though there have been remarkable achievements in implementation of NFPP and NFPP in the forest regions.

### 4.5.1 Crimes in forest region increased recently

There were 4800 crime cases reported in 2005 and 6700, 6600 and 5900 crimes reported in 2010, 2011 and 2012, respectively. One reason for the rise in crime rate is that some forest regions are economic black spots where the economy lags behind the rest of the country. They are often the locations of ethnic groups and there is not a comprehensive and historical relationship between forestry enterprises and local government. Other causes for crime rates increasing are

- follow-up policies which do not match the need of staff after enterprises were transformed into publicly financed institutions;
- low income and hardship of people's lives in remote mountainous forest regions;
- higher rates of unemployment;
- lack of skills and less employment opportunities, etc.

### 4.5.2 Some social services of enterprises have not yet been handed over

It appears that some forestry enterprises still need to provide social services at a high cost. From

2005 to 2011, education and public security in Lushuihe forestry enterprise was transferred to local government. But procuratorial organs, courts, hospitals, the firefighting service, environmental sanitation service, and pipe water supply services were not handed over to local government and required CNY 20 million support each year from Lushuihe Forestry Enterprise as there was not enough subsidy for these services from central finance. In reality, local government could not support the cost of this public service. Some enterprises needed to pay salaries and social insurances of the staff working in the handed over public service organizations, which seriously burdened them financially.

### 4.5.3 Basic management is weak

Institutional organizations set up for NFPP management have not sufficient investment and do not work efficiently. Some NFPP management departments do not have enough staff. Some staff and managers have not understood the policies of NFPP II which lead to a lag in policy implementation. Some forest farms have not set up patrol protection logs, and the contents of protection contracts have not been unified and recorded as required. Basic management in NFPP is still weak.

### 4.5.4 Policies on forest tending need to be improved and reinforced

Forest tending is central to NFPP II. It was found that some enterprises harvested middle-aged forest instead of tending young-aged forest because of the high cost of tending and low price of wood from forest tending. Some enterprises in the upper branches of the Yangtze and Yellow Rivers used low intensity tending measures to decrease tending cost, such as pruning, trimming and brush cutting, which would not strongly promoting forest growth. As much as 81% of forest tending in Heilongjiang Forestry Enterprise Group was intermediate improvement cutting and they mistook the diameters of tending wood

to purposely decrease the proportion of tending wood in the annual allowable quota. Forest tending policies of NFPP II do not really match the reality of some enterprises. Tending was allowed in limited harvest zones of ecological forest but large areas of forbidden harvest zones of ecological forest in the northeast and Inner Mongolia forest regions urgently required forest tending after ten years of closing land for natural regeneration and logging bans. Some enterprises did not finish their forest tending tasks, as they did not have a large area of commercial forest and had limited harvest zones of ecological forest.

## 4.6 Policy suggestions

Following the reforming concept of ‘two decrease, two stripping, one confirmation’ proposed by SFA, sample enterprises decreased their harvest and numbers of redundant staff, removed social services from forestry enterprises and timber processing industries, and confirmed their role of forest practice. A new system of state-owned forest management was speedily established by detaching the functions of administration and profit making, unifying their rights and obligations.

### 4.6.1 Speed up the reform of key state-owned forest region and promote the construction of safe forest regions

First, speed up the reform of key state-owned forest regions, transfer forestry enterprises into fully financed ecological construction organizations and fully pay the staff salaries and welfare following the instruction of central government.

Second, promote the investment in infrastructure in forest regions, including forest disease and insects control, provision of electricity and water supply, renovation and rebuilding of residential and outdated houses, and other communication or transportation facilities building to improve the living situation of employees.

Third, enhance the mechanism of conflict resolution. Take advantage of political, and legal methods of settlement. Resolve the conflicts by all means including law, policy, education, etc. and strictly prevent law violating by the officers. Raise public general awareness of the signification, scope and consequence of law.

Fourth, enhance the supervision and inspection of officers to ensure the principle of ‘privilege should always be accompanied with responsibility, privilege to be monitored, compensation when rights are violated, penalty when law is violated’ is fully implemented.

### 4.6.2 Enhancing project management and improving efficiency

First, improve the ‘audit’ function. Establish ‘auditor responsibility’ system to prevent procedural auditing; establish a project quality manager. Second, scientifically assess the performance of administrators. According to the 12th Five-year Plan, enlarge the ratio of forest increase in assessment of leadership in term of services to guide forestry enterprises carefully practice forest tending. Third, speed up the introduction of an information technology system. According to the requirement of intelligent forestry, boost the construction of database system that covers all forest regions. Fourthly, improve forest reformation and silviculture. Strictly implement the five measures of: technical training, operation design, on-site management, checking, and document management, to ensure forest tending is carried out by qualified staff.

### 4.6.3 Improving the policy to ensure the quality of forest tending

First, establish working mechanism for forest tending. The contract and tasks of forest tending with contractors should be publicized. Registered information including full name, ID number, operating group should be included

in the publicized contracts. Second, improve the design, inspection and punitive measures for management of forest tending to prevent non-qualified operation. Most of all, establish a responsibility and punishment system to monitor and remind contractors of the implementation of forest tending. Third, establish an incentive system to encourage and provide further work for careful contractors who perform well and stop using those who don't.

#### **4.6.4 Strengthening investigation and research to break through related policies**

First, it is important to establish an effective mechanism to promote the transition from wood producing oriented forestry enterprises to forest silviculture oriented institutions. We must consider dispatching forest resource management and

wood producing, and cancelling the two-layered management fee depending on wood producing. Forest resource growth in terms of quality and quantity should be seen as the primary factors of performance assessment of administrators and managers, to encourage forest conservation and environment building.

Second, we should increase the investment according to the levels of inflation. Due to the calculation of NFPP II, investment shortages have become worse in many areas.

Third, we should begin the procedure of legalization of NFPP. Some provinces have made local policies for NFPP that work well. National regulation on NFPP needs to be legalized to promote NFPP more effectively.







# 5

## Monitoring report on socioeconomic benefits of the natural forest protection program (NFPP) in sample counties

Gu, Zhenbin; Wang, Yuehua; Liu, Yonghong; Ni Yi.

Since the NFPP was implemented over ten years ago, noncommercial forest, forest management and protection, and forest tending along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River have helped forestry staff employment and increased incomes. These activities have maintained the stability of the forest community through the establishment and improvement of social security systems and ecological compensation mechanisms, and promoted effective forest industrial adjustment and economic transformation and upgrading by guiding and supporting special industrial development. Compared with the situation more than a decade ago, the resources, ecology, economy and communities in the program areas have changed significantly, and this has laid a solid foundation for constructing ecological civilization and realizing sustainable development.

2012 was vital for implementation of the policies and procedures of the Natural Forest Protection Program Phase II (NPPP II), which included enhancing system building, and revising and introducing several program management methods and working guidelines. The program produced *Forest*

*Management and Protection Regulations of Natural Forest Protection*, standardized the text of a forest management and protection agreement, and specified the combination of forest management and protection and woodland economy in order to increase the income of working staff and foresters. It held a meeting on noncommercial forest construction and forest management of NPPP in Diqing Autonomous Prefecture of Yunnan Province, summarized and shared the experiences of those working in noncommercial forest management and protection, and ecological compensation and forest tending in the program. It released the *Instructions on Further Enhancing Noncommercial Forest Management and Protection in Natural Forest Protection Program Areas* and *Instructions on Effectively Strengthen Forest Tending in Natural Forest Protection Program Areas* at the beginning of 2013. The program produced

*Examining Methods of Natural Forest Protection Program Phase II*, which provided institutional guarantees for examining NPPP II. In addition, four departments including the Ministry of Finance and State Forestry Administration jointly issued *Notice of the Implementation of One-Time Social Insurance Subsidy Policy for Settling Staff and Workers of Natural Forest Protection Program* in order to solve the economic difficulties and social security problems for one-time settled staff since the first phase of the program. Governments at the provincial level are in charge of submitting subsidy applications and implementing the policies. These policies and measures combine improving of ecology and people's livelihoods (which provide important institutional guarantees for standard program implementation), with economic prosperity in program areas, and social stability.

Table 5.1 Monitoring samples of important counties listed in the national poverty alleviation program.

Province	Number	Monitoring sample counties
Henan	3	Luanchuan County, Lushi County, Xichuan County
Hubei	4	Yun County, Fang County, Danjiangkou City, Enshi City
Chongqing	2	Wulong County, Wuxi County
Sichuan	5	Mabian Yi Autonomous County, Tongjiang County, Litang County, Muli County, Meigu County
Guizhou	3	Shuicheng County, Xishui County, Dafang County
Yunnan	6	Nanhua County, Guangnan County, Heqing County, Lushui County, Lanping Bai People and Pumi Autonomous County, Deqin County
Shanxi	4	Yijun County, Chunhua County, Dingbian County, Zhenping County
Gansu	5	Zhenyuan County, Minjiang State-owned Forest farm (Dangchang County), Kangnan State-owned Forest Farm (Kang County) Liangdang County, Qilian Mountain National Nature Reserve (Gulang County and Tianzhu Tibetan Autonomous County)
Qinghai	1	Minhe Hui and Tu Autonomous County

Notes:

1. Only Yijun County and Dingbian County in Shaanxi Province are not included in the integrated areas with special difficulties;
2. There are Huangjialu, Chigou national forest farms in Dangchang County; Kangnan forestry farm is in Kang County; Qilian Mountain National Nature Reserve covers 8 counties including Gulang County and Tianzhu Tibetan Autonomous County.

2012 was the eleventh year of tracking and monitoring of the NPPP in sample counties along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. In order to give an objective and comprehensive reflection of the program and policy implementation, a tracing and monitoring fixed point method was used to collect sample data in 50<sup>1</sup> sample counties along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. The main monitoring contents included program development and policy implementation, ecological construction and protection, forestry development, the influence of the program on district social and economic development and a summary of experience in the program process and policy advice. In order to keep up with the policy in NPPP II, some adjustments were made in the monitoring targets of 2012. The targets at provincial level were 355 (an increase of 16), and at village level were 96 (a decrease of 1). New targets reflect the overall situation in tasks such as: forest management and protection, national forest tending, and noncommercial forest construction in the second phase of the program in sample counties, so as to accurately master the program development situation in different places in future monitoring.

## 5.1 Basic data for sample counties

Social and economic benefits monitoring areas of NPPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River coincide with integrated special poor areas

1 50 monitoring counties include Luanchuan County, Lushi County, Xixia County, Xichuan County in Henan Province; Enshi City, Fang County, Gucheng County, Maojian District, Yun County, Danjiangkou City in Hubei Province; Jiangjin District, Wuxi County, Banan District, Wulong County, Zhong County in Chongqing Municipality; Tongjiang County, Songpan County, Meigu County, Kangding County, Litang County, Muli County, Mabian County in Sichuan Province; Kaili City, Duyun City, Xishui County, Dafang County, Shuicheng County in Guizhou Province; Yulong County, Deqin County, Heqing County, Yuanmou County, Nanhua County, Lanping County, Guangnan County, Lushui County in Yunnan Province; Huanglong Mountain Nature Reserve, Zhouzhi County, Feng County, Chunhua County, Zhenping County, Yijun County, Dingbian County in Shaanxi Province; Zhenyuan County, Liangdang County, Qilian Mountain National Nature Reserve, Minjiang State-owned Forest Farm, Kangnan State-owned Forest Farm in Gansu Province, Minhe County, Huzhou County, Menyuan County in Qinghai Province.

such as Liupan Mountain area, Qinba Mountain area, Wuling Mountain area, Wumeng Mountain area, Dian, Gui, Qian Desert area and Dian West Mountain area near the border – four provinces where Tibetan people gather, which are the main areas with underdeveloped economic development and important ecological areas. Among the 50 social and economic benefits monitoring sample counties of the NPPP, 33 are key counties in the national poverty relief and development program (Table 2-11). A total of 36 sample counties are located in integrated special poverty-stricken areas (Table 2-12), which makes ensuring ecological protection and improving people's well-being difficult.

In 2012, the administrative areas of sample counties<sup>2</sup> covered an area of 21.5006 million ha,<sup>3</sup> of which 20.0341 million ha are part of NFPP areas, taking up 8.63% of the overall areas of the program along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. Apart from the Qilian Mountain National Nature Reserve in Gansu Province, the monitoring scale of the other 49 samples did not change.

Population density is lower than the national average level. The average land area of sample counties is 430,000 ha, with a population density of 1 person per ha, which is lower than the national average level<sup>4</sup>.

### **The ratio of urban to rural population is 7:3.**

At the end of 2012, the population of sample counties was 19.89 million. The rural population was 14.71 million and the urban population was 5.18 million, each taking 73.98% and 26.02%, respectively, of the overall population.

2 If there is no special explanation, sample counties in the text means all 50 samples.  
3 Monitoring scope of Qilian Mountain National Nature Reserve in Gansu Province was only four state-owned forest farms before and had been changed to the whole NR since 2012.

4 According to the sixth national population census, the population in 31 autonomous counties, cities and military personnel in service were 1.34 billion. The average population density of China was 140 per km<sup>2</sup> while that of the sample cities was 100 per km<sup>2</sup>.

Table 5.2 Monitoring of sample counties lists located in the integrated areas with special difficulties.

Zones	Province	Monitoring Sample Counties
Qinling-Ba Mountain Area (13)	Henan	Luanchuan County, Lushi County, Xichuan County
	Chongqing	Wuxi County
	Hubei	Yun County, Fang County, Danjiangkou City
	Sichuan	Tongjiang County
	Shaanxi	Zhouzhi County, Zhenping County
	Gansu	Liangdang County Minjiang Farm (Dangchang County) Kangnan Farm (Kang County)
Wuling Mountain Area (2)	Hubei	Enshi City
	Chongqing	Wulong County
Stony desertification areas in Yuannan, Guangxi and Guizhou Provinces (2)	Guizhou	Shuicheng County
	Yunnan	Guangnan County
Wumeng Mountain Areas (4)	Sichuan	Mabian Yi Autonomous County, Meigu County
	Guizhou	Xishui County, Dafang County
Dian West Mountain Area near the border (4)	Yunnan	Yulong Naxhi Autonomous County, Nanhua County, Lushui County, Lanping Bai and Pumi Autonomous County
Liupan Mountain District (5)	Shaanxi	Chunhua County
	Gansu	Qilian Mountain National Nature Reserve (Gulang County), Zhenyuan County
	Qinghai	Minhe Hui Autonomous County, Huzhu Tu Autonomous County
Tibetan areas in four provinces (6)	Yunnan	Deqin County
	Sichuan	Songpan County, Kangding County, Litang County, Muli Tibetan Autonomous County
	Gansu	Qilian Mountain National Nature Reserve (Tianzhu Tibetan Autonomous County)
	Qinghai	Menyuan Hui Autonomous County

(1) Scarcely populated areas with an increasing proportion of urban residents

**The ratio of urban population keeps rising.** Compared with 2011, the overall population of sample counties increased by 145,900 – the rural population decreased by 151,300 while the urban population increased by 297,200. The ratio of urban population of sample counties rose by 1.31 percentage points in 2012 due to the flow of rural population to urban areas and the relatively high natural growth rate of urban populations.

**A total of 38 sample administrative areas were included in NFPP areas.** In 2012, the overall area of sample counties included in the NFPP areas reached 20.03 million ha, taking up 93.18% of the administrative areas of sample counties. The total population of the NFPP areas was 19.08 million at the end of the year, accounting for 95.96% of the total population of sample counties.

**The employment situation remained optimistic, but the low-income situation was difficult to change in the short-term.**

Employment is the basis of people's well-being, while income is the source of people's livelihoods. People's livelihood issues can only be solved by expanding urban and rural residents' employment and by continuous income growth. The socioeconomic development of the NFPP areas along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River lag behind the rest of the country; the income level of urban and rural residents is lower than the national average level.

Employment structure is an important part of socioeconomic and industrial structure and is a vital criterion for a country's economic development stage. The process of the labor force flowing from the low value-added and resource-based primary industry to high value-added industry, or from the primary industry to the secondary and tertiary industry, is employment structure optimization.

**The rate of employed population in the total population increased.** In recent years, the number of people working in primary industries has been continuously decreasing while that in secondary and tertiary industries has been continuously increasing, leading to a significant change in the employment structure compared with that before the introduction of NFPP areas (Figure 5.1). In 2012, the total employed population of sample counties was 10.52 million, which was 214,700 more than that in 2011. The total population growth rate was 0.73% and the employment growth rate was 2.04%. The share of the employed population in the total population increased by 0.69 percentage points.

**The secondary and tertiary employed population accounts for half of the total population.** In 2012, the employed population of sample counties in the primary industry was 5.33 million, taking up 50.65% of the total population, while people working in secondary and tertiary industries were 2.12 million and 3.07 million each, with a share of 20.14% and 29.21%, respectively.

**The income levels of urban and rural residents were lower than the national average level.** In 2012, the disposable income of urban and rural residents in 44 sample counties with reliable data was CNY 18,263, which was CNY 6,302 lower than the national level (CNY 24,565) in the same year. In 2012, the per capita net income of rural residents in 45 sample counties with reliable data was CNY 5,835, which was CNY 1,718<sup>5</sup> lower than the national level (CNY 7,917) in the same year. In 2012, the highest average annual salary level of enterprise employees in sample counties was CNY 50,465 (Dafang County in Guizhou Province), the lowest level was CNY 12,000 (Xichuan County in

<sup>5</sup> The national data of per capita disposable income in urban and rural areas and the net income of rural residents comes from *the National Economic and Social Development Statistical Report of the People's Republic of China in 2012*.

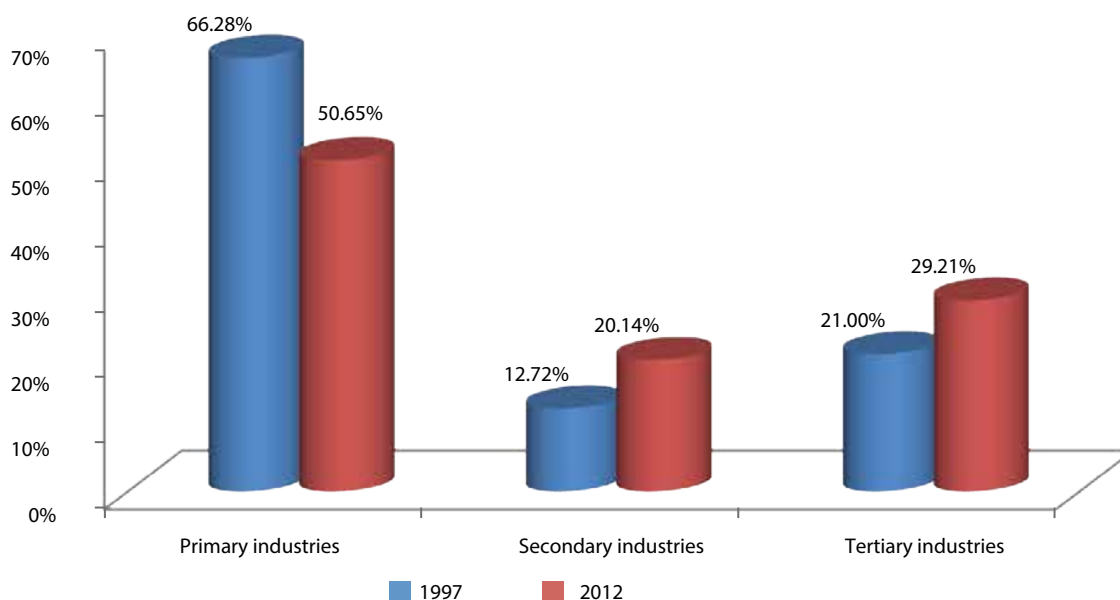


Figure 5.1 Comparison of employment structure in sample counties between 1997 and 2012.

Henan Province) and the middle level was CNY 30,000. The national average annual salary of employees in the non-private sector in urban areas was CNY 46,769<sup>6</sup> in the same year. Compared with 2011, there was dramatic improvement in the per capita disposable income of urban residents, per capita net income of rural residents and the average salary of enterprise employees, but levels remained lower than the national average level.

Regional economic development showed an optimistic trend and the fiscal deficit situation was taking a turn for the better.

The economic volume of the NFPP areas along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River is relatively small, yet has shown a high growth rate in recent years. The imbalance of financial revenue and expenditure is also changing for the better.

<sup>6</sup> The national data of the average wages of working staff in non-private sector in urban and rural areas comes from *Human Resources and Social Security Development Statistical Report in 2012*.

### **Regional GDP growth rate was higher than the national average level.**

In 2012, the regional GDP of 46 sample counties<sup>7</sup> was CNY 388.902 billion, with an average of CNY 845,400 per county. Compared with 2011, regional GDP in sample counties increased by 19.02%, which was 7.8% higher than the national GDP growth rate.

### **Inner adjustment in large-scale agriculture structure.**

In 2012, the value of agriculture, animal husbandry, and fisheries output in 46 sample counties was CNY 106.95 billion, increasing by 18.01% compared with 2011. Among them, the agricultural output value was CNY 57.752 billion, the forestry output value was CNY 10.215 billion, the animal husbandry output value was CNY 34.597 billion, the fisheries output value

<sup>7</sup> Four samples as Huanglong Mountain Nature Reserve in Shaanxi Province, Qilian Mountain National Nature Reserve in Gansu Province, Forest Farm of MinJiang and Forest Farm of KangNan were not included because of lack of economic statistics on them as they locate in transboundary of multi-counties.

was CNY 2.577 billion and the service industry output value of these four sectors was CNY 1.806 billion. Compared with 2011, the service industry output value of these four sectors decreased most dramatically (by 1.18%), the ratio of agricultural output value fell by 0.84%, and the forestry and fisheries output value increased by 0.57% and 1.14%, respectively.

### **The imbalance of financial revenue and expenditure was changing for the better.**

In 2012, the fiscal deficit of 46 sample counties was CNY 56.279 billion, an increase of CNY 6.333 billion compared with 2011, with a newly average increase of CNY 138 million per county. The financial revenue of 46 sample counties was CNY 48.918 billion in 2012, rising by 34.29% compared with 2011; the financial expenditure was CNY 105.197 billion, rising by 21.79% compared with 2011. In recent years, the fiscal deficit of 46 sample counties has been expanding; the financial income grow rate speed is higher than the expenditure growth rate, and the extent of fiscal deficit expansion lessened. In 2012, the financial expenditure is 2.15 times of the financial revenue compared with 2.37 times in 2011. The imbalance of financial revenue and expenditure is changing for the better.

### **The forest resource is rich but new afforestation space is limited.**

Since NFPP started ten years ago, the forest resources in the program areas recovered significantly, the forest area and wood storage increased dramatically and the ecological environment is remarkably improved.

### **The share of forestry land was relatively large.**

In 2012, the forestry land was 12.8454 million ha in sample counties, taking up 59.74% of the administrative areas; the forestry land increased by 1.6653 million ha<sup>8</sup>.

<sup>8</sup> The increasing forest land due to the adjustment in Qilian Mountain National Nature Reserve monitoring scope is 805,000 hectarehasha.

### **New afforestation space was limited.**

In 2012, the forest land area in sample counties was 7.835 million ha, the open forest land was 124,900 ha, shrub land was 3.6665 million ha, young afforested land was 274,300 ha, other forestry land (such as nursery and non-stocked land) was 944,700 ha. Compared with 2011, shrub land area in sample counties increased 744,400 million ha<sup>9</sup>, its share in forestry land structure increased by 2.4 percentage points. From the data in 2012, the non-forest land and open forest land that can be used for afforestation were not much, less than 8.00% of the forestry land area. The main land for afforestation was the forestry land that was difficult for afforestation.

### **Collective forest area ratio reached two-thirds.**

The state-owned woodland in sample counties was 2.8566 million ha in 2012, taking up 36.46% of woodland area; state-owned forest stock volume was 396.6178 million m<sup>3</sup>, unit area stock volume was 138.84 m<sup>3</sup> per ha. Collective woodland area was 4.9784 million ha, among them 3.3544 million ha were already distributed to households, taking up 67.38%; the collective forest stock was 172.0298 million mu, private and other ownership forest stock was 70.8193 million mu and the unit area forest stock of collective forest was 48.78 mu per ha.

### **National and local noncommercial forest share was 72.31%.**

According to its usage, the national noncommercial forest area of sample counties in 2012 was 3.8817 million ha, the local noncommercial forest area was 1.7059 million ha and the commercial forest area was 2.2474 million ha, with a ratio of 49.54%, 21.77% and 28.69%, respectively.

<sup>9</sup> The shrub area of in Qilian Mountain National Nature Reserve in Gansu Province increased 600,500 hectarehasha.

### **Natural forest was primary.**

The natural forest area in sample counties in 2012 was 6.0656 million mu, accounting for 77.42%; man-made forest stock was 1.7694 million ha, taking up 22.58%. The natural forest stock in sample counties in 2012 was 556.0912 million ha and man-made forest stock was 83.3757 million mu, with unit area forest stock of 91.68 mu per ha and 47.12 mu per ha each.

### **Young and middle-aged forest share reached 65.77%.**

The young forest area in sample counties in 2012 was 2.7959 million ha, the middle-aged forest area was 2.3572 million ha, near-mature forest area was 1.1988 million ha, mature and overmature forest area was 1.4831 million ha, taking up 35.68%, 30.09%, 15.30% and 18.93%, respectively, of the forest area. In 2012, the young forest stock in sample counties was 100.4507 million mu, middle-aged forest stock was 165.0986 million mu, near-mature forest stock was 126.2646 million mu, mature and overmature forest stock was 247.653 million mu; unit area forest stock was 35.93, 70.04, 105.33 and 166.98 mu per ha.

## **5.2 Program development and policy implementation**

Forest management and protection, noncommercial construction, state-owned young and middle-aged forest tending were the main construction tasks of the second phase of the NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River, as well as key measures for ensuring regional ecological continuous improvement and the employment of residents in the program area. Therefore, it has become an important part of monitoring the social and economic benefits in the program.

### **Forest management and protection.**

Forest management and protection is a vital method of enhancing ecologic construction and protection of NFPP as well as an important way to solve the employment issue of forest workers and other residents in the program area. In 2012, sample counties further strengthened forest management and protection, expand the working staff, increased funding, which infused strong momentum for ecologic and people's well-being improvement in the program area.

### **Forest management and protection area further expanded.**

As new afforestation area are continuously incorporated into the management and protection scope, the management and protection area in the NFPP is expanding every year (Figure 5.2). In 2012, the planned forest management and protection area in sample counties was 8.7972 million ha, accounting for 68.49% of forest land area in sample counties and the actual forest management and protection area in sample counties was 9.0024 million ha, accounting for 70.08% of forest land area; this overfilled 2.33% of the plan, which was 302,400 ha more than 2011.

### **The management and protection of state-owned forest mainly relied on management stations.**

In 2012, the actual management and protection of state-owned forest land area in sample counties was 4.1113 million ha, which was an increase of 0.71% compared with 2011. According to the state-owned forest land area management and protection mode, 3.6817 million ha was managed by the newly built management and protection station, 105,400 ha by the professional management and protection team, 284,000 ha by the contract management and protection team, and 40,200 ha by other modes. Compared with 2011, more state-owned forest was managed and protected by the newly built management and protection stations, while the share of other



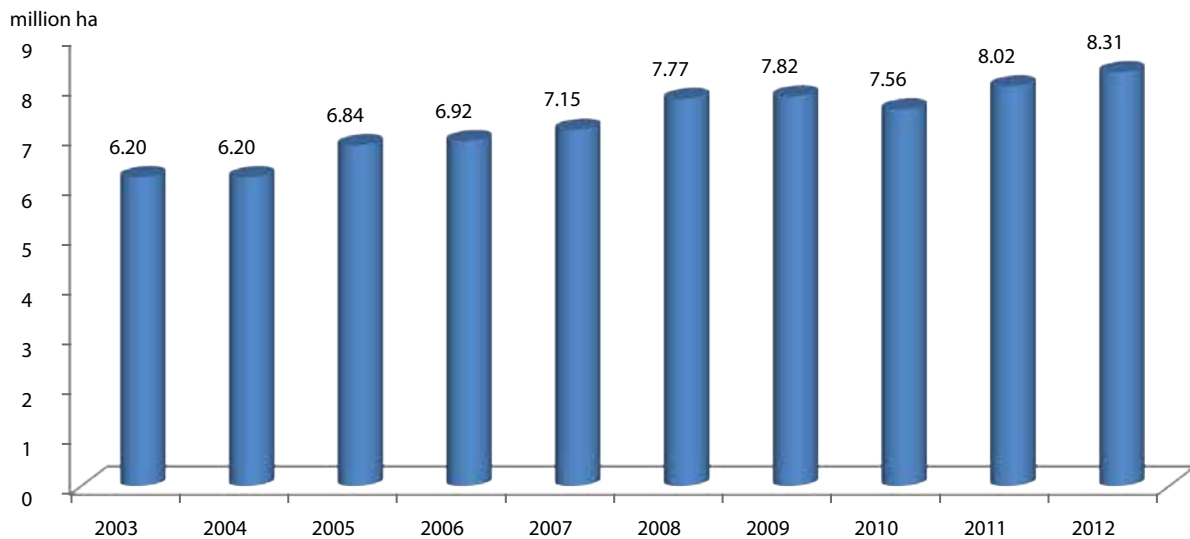


Figure 5.2 The actual forest management and protection areas in sample counties.

management and protection modes declined dramatically.

**Collective forest management and protection modes diversified, yet main focus on contract management and protection.**

As the share of collective forest was bigger, most of the forest incorporated into the management and protection scope was collective forest, taking up 90.44% of forest management and protection. In 2012, the collective forest management and protection area was 4.8911 million ha, which was an increase of 5.92%. The area of collective forest managed and protected at different levels was 985,900 million ha, collective forest managed by households was 10,000 ha, collective forest directly managed and protected by forest workers was 359,600 ha, collective forest managed by contract management and protection was 2.5339 million ha and collective forest managed and protected by other modes was 1.0017 million ha. By comparison, contract management and protection remain the major mode of collective forest management and protection and other management and protection modes are still being explored.

**Forest management and protection work force expanded.**

In recent years, the number of forest management and protection staff in sample counties has been decreasing. However, in 2012, the number of staff members increased dramatically, which maintained the stability of forest management and protected the work force in NFPP and resulted in improved forest management and protection quality.

**Forest workers, farmers and other management and protection staff are increasing.**

In 2012, the numbers of forest management and protection staff in sample counties were 25,193, an increase of 6,931 compared with 2011. Among them, forest workers were 10,303, an increase of 3,162 within the year; farmers and other management and protection staff were 14,890, an increase of 3,769 compared with the previous. As the investment standards for the second phase of the program improved and the program construction fund were in place, forest management and protection remains an important way to solve the issues of employment and increasing incomes of forest workers and other residents in the program areas.

**State-owned forest management and protection were in charge of forest workers and collective forest management and protection was undertaken by farmers.**

There was a larger increase in the number of staff members in charge of state-owned forest management and protection in sample counties in 2012. Most of the increased members were forest workers in the management and protection station, showing that the building of management and protection stations speeded up in different places. In 2012, the number of state-owned forest management and protection staff was 10,206, an increase of 3,532 compared with 2011. Among them there were 8,611 were forest workers, 1,595 were farmers and other workers. The number of management and protection staff in sample counties in the same year was 14,987, an increase of 3,399 compared with 2011; among them, there were 1,692 forest workers, and 13,295 farmers and other workers. It is clear that the forest management and protection staff structure has not changed. State-owned forest management and protection staff were in charge of forest workers, while collective forest management and protection staff were focused on farmers and other workers (Figure 5.3).

**Management and protection tasks distribution is rational.**

With continuous expansion of staff members and the improvement of management and protection facilities, the distribution of tasks in forest management and protection in sample counties was rational. In 2012, the forest management and protection per capita in sample counties were 357.34 ha, or a decrease of 119.06 ha compared with 2011 (476.40 ha).

**State-owned forest management and protection tasks per capita were heavier than that of collective forest.**

State-owned forest management and protection area per capita was 402.84 ha and collective forest

management and protection area per capita was 326.36 ha. Compared with 2011, the area of managed and protected areas decreased and the task distribution was more rational. The difference in workload between state-owned forest management and protection workers (that mainly consisted of forest workers) and collective forest management and protection (that mainly consisted of farmers) dramatically decreased (reduced by 1.23 times).

**The tasks per capita in the management and protection station were more than that of the contract management and protection.**

The tasks per capita in the management and protection station were relatively high, with 563.47 ha under the charge of each person; while collective forest focused on contract management and protection, with a management and protection area of 331.40 ha under the charge of each contractor.

**Fund source and investment structure remains steady.**

Funds are an important guarantee for efficiently carrying out forest management and protection. In 2012, the forest management and protection in sample counties was CNY 504.9138 million, an increase of 8.81% compared with 2011.

**The central financial fund takes the lead.**

The central financial fund was CNY 457.4016 million, accounting for 90.59% of the total fund in the same year, and the local financial fund was CNY 47.5122 million, accounting for 9.41% of the total fund. Compared with 2011, the local financial investment in the NFPP decreased by 5.47 percentage points.

**The central financial fund is mainly used for state-owned forest tending and protection and collective forest.**

The investment in state-owned forest tending and protection in sample countries was CNY 227,9983 million in 2012, accounting for 45.16%; the

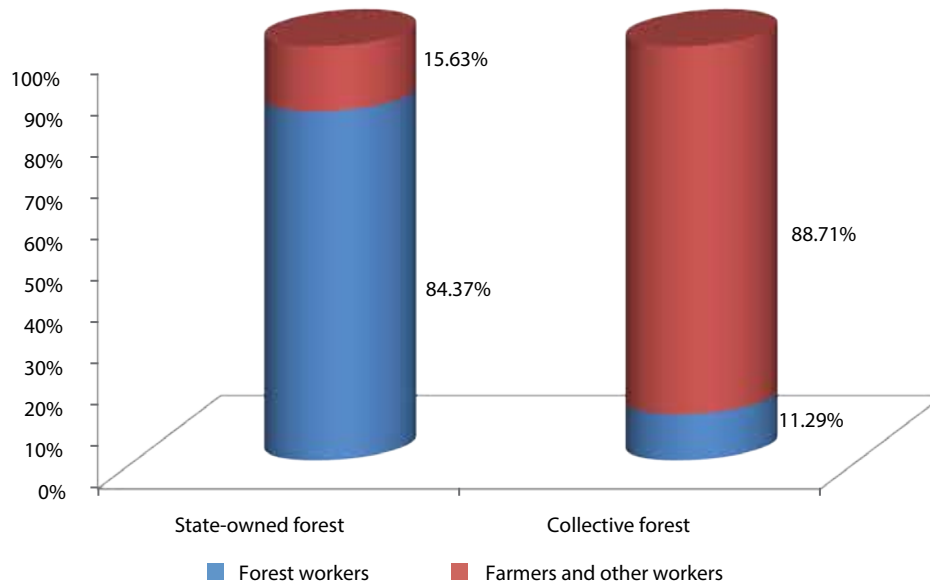


Figure 5.3 Staff members of state-owned and collective forest management and protection in sample counties in 2012.

collective forest tending and protection in sample counties didn't change much compared with 2011; the central financial investment was focused on state-owned forest and state-level noncommercial forest management and protection, while the local financial investment was in local noncommercial forest management and protection (Figure 5.4).

**The income of forest management and protection staff increased dramatically.**

The income and subsidies of forest management and protection staff continue to increase, which is an important guarantee for the stability of the management and protection work force and the improvement of management and protection quality and a key way of allowing people to benefit from the program.

**Staff subsidies take a larger share of forest management and protection expenditure.**

In 2012, the total amount of subsidies for forest management and protection staff was CNY 329.6899 million, accounting for 65.30% of management and protection expenditure for the year. The subsidies for staff increased CNY 130.2201

million, rising by 22.31% when compared with 2011. Therefore, for staff subsidies related to people's well-being, the financial investment in the NFPP Phase II increased significantly.

**The income of management and protection staff enjoyed double-digit growth.**

In 2012, the subsidies of forest management and protection staff in sample counties was CNY 13,086.57 per capita, an increase of CNY 2,163.90 compared with 2011 (an increase of 19.81%). Among them, forest staff subsidies from forest management and protection were CNY 19,521.03 per year, an increase of 21.91% compared with 2011 (CNY 3,507.91). The subsidies of farmers and other work staff from forest management and protection was CNY 10,534.51 per year, an increase of 34.32% compared with 2011 (CNY 2,691.68). By comparison, the subsidies of forest management and protection staff in sample counties all improved considerably, which encouraged residents in the program area to participate in forest management and protection and benefit from it.

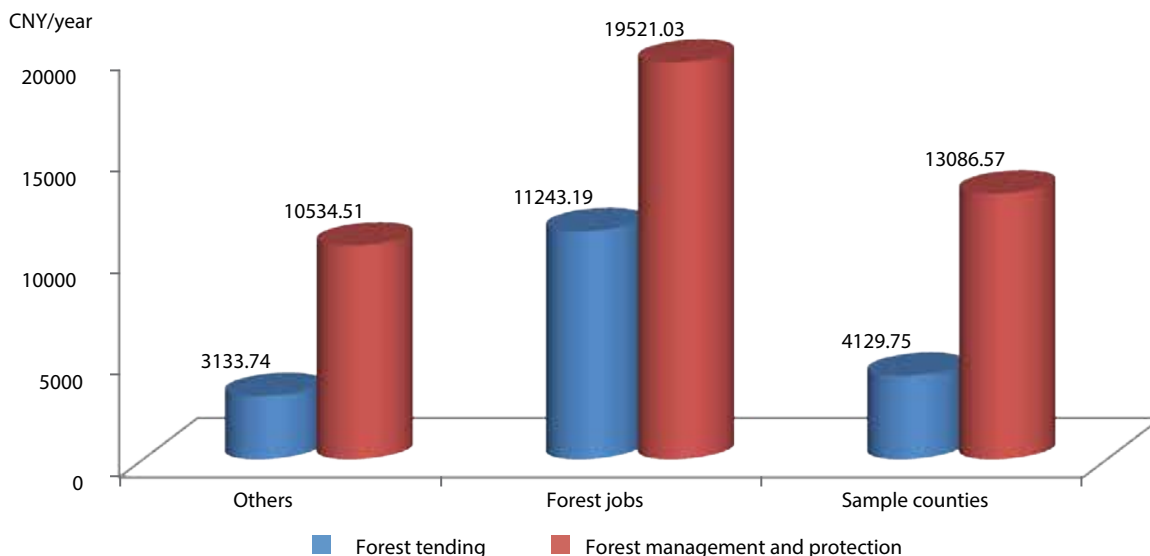


Figure 5.4 The salaries for forest tending and protection in sample counties in 2012.

#### **Noncommercial forest construction.**

The NFPP Phase II continues to arrange noncommercial forest construction along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River in order to recover vegetation cover as soon as possible. Noncommercial forest construction adopted three methods of artificial afforestation which depended on the socioeconomic conditions and forest land characteristics: closing off mountains for greening, aerial seeding afforestation, and the use of the construction fund allocated by the central government.

#### **Noncommercial forest construction develops steadily.**

Considering the increasing difficulties of afforestation in NFPP areas, there was a small increase in noncommercial forest construction tasks in the sample counties.

Noncommercial forest is built by around 50,000 ha per year in 2012, sample counties planned to complete 51,400 ha of noncommercial forest construction, increasing by 15.77% compared with 2011. The actual completion area was 49,600 ha, which completed just 96.50% of the year's plan. Compared with 2011, the complete noncommercial forest construction area increased by 200 ha, and the amount of work was almost the same as that of 2011.

#### **Natural restoration was the main method for noncommercial construction.**

In 2012, artificial afforestation area in sample counties was 19,500 ha, aerial seeding afforestation area was 2800 ha and closing mountains for greening (closing off the land for natural regeneration) area was 27,300 ha, accounting for 39.31%, 5.65% and 55.04% of complete noncommercial tasks, respectively. Compared

with 2011, the amount of noncommercial forest construction didn't change. The noncommercial forest construction in sample counties was carried out smoothly.

Noncommercial construction investment standards improves significantly. Compared with 2011, the fund invested in noncommercial construction in sample counties almost doubled in 2012, reaching CNY 153.8907 million. Among them, artificial afforestation investment was CNY 127.1950 million, aerial seeding afforestation investment was CNY 1.8 million and closing mountains for natural regeneration was CNY 24.8957 million. By comparison, because artificial afforestation per unit area requires more labor, it becomes the major area where noncommercial forest investment goes; aerial seeding afforestation work was not large, with only 1.17% of the fund.

#### **Noncommercial forest construction achievements are difficult to maintain.**

According to the monitoring result, accumulated artificial afforestation and young and middle-aged forest area in the original 44 sample counties was 468,700 million ha in 2012, which was 67.92% of the accumulated artificial afforestation area (690,100 ha), a decline of 8.96 percentage points compared with the result in 2010. The expansion of noncommercial forest makes artificial afforestation and preservation more difficult. The natural and well-preserved forest land, if not managed well, will be difficult to count in the current forest land due to adverse natural conditions or because of damage.

### **5.3 Forest tending**

As one of the main construction tasks of NFPP Phase II, young and middle-aged forest tending aims to improve forest quality and the productivity of forest land, creating favorable conditions for increased employment levels and incomes of residents in the program areas.

#### **1. Young and middle-aged forest and noncommercial forest are the main targets of forest tending.**

Young and middle-aged forest tending has been carried out for the past two years in NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. The implementation targets of forest tending are focused on young and middle-aged forest and noncommercial forest in sample counties. In 2012, sample counties planned to cover 17,800 ha of young forest tending area and 33,900 ha of middle-aged forest. Young and middle-aged forest tending in sample counties was 51,500 ha, completing 99.61% of the plan, which was 4,300 ha less than 2011.

#### **Middle-aged forest tending area accounted for 70.49% of task load.**

Among the complete young and middle-aged forest tending area in sample counties in 2012, the young forest area was 15,200 ha, or 29.51%, and the middle-aged forest area was 36,300 ha, or 70.49%, completing 107.08% of the plan.

#### **Noncommercial forest tending accounts for 74.76% of the task load.**

According to the forest types, noncommercial forest tending in sample counties was 38,500 ha, or 74.76% of the young and middle-aged forest tending and complete commercial forest tending was 13,000 ha, or 25.24%.

#### **Sanitation cutting, accretion cutting and lighting cutting are the main forest tending methods.**

According to forest tending methods, the sanitation cutting area in sample counties was 11,200 ha, the accretion cutting area was 14,800 ha and the lighting cutting area was 12,600 ha. The overall area was 74.95% of young and middle-aged forest tending areas completed in the year.

## **2. Forest tending was mainly completed by non-registered staff.**

In 2012, the employed laborers working in young and middle-aged forest tending in sample counties worked a total of 1.0875 million work days, with an average of 21.13 work days per ha. Young and middle-aged forest tending in the NFPP areas demands a large amount of labor, creating job opportunities for local people. However, since forest tending requires seasonal labor, the work was mainly done by temporary workers and a minority of forest staff. In 2012, the number of people involved in young and middle-aged forest tending in sample counties was 18,645, an increase of 9,901 compared with 2011. Among them, active forest staff were 2,234, or 11.98% of the number of people involved in forest tending; the number of forest staff waiting for employment contracts were 56, or 0.30%; employed non-registered staff were 16,355, or 87.72%.

## **3. The income of forest tending staff declined.**

According to the monitoring data, in 2012 the fund investment in forest tending in sample counties increased, but there was little subsequent increase in staff income. The income of forest tending staff declined, which negatively affected further forest tending.

## **The central fund is still the main source.**

In 2012, the fund invested in young and middle-aged forest tending in sample counties was CNY 102.3499 million, a rise of 68.54% compared with 2011; the local financial investment was CNY 19.807 million, which was 4.38 times that of 2011.

## **Direct expenses such as staff salary are the main expenditure.**

The direct expenses of forest tending was CNY 97.4029 million, an increase of 72.55%; indirect expenses was CNY 4.947 million, an increase of 16.60%.

In 2012, the salary of forest tending staff in sample counties was CNY 76.9992 million, or 75.23% of the forest tending fund, representing an increase of 34.84% compared with 2011.

## **Forest tending staff are paid according to their jobs.**

As the total salary amount growth is smaller than the number of workers, the average salary of forest tending staff in 2012 was CNY 4,129.75, which was CNY 2,400.68 lower than that of 2011. Among them, the average salary of forest tending staff on duty was CNY 11,247.49, the average salary of forest staff waiting for contracts was CNY 11,071.43, and the average salary of employed non-registered staff was CNY 3,133.74. By comparison (Figure 5.5), the salary of forest tending staff was more than that of temporary workers. In general, the salary of forest tending was lower than that of forest management and protection, mainly because forest tending is temporary, seasonal and takes a shorter time.

## **4. Logging and the consumption of forest resources.**

According to the *Implementation Plan of the NFPP along the Upper Reaches of the Yangtze River and the Upper and Middle Reaches of the Yellow River*, in order to ensure the recovery of forest ecological functions along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River, natural forest commercial logging is forbidden, except for limited consumption to meet the basic living demands of local farmers and some collective forest allocated in the commercial forest.

## **The forest stock consumed by forest logging continued to decline.**

According to the monitoring data, the forest stock that was reduced by logging consumption has not substantially increased in recent years; the logging quota target was not fully met and production mainly came from artificial forest. All of these

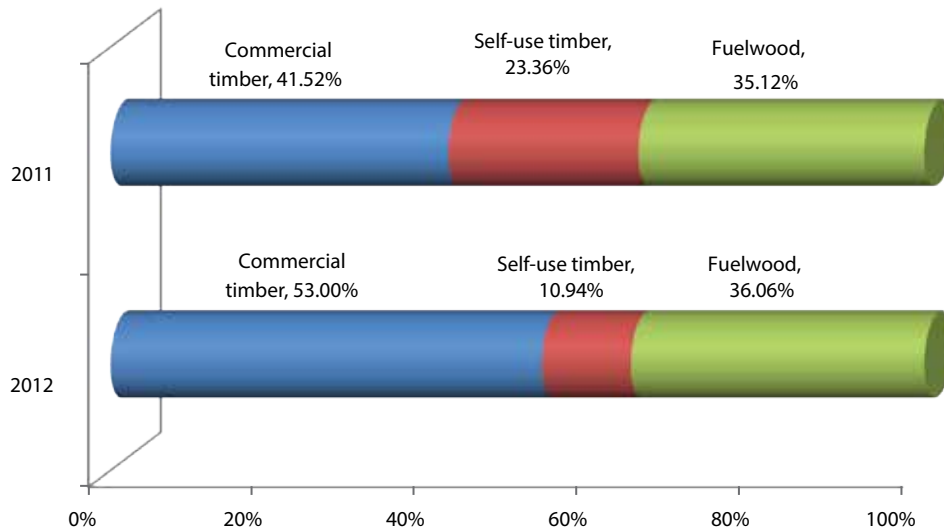


Figure 5.5 The forest resources consumption structure in sample counties in 2011 and 2012.

factors contributed to the fast recovery of forest cover and resources.

**Over one-third of the logging quota was utilized.**

In 2012, the forest stock consumed by the timber production in sample counties was 1.3307 million mu, a reduction of 85,100 mu compared with 2011, or just 38.45% of the logging quota for the year.

**Commercial timber logging increases.**

In 2012, commercial timber logging consumed 705,200 mu of the forest stock, the self-use timber for farmer consumed 145,600 mu, and fuelwood logging consumed 479,900 mu. Compared with 2011, the forest stock consumed by commercial timber logging increased by 117,400 m. Therefore, the forest resources consumptions structure changed. The share of forest stock consumed by commercial timber logging exceeded that of production and living wood in rural areas for the first time, which is more than 50% (Figure 5.6).

**The reliance on production and living wood in rural areas is declining.**

Since the implementation of NFPP over a decade ago, there have been profound changes in

economic and social development in the program area along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River. Economic and social development is no longer a heavy burden of ecological protection. In 2012, the population relying on fuelwood as their major energy source was 767,300, a reduction of 242,900 compared with 2011 (1.0102 million); the population relying on fuelwood as their major energy source was 3.009 million, a reduction of 917,100 compared with 2011 (2.9261 million). Accordingly, the forest stock consumed by fuelwood logging in sample counties in 2012 declined, showing that the consumption of forest resources from those living in rural areas was falling, which is beneficial for maintenance of the aims of NFPP.

**Commercial timber production mainly comes from artificial forest.**

As forest vegetation in the NFPP recovers, available forest resources in southern forest areas are increasing annually, and natural forest is being replaced by available artificial forest, which becomes the main source for logging. In 2012, timber production in sample counties was 507,500 mu, a reduction of 193,300 mu compared with

2011. The timber production from artificial forest was 443,800 mu, accounting for 87.45% of the total timber production in sample counties in 2012.

### **5. Available fund and fund usage.**

Financial investment is a core guarantee for ecological recovery and improvement of people's livelihoods in NFPP areas. At the end of 2012, the available program fund in sample counties was CNY 1.6722594 billion, of which the central financial fund was CNY 1.3993754 billion, accounting for 83.68% of the fund. The actual complete investment was CNY 1.5616658 billion, accounting for 93.39% of the planned fund, and the financial fund was CNY 1.2377233 billion, accounting for 79.26% of the actual complete investment. By comparison, the funding of NFPP mainly comes from central finance. Local financial fund investment is also increasing; the program fund is more often used in the areas of employment, income and social guarantee related to people's livelihoods, which is beneficial for the targets of forest vegetation recovery and people's livelihoods improvement in the program areas.

### **6. The share of local financial investment in the program fund rises significantly.**

All the construction tasks in NFPP started with the completion of the program plan in different program areas. In 2012, the actual available and complete investments in sample counties created new highs. The actual available fund in sample counties was CNY 859.5543 million in 2012, an increase of 5.76% compared with 2011. In the available fund in sample counties in 2012, the central financial fund was CNY 698.3721 million, accounting for 81.25%; the local financial fund investment was CNY 161.1822 million, accounting for 18.75%, which is the highest in all years. Compared with the program fund sources structure in recent years, the share of local financial investment in NFPP increased slowly, which was quite different from the start of the program.

### **7. Program fund usage structure remained stable.**

In 2012, the actual complete investment in sample counties was CNY 963.3505 million, an increase of 61.01% compared with 2011. This was because there was CNY 214.3868 of available fund left in 2011 and the actual complete investment was only 73.62% of the available fund.

### **Basic construction fund was used in noncommercial forest construction.**

In 2012, the basic fund expenditure for NFPP in sample counties was CNY 203.9224 million, increasing by 69.9% compared with 2011. Among them, the noncommercial forest construction (artificial afforestation, closing off mountains for greening and aerial seeding afforestation) was CNY 153.8907 million, accounting for 75.46% of the basic construction fund in 2012; forest tending investment was CNY 26.8517 million, accounting for 13.71%; other investments were CNY 23.18 million, accounting for 11.37%.

### **Financial fund mainly went to forest management and protection.**

In 2012, the financial investment expenditure in sample counties was CNY 759.4281 million, rising by 58.78% compared with 2011. Among them, the subsidy for forest management and protection was CNY 470.4928 million, the subsidy for forest tending staff was CNY 35.6276 million, the subsidy for social insurance was CNY 94.988 million, the political and social expenditure subsidy was CNY 31.8217 million, the subsidy for the separation of public welfare institution reform expenditure was CNY 751,000, the staff training expenditure was CNY 14,000 and other expenditure was CNY 125.733 million. Compared with 2011, with the exception of the share of the forest management and protection subsidy declining by 17.12 percentage points, the share of other financial expenditure didn't change much.



## **8. The project fund investment was beneficial to people's livelihood improvement.**

Although NFPP is an ecological protection and forest vegetation recovery program, it aims to solve problems related to people's well-being such as staff employment, income and social insurance. The fund is also used for staff expenditure and social insurance. In 2012, the subsidy for forest management and protection and forest tending staff in sample counties was CNY 268.9957 million. The subsidy for social insurance and political and social expenditure was CNY 126.8097 million. The subsidy of both accounts was 41.09% of the total complete investment in 2012. The financial investment in noncommercial forest construction, forest management and tending, forest tending related to ecological protection and forest vegetation recovery was CNY 417.8671 million, or 43.38%. In addition, as public welfare institution reform expenditure was separate and the staff training expenditure was connected with forest staff livelihoods, over half of the program fund was used to improve people's well-being, which played a vital role in maintaining social stability in the program areas.

## **5.4 The ecological, social and economic influence of the program**

NFPP has profoundly influenced the ecological environment and social economy in the program areas. Fixed-point monitoring mainly analyzes the effect of all the program policies implemented in sample counties in terms of its ecology, society and economy. Program construction experiences were summarized and the existing problems in the program were detected and reported.

### **1. Forest resources recovery.**

NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River is the source of China's major rivers. Therefore, their ecological protection is of great significance. Forest vegetation recovery is the

basis for improving the ecological protection function in the program areas. The improvement of the amount and quality of forest resources is the program's main aim, which requires continuous ecological environment improvement in the program areas.

### **The forest areas in the program areas continued to expand.**

Since the start of NFPP, the forest land in the program areas continued to expand and the rate of forest vegetation coverage increased dramatically. In 2012, the forest land in the program areas was 7.5585 million ha, accounting for 96.47% of the forest land area in sample counties, with an increase of 831,100 ha compared with the previous year. In 2012, the open forest land in sample counties was 104,100 ha, or a reduction of 9,500 ha; shrubbery was 3.4216 million ha, and young forest afforestation was 262,700 ha; others (such as nursery and non-forest land) was 758,500 million ha. Compared with 2011, the shrubbery increased substantially (604,400 ha), because the adjustment in monitoring scope of Qilian Mountain National Nature Reserve in Gansu Province increased by 438,500 ha of shrubbery.

### **Collective forest increased more than state-owned forest.**

According to the ownership data, the state-owned forest area in NFPP in sample counties was 2.7278 million ha, an increase of 409,200 ha compared with 2011, accounting for 36.09% of the total forest land in sample counties. The collective forest land was 4.8307 million ha, an increase of 421,900 ha compared with 2011; among them, the forest land area allocated to households was 3.2103 million ha, accounting for 66.46% of the collective forest land.

### **Commercial forest land increased dramatically.**

According to usage data, the national noncommercial forest land of the program areas in sample counties was 3.6684 million ha, the local

noncommercial forest land was 1.6735 million ha and the commercial forest land was 2.2166 million ha, or 48.53%, 22.14% and 29.33%, respectively, of the forest land of the program areas. Compared with 2011, the commercial forest areas increased by 686,400 ha and its share in the forest land of the program areas also increased by 6.85 percentage points.

#### **Natural forest land increased by 15.49%.**

The natural forest of the program areas in sample counties in 2012 was 5.9096 million ha and the artificial forest was 1.6489 million ha. As noncommercial forest construction at the end of the first phase focused on closing off mountains for greening, most of the newly counted forest was natural forest, which increased the share of natural forest in the NFPP in sample counties by 2.12 percentage points.

#### **Area of young forest land area continued to increase.**

The young forest land area in the program areas was 2.6536 million ha, of which middle-aged forest was 2.298 million ha, near-mature forest was 1.1495 million ha, and overmature forest was 1.4574 million ha. Compared with 2011, the young forest in NFPP in sample counties increased by 489,600 ha. The middle-aged forest and near-mature forest increased by 243,700 ha and 173,700 ha each while the overmature forest reduced by 75,900 ha.

#### **Forest stock continues to increase.**

Due to the banning of natural forest commercial logging, the forest stock for timber production, production and living wood logging in recent years didn't change very much, which allowed fast growth of forest stock in the program areas. In 2012, the forest stock in the NFPP in sample counties was 620.5332 million mu. Ruling out changes in the monitoring scope in the Qilian Mountain Nature Reserve, the forest stock in the program areas of sample counties increased by 44.0956 million mu,

with an average increase of 881,900 mu in each sample county.

#### **State-owned forest stock increased rapidly.**

In 2012, the state-owned forest stock in the sample counties was 379.8429 million mu; the collective forest stock was 171.9912 mu; private and other types of forest stock was 68.6991 million mu. Compared with 2011, the state-owned forest stock increased by 60.1427 million mu, or by 3.53 percentage points; the collective forest stock reduced by 7.2252 mu; private and other types of forest stock increased by 13.3996 million mu. This was the result of forest ownership transfer after the releasing of collective forest ownership certificate in the program areas.

#### **Natural forest stock increased faster than artificial forest stock.**

In 2012, the natural forest stock in the sample counties was 542.6965 million mu, an increase of 62.5245 million mu compared with 2011; artificial forest stock was 77.8367 million mu, an increase of 3.7926 million mu. By comparison, the natural forest stock in the program areas increased 16.49 times more than the artificial forest stock. The natural forest area was only 3.58 times of the artificial forest. The annual increment of natural forest per unit area was higher than that of artificial forest.

#### **The share of mature and overmature forest stock declined.**

In 2012, the young forest stock in the sample counties was 95.8506 million ha, the middle-aged forest stock was 160.0872 million ha, the near-mature forest stock was 120.9138 million ha, and the mature and overmature forest stock was 243.6816 million ha. Compared with 2011, the mature and overmature forest stock in the program areas declined by 4.1669 million mu, or by 5.45 percentage points; young, middle-aged and near-mature forest stock continued to increase.

**There were no obvious changes in forest quality.**

The share of young and middle-aged forest area in sample counties was 65.51% of the total forest land; the young and middle-aged forest stock was just 42.25% of the total forest stock. Therefore, in 2012, the forest stock unit area was just 82.10 mu per ha, or 0.28 mu lower than that of 2011. Forest quality declined slightly.

According to the ownership data, the state-owned forest stock in the sample counties in 2012 was 139.25 mu per ha, which was 1.36 mu per ha; the collective forest stock unit area was 49.82 mu per ha. Natural forest stock unit area was 91.83 mu per ha, which was 2.01 mu per ha lower than in the previous year; artificial forest stock unit area was 47.21 mu per ha, or an increase of 1.23 mu per ha. Young forest stock unit area was 36.12 mu per ha, middle-aged forest stock unit area was 69.66 mu per ha, near-mature forest stock unit area was 105.19 mu per ha, and mature and overmature forest stock unit area was 167.20 mu per ha. Compared with 2011, state-owned forest, mature and overmature forest stock unit area increased dramatically; the area of the natural forest by closing off hills in the first phase of the program was larger, which had a negative effect on the natural forest stock unit area growth.

**2. Social development.**

Since the start of NFPP over a decade ago, there have been many changes in society, such as the annual changes in the numbers of impoverished people, employment structure, family income and social guarantees. These changes were caused by program policies and may influence the program construction process, which are major concerns of the socioeconomic benefits monitoring part of the program.

**3. Poverty issues are still serious.**

The ban on natural forest logging and the decline in timber production were once the most important

causes of poverty. Therefore, solving the problem of employment, increasing the incomes of people living in the program area, and reducing poverty by ecological construction has always been a target of program policies.

**The ratio of poor people in sample counties is still high.**

In 2011, after the country raised the poverty standards in rural areas, the number of poor people in sample counties rose considerably; the proportion of poor people in the total population rose by 24.29% by the end of the year. The number of poor people in program areas was 93.69% of that in sample counties. Therefore, poverty issues in NFPP are still severe. Poor people are more vulnerable and can easily become poor again, which is of high concern.

**Lifting people out of poverty in the program areas was slow.**

In 2012, the number of those living in poverty in sample counties reduced to 4.3051 million, or 21.65% of the total population in sample counties; the population of poor people in the program area was 4.1923 million, or 97.38% of those living in poverty in the sample counties. Compared with 2011, the share of the population living in poverty in the sample counties fell by 2.64 percentage points, while the share of the population living in poverty in the program area rose by 3.69 percentage points – showing that those living in poverty in the program areas addresses poverty issues more slowly than that in the non-program areas.

**4. Social insurance coverage keeps expanding.**

Social insurance subsidy is designed to make up the gap, due to the timber production decline and natural forest ban causing by the lack of fund for basic pension for the aged, those in need of medical care, unemployed, those with an occupational injury and pregnant workers. The subsidy receivers included in-service forest staff, laid-off workers,

retired workers and other non-registered forest workers. At the end of 2012, the special financial subsidy of social insurance was CNY 430.2007 million; the number of forest staff and other forest workers who benefited in 2012 were 15,169, and the subsidy per capita was CNY 6,261.98.

**The benefited target of social insurance subsidy are in-service forest staff and retired forest staff.**

In 2012, the in-service forest staff who received the social insurance subsidy were 10,576, or 69.88% of in-service forest staff in sample counties; the laid-off forest staff were 5.78% of the total laid-off forest staff in the county; retired forest staff were 4232, or 64.47% of retired forest staff in the county; other forest workers were 310, or 10.35% of non-registered forest workers in the county; by comparison, the in-service and retired forest staff were the main beneficiaries, or 97.62% of the social insurance subsidy for forest staff.

**Social insurance subsidy mainly went to old-age insurance and medical insurance.**

In 2012, 8532 forest staff and other workers received the basic old-age insurance subsidy of CNY 7,659.42 per capita; 12,616 received a basic old-age insurance subsidy of CNY 1,786.22 per capita; 6812 received an unemployment subsidy of CNY 529.04; 7002 got an occupational injury subsidy of CNY 289.61 per capita; 6259 got maternity insurance subsidy of CNY 234.00. Compared with 2011, the social insurance subsidy amount doubled, the subsidy coverage further expanded and the social insurance system in the program areas gradually improved.

**5. Residents' income structure changes dramatically.**

After the ban on natural forest logging, the traditional forest industry relying on timber production declined. There were obvious changes in the industry structure of program areas. Underwood planting and ecological tourism were

fully developed, which also promoted a change in residents' income structure in the forest areas.

**The population relying on logging and timber processing as the major economic source reduced significantly.**

In 2012, the population who relied on logging as their major income source was 525, of which forest workers were 145; the population relying on timber processing as their major income source was 3885, of which forest workers were 234. This showed that the traditional forest industry in monitoring sample counties declined, and the number of workers also decreased; the forest workers mainly took on the jobs of ecological protection and construction. Fewer people continued to work in logging and timber processing enterprises.

**6. Forest-related cases are declining.**

With the further implementation of collective forest regulations reform and the public common consensus on ecological protection, the number of forest-related cases are declining, which lays a solid foundation for achieving program construction and developing the economy in the forest areas. In 2012, forest-related cases in sample counties were 1106, a reduction of 159 compared with 2011; in 201, the crime of illegal lumbering was 355 cases, a reduction of 110 compared with 2011.

**7. Forestry economy.**

Since the start of NFPP, the economy in the forest land has experienced highs and lows. Forestry enterprises were hardest hit and forestry output value was the most directly affected. Currently, the forestry economy is developing well in monitoring sample counties, and the forest products yield and forestry output value keeps rising. Forest enterprises operating conditions have improved significantly, the total value of assets has increased, the debt burden has declined and the enterprises' ability to survive has recovered.

## **8. The forestry output value is growing**

### **The overall forestry output value increased by a large margin.**

In recent years, the output value in sample counties has grown. In 2012, the forestry output value in sample counties was CNY 37.222798 billion, an increase of 41.97% compared with 2011, creating a new high since the implementation of the program in sample counties. Among them, the forest primary industry output value was CNY 23.8389 billion, or 64.04% of the total output value in sample counties; the forest secondary industry output value was CNY 6.885358 billion, or 18.5%; the tertiary industry output value was CNY 6.49854 billion, or 17.46%.

### **The NFPP special forest industry shows a good developing momentum.**

In the forest primary industry, the timber and bamboo lumbering industry output value only accounts for 2.73%; the commercial forest products plantation and collection output value accounts for 65.28%. In the secondary industry, the output value of wooden and bamboo furniture manufacture, papermaking by wood, bamboo and reed pulp and the chemical processing of forest products only account for 31.05%. In the forest tertiary industry, forest tourism and leisure industry account for 66.57%.

## **9. Forestry enterprises operating conditions continue to improve.**

The forestry economy cannot live without the development of forestry enterprises. In 2012, the number of forestry enterprises in sample counties expanded to 1,198, an increase of 113 compared with 2011.

### **Forestry enterprises' assets increase and debt decreases.**

In 2012, the total assets of forestry enterprises in sample counties were CNY 1.013 billion, an increase by 12.06% compared with 2011, with

the average assets of 845,900 for each forestry enterprises. In 2012, the forestry enterprises debt was CNY 540.669 million, a decrease of CNY 6,1021 million, of which the principal and interest of loan from financing institutions reduced by CNY 60.922 million. The unpaid wages and service fee increased by CNY 24.89 million.

### **The production ability of forestry enterprises further improves.**

In 2012, the timber production in sample counties was 1.106 million mu, which was 405,300 mu more than that of 2011; among them, logging was 872,400 mu, fuelwood was 224,800 mu. Bamboo production was 34.2719 million, an increase of 2.5915 million compared with 2011; sawn timber production was 208,700 mu, an increase of 6400 mu compared with 2011; artificial board production was 241,700 mu, an increase of 123,600 mu; furniture pieces were 147,800, an increase of 52,300 pieces compared with 2011.

### **Problems facing the NFPP.**

Since the social economic benefits monitoring of NFPP began over a decade ago, much attention has been paid to the problems affecting program implementation and maintaining the construction achievement, such as the poverty levels of residents and socioeconomic development in the program areas, the wages and workload of management and protection staff, industry development in the program areas, and the total amount and quality of forest resources. We hope that through political adjustment and necessary measures, we can address the policy problems so as to encourage program participants and address the problems of social economic development in the program areas so that they will not affect ecological protection and construction there. From the monitoring sample counties in 2011 and recent years, NFPP is facing a number of problems, listed below.

### **(1) Poverty remains a prominent issue of NFPP.**

From the monitoring result in 2011, China raised the poverty alleviation standards, making the average income of CNY 2300 per capita (it didn't change in 2010). As a result, the national poverty alleviation population rose to 128 million in 2011. The poverty population in 44 monitoring sample counties increased by 2.6072 million and the share of the population of poor people in 50 monitoring counties reached a 24.29% high, of which 93.69% were in the program areas. In 2012, the poverty population in 50 monitoring counties reduced by 490,600, the ratio of which declined by 2.64 percentage points.

The population of poor people in the program areas was 97.38% of the total population of poor people in sample counties. These results shows that 50 sample counties were in the dense poverty-stricken areas; these places are also fragile ecological areas where people are vulnerable and can easily fall back into poverty. The poverty population doubled after the improvement in poverty alleviation standards in rural areas; it was very difficult for the poverty population to eradicate poverty in NFPP. The wealth gap between program areas and non-program areas was the most troublesome.

NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River coincides with Western ecological fragile areas and concentrated areas with special difficulties. Improving people's well-being and protecting the ecology in those areas are very difficult their targets are in conflict with each other to some extent. On one hand, economic exploitation aimed at poverty alleviation can easily cause ecological damage in fragile areas, which leads to frequent natural disasters that intensifies poverty. On the other hand, the forest vegetation protection and recovery program aimed at ecological improvement will change the production and lifestyles of those relying on natural resources in underdeveloped districts which may cause some low-income people to slide

into poverty and poor people to get even poorer. Therefore, poverty in NFPP cannot be solved by the program itself, but by the national anti-poverty program. We must accelerate the poverty alleviation process of the NFPP to achieve the aims of the ecological protection program.

### **(2) The orientation of forest industry in NFPP is not clear and the planning isn't put in place.**

Concerning the issues of poverty and backward social economic development, from the point of forest industry itself, we hope to solve the employment and income increase issues in the short-term by developing forest industry, promote socioeconomic development in the program areas by developing forest special industry as the pillar industry. However, from the tracking and monitoring result, there remains many problems in the forestry industry in NFPP. First, the forest industry structure is not rational. The ratios of forest primary, secondary and tertiary industries in 2012 were 64.04%, 18.5% and 17.46%, respectively. The processing industry and service industries lag behind and the industry lacks scale merit, which limited functions in increasing employment and people's income. Second, the business type is single and the special feature of resource advantage is not obvious. From the monitoring result in 2012, 65.28% of the forest primary industry output value came from commercial products plantation and collection and 66.57% of the forest tertiary industry came from forest tourism and the leisure industry, which is consistent with the phenomena of planting herbs in the whole countryside or 'forest rural tourism'. Finally, the forestry enterprises are not strong enough, not able to act as the backbone for promoting economic development in the forest areas. In 2012, the average assets scale and profit levels of forestry enterprises in sample counties declined. The unpaid wages and labor fees by enterprises increased by CNY 24.89 million. The development of forestry enterprises is not stable.

There were not corresponding policies for the forestry development in the NFPP Phase II, which is possibly an important reason for the unclear orientation and arrangement of forest industries. However, the forest industry development of NFPP was ignored, since developing forestry industry was an important way to improve people's well-being in the program areas. The investigation found that for most households, over half of their income came from operating forest land. The income of *Dendrocalamus latiflorus* growers in Rongchang County in 2012 increased by CNY 940 per capita. However, most of the farmers' forest land businesses were developing randomly and many difficulties were not overcome. If the development of forest industry can ease the tension on employment and increasing income as well as meet the growing social need for ecological products, improvement of the ecological and people's livelihoods in the program areas can be realized.

**(3) Noncommercial construction, forest management and protection and forest tending working staff are not stable.**

Noncommercial construction, forest management and protection and young and middle-aged forest tending are the main tasks in NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River and the major direction for distributing forest staff. Compared with the monitoring data for many years, affected by the program construction investment and task arrangement, the working team of forest protection and recovery in the program areas was not stable. The number of forest management and protection staff decreased, especially during the last few years at the end of the first phase, as the program investment standards didn't change for a long time and the national price level kept rising. The number of forest management and protection staff in 44 sample counties reduced by 217 in 2011 and by 171 in 2010. There were only a few months

for working in noncommercial forest construction and forest tending every year and the wages were relatively low. These two tasks were mainly done by temporary workers in monitoring sample counties. The registered forest staff engaged in young and middle-aged forest tending in 2012 only took up 12.28%. The instability of employment and income expectation lead to instability of working staff, which affected the program construction quality. These are also the problem which have been mentioned a lot in our monitoring reports.

In the long-term, natural forest protection requires a team of specialized and stable working staff. There needs to be talent and professional skills in the team, so that ecological protection and construction tasks can be completed with high quality. Staff must have well-organized construction tasks and stable incomes to ensure that they are engaged in natural forest protection over a long period of time. The staff organization structure for solving the arrangement of forest staff and completing construction tasks is due for review. We plan to explore long-term mechanisms for natural forest protection.

## 5.5 Recommendations

We offer the following suggestions about the problems detected in monitoring of sample counties in the NFPP in 2012.

**(1) Adopt measures suitable for the program areas to enhance poverty alleviation efforts.**

Poverty alleviation is closely related to social stability, and need to be addressed by forestry ecological protection and further implementation of the program. The poverty of NFPP along the upper reaches of the Yangtze River and the upper and middle reaches of the Yellow River is mainly ecological poverty. Low ecological capacity, frequent natural disasters, bad production and poor living conditions are the source of poverty.

To help the people in NFPP areas eradicate poverty, increasing efforts shall be made to alleviate their poverty. More financial support from departments at all levels should be given to ecological conservation and construction to increase the investment standard and the workers' wage level. We should ensure that the ecology of the program area improves so that the eco-capacity, disaster prevention and reduction ability can be enhanced. We should accelerate the development of the forestry industry to let the economy serve as the driving force for eradicating poverty. We should rely on specialized forestry resources to carry out poverty reduction and development so that the program area's ability of self-development can be improved. Input for rural social security system in the program areas should be greatly increased. Incapacitated persons and low-income populations will be regarded as key recipients. Eco-migration should be steadily promoted. Residents in the program area with extremely difficult living conditions should be encouraged to relocate to small and medium-sized towns and industrial parks. Governments should create employment opportunities and help them with employability.

### **(2) More supports shall be given to characteristic forest industry in the program area.**

Economic development is the basic way of improving people's living conditions. NFPP area has various characteristic forestry resources and rich labor resources, which makes forestry an industry with unlimited potential. But the development of industry requires forestry departments at all levels serving as a guide in planning and supporting. First of all, financial departments at all levels shall cooperate with each other to increase investment in forestry by setting up a special fund, government discount loans and replacing subsidies with rewards. At the same time, if the efficiency of the fund for

forestry ecological development is low, the forestry department at grass-roots level shall be allowed to use the fund in forest industry development in order to solve the problem of funds shortage in managing forests. Second, macroscopic planning for forestry industry shall be strengthened to avoid the similarity of management types. Low-level and vicious competition during early stages needs to be prevented. Third, the establishment of rural professional cooperative organizations should be improved by rewarding them according to their contributions to social and economic development in rural areas in various ways, such as overall economic efficiency, improvement of rural employment and management level. Fourth, leading enterprises in forest industry should be given more support by reducing their taxes or financial fees. Enterprises should be encouraged to closely link with production bases and markets, and enlarge the industry scale and output capacity.

### **(3) Build up a stable and professional ecological conservation and construction team.**

Protecting natural forests, which act as green shelters, requires a stable and long-term input mechanism and a professional constructing team. NFPP is obviously a temporary measure, so a long-term mechanism for protection natural forests shall be established as soon as possible. First, a professional ecological conservation and construction team needs to be established from our current forestry staff. This team will be responsible for forest management and protection, public welfare forest construction and young forest tending. Its quantity of tasks should be calculated scientifically and should remain unchanged over a long period. Second, a stable input mechanism with which financial departments at all levels can distribute the investment of ecological conservation and construction in certain proportions should be established. Direct expenses, such as ecological conservation and construction and indirect



expenses such as labor wages, can be ensured this way. Third, professional skills training for ecological conservation and construction staff should be emphasized. Staff should keep improving their overall quality and efficiency by undergoing regular training and testing, and through the reward-and-punish mechanism. In the long-term,

natural forest protection should be regarded as a noncommercial industry. The funds required for natural forest conservation should be included in the financial budgets and the staff should be made formal staff so that the achievement of ecological conservation and construction can be consolidated.



# 6

## Monitoring report on the socioeconomic impacts of conversion of cropland to forests program (CCFP)

Xie, Chen; Peng, Wei; Wang, Jia Nan; Liu, Jian Jie; Jiang, Xilin; Li, Fang Fang; Li, Bao Yu

2012 was the fifth year during which the specific planning to consolidate the outcome of the Conversion of Cropland to Forests Program (hereafter referred to as CCFP) was implemented. So far, more than half of the assignment has been completed in over half of the implementation period. With the first round of subsidy due to expire in 2015, CCFP is facing a new obstacle. In 2012, the activities of converting cropland to forests sto focused on consolidating the outcome of CCFP and the long-term livelihoods of rural households participating in CCFP.

In 2012, (which is the eleventh year since the social and economic benefits of CCFP has been monitored) 100 sample counties, 119 villages and 1156<sup>1</sup> households were covered in a fixed-point continuous tracking monitoring program. The monitored sites were spread across 22 provinces: 52 counties, 61 villages and 576 households in the Yangtze River Basin; and 48 counties, 58 administrative villages and 580 households in the Yellow River Basin. In the 100 sample counties, the cumulative completed assignments of CCFP accounted for 11.85% of the national total.

<sup>1</sup> In 2012, two additional monitored households were included in the database of Yuzhong County of Gansu Province with a complete set of data since the start of the Grain for Green Program. Hence the two households have been formally covered in the routine monitoring since 2013.

Data collection for the monitoring of CCFP comprised of three surveys at county, village and household level, as well as a set of household questionnaires. The questionnaire covered basic monitoring information, progress of the program, and implementation of relevant policies and their effects. In 2012, there were 483 indicators in the three-level monitoring, 171 at county level, 135 for villages and 177 targeting households. Household questionnaire was developed to address the key program issues, and in total there were 13 questions covering delivery of subsidies, consolidation of CCFP tasks, forest management, issues and recommendations, etc. In addition, as the second round of subsidy has been fulfilled in some program areas while the new cycle of the conversion policy is approaching, at the beginning of 2013, the monitoring group of the program, in collaboration with the Northwest Agro-forest Technology University, carried out a household questionnaire survey on policies of CCFP (hereafter referred to as Northwest Farmland Conversion Survey), in order to understand the policy needs in the central and northwest provinces and autonomous regions. This survey covered 1757 program households in 74 counties in 15 provinces.

The monitoring results showed that the outcome of CCFP had been effectively consolidated and brought about significant ecological impacts, such as an increase of both forest area and stocking volume, which have boosted the productivity of cultivated land and promoted the transformation of agricultural growth. The consolidation of CCFP tasks had been adjusted to meet local needs and has prioritized ecological migration and rural energy. Forests have grown well thanks to the enhanced management in farmlands converted to forests and as a result of the enforcement of inspection and verification methods of CCFP. However, rapid changes were found among early warning indicators because of the new policy cycle, in particular, the reclaimed land area increased, the

pressure of converting forest land back to farmland was high in poor and ethnic minority areas and the demand for replacing ecological forests with economic forests became stronger.

Recommendations are to:

- restart CCFP with a focus on poor areas located in ecologically significant regions;
- reinforce the ecological objectives as a priority of CCFP;
- test out new policies to explore the possibility of restarting CCFP and the mechanisms to achieve long-term sustainability in the poor program areas located in ecologically significant regions;
- include a specific fund for subsequent management in the budget of consolidation of CCFP tasks;
- cover the cost of tending and intermediate cutting of the program in the subsidy for young and middle-aged forest tending provided by central government finance.

## 6.1 Policy priorities of CCFP in 2013

As pointed out in *Opinions of the Central Party's Committee and the State Council* on accelerating innovation in agricultural technologies to promote sustained ability in guaranteeing agricultural produce supplies (No. 1 of Central Party's Committee, 2012), in 2012, the outcome of the CCFP should be strengthened and the scale of afforestation in converted farmlands should be expanded in an appropriate manner in the key ecological functional zones, such as the sources of rivers and around lakes, etc.

During the 217<sup>th</sup> executive meeting of the State Council held on 19 September 2012, the achievements of CCFP were reported. It was pointed out during the meeting that it was a critical phase of consolidating the outcome of CCFP, and it was necessary to continue with the special

planning and accelerate the implementation of consolidation activities by focusing on priorities. First, the priority of the consolidation activities should be in areas with difficulties and program households in distress and efforts should be made in ensuring sustainable long-term livelihoods for program households. Second, management of project and funding should be reinforced, and the relevant provincial governments should take overall responsibility to enforce the management and inspection of the activities of CCFP in order to ensure the quality of the program and the security of special funding. Third, more emphasis should be put on maintenance and management of program outputs, in particular, to work on forest tending, repairing of plantation and forest fire control in order to increase the survival rate and maintenance rate. It is necessary to guide farmers to play a leading role in the daily maintenance of construction outputs, such as biogas. Fourth, the impacts of the program should be further monitored and the effectiveness of consolidation efforts should be evaluated. It was decided during the meeting that the subsidy for consolidating program outcomes should be raised in a proper manner from 2013, and the assignments in key ecologically fragile regions should be based on the results of the 2<sup>nd</sup> National Soil Survey.

In alignment with the Central Party's Committee and State Council's overall requirements for farmland conversion to forests and the unified deployment of the State Forestry Administration, the general ideas of the farmland conversion work of 2012 was to focus on the consolidation and expansion of program outcomes, explore win-win solutions to achieve success in both outcome consolidation and CCFP expansion, put balanced efforts into farmland conversion and livelihoods improvement, and enhance the effectiveness of CCFP by consolidating and expanding existing outcomes.

## 6.2 Basic information of the monitored sites

In 2012, with the continued urbanization in monitored sites, population, resources and environment developed in a more coordinated manner with further restructuring of rural industries, but the growth of the economy and rural incomes was less than in previous years.

### 6.2.1 Population growth was slow while labor migration and the trend for non-agriculturalization continued

As a result of accelerated urbanization and the restructure of rural industries, in 2012, there continued to be a significant trend of increased labor migration and non-agriculturalization in sample counties. With the total population growing, the number of employed people in villages, the number of labor migrating and the size of the labor force in agriculture, forestry, animal husbandry and fisheries all declined to different extents.

In 2012, the total population of sample counties was 46.2174 million, or 0.22% of growth compared with that of 2011, which was 46.1148 million. The rural population in 2012 was 37.3852 million, 466,200 more than that of 2011, with a growth rate of 1.26%. The percentage of rural population in the total population was 80.89% in 2012, 0.83 points higher than that of 2011.

Due to urbanization, rural employment in sample counties showed a decline for the first time since 2007; labor migration and labor force in agriculture, forestry, animal husbandry and fisheries decreased, with the decline in the latter more severe than that of the former. In 2012, rural employment in sample counties was 21.28 million, or 84,400 persons less than that of 2011, or a decrease of 0.39%. The number of labor migrants was 9.5577 million, 30.800 persons less than that of 2011, or a decrease of 0.32%. The

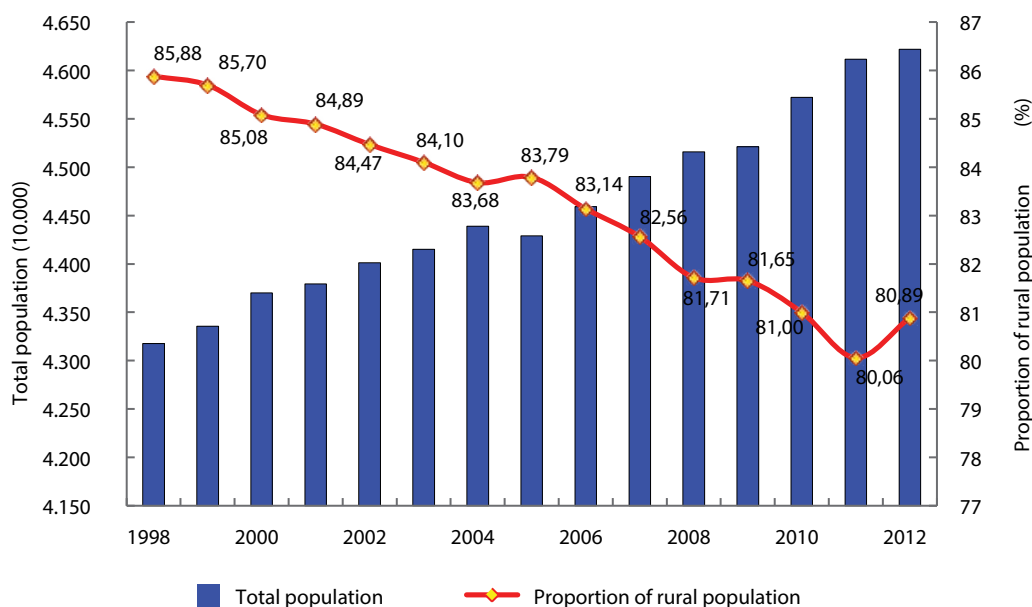


Figure 6.1 Demographic statistics of sample counties.

number of migrant laborers made up 25.65% of the total rural population, and 45.06% of rural employment. In line with the trend of rural labor force transferring to non-agricultural industries, the labor force in agriculture, forestry, animal husbandry and fisheries among rural employment continued to decline – in 2012, labor force in

agriculture, forestry, animal husbandry and fisheries in sample counties was 11.5905 million, 246,200 persons less than that of 2011, at a rate of 2.08% (Figure 6.1, Figure 6.2).

In 2012, among the 50,600 households in the 119 sample villages, cumulatively 30,100 households

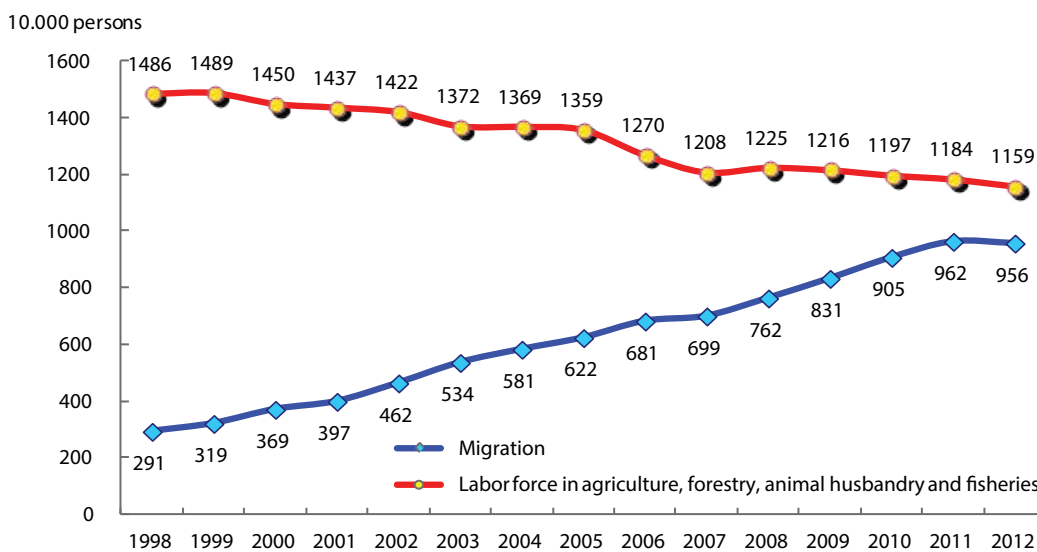


Figure 6.2 Rural labor force and migration in sample counties.

participated in CCFP, which was 59.56% of the total number of households. The population was 193,100 with a labor force of 105,500, and the number of migrant workers was 46,500, or 24.08% of the total population and 44.08% of the total labor force.

In 2012, the total population of the 1157 sample households was 5295, 11 persons more than that of 2011 which was 5284. The total labor force in sample households was 2979, which was 4 persons more than that of 2011 and the labor dependent ratio was 1.77. The total number of migration workers was 1385, or 46.49% of the total labor force.

### **6.2.2 Land utilization was optimized and the general status of natural resources was improved**

In 2012, the area of cultivated land in sample counties, forest area, forest stocking volume and rainfall, increased which ensured the continuous improvement of the status of natural resources.

In 2012, the total area of sample counties was 416,800 km<sup>2</sup>, among which the cultivated land area was 5.3418 million ha, 32,300 ha more than that of 2011; the forest area was 10.1411 million ha with a stocking volume of 745 million m<sup>3</sup>, and the average forest coverage rate in sample counties was 32.52%.

In 2012, rainfall increased in sample counties, and the average annual rainfall was 627 mm<sup>2</sup>, 14 mm more than that of 2011, which was close to the average annual rainfall found in 1998 (629 mm). However there was different results in different river basins. In the Yangtze River Basin, rainfall in sample counties decreased while in the Yellow River Basin counties, the rainfall increased. In 2012, the average annual rainfall in sample

counties in the Yangtze River Basin was 1047 mm, 33 mm less than that of 2011; while in the Yellow River Basin, the annual average rainfall of sample counties was 385 mm, 37 mm more than that of 2011 (Figure 6.3).

### **6.2.3 Economy sustained fast growth, but the general situation was still below the national average level**

In 2012, the economy in sample counties sustained fast growth with continuous structure adjustment. The social safeguard for rural population was strengthened and rural residences' incomes continued to rise, which provided a favorable social and economic environment for consolidating the outcome of CCFP. However, the overall growth of economic development and farmer's income in sample counties was slower than the national average.

In 2012, the GDP in sample counties was CNY 982.970 billion, a 14.42% increase compared with that of 2011 after deducting price increases, and the growth rate was 6.62 points bigger than the national GDP growth rate (7.8%). The total fiscal revenue of sample counties was CNY 74.38 billion, 22.37% increase compared with that of 2011, and 9.57 points higher than the growth rate of national fiscal revenue. The proportions of primary, secondary and tertiary industries in GDP were 17.23%, 54.67% and 28.10%, respectively. Compared with that of the national status, the proportion of the primary industry was 7.14 points higher, while the proportion of the tertiary industry was 17.21 points lower, which indicated that the economic structure in sample counties was less developed than the national level.

In 2012, the rural per capita net income of sample counties was CNY 6230.56, a 6.13% actual increase compared with that of 2011 if price increases were deducted. In the same year, the national rural per capita net income was CNY 7350, or 15.75%

<sup>2</sup> The rainfall here is the weighted average based on administrative territory of sample counties.

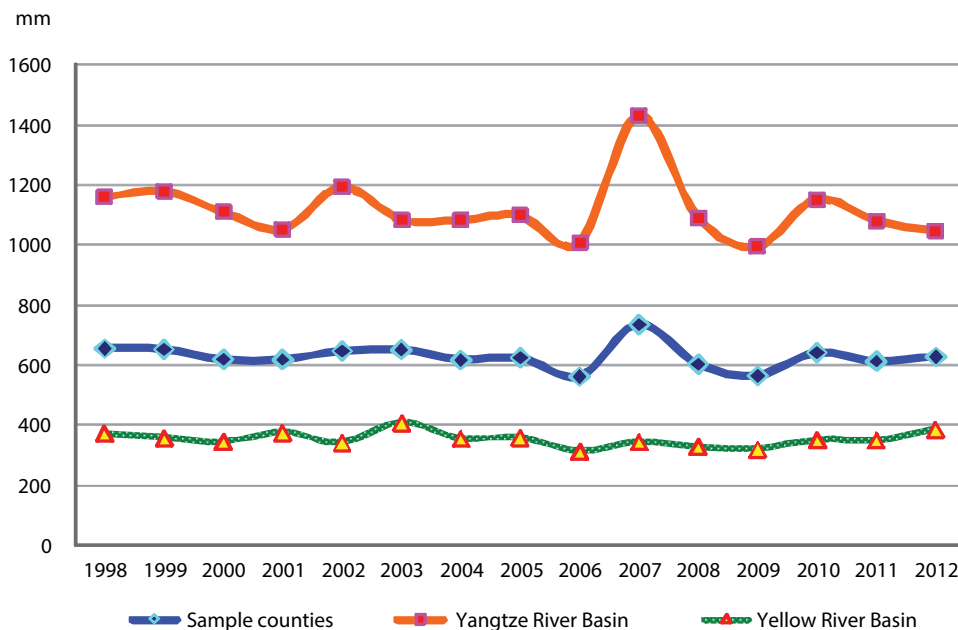


Figure 6.3. Changes in precipitation in sample counties from 1998 to 2012.

higher than that of 2011 at a comparable price. It is obvious that the rural net income and its growth rate in sample counties were both lower than the national level. In 2012, 16.3483 million people joined the new type of rural endowment insurance system and 35.3344 million people participated in the new type of rural cooperative medical insurance system, or 17.23% and 1.00% more than that of 2011, respectively. The participation rate of new type of rural cooperative medical insurance system was 94.51%, which was slightly lower than the national average of 98.1%.

### 6.3 Implementation of major policies

In 2012, the policies of CCFP were steadily implemented. New outputs were gained in the transitional construction for consolidating the outcome of CCFP, the subsidies for CCFP were fulfilled effectively, and the management of converted farmland continuously improved.

#### 6.3.1 Growth of investment became larger and local investment increased

Along with the acceleration of consolidation tasks to consolidate CCFP, 2012 saw a significant growth in the construction fund and the local capital investment surpassed that from the central government for the first time. Thanks to the mechanism of holding meetings at provincial and ministerial level, capital investment in ecological immigration increased rapidly.

In 2012, the completed investment of CCFP in sample counties was CNY 4.089 billion, CNY 862 million more than that of 2011, with an increase rate of 26.71%; and it accounted for 18.36% of the national total investment in CCFP. Within the total investment, the total funding for grain subsidy, living cost subsidy and seedling subsidy (hereinafter referred to as CCFP subsidies) was CNY 1.702 billion, or 5.55% higher than that



of 2011. Consolidation CCFP Fund<sup>3</sup> (hereafter referred to as Consolidation Fund) was CNY 2.387 billion, 47.88% higher growth than that of 2011. The substantial increase of the Consolidation Fund is attributed to bigger investment from local governments. CCFP subsidies and the Consolidation Fund were 41.62% and 58.38%, respectively, of the total completed investment of CCFP in sample counties in 2012.

In 2012, within the completed investment of the Consolidation Fund, 47.40% was provided by the central government, and 52.60% was matching funds from local government. CNY 399 million was spent on basic farmland, CNY 160 million was spent on rural energy, CNY 438 million was spent on ecological immigration, CNY 787 million was spent on subsequent industries, CNY 27 million was spent on farmer's technical and skills training, and CNY 51 million was spent on repairing of plantations; and the respective growth were -7.27%, 38.68%, 85.08%, 17.61%, 33.74% and -19.11%; the proportions of sector investment in the total consolidation CCFP tasks investment in 2012 were 21.45%, 8.57%, 23.52%, 42.28%, 1.43% and 2.75%. The highest growth of investment in terms of amount and proportion were found in the investment in ecological immigration, though investment in subsequent industries remained the biggest proportion. The proportion of investment in rural energy was 1 percentage point more than that of 2011.

In 2012, the completion rate of Consolidation Fund in sample counties was 93.70%, or 3.03% lower than 2011. The completion rate of central government investment was 90.51%, and the completion rate of local matching fund was

96.77%. The major cause of the lower completion rate in 2012 was because of the low completion rate in some sample counties which didn't finish the investment. The completion rate of repairing of plantation was the highest at 106.67%, while the lowest was that of farmer's training and employment, at only 69.40%. In 2012, the overall completion rate of investment was 98.77%, which remained at a fairly high level and demonstrated the effective practice of policies on CCFP subsidies (Figure 6.4).

### 6.3.2 Scale of afforestation kept down while the enclosed mountain areas for forests showed increases

In 2012, the scale of afforestation on converted farmland in sample counties kept decreasing while the mountain area enclosed for forests increased. The completed afforestation assignment in 2012 was 43,000 ha in sample counties, 2200 ha less than that of 2011, a decrease of 4.87%; the completed afforestation on waste land barren hills was 22,900 ha, which was 10.40% lower than that of 2011; the enclosed mountain area for forests was 18,800 ha, which was an increase of 4.47%.

Since 1999, the cumulative area converted from farmland to forests in sample counties was 3.0471 million ha, with 1.0738 million ha for forests and 84,400 ha for grassland. Reforestation on waste land and barren hills to support CCFP covered an area of 1.6417 million ha, and newly enclosed mountain areas for forests was 247,300 ha, representing 11.85%, 10.39% and 9.22%, respectively of the national total of each category.

### 6.3.3 Delivery of CCFP subsidies was satisfactory, and the subsidies for about 10% of converted farmland expired

The policies of CCFP is centered on the delivery of subsidies which is of great importance in protecting the immediate interests of farmer households involved in CCFP and consolidating

<sup>3</sup> It is part of CCFP investment since 2007 when the Phase II CCFP launched. In Phase II, CCFP subsidy delivered to farmer households reduced half and the rest of it become the 'Consolidation CCFP Fund'. The Consolidation Fund was assigned to conduct tasks which was good to strengthen CCFP farmers as well as rural development capacities such as rural energy, basic cropland improvement, migration of extreme ecological fragile, CCFP farmers training, CCFP post industry, etc.

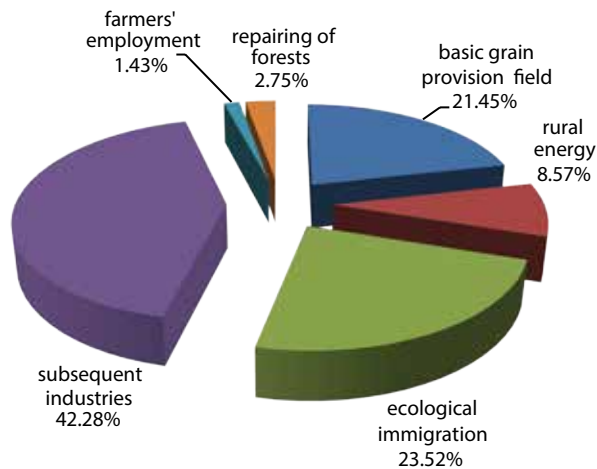


Figure 6.4 Allocation of consolidation fund for consolidating the outcome of conversion program in sample counties in 2012.

the outcomes of the program. According to the monitoring results of 2012, the delivery of subsidies was satisfactory thanks to the supervision of governments at different levels. We must work out the future strategy of CCFP because so far more than 70% of converted farmland is subsidized under the extended policy of CCFP, and the subsidies on 10% of converted land have expired.

In 2012, the area of converted farmland which received original CCFP subsidies and the extended subsidy was 237,900 ha and 862,800 ha, respectively, or 19.42% and 70.44% of the total converted farmland in sample counties. The subsidies of 124,200 ha of converted farmland have expired, or 10.14% of the total converted farmland. All the converted farmland in Tianquan of Sichuan, Yiliang and Shangri-La of Yunnan, has entered an extended subsidy phase. In Sichuan Province, the converted farmland is in ethnic minority counties where subsidies have expired, and the original subsidy standard is used to increase farmers' benefits. In 2012, the area of converted land under original subsidies, under extended subsidies and in the expiration phase of subsidies

accounted for 9.06%, 72.26% and 18.68% of the total converted land, respectively. There were 47 households whose subsidies on all converted land have expired, which was 4.07% of the total number of monitored households.

The household questionnaire revealed that 94.83% of sample households used an 'all-in-one card' to withdraw the subsidies, and 96.77% of sample households confirmed that they had received the full amount of subsidies. The fulfillment rate of subsidies at household level was 96.50%; extended subsidies were fulfilled by over 100%, as sample households in minority regions in Sichuan Province still received the original subsidies in the extension phase. The fulfillment rate in the Yangtze River Basin was 97.82%, and that of the Yellow River Basin was 95.19%.

#### 6.3.4 Consolidation of CCFP tasks has developed and ecological immigration and rural energy became the priorities

In 2012, the consolidation of CCFP tasks has developed and the priorities became ecological immigration and rural energy. In the meantime, rural water conservancy was strengthened and more new projects were introduced. The consolidation of CCFP tasks has significantly expanded the coverage of projects among rural households.

In 2012, among the 119 sample villages, 70 villages were involved in consolidation of CCFP tasks, or 58.82% of the total number of sample villages, and 13 villages more than that in 2011. Within the sample villages, the number of households involved in consolidation of CCFP tasks was 9844 cumulatively, 1034 households more than that of 2011, and the proportion of participating households increased to 32.66%. The Northwest CCFP Survey showed that the coverage of consolidation CCFP tasks was 31.19%.

A total of 68.81% of households believed that consolidation of CCFP tasks was helpful for the

participating households. The majority (71.66%) of households indicated that they knew the procedure of task allocation in consolidation of CCFP tasks, and 70.99% believed it was done in an equitable way.

#### **a. The scale of basic farmland construction was expanded.**

In 2012, the scale of basic farmland construction in sample counties was expanded, and the newly constructed farmland and rural water conservancy was concentrated in the northwest and southwest regions.

In 2012, 90,800 ha of basic farmland construction were finished in sample counties, 33,200 ha more than that of 2011, or an increase of 57.55%. Among which, 52,200 ha was newly developed and 33,600 ha was improved, which was 102.85% and 14.15% more than that of 2011, respectively. Within the improved farmland, 17,800 ha was equipped with rural conservancy, which was 207.15% more than that of 2011, while the areas of land which had converting from slopes to terraces, or the land receiving soil improvement measures were less than that of 2011. Among the 119 sample villages in 2012, there were five villages which finished the basic farmland construction in an area of 4830 mu, in which 3732 mu was newly developed, 1098 mu was rebuilt or improved, with the overall construction scale at less than half of that of 2011.

#### **b. Rural energy construction was accelerated**

In 2012, the activities of the consolidation of CCFP tasks relating to rural energy were continuously adjusted according to local situations, and the construction of biogas tanks, fuelwood saving stoves and solar power was scaled up. New energy activities, such as energy saving ovens, biomass stoves and straw gasification were promoted. Due to the high cost, solar power, which was initially welcomed by farmer households involved in CCFP, didn't develop very quickly.

In 2012, 65,409 biogas tanks, 48865 solar power sets, 15 small hydro facilities, and 176,400, fuelwood saving stoves were constructed, and 5897.43 ha of fuelwood forests were planted, with growth ratios of 165.18%, 12.14%, -89.93%, 242.48% and -31.79%, respectively compared with that of 2011- among which the number of fuelwood saving stoves experienced the fastest increase. In addition, the consolidation of CCFP tasks helped to promote new types of rural energy activities, e.g. 3266 sets of energy saving ovens were constructed in Huan County in Gansu Province in 2012.

Since the beginning of rural energy consolidation of CCFP tasks in 2008, 201,500 biogas tanks, 209,200 sets of solar power appliances, 984 small hydro facilities, 411,500 fuelwood saving stoves were constructed and 40,100 ha of fuelwood forests were planted.

In 2012, the scale of construction scale was expanded, and the new achievements included 2450 biogas tanks, 1572 solar power facilities, 242 small hydro stations, 5090 fuelwood saving (biomass) stoves, and an area of 4169 mu of fuelwood forests. Since the start of the consolidation of CCFP tasks in 2008 to consolidate CCFP, in the 119 sample villages, 6910 biogas tanks, 4692 sets of solar power, 6936 fuelwood saving stoves and 31 small hydro stations have been constructed, and an area of 26,384 mu of fuelwood forests have been planted.

According to sample household questionnaires, in 2012, newly equipped facilities included 23 solar power stoves and 32 sets of solar power; and sample households, owned 248 biogas tanks, 294 fuelwood saving stove, 138 solar power stoves and 32 solar power facilities, with possession rates of 21.45%, 25.43%, 11.94% and 19.29%, respectively. The number of people who owned solar power stoves and facilities increased compared with that of 2011, but the overall rate is low. In addition,

three sample households living in Anding District in Gansu Province installed straw gasification equipment, and 218 biomass stoves were built in Wanzi Village of Ping'an County in Qinghai as part of the consolidation of CCFP tasks.

#### **c. The ecological immigration advanced rapidly**

In 2012, the consolidation of CCFP tasks helped 27,600 persons immigrate for ecological reasons, 10,900 persons more than in 2011, or an increase of 65.25%; the number of farmers participating in technical training was 116,000, 32,800 persons less than in 2011, or a decrease of 22.01%. Since 2008, the cumulative number of ecological immigration in sample counties was 125,200, and 676,900 farmers received technical training.

In sample villages, ecological immigration and technical training for employment grew substantially. In 2012, 2468 persons immigrated from sample villages to other places for ecological reasons, which was 1041 persons more than that in 2011, with a growth rate of 72.95%; 7362 farmers received technical training, 2897 persons more than that of 2011, at a growth rate of 64.88%. Since 2008, cumulatively 5185 persons have immigrated to other places from sample villages for ecological reasons, or 2.69% of the total population of sample villages in 2012; 13,455 farmers have received training, or 19.87% of the total labor force in sample villages.

#### **d. Replanting of plantations decreased**

In 2012, 70,400 ha of plantation replanted was completed in sample counties, 37.24% less than that of 2011, in which 68,000 ha of replanting individual trees, declined by 34.8%. Since 2008, 498,900 ha of converted forest plantation were replanted under the consolidation of CCFP tasks, or approximately 18% of the total afforested (afforestation on both converted land and wasteland or barren hills) areas.

In the 119 sample villages, 17,800 mu of plantation on converted farmland has been replanted, 5057.16 mu more than that of 2011, or an increase of 39.70%, in which 15,000 mu was replanted with individual tree plants, which was 3951.96 mu more than that of 2011. Since 2008, a total of 59,000 mu has been replanted in sample villages, 22.69% of the total converted land area in sample villages, or 260,000 mu.

As reflected by the household level monitoring, more effort was put into repairing plantations. In 2012, sample households completed repair for an area of 1838.6 mu with 65476.2 plants (including grass), at a cost of CNY 23,577.3, 51.06%, a -19.04% and 30.39% increase compared with that of 2011. Average number of plants replanted (including grass) per mu was 36 at an average cost of CNY 12.

#### **e. Structure of subsequent industries was adjusted**

Due to the considerable reduction in the fruit growing area in 2012, other industries in sample counties scaled down, while industrial material plantations, Chinese medicine and oil tea plantations showed rapid growth. In sample counties in 2012, 132,700 ha of plantation, fruits and tea plantations and farming was completed, which was 27,500 ha less than that of 2011, with a decrease of 17.18%. The top three industries with the biggest area were: Chinese medicine (25,700 ha), dry or fresh fruits (25,200 ha) and industrial materials plantations (13,700 ha) (Figure 6.5). Since 2008, the cumulative area of subsequent industries completed in sample counties has been 575,600 ha, covering plantations, fruits, tea and farm planting.

Animal husbandry industries in sample villages expanded rapidly in 2012, while the area of fruit planting decreased. In 2012, the total area of subsequent industries of plantation, fruits, tea

and farm planting was 21,500 mu (15 mu =1ha), which was 2459.09 mu less than that of 2011, with a decrease rate of 10.28%. The planting area of tea, bamboo and oil tea increased while the area of Chinese medicine and industrial materials decreased. In sample villages, the cumulative completion area of industries for plantations, fruits and farming was 75,000 mu from 2008 to 2012, and the top three were: tea, vegetables and industrial materials plantations.

In 2012, husbandry developed rapidly in sample villages. The number of poultry raised in sample villages was 270,400, and the number of livestock (cattle) was 53,100, 76.88% and 98.08% higher than that of 2011. A total of 70,000 mu of animal housing were built, which was 13.44% more than that of 2011. From 2008 to 2012, cumulatively 589,200 poultry and 120,100 livestock were raised in sample villages, and 245,200 mu of animal housing were built.

### 6.3.5 Management of converted land was significantly strengthened

Strengthening the management of forests on converted land is a high priority of CCFP at this stage and in the next phase. The monitoring results of 2012 showed that the management of converted land was greatly improved and was largely driven by verification and inspection during program implementation. However, due to factors such as policies, management mechanisms and shortage of labor, there was not much change in the situation of low priority for ecological forests and high priority for economic forests.

The survey conducted by the Sha'anxi Agro-forest University showed that the improved management of converted land was driven by verification and inspection during program implementation. However, restricting factors such as policies, management mechanisms and shortage of labor remained unchanged. Among the 1321 surveyed

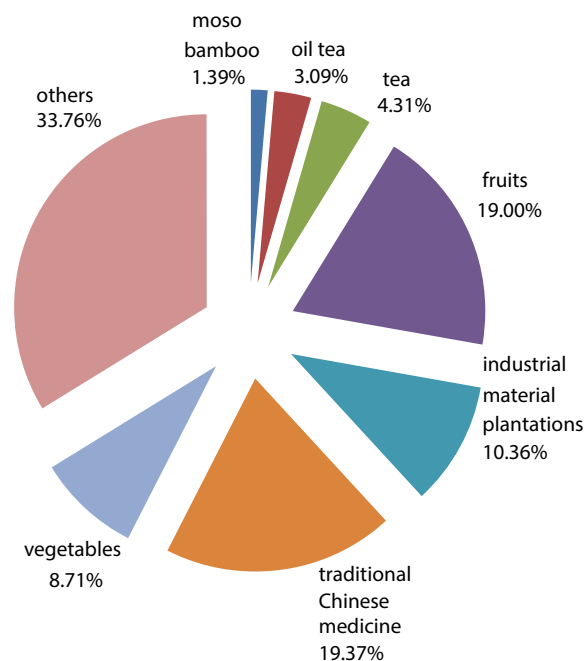


Figure 6.5 Subsequent industries in sample counties.

households, 86.00% said that they were responsible for maintenance and management of the converted land and forests on them; 84.86% pointed out that they managed forests on converted land; 27.48% households reported illegal logging cases; 45.42% households thought livestock animals could damage the forests on converted land in their villages. About 20% of forests on converted land had been completely neglected, and 8.40% of surveyed households had transferred the converted land to other people to manage.

In 2012, the situation of prioritizing economic forest and putting less effort into managing ecological forests remained unchanged. The majority (93.69%) of sample households said they managed the forest on converted land by cutting twigs, clearing weeds, loosening soil, repairing the plantation, collecting fruits and logging. A total of 42.93% of households said that the land was managed by old people or women in the family

and 28.70% of households didn't think it was necessary to manage the converted land. A total of 60.68% of people believed that management of converted land by individual family members was desirable, and 76.01% of households knew that some villagers had leased their converted land to other people to manage.

In 2012, 297 households invested in their converted land, six households more than that of 2011, and accounted for 25.69% of the total number of sample households. The total investment was CNY 388,000, CNY 73,000 more than that of 2011. The households who invested in converted land were those converted farmland to economic forests and the products sold well in the market.

## 6.4 Early warning and prediction of policies

As the extension of CCFP is carried out, the comparative advantages of CCFP subsidies are diminishing and have affected farmers' forest management practice and their expectations with regard to benefits. Early warning indicators, such as areas reconverted to farmland, are presenting us with the need to develop follow-up policies.

### 6.4.1 Are comparative advantages of CCFP subsidies diminishing?

**a. Compared with the direct agricultural subsidy, CCFP subsidies at county level has no advantages and the incentive effects is even less**

In 2012, the total agricultural subsidies (direct subsidy on grain, subsidy on seeds, subsidy on machinery, and comprehensive subsidy) in sample counties reached CNY 5.639 billion, 25.68% more than in 2011. In the same year, the subsidies of CCFP (fund converted from grain inputs and living costs) were CNY 1.702 billion, or 5.55% more than in 2011. The agricultural subsidy was as much as 3.31 times of CCFP subsidies in 2012. On

the contrary, in 2007 before the extension subsidy was provided, CCFP subsidies were as much as 1.54 times of the direct agricultural subsidies. As discovered in sample counties, the investment in direct agricultural subsidies has surpassed CCFP subsidies, both in the amount and in the growth rate. Therefore CCFP subsidies demonstrate no advantages compared with agricultural subsidies, and the incentive effect is reducing (figure 6.6).

**b. Household level CCFP subsidies have advantages compared with direct agricultural subsidies, but the gap narrowing**

As reflected by the sample household survey, household level CCFP subsidies have some advantages compared with direct agricultural subsidies. In 2012, sample households received a total of CNY 1.4692 million of program subsidies, and that of the four types of direct agricultural subsidies was CNY 615100, with CCFP subsidies being as much as 2.39 times of the latter. At unit area level, CCFP subsidies per mu was CNY 104.38, and that of direct agricultural subsidies was CNY 52.14, with the former being as much as twice of the latter (Table 6.1).

According to the household questionnaire, 77.41% of households believed that CCFP subsidies were important for their livelihoods, while 22.59% didn't rate them as being as important as before.

**c. Agricultural subsidies of some households exceeded the program subsidies they received**

In 2012, there were 277 sample households whose agricultural subsidies were more than CCFP subsidies, or 23.94% of the total number of sample households. Most of these households were from the major grain production areas where agricultural subsidies are high and the second round of CCFP subsidies have phased out. Geographically, most of these households are distributed in the northeast and central area of China.

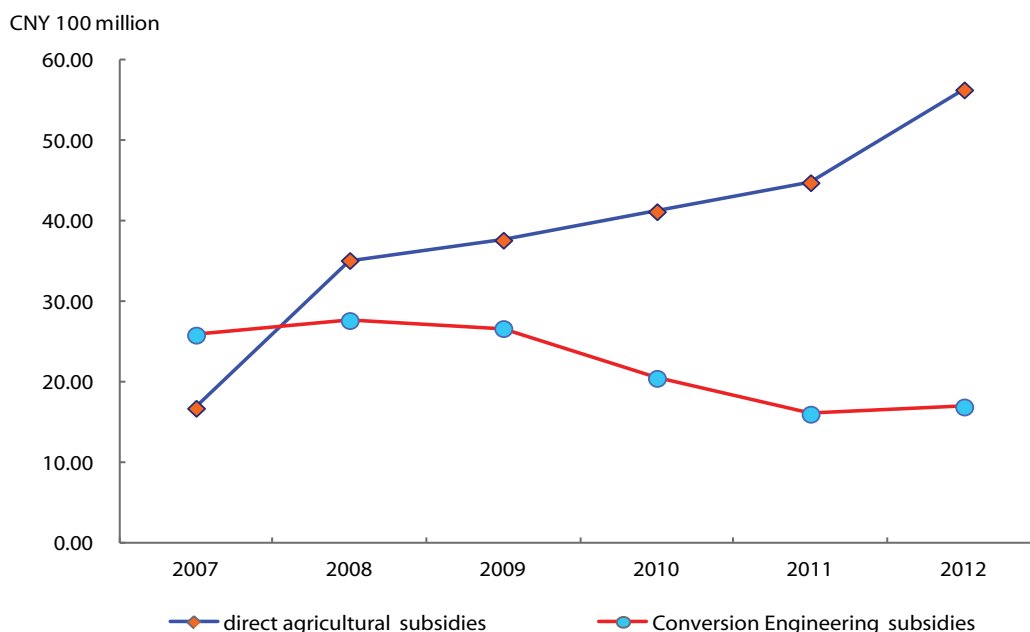


Figure 6.6 Comparison of Direct Agricultural Subsidies and the Conversion Engineering Subsidies

#### 6.4.2. How about the survival of trees?

If the forests planted on converted land survived at this moment when the first round of CCFP subsidies are going to completely phase out in 2015? What about the survival and maintenance status? These are critical indicators of the consolidation of program outputs. As revealed by the 2013 Northwest CCFP Survey, among the 1762 interviewed households, forests owned by 714 households remained 90% or above alive; survival rate of forests owned by 686 households was 70%–90%; and survival rate for 260 households was 40–70%, 10–40% for 69 households; 10% or below survival rate was found in the forests owned by 33 households. According to the survival rate categories, the households which fell into each category was: 40.52%, 38.93%, 14.76%, 3.92% and 1.87%, respectively; less than 8% households didn't ensure a reasonable survival rate of the forests on their converted land.

This finding is very close to the results of the 10-year evaluation of CCFP,<sup>4</sup> which proved once again that most of forests planted on converted farmland have been well maintained more than 10 years after CCFP was implemented.

Econometrical analysis of the 10-year evaluation of CCFP policies shows that the contribution of factors including household economic conditions, features of the converted farmland, fulfillment of subsidy policies and its share in household income, as well the management of converted farmland have significantly affected the survival rate of forests—forest of households with good economic conditions ensure a high survival rate, while

<sup>4</sup> In 2010, the monitoring group of Conversion Program in the socioeconomic benefits monitoring of major forestry program and Beijing Forestry University jointly carried out a household questionnaire survey of the 10-year evaluation of policies of converting farmland to forests. The results of the above forest survival rates among interviewed households were 39.63%, 39.87%, 15.08%, 3.76% and 1.66%.

Table 6.1 Comparison between CCFP subsidies and direct agricultural subsidies received by sample households.

Year	Program subsidies per household (CNY)	Agricultural subsidies per household (CNY)	Program subsidies per mu (CNY)	Agricultural subsidies per mu (CNY)	% of program subsidies in household net income	% of agricultural subsidies in household net income
2006	2188	63.61	176.05	7.19	16.30	0.48
2007	2274	203.54	180.08	21.35	13.78	1.58
2008	2109	321.47	167.30	34.74	10.53	1.61
2009	1988	425.00	159.40	42.74	9.14	1.97
2010	1629	470.00	134.70	47.87	5.68	1.60
2011	1450	475.88	117.24	47.93	4.99	1.64
2012	1270	531.66	104.38	52.14	2.85	1.20
% of growth from 2011 to 2012	-12.41	11.72	-10.97	8.78		

forests from households with scattered and remote converted land don't survive to a satisfactory degree. In addition, the higher the proportion of CCFP subsidies is in the total household income, the higher the survival rate of converted forests, which indicates that households receiving higher program subsidies attach more importance to forest management.

Information publicity and verification of CCFP progress were varied, inferring that policy fulfillment of and management of the program are imperative to the consolidation of program outcomes. Harvest of the converted farmland is a positively significant variable, indicating that households would be more careful about forest management if they can get harvests. On the contrary, survival rate of replanted trees was low, which shows that the replanting of forests was forced due to low survival rates; it also indicates the program needs to be implemented on suitable land (Table 6.2).

### 6.4.3 Have the households who have converted all farmland to forests developed alternative livelihoods?

Among sample households, there are 40 households whose farmland has all been converted into forests,<sup>5</sup> and they are from Zigui of Hubei Province, Zizhong of Sichuan Province, Yuzhong and Kang County of Gansu Province. In 2012, the total population of these households was 174 with 91 having a labor force. The dependent ratio was 1.91. There were 55 migration workers, making up 60.44% of the total labor force. In the same year, the per capita net income of these households was CNY 17,176.18, which came from mainly three sources. The first source of income was from family-run businesses such as tea and fruit growing, silkworm rearing and pig raising on converted land, which was 59.59% of their total income. With the exception of medicinal plants produced in Kang County, income from all other fruit and tea were generated on converted land, and so the outputs of converted land became the most

<sup>5</sup> Those whose cultivated land has all been converted to forests and do not have any grain production.



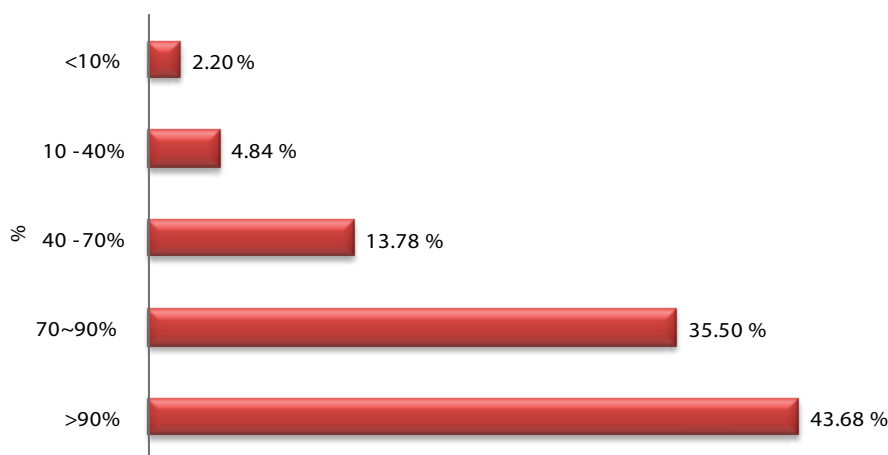


Figure 6.7 Forest survival rate.

Table 6.2 Econometrical analysis of forest survival of CCFP.

Explanatory variable	Coefficient	Std. Error	z-Statistic	Probability
Household economic conditions	0.251477	0.089607	2.806450	0.0050
No. of pieces of converted land	-0.072760	0.016443	-4.424985	0.0000
Distance of converted land	-0.063624	0.007130	-8.923278	0.0000
Proportion of program subsidies in household income	0.016384	0.002721	6.020509	0.0000
Publicity of program information	-0.274946	0.094283	-2.916181	0.0035
If verified	0.436464	0.077016	5.667187	0.0000
Harvest of converted land	0.594112	0.095110	6.246603	0.0000
Replanting and repairing	-0.467760	0.112626	-4.153220	0.0000

Note: Sample size was 2120. Multi-factor Ordered Logit was adopted and 1% of significance level.

important income source for such households. The second source of income was wages and migration income, which was 30.94% of the total income of these households. The third source was transference income including program subsidies, 4.43% of total income, and program subsidies which accounted for 0.42% of net income.

From the above analysis of the livelihoods of households whose farmland have been converted to forests completely it is clear that:

- most of these households have secured income sources;
- most of these households still depend on farming, husbandry and forestry and the converted land has become their main alternative income source;

- program subsidies' contribution to such households' income has become fairly low and they could survive without too much difficulties without program subsidies.

#### 6.4.4 How about the households whose second round subsidy has expired?

What happens to households' livelihoods when there are no program subsidies? With more and more households whose second round subsidies have expired, we'll keep tracking and monitoring the livelihoods of these households.

In 2012, there were 43 sample households whose second round subsidies had expired (hereafter referred to as expiration households), and they were located in Bin County of Sha'anxi Province,

Zihong of Sichuan Province, Yuzhong of Gansu Province, Shangzhi of Heilongjiang Province, and Yaozhou of Sha'anxi Province. Subsidies to these households started to expire in 2009 or later, and the average subsidy per household before the expiration date was CNY 762. In 2012, the total number of expiration households was 194, with 112 labor force; the dependent ratio was 1.73; and there were 56 migration workers, half of the total labor force. In 2012, the per capita net income of expiration households was CNY 11,340.82, which was higher than that of sample households. Income from forestry, including dry and fresh fruits, accounted for 59.75% of the per capita net income of expiration households, and migration income accounted for 18.67%.

From the economic point of view, although there is no further CCFP subsidy, the income of the expiration households didn't show any dramatic changes. On the contrary, their income level remained fairly high because of fruit production on their converted land. It can be concluded that so far, the livelihoods of expiration households remains good and have not been affected by reducing program subsidies. However it's hard to tell the future livelihoods of households involved in CCFP as the subsidies on ecological forests are due to expire. Therefore we'll keep the livelihoods of expiration households under our tracking and monitoring system.

#### 6.4.5 Is the phenomenon of farming on converted forest land serious?

As estimated by the Office of CCFP of the State Forestry Administration, the farming area was 3800 ha from 2008 to 2011, and there showed an increasing trend over time. From the sample household monitoring, grain output was reported by some households whose land had all been converted to forests. The monitoring of sample villages found that 23 households farmed on converted land, 1 household more than that of 2011; and there was 614 mu of newly claimed land in 7 villages. It was predicted by the sample villages that there could be 4095 households facing livelihoods difficulties after program subsidies expired, or 13.58% of the total number of households participating in CCFP in sample villages. According to the sample household questionnaire, only 1.32% of households indicated that they would log forests on converted land and grow grains again. The results of the Northwest CCFP Survey found that the farming rate could have been as high as 25.66% if there had been no program subsidies.

Although there have been just a few individual cases of farming on converted land because of the rigorous management and rules of checking and acceptance, the pressure of farming could become higher when the second round of CCFP subsidies phases out later.

Table 6.3 Econometrical analysis of factors relevant to farming.

Explanatory variables	Coefficient	Std. Error	z-Statistic	Probability
Ethnic minority	0.533690	0.133533	3.996705	0.0001
Distance of converted land	-0.010021	0.004079	-2.456408	0.0140
Converted land registration	0.270251	0.083326	3.243283	0.0012
Receipts of program subsidies in full amount	-0.169737	0.080393	-2.111332	0.0347
Occurrence of farming in villages	0.993027	0.047496	20.90743	0.0000
Land reclamation	0.692172	0.207801	3.330933	0.0009

Note: Sample size was 2120. Multi-factor Ordered Logit was adopted and 1% of significance level.

The econometric analysis of the 10-year evaluation of CCFP policies shows (Table 6.3) that ethnic minority households and the households who hadn't received the full amount of subsidies that the government committed tend to farm on converted land; converted land close to family houses and registered land is prone to being farmed; households with newly claimed land tend to farm as their demand for farmland is higher; and households located in the villages where farming has occurred are more likely to farm their converted land.

## 6.5 Achievements of CCFP

After ten years of construction, forest resources in CCFP area is growing steadily, and the ecological benefits of the program are becoming more and more significant. In the meantime, rural economic structure is experiencing dramatic changes and the livelihoods of households participating in CCFP has continuously being strengthened.

### 6.5.1 Forest resources is growing and the capability of sustainable development is enhancing

Driven by the forestry development targets of double-growth, in 2012, the total afforested area in sample counties was 480,700 ha, which was 54,400 ha more than that of 2011, at a growth of 12.76% (table 6.4); in which man-made forests made up 74.66%, an area of 358,900 ha. In 2012, the afforestation on converted land (on wasteland and barren hills and enclosed mountains for forests) covered an area of 43,000 ha, or 8.95% of the total afforestation area in sample counties.

In 2012, the total forest area in sample counties was 10.1412 million ha, an 17.80% increase on than that of 1998; the woodland for forestry was 17.4826 million ha, 16.08% more than that of 1998; the average forest coverage was 32.52%,

7.34 percentage points higher than that of 1998 and the growth rate was 25.18%.

### a. The farm areas affected by natural disasters went down

In 2012, the farm areas affected by natural disasters in sample counties was 1.1697 million ha, 45.45% lower than that of 2011; the area affected by droughts was 514,300 ha, affected by floods was 292,000 ha, 52.58% and 7.83% lower than that of 2011 respectively (Figure 6.8). Compared with the annual average areas affected by natural disasters in 1998, which was 1.8987 million ha, the disaster affected farm area in 2012 was 729,000 ha smaller, or representing a decrease of 38.39%.

### b. The area of effective irrigation increased dramatically

In 2012, the effective irrigation area in sample counties was 1.8327 million ha, 83,600 ha more than that of 2011, at a growth rate of 4.78%. Compared with 2006 before the implementation of extension policies, the area of effective irrigation increased by 597,300 ha, at a growth rate of 48.34%. The proportion of effective irrigation in the total grain sowing area reached 34.59% in 2012, and increased by 12.04 points compared with that of 2006, the proportion of which was 22.55%.

### 6.5.2 Both total grain output and grain yield increased, and basic grain provision of households participating in CCFP was guaranteed.

The core objective of the extension policies was to secure a supply of basic grain rations for the households participating in the program. In 2012, driven by the construction of basic grain land and the subsequent industries, grain sowing area in sample counties increased dramatically and achieved an increase in both grain outputs and grain yield, which further guaranteed the supply of grain provision for households.

Table 6.4 Forest area converted from farmland and its proportion in the total afforestation area in sample counties.

Year	Afforestation area (10,000 ha)	Afforestation area on converted farmland (10,000 ha)	Proportion of afforestation on converted farmland in the total afforestation area (%)
1999	36.75	6.76	18.39
2000	50.06	12.09	24.15
2001	52.50	10.80	20.57
2002	67.31	25.11	37.31
2003	84.79	37.51	44.24
2004	53.13	12.46	23.45
2005	48.62	10.26	21.10
2006	18.51	3.18	17.18
2007	26.29	8.78	33.40
2008	28.01	8.27	29.53
2009	33.79	5.64	16.69
2010	35.44	5.54	15.63
2011	42.63	4.52	10.60
2012	48.07	4.30	8.95
Changes in 2012 compared with that of 2011	12.76	-4.87	

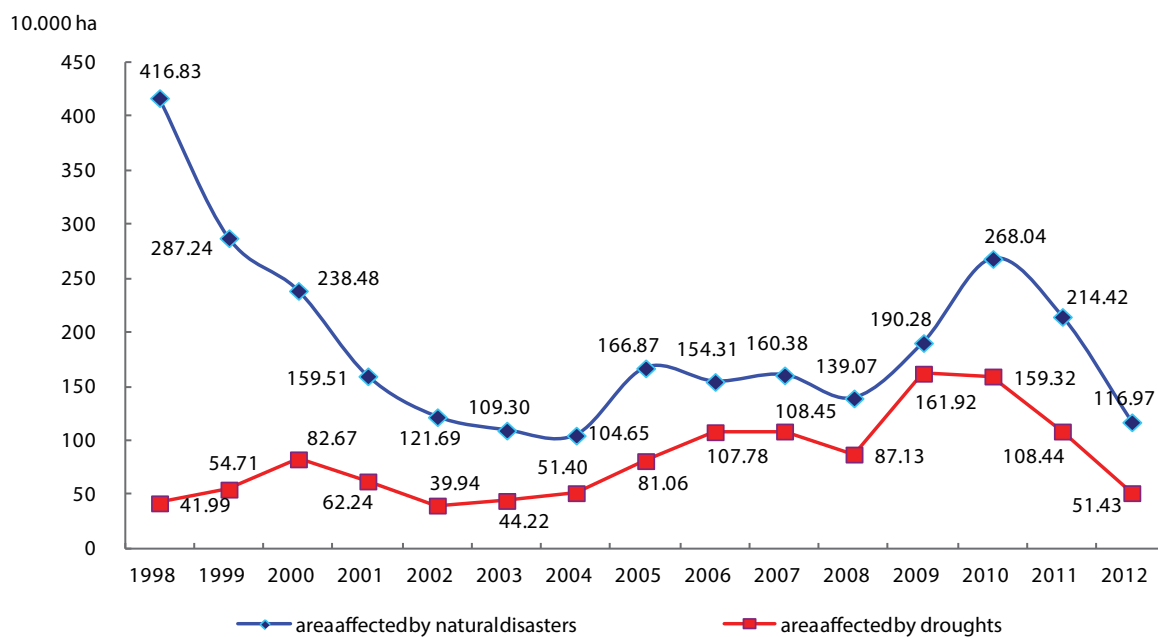


Figure 6.8 Variation trend of crop area affected by natural disasters in sample counties.

**a. Productivity of cultivated land was enhanced with an increase in total grain outputs and grain yield**

In 2012, boosted by the continuous driving force of direct grain subsidies and the construction of basic grain ration farmland, the total grain output and grain yield in sample counties grew, which indicated that the productivity of farmland in CCFP areas was enhanced and food security in program areas has been achieved.

In 2012, the total grain output of sample counties was 23.735 million tonnes, 1.0271 million tonnes more than that of 2011, at a growth of 4.52%. The total output in sample counties increased by 4.6118 million tonnes, with a growth rate of 24.12%, compared with that of 1998 before the program started. In 2012, the total grain production of sample households was 631,300 jin (1 jin = 0.5 kg), 100,000 jin more than that of 2011, at an increase of 18.82%.

Along with the increase of total grain output, the grain yield in program areas has gained steady growth. In 2012, the grain yield in sample counties was 597.58 jin/mu, higher than that of multiyear average grain yield in sample counties (593.51 jin/mu). The grain yield of sample households was 773.17 jin/mu (1 mu = 1/15 of ha), which the highest after the program started.

**b. Sowing area increased and grain provision on farmland was secured.**

According to State Council policies, in order to achieve food security for households involved in the program, the area of high yield basic grain provision farmland managed by a household in the southwest of China should not be lower than 0.5 mu, if necessary conditions are met, and in the northwest of China the lowest threshold is 2 mu.

In 2012, the per capita cultivated land of sample households was 2.23 mu, which was 0.03 mu

larger than that of 2011. In the southwest of China, the per capita cultivated land was 0.96 mu, and in the northwest, it was 3.43 mu. The possession of cultivated land among sample households was higher than the requirements of the program extension policy, but the per capita area of cultivated land in the southwest decreased from that of 2011. In 2012, the per capita grain output of sample households was 1193 jin, 181 jin more than that of 2011. Since 2003, the per capita cultivated and food availability among sample households have been growing steadily (Figure 6.10), and the household grain provisions have been guaranteed as stable.

**6.5.3. The rate of new energy adoption increased, but the dependence on fuelwood in forest-rich areas remained high.**

Along with the implementation of consolidation of CCFP tasks, significant improvements were made in fuelwood provision for sample households. According to the 2012 monitoring results, the coverage of new energy such as coal, electricity, biogas and solar power, increased steadily. Fuelwood was the major rural energy source in forest-rich areas except in coal-production areas.

In 2012, the number of sample households owning biogas, fuelwood saving stoves, solar power stoves and solar power water heaters were 20.50%, 29.40%, 10.85% and 11.24%, respectively, or an average of 18.00%. The demand for solar power water heaters was the highest, with a gap in supply of 72.17%, while the demand for fuelwood saving stoves was the lowest. The number of available fuelwood saving stoves exceeded the needs, except for a small number of sample villages.

In 2012, there were 627 households whose main energy source was fuelwood, or 54.19% of the total number of sample households. Among them, 460 households relied on fuelwood only, or 39.76% of the total sample. 250 households were mainly

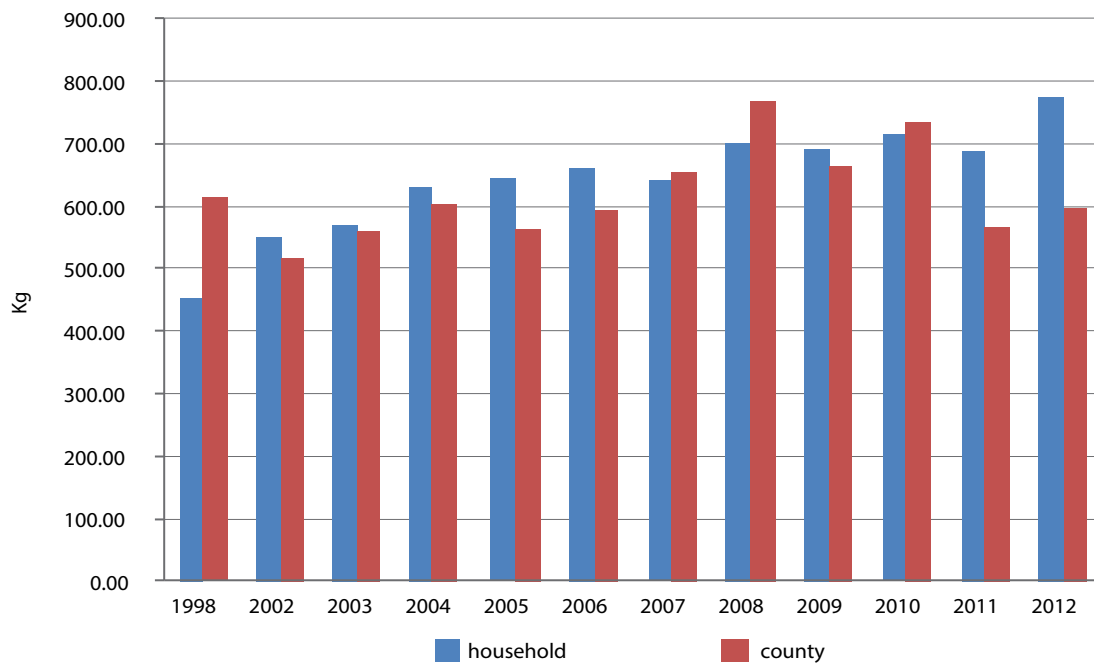


Figure 6.9 Changes in grain yield in sample counties and sample households.

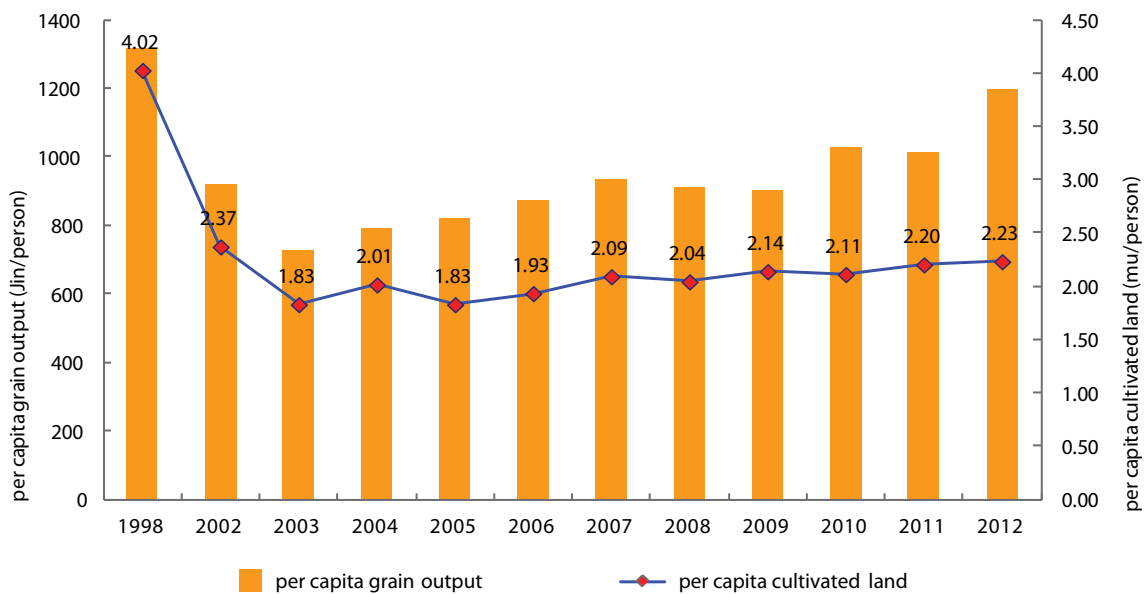


Figure 6.10 Per capita cultivated land and grain output of sample households.

dependent on coal, or 21.61% of the total sample. There were many households who used a number of energy sources including fuelwood, coal and electricity. In 2012, there were 23 sets of newly installed solar power stoves and 32 solar power facilities in sample households. The total number of biogas tanks owned by sample households was 248, and there were 294 fuelwood saving stoves, 138 solar power stoves, 223 solar power facilities, or possession rates of 21.45%, 25.43%, 11.94% and 19.29%, respectively. The possession rate of solar power stoves and solar power facilities were higher than that of 2011, but the overall rate was still low. In addition, straw gasification equipment was installed in three sample households.

#### **6.5.4. Household incomes increased and the contribution from forestry to household incomes was significant**

CCFP has helped to change land-use structure in rural areas and adjust labor force allocation, as well as increase the forestry area. There has been a significant increase in household income from forestry. In 2012, the income from farming, husbandry, forestry and sideline industry in sample households was CNY 10988, CNY 6095, CNY 5215 and CNY 5706, respectively, or a rate of 9.05%, -13.62%, 10.39% and 9.50%, respectively. The proportion of farming kept declining while the importance of forestry kept growing. In 2012, the proportion of farming, husbandry, forestry and sideline industry incomes as a proportion of the total family income were 26.40%, 14.64%, 12.53% and 13.71% in sample households. Compared with that of 1998 before the start of CCFP, the proportion of farming decreased by 36.36 percentage points, and the proportion of husbandry, forestry and industry increased by -1.30 points, 10.39 points and 9.50 points, respectively.

The incomes of households participating CCFP subsidies were the main income source for these

households, its contribution to household income decreased over time. In 2012, the per capita net income of sample households was CNY 7350, or 15.73% higher than that of 2011. Up to 2012, the average cumulative program subsidies received by a sample household was CNY 20,400, and in 2012 the program subsidies was CNY 1254 per sample household, with a share in per capita net income decreasing by 3.65% (Figure 6.11).

#### **6.5.5 The scale of migration kept growing while the rate slowed.**

Driven by both the urbanization process and the policy of converting farmland to forests, the rural labor force in CCFP areas continued to migrate, but the speed of migration started to slow down. In 2012, the number of migration workers in sample counties was 9.59 million, 30.800 persons less than that of 2011, with a growth rate of 0.32%. In 2012, migration workers were 25.65% of the rural population, representing 44.91% of rural employment. The migration workers in the counties of the Yangtze River Basin experienced fast growth while migrant works negative growth in the counties of the Yellow River Basin for the first time. The increase in migration rates in the counties of the Yangtze River Basin was 1.27% compared with the number of migration workers in 2011; the figure in the counties of the Yellow River basin showed a decline of 9.45%. The overall increase of migration in sample counties was 229.53% compared with that of 1998 before the start of CCFP, and the figure was 185.28% for the Yangtze River Basin and 310.00% for the Yellow River Basin (Table 3-6).

The number of laborers migrating to cities decreased for the first time since the implementation of CCFP, and this phenomenon occurred in the sample counties of the Yellow River Basin and the Yangtze River Basin, which indicated the onset of labor force shortage in program areas. Compared with 2011, the migrant labor force in sample

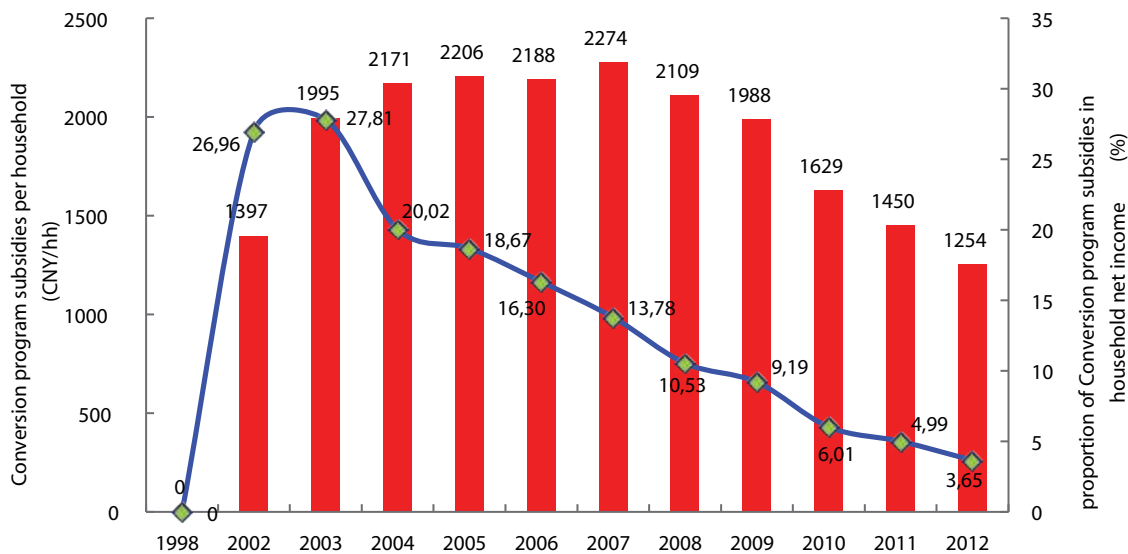


Figure 6.11 Changes in average conversion program subsidies and its proportion in household net income of sample households.

households decreased by 1.98% in 2012; the reduction in the Yangtze River Basin was 1.10%, and that in the Yellow River Basin was 3.19%.

### 6.5.6 Rural economy maintained growth but the land-use pattern changed dramatically.

Boosted by agricultural modernization and the construction of subsequent industries of CCFP, the rural economy in sample counties grew rapidly with the forestry economy growing at a speed twice that of agriculture. Under the triple interaction of collectively-owned forest tenure reform, urbanization and direct grain subsidy policy, land-use patterns in CCFP areas changed dramatically, and the growth in both household forest land and cultivated land area was maintained.

#### a. The forestry economy outgrew the agricultural economy, although the latter developed rapidly.

In 2012, the total output value of agriculture, forestry, husbandry and fisheries in sample counties was CNY 284.984 billion, 13.94% more than that of 2011; in which the increase of output

value in farming, forestry, husbandry, fisheries of the above industries were: CNY 149.224 billion, CNY 19.147 billion, CNY 103.339 billion, CNY 6.535 billion and CNY 6.504 billion, respectively, and the growth rates compared with 2011 were 14.99%, 25.29%, 11.99%, 16.23% and 8.42%, respectively. Forestry had the biggest growth rate (Figure 6.12). In 2012, the share of agriculture in the total output value of agriculture, forestry, husbandry and fisheries was 52.36%, 0.10 points lower than that of 2011; the proportion of forestry was 6.11%, 0.61 points higher than that of 2011.

#### b. Under the triple interaction of collectively-owned forest tenure reform, urbanization and direct grain subsidy policy, the land-use patterns in CCFP areas changed dramatically.

Promoted by the collectively owned forest tenure reform, the forest land area of sample households increased rapidly. In 2012, the forest land area managed by sample households was 35,000 mu, a 4.76% increase from 2011. With the fast development of urbanization, in 2012, 236



Table 6.5 Average agricultural income and expenditure of sample households.

A. Income	1998 (CNY)	2011 (CNY)	2012 (CNY)	Up or down from 2011 to 2012 (%)
1. Income of farming	5,019	10,076	10,988	9.05
In which: grain crops	2,542	5,370	5,824	8.45
cash crops	2,477	4,706	5,164	9.73
2. Income from animal husbandry	1,275	7,056	6,095	-13.62
3. Income from forestry	316	4,724	5,215	10.39
4. Income from sideline industry	431	5,211	5,706	9.50
5. Labor income	956	9,829	10,717	9.03
6. Transfer income	0	2,743	2,904	5.87
In which: direct agricultural subsidies		475	532	12.00
CCFP subsidies		1,450	1,254	-13.52
Other transfer income		818	1,333	62.96
7. Property income		1,694	1,333	-21.31
<b>Total income</b>	<b>7,997</b>	<b>36,122</b>	41,625	15.23
<b>B. Productive expenditure</b>				
1. Expenditure on farming	1,610	2,530	2,939	16.17
2. Expenditure on animal husbandry	359	2,644	2,438	-7.79
3. Expenditure on forestry	36	687	558	-18.78
4. Expenditure on sideline industry		795	1,356	70.57
5. Other productive expenditure	17	417	532	27.58
<b>Total expenditure</b>	<b>2022</b>	<b>7074</b>	7823	10.59
C. Household net income	5974	29049	33802	16.36
D. Per capita net income	<b>1328</b>	<b>6351</b>	7350	15.73

households among sample households did not do any farming, representing 20.40% of the total sample; and the lease of cultivated land covered an area of 540.43 mu, or 4.71% of the total agricultural land managed by sample households. In the meantime, driven by the growing impact of direct grain subsidies, the total areas rented for farming by sample households was 2074.32 mu, equivalent to 18.09% of the total agricultural land managed by sample households. Under the triple

drives, the average cultivated land of 2012 in sample households was 9.91 mu, 0.40 mu larger than that in 2011; average forest land per household was 30.24 mu, 1.3 mu larger than that in 2011, so the trajectory of double-growth in cultivated land area and forest land area was maintained. On average, forest land area of sample households increased by more than seven times compared with 1998 prior to the start of CCFP. (Figure 6.13).

Table 6.6 Changes of rural labor force migration in sample counties.

Year	Sample counties (10,000 persons)			Sample households (persons)		
	Total	Yangtze River Basin	Yellow River Basin	total	Yangtze River Basin	Yellow River Basin
1998	291	231	60	470	288	182
1999	319	251	68	-	-	-
2000	369	291	78	-	-	-
2001	397	312	85	-	-	-
2002	462	359	103	683	440	242
2003	534	402	133	777	492	280
2004	581	434	147	877	532	348
2005	622	464	158	1027	626	417
2006	681	494	186	1095	658	445
2007	697	511	187	1230	753	486
2008	762	555	207	1234	722	522
2009	831	607	224	1312	708	604
2010	891	645	246	1340	750	590
2011	943	693	250	1413	818	595
2012	956	693	241	1385	809	576
Growth in 2012 compared with that of 2011 (%)	1.38	22.48	-9.45	-1.98	-1.10	-3.19
Growth in 2012 compared with that of 1998 (%)	228.29	209.63	299.75	194.68	180.90	216.48

### 6.5.7 Rural social security was strengthened and the social welfare in CCFP areas kept improving.

Enhancing the rural social security system is the fundamental social basis to consolidate the outcomes of CCFP. Promoted by government policies to aid agriculture and benefit farmers, in 2012, rural social security was strengthened in CCFP areas.

In 2012, the rapid growth of participation in social endowment insurance and rural cooperative medical insurance was maintained. The participation in social endowment insurance was 16.3483 million persons and 35.3344 million

people joined the cooperative medical insurance, which was 17.23% and 1.00% more than that of 2011, respectively. The proportion of population participating in the two systems in the total rural population of sample counties was 43.73% and 94.51%, respectively. In 2012, the participation of the above two systems in sample villages were 95,600 persons and 181,100 persons, respectively, or a growth rate of 77.07% and 0.03% compared with that of 2011. The proportion of participating farmers in the two systems in the total population of sample villages were 49.50% and 93.76%, respectively, which was 8.40 points and 2.88 points higher than that of 2011.

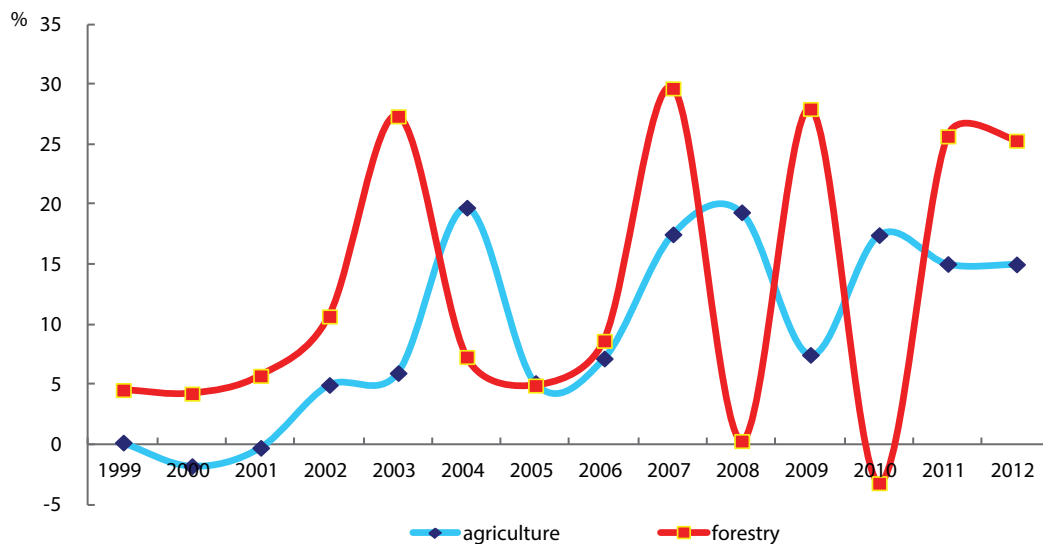


Figure 6.12 Relative ratio of agricultural and forestry industry growth in sample counties.

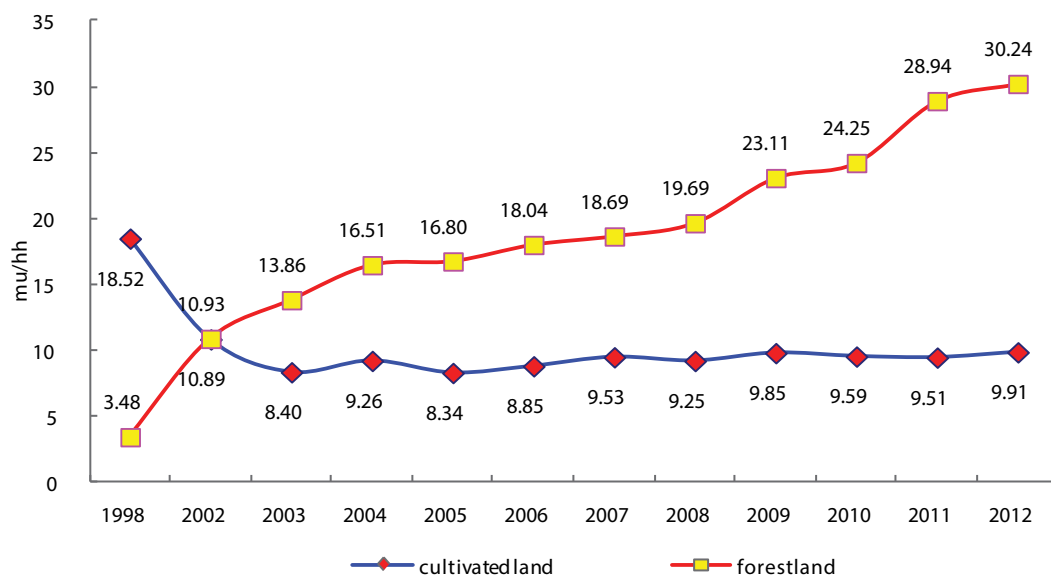


Figure 6.13 Changes of cultivated land and forest land per sample household.

## 6.6 Issues and policy needs

- a. The comparative benefits of CCFP subsidies are decreasing while the demand for economic forest development is growing strongly, and this could be detrimental to the success of the ecological objectives of CCFP.
- b. Ecologically significant regions in CCFP areas still suffer from poverty, which is hard to solve, and specific subsidy policies targeting these areas are urgently needed.
- c. CCFP areas are entering the peak phase of forest logging, so it is necessary to work out

Table 6.7 Status of rural social security in sample counties and villages.

Year	Participation in rural social endowment insurance in sample counties (10,000 persons)	Participation in rural cooperative medical insurance in sample counties (10,000 persons)	Participation in rural social endowment insurance in sample villages (persons)	Participation in rural cooperative medical insurance in sample village (persons)
2004	44.13	587.46		
2005	64.95	1,299.40		
2006	125.76	2,347.65	976	102,294
2007	159.62	3,103.05	1,697	132,948
2008	172.57	3,153.35	8,063	154,446
2009	333.38	3,350.31	14,470	161,075
2010	725.68	3,450.39	43,460	172,134
2011	1,384.65	3,492.74	78,405	173,361
2012	1,634.83	3,533.44		
Increase in 2012 compared with that of 2011 (%)	17.23	1.00	21.93	4.44
Share of participation in insurance systems in total population in 2012 (%)	43.73	94.51	49.50	93.76

measures and policies for regeneration, follow-up tending and management after logging so as to strengthen the management of forests on converted land.

- d. Consolidation of CCFP tasks should be done to strengthen the outcomes of CCFP. During field investigations, it was found that biogas tanks in many households had not been used. When asked for reasons, the farmers answered that local temperature were not high enough to operate it. The farmers reported that they could only use biogas from time to time and they didn't know how to solve the problem. The most popular energy sources were solar power stoves and solar power facilities. Due to their relatively high cost, solar power facilities have not been adopted as much as solar power stoves, which were widely used. The use of solar power stoves has decreased because they were installed years ago and require repair, or have reached the end of

their life. Farmers reported serious pests and diseases in recent years, which resulted in lower quality of forest products and its by-products. Farmers reiterated the importance of replanting and repairing of plantations and seed improvement because products of poor quality were not marketable.

- e. Ecological forests planted on converted land brought ecological benefits, but had unsatisfactory economic returns, hence farmers had little enthusiasm to carry out follow-up forest management. In addition, the quality of CCFP implementation in some areas was poor and the predicted returns became limited, so farmers' expectations were not fulfilled, which dampened their enthusiasm for forest management. Poor follow-up management has affected the growth of seedlings and caused low yield and low quality of forest products or by-products, and farmers' immediate profit has become

small. With the expiration of CCFP subsidies, farmer's incomes could not be sustained and the consolidation of CCFP outcomes will be affected.

## 6.7 Policy recommendations

### 6.7.1 Highlighting the priority on ecological benefits and making possible efforts to protect the outcome of CCFP

This is the critical time to consolidate the outcomes of CCFP. The ecological benefits of CCFP can be achieved but it will take a longer time for the forests to develop into steady ecosystems, and further strengthening of forest management is a priority. In order to protect the overall ecological security of China, partitioning strategies should be adopted in the new policy cycle. In ecological regions of significant importance, ecological objectives should be emphasized. In the meantime, in other program areas, farmers can be allowed to choose suitable economic forest species to replace or reform the ecological forests, under the guidance of the forestry department.

### 6.7.2. Focusing on resource-poor program areas of ecological importance and speeding up the inception of a new round of farmland conversion to forests

It is often the case that ecologically vulnerable areas, poor areas and hot spots of biodiversity are overlapped or highly correlated, hence it is possible to identify the key contents of new cycle policy of CCFP only if the main problems in regions of significant ecological importance and poor program areas can be revealed. Currently extension subsidies in program areas are expiring so tests of a new round of farmland conversion policy should be carried out in poor regions of ecological importance in order to successfully implement the consolidation, of CCFP tasks,

consolidate CCFP outcomes and solve the long-term livelihoods problems for rural households. The tests should be centered on the ecological benefits of farmland conversion to forests, and how to explore the long-term mechanism of ecological restoration and protection on steep slopes. Research on returning farmland to forests, program subsidies, forest logging and regeneration, and sustainable forest management, etc. should be conducted to provide experience for future policy development.

### 6.7.3 Adding follow-up management funding for consolidating the outcome of CCFP, and including tending and intermediate cutting of forests constructed in CCFP in the central government's subsidy on middle and young-aged forest tending

Forest management and tending in converted farmland is a priority of current CCFP activities. As the forests planted during the program implementation phase mature, a lot of efforts and capital are needed for follow-up management such as middle- and young-aged forest tending, pest control and prevention of forest fires, etc. Currently there is no government fund allocated for middle- and young-aged forest tending, pest control and prevention of forest fires, and the inputs from individual households for large-scale forest fires or pest and diseases will not be enough to address them if such risks occur. Therefore it is recommended that funding for follow-up management should be listed in the Consolidation Fund of CCFP, and rigorous management should be enforced to secure the quality of program implementation and consolidate program outcomes. For the forests planted in CCFP implementation that reach the condition of tending and intermediate cutting, central government's subsidy on middle- and young-aged forest tending should be applied to encourage rural households to manage program forests.



# 7

## Monitoring report on socioeconomic impacts of sandification combating program (SCP) for areas in the vicinity of Beijing and Tianjin

Zhao, Jincheng; Yu, Baichuan; Bai, Jianhua; Wang, Jiayong; Jiang, Tianfa

**B**y 2012, the Sandification Combating Program for Areas in the Vicinity of Beijing and Tianjin (hereafter referred to as SCP) has been implemented for 12 years. 2012 was the last year of the program's first phase, a critical year for phase II and the tenth consecutive year of monitoring of the socioeconomic impacts of SCP. During 2013, monitoring of the socioeconomic impacts was conducted in 21 SCP counties and in 400 farmer households under the three fixed provinces (autonomous region, municipality directly under the central government), among which, 327 farmer households (287 participated in the program, 40 did not participate) were under continuous tracking monitoring. Five monitoring indicators for disasters and damage were added. Households questionnaires for 2013 were completed in 327 sample farmer households in 21 counties under three provinces—Hebei, Inner Mongolia and Shanxi, covering 226 participating sample households of SCP (program households) and 111 sample households who hadn't participated in the program (non-program households). The questionnaire was comprised of five parts, and a total of 38 questions. Part I asked whether the farmer household had participated the program; Part II was about the extent of the program; Part III examines the results and achievement

of the program; Part IV focuses on major problems that the SCP faces and Part V invites overall comments on local ecological conditions. Program households were required to answer all of the parts, but non-program households were only required to answer Part I and Part V. In the meantime, in order to reflect SCP's role and contribution to the improvement of people's livelihoods, a monitoring team of socioeconomic impacts of SCP went to Zhangbei County in Hebei Province to conduct research on SCP and livelihoods. During the research, the monitoring team conducted field research questionnaires with 18 farmer households, resulting in improved knowledge of the living conditions of farmer households in the region. It helped to improve the ecological conditions in and around the village, and provided advice and suggestions from farmers for the next phase of the program.

In 2012, SCP further strengthened program regulation by holding a meeting on forestry construction in late March. Zhang Yongli, Deputy Director of the State Forestry Bureau attended the meeting, and presented a comprehensive summary of the work of SCP in Beijing and Tianjin in 2011 and a systematic report of the tasks for 2012. Monitoring authorities regularly coordinated and communicated with the five related provinces during the year in an effort to:

- supervise, urge and instruct local authorities to make comprehensive yearly plans;
- make clear their responsibilities; popularize the successful SCP modes of Beijing and Tianjin and other techniques and modes for the control of dust and sandstorms;
- promote the application of afforestation through use of container seedling and water-saving and drought-resistance techniques to continuously improve the survival rate of afforestation.

All of these efforts have guaranteed the quality of SCP (phase I) and its accomplishments. Monitoring results show that SCP in Beijing and Tianjin has fulfilled phase I's planning investment:

- forest coverage rate in program areas has increased by 3.85 percentage points through program construction;
- the numbers of dust and sandstorm afflicted towns and villages have decreased by 56 and 111, respectively;
- soil erosion area has reduced by 1.6453 million ha;
- reduction amplitude reached 55.53%;
- per capita net income of sample households in program area has increased by 3.88 times to CNY 7923.12 in 2012, from CNY 1625.12 in 2000.

The results also showed problems, such as the imperfections in the top-level design of SCP (phase I) in Beijing and Tianjin and the divergence between agriculture and forestry policies. Soil and water conservation measures in agriculture and forestry need to be strengthened and the development of follow-up industries of the program needs to be accelerated. The above problems will be further addressed, to ensure the program runs smoothly and realizes its win-win goal of sustainable development, ecological improvement and a better regional social economy.

## 7.1 Overview on natural economy and society in sample counties

### 7.1.1 Population and resources

#### 7.1.1.1 Population and labor resources

From 2000 to 2012, the population in the sample counties and rural areas showed year-on-year growth and then a decline. In 2012, the total population in the sample counties was 6.0999



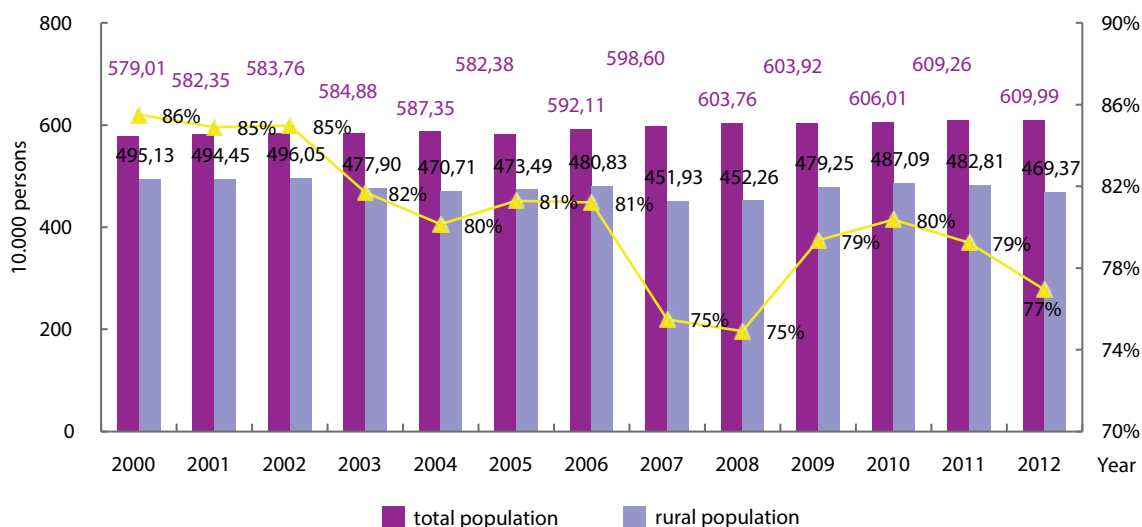


Figure 7.1. Population changes in the sample counties.

million, with a growth rate of 5.35% compared with that of 2000 and the total population in rural areas was 4.6937 million, a decrease of 5.20%, and the proportion of rural population declined by 8.56 percentage points (Figure 7.1).

Household-level monitoring results show that since 2000, the population and labor force in the sample households have remained stable, and the

labor dependency ratio in the sample households have decreased slightly. In 2012, per household population in the sample households was 3.66, a decrease of 2.14% and 0.81% compared with that of 2000 and 2011, respectively; per household labor force was 2.33, an increase of 22.63% compared with 2000 and a decrease of 1.27% compared with 2011; per household labor dependency ratio was 1.57, a decrease of 20.30% compared with 2000

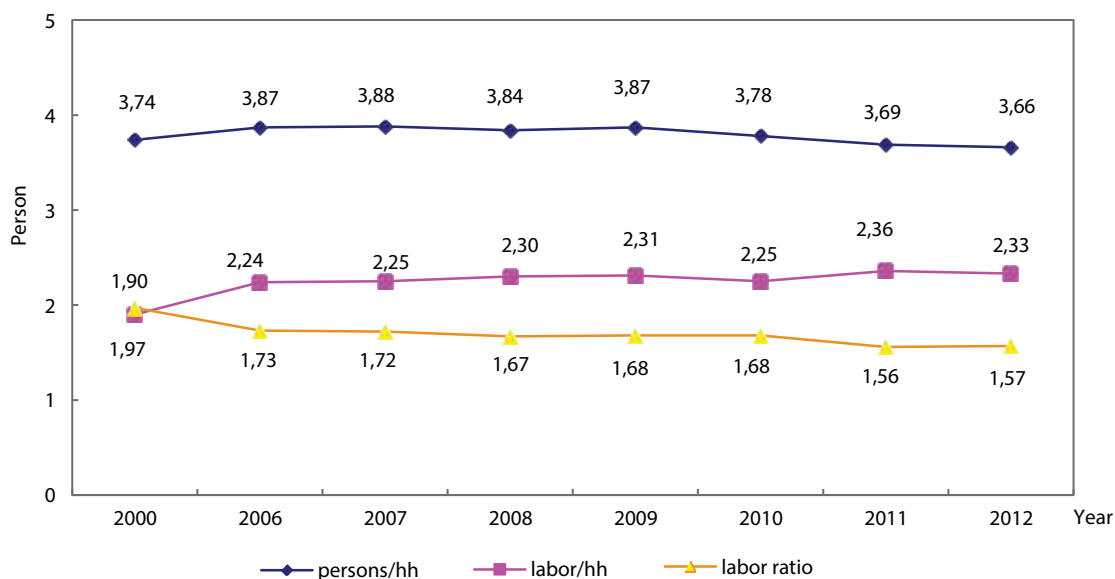


Figure 7.2 Population and labor status of sample households.

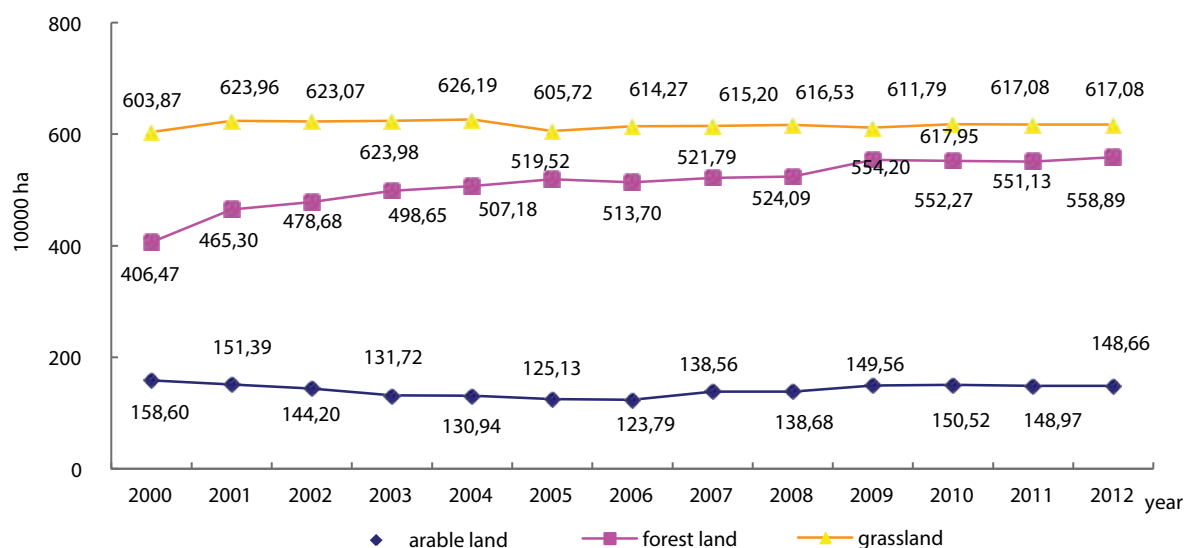


Figure 7.3 Land resources of sample counties.

and an increase of 0.64% compared to 2011. (Figure 7.2)

### 7. 1.1.2 Land resources

From 2000 to 2012, the area of pastureland in the sample counties remained stable, forest land area continued to grow, registered farmland area showed first an upward and then a downward trend, but a downward trend overall. From 2000 to 2006, the shift of land-use patterns and the use of engineering measures such as the conversion of degraded farmland into forest (grassland) have led to a continuous decline in the area of registered farmland in sample counties. Subsequently, with the implementation of other measures to consolidate the results of the country's conversion of degraded farmland into forest, registered farmland in sample counties began to grow continuously. At the end of 2012, registered farmland in the sample counties was 1.4866 million ha, a decrease of 99,400 and 3,100 ha, respectively compared with that of 2000 and 2011, a decrease of 6.27% and 0.21%, respectively; pastureland reached 6.1708 million ha, which was 132,100 ha more than that of 2000, an increase of 2.19%;

forest land area was 5.5889 million ha, which was 1.5242 million ha more than that of 2000, an increase of 37.50%. (Figure 7.3)

Prior to 2006, the trends for household-level land resources were similar to that at county level, and land-use patterns mainly changed between farmland and forest land. After 2006, the cover areas of farmland, forest land and grassland remained stable. (Figure 7.4). In 2012, average per household area of: farmland was 22.33 mu, forest land 27.11 mu, and pastureland 29.25 mu. Compared with 2000, the forest land area increased by seven times, pastureland area increased by 10.63%, and farmland area decreased by 18.24%.

### 7. 1.1.3 Forest resources

From 2000 to 2012, forest land area in sample counties increased. In 2012, the figure was 2.375 million ha, an increase of 46.88% compared to that of 2000. From 2000 to 2012, afforestation area of SCP in Beijing and Tianjin was 464,241 ha in sample counties, an increase in the forest coverage rate of 3.85 percentage points through engineering construction.

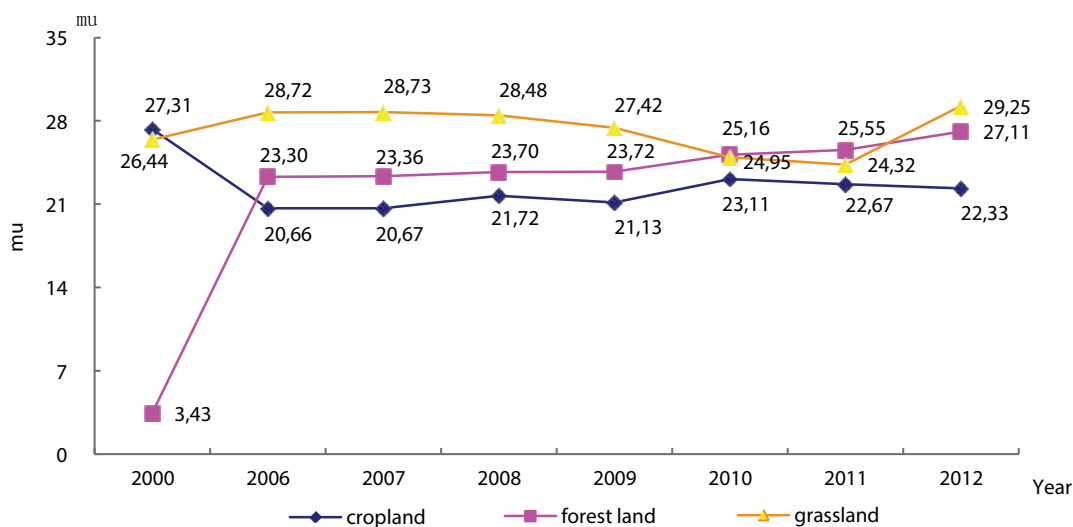


Figure 7.4 Land-use change of sample households.

## 7.1.2 Economic and social development

### 7.1.2.1 Regional economic aggregate and structure

From 2000 to 2012, the economic aggregate in sample counties continued to grow. In 2012, gross regional product was CNY 160.305 billion, local fiscal revenue was CNY 10.613 billion, which was 8.60 and 12.66 times that of 2000, respectively, and link relative ratio for 12 years were 19.64% and 23.56%, respectively,

higher than the country's average level in the corresponding period (Figure 7.5).

In 2012, the output value proportions for the three industries in the sample counties were 18.49%, 53.45% and 28.06%. Compared with 2000, the proportion of primary industry fell by 41.52 percentage points, and that of secondary industry and tertiary industry increased by 14.39 and 27.13 percentage points, respectively (Table 7.1).

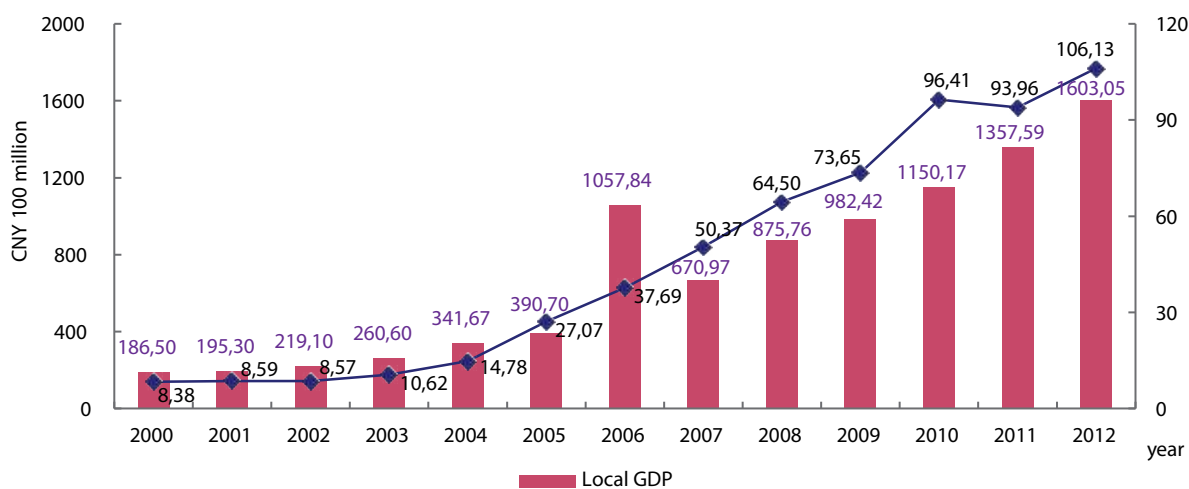


Figure 7.5 Economic development of sample counties.

Table 7.1 Proportion change in the three industries in the sample counties (%).

Year	Primary industry (%)	Secondary industry (%)	Tertiary industry (%)
2000	60.01	39.06	0.93
2011	18.62	53.38	28.00
2012	18.49	53.45	28.06
2012–2011	-0.13	0.07	0.06
2012–2000	-41.52	14.39	27.13

### 7.1.2.2 Social security system

From 2000 to 2012, the proportion of rural residents joining endowment insurance and medical insurance in sample counties increased and the social security system coverage continued to be widened. By the end of 2012, there were 3,152 health clinics covered by cooperative medical care in the sample counties, with 8,743 doctors and health personnel; 1.7237 million rural residents or 36.72% of the total population of the sample counties joined social endowment insurance (an increase of 69.84); 4.3028 million rural residents, or 91.67% of the whole population of the sample counties joined rural cooperative medical insurance, which was an increase of 33.20 percentage points compared with that of 2000. Rural elderly care and medical social security systems have been gradually set up and improved, and welfare levels for rural residents will continue to rise.

### 7.1.3 Rural labor force employment

From 2000 to 2012, the number of employed rural residents in sample counties remained stable, with those who were employed in farming, forestry, animal husbandry and fishery industries slightly decreased. At the end of 2012, the number of employed persons in sample counties reached 2.6433 million, an increase of 9.84%. In 2012, the number of people who were employed by farming, forestry, animal husbandry and fishery industries was 1.5388 million, or 58.22% of the total employed people in the sample rural area, a decrease of 12.18 percentage points compared with that of 2000.

### 7.1.4 Production and living conditions of farmer households

From 2000 to 2012, the means of production of sample households had improved, the number and quality of durable consumer goods increased and improved; living conditions also continuously improved. In 2012, per household production housing was 26.75 mu, an increase of 100.37% over that of 2000. The number of ownership of means of production such as cars, tractors, small four-wheel tractors, combine harvesters and threshers in 100 households greatly increased.

The number of durable consumer goods such as refrigerators, TVs, washing machines, motor cycles and telephones also increased, with an average of one motor cycle per household.

### 7.1.5 Household income and expenditure

From 2000 to 2012, per household income and expenditure were both increasing. The figure for 2012 was CNY 41,830.09, which was 4.41 times of that of 2000, among which, labor income, crop production income, animal husbandry income, industry and sideline income took the first four places.

In 2012, per household expenditure was CNY 30,270.20, which was 3.14 times of that of 2000, which consisted of production expenditure of CNY 8108.46 and living expenditure of CNY 22161.74. Animal husbandry, farming and rental payment were among the top three production expenditures, while expenditure for food and

education were largest two items in living expenditure.

## 7.2 Program progress

### 7.2.1 Program investment

From 2000 to 2012, program investment in sample counties increased, with a total investment of CNY 10.817 billion for this 12-year period. Planning total investment was CNY 11.225 billion. Rate of investment completion was 96.36%, which indicated that investment for the first eight years was not as good as expected, but after 2009, the investment was outperformed every year.

Investment in forestry measures was more than 60% during the 12 years, ranging from 62.04% to 78.45%. There was no big investment gap between that in farming measures and water conservation measures; before 2005, the former was higher than the latter one, but it was reversed after 2005. The total investment volume of the two came to 30% of the total program investment (Figure 7.6).

### 7.2.2 Forestry construction

From 2000 to 2012, afforested area on unclaimed mountains and land in sample counties was 2.2126 million ha, among which, artificial plantations were 1.2022 million ha and aerial seeding afforestation was 0.2585 million ha; forest converted from farmland was 0.9779 million ha, and seed base construction was 20,900 ha (Figure 7.7).

### 7.2.3 Farming program

Farming program measures were mainly: grass plantations, enclosures for restoration, grazing prohibition, basic grassland construction, feedlots and sheds and feed machinery. From 2000 to 2012, sample counties completed 11.0685 million ha of grassland treatment, which included grass plantations of 315,200 ha, enclosures for restoration of 756,800 ha, grazing prohibition of 9.3624 million ha, aerial seeding of 62,100 ha, basic grassland construction of 540,200 ha, shed construction of 3.2818 million ha and feed machinery of 34,440 sets.

### 7.2.4 Water conservancy measures

There was mainly small watershed treatment, water source projects and water-saving irrigation. From 2000 to 2012, the area of comprehensive small

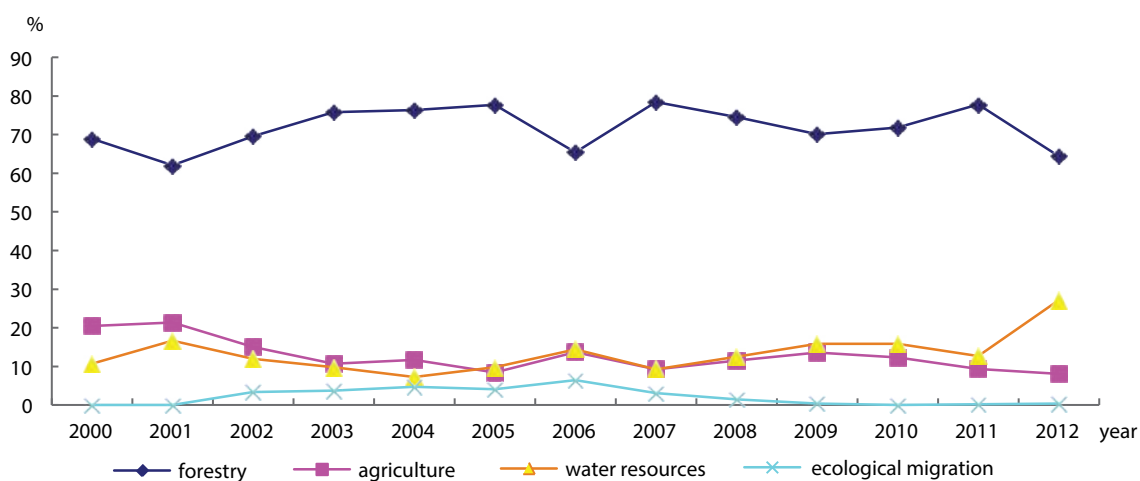


Figure 7.6 SCP investment in sample counties.

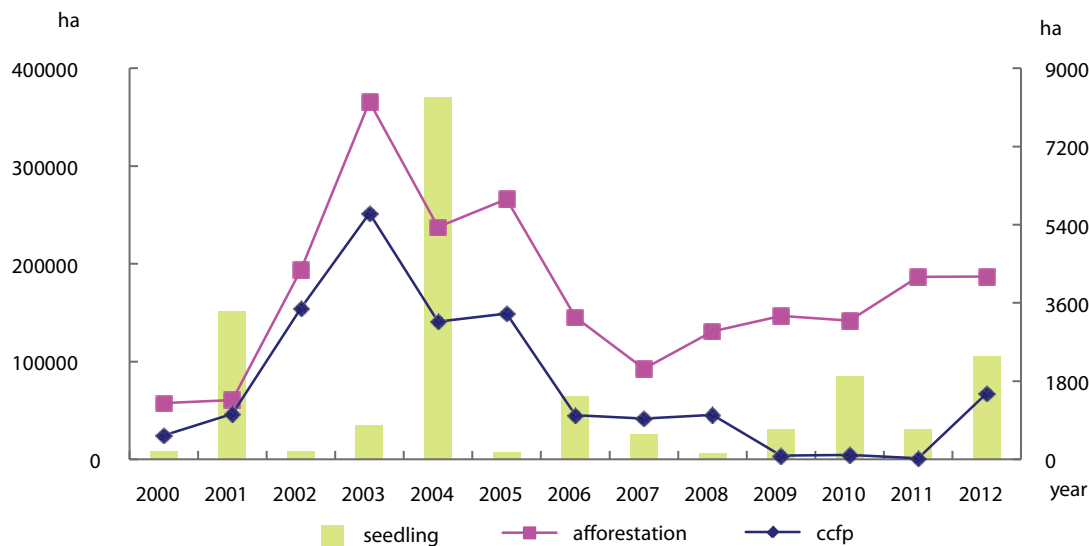


Figure 7.7. Forestry construction of SCP in sample counties.

watershed treatment was 467,500 ha; 35,560 water source projects and 27,618 water-saving irrigation missions were completed.

### 7.2.5 Eco-migration

An eco-migration program was launched in 2002 as an important program in SCP in the areas of Beijing and Tianjin. As the program was conducted more thoroughly, eco-migration tasks decreased. In 2012, eco-migrants in sample counties were 1252. From 2000 to 2012, actual accumulative eco-migrants in sample counties were 50,759, and the rate of planning completion was 95.94%.

### 7.2.6 Subsidy for conversion of cropland to forest land

According to the monitoring results, the subsidy for conversion of cropland to forest land had been functioning well in sample counties. By the end of 2012, the government granted an accumulative subsidy for grain and cash of CNY 6.76 billion and CNY 1.54 billion, respectively. In 2012, 761,800 farmer households received a subsidy for conversion of cropland to forest land in sample counties, receiving a subsidy for grain and a cash

subsidy of CNY 422 million and CNY 184 million. The household-level questionnaire showed that all the 226 sample households in CCFP reported that they received the full subsidy on time, and the rate of subsidy completion was 100%. In 2012, land area in CCFP was 389,300 ha, with 141.3 ha receiving a normal subsidy, and 24,800 ha receiving an extended period subsidy, and nearly two-thirds of forest land converted from cropland receiving an extended period subsidy.

## 7.3 Program results analysis

SCP (phase I) in Beijing and Tianjin played a central role in promoting local socioeconomic development and social welfare, improving ecological conditions and people's living standards.

### 7.3.1 Safeguarding people's livelihoods

The implementation of the program improved ecological conditions and the environment. According to county-level monitoring results: from 2000 to 2012, forest coverage rate in 21 sample counties increased by 3.85 percentage points. Among 290 household-level questionnaires,

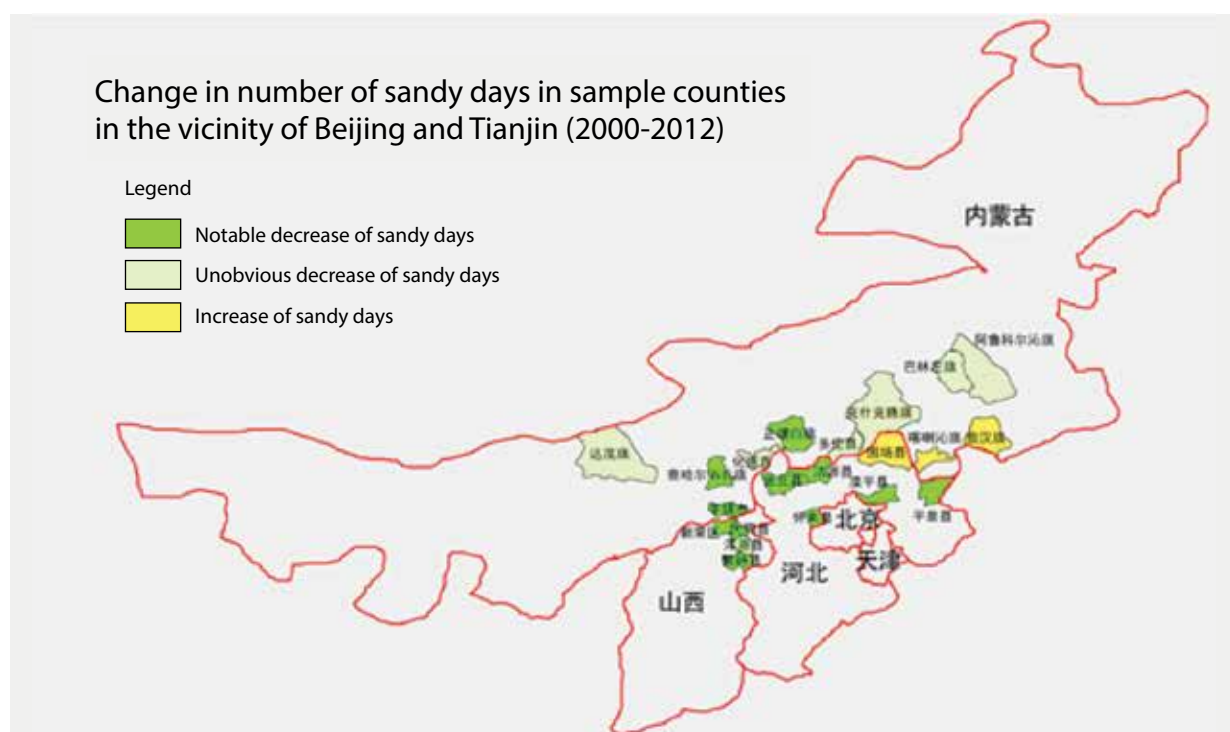
96% confirmed that they could see and feel the improvement of the ecological environment around them, and their direct feeling was, “mountains are covered by more trees and grass, rivers are clearer, and there are more wild animals around the village”.

The implementation of the program alleviated natural disasters. According to satellite image from Satellite Meteorology Center of State Meteorological Administration, from 2000 to 2009, among 21 meteorological observation points in sample counties, two showed no obvious change in the number of days of sand blowing and sandstorms, one showed an upward trend, and the other 18 all showed a decline.

SCP results showed that from 2000 to 2012, among 21 sample counties, three were on the increase in terms of the number of sand blowing days, five were slightly declining, and the other 13 were obviously declining. The damage range

and degree of damage in the sample counties were all better in 2012 than in 2000. The number of sandstorm-afflicted towns and administrative villages were down by 56 and 111 respectively, a drop of 18.48% and 2.61%. Sandstorm-stricken farmland in sample households decreased by 145.39 mu, a drop of 24.91%.

The improvement of agricultural production conditions promoted grain output in the program area. In 2012, the average grain output of 327 sample households was 3786.65 kg, and grain acreage was 15.83 mu. Compared with 2000, grain output increased by 264.125 kg, and grain acreage reduced by 3.73 mu. Research findings by scholars such as Fan Dongjun showed that the rate of improvement of China’s agricultural production infrastructure and ecological environment to the increase in grain output was 41.9%, grain acreage was 24.63%, and farmers’ production input was 33.47%. The main contributors to the output increase were the increase in farmer’s production



input and the improvement in infrastructure building and in the ecological environment.

### 7.3.2 Laying the foundation for development

The local economic aggregate increased. From 2000 to 2012, the accumulative investment in the program in sample counties was CNY 5.671 billion. Calculated by the GDP growth factor driven by domestic investment, the investment in DCP in Beijing and Tianjin drove sample counties' local GDP up by CNY 2.93 billion, and the rate of contribution to local GDP growth was 2.08%.

We optimized the economic structure and the mode of land use. The proportion of the structure of three industries changed from 60.01:39.06:0.93 in 2000 to 17.98:53.79:28.23 in 2012, which showed that the primary industries are less important and the second and tertiary industries were more important. Since the program started, forest land and pastureland cover in the sample

counties has been constantly increasing, with the desertification of cultivation land decreasing, and unsustainable use of land and overgrazing being controlled in program areas. The desertification of cultivation land has reduced from 729,900 ha in 2000 to 299,900 ha in 2012, a decrease of 58.91%. Forest land cover has grown from 4,064,700 ha in 2000 to 7,733,800 ha in 2012, an increase of 90.27%. Pastureland cover has grown from 6,038,600 ha in 2000 to 6,292,000 ha in 2012, an increase of 4.20%.

We have consolidated the sufficiency of resources and energy for local economic development. From 2000 to 2012, sample counties had 26,169,000 mu of forest growing stock, an increase of 49.37%. Since 2010 the program has been productive with sample households producing timber, fruits and nuts on their converted land. In 2012, output from converted land has taken up 42.63% of the total income from forestry for sample households.

Table 7.2 Program investment's contribution to GDP growth in sample counties (CNY billion).

	2000–2005	2006	2007	2008	2009	2010	2011	2012
State investment's contribution rate to GDP growth (%)	50.5	42.99	37.12	43.5	87.6	54.8	54.2	50.4
DCP in Beijing and Tianjin investment	23.91	4.25	3.1	3.77	3.82	4.48	5.65	7.73
Program investment's contribution to local GDP growth	12.07	1.83	1.15	1.64	3.35	2.46	3.06	3.74
Local GDP growth	204.2	67.14	213.13	204.79	106.66	167.75	207.41	235.42
Program investment's contribution rate to local GDP growth (%)	5.91	2.72	0.54	0.80	3.14	1.47	1.48	1.59

**Note:**

1. Program investment included investment in seedlings for afforestation and CCFP, in grassland treatment and small watershed comprehensive treatment. Grain and cash subsidies for CCFP program households were not included in afforestation investment.
2. Data of China's investment's contribution rate to GDP growth during 2000 to 2005 was from the research project report *China's Investment and Consumption's Contribution to Economic Growth* by State Statistic Bureau; data of 2006 and 2007 drawn from *Consumption's contribution to GDP Surpasses Investment for the First Time in Seven Years* by State Statistic Bureau; data of 2008 was from *Issues on Accelerating the Shift of Economic Development Mode* by Ma Jiantang from State Statistic Bureau; data of 2009, 2010, 2011 and 2012 was from the State Statistics Bureau.



They have constructed 179,500 biogas digesters, and 220,800 of households have involved in saving fuelwood by changing their ovens. There have been 585,600 households using coal, electric and gas instead of fuelwood, 119,000 households using solar energy and 19,000 households using other forms of energy.

### 7.3.3 Improvement of employment

In order to implement the program, 110630.4 jobs were created. From 2000 to 2012, there were 2,212,600 ha afforested on barren mountains and sand in sample counties, or on average of 184384.1 ha planted each year. According to the standard of labor force of the program and the State Statistics Bureau, the DCP employed 110,600 people in sample counties. Jobs created by afforestation on barren mountains and sand accounted for 46.72% of the total increase in the rural labor force at the end of each year.

The program has helped the shift of rural labor force. From 2000 to 2012, those who sought employment in their hometown in sample counties have grown, their employment time has increased and their employment destination has expanded.

In 2012, 732,000 people went out to find jobs in sample counties, an increase of 711,000 people compared with that of 2000, and 295 people out of 327 sample households found jobs outside of their hometown, an increase of 186 people compared with that of 2000. The monitoring data showed that on average, 0.95 people from sample household found jobs outside their hometown, 0.6 people worked outside their hometown throughout the year, 0.6 people stayed within the province, which is an increase of 0.62, 0.39 and 0.25 people, respectively compared with that of 2000. By contrast, compared with that of 2000, those from the program households who worked outside their hometown increased by 272.14%, and those from non-program households who worked outside their hometown increased by 201.41%. As many as 70.73% from program households worked outside their hometown compared to those from non-program households.

### 7.3.4 Reduce income gap

From 2000 to 2012, rural residents from sample counties enjoyed a sustained increase of per capita net income and its growth rate was higher than the national average growth rate. In 2000, per capita

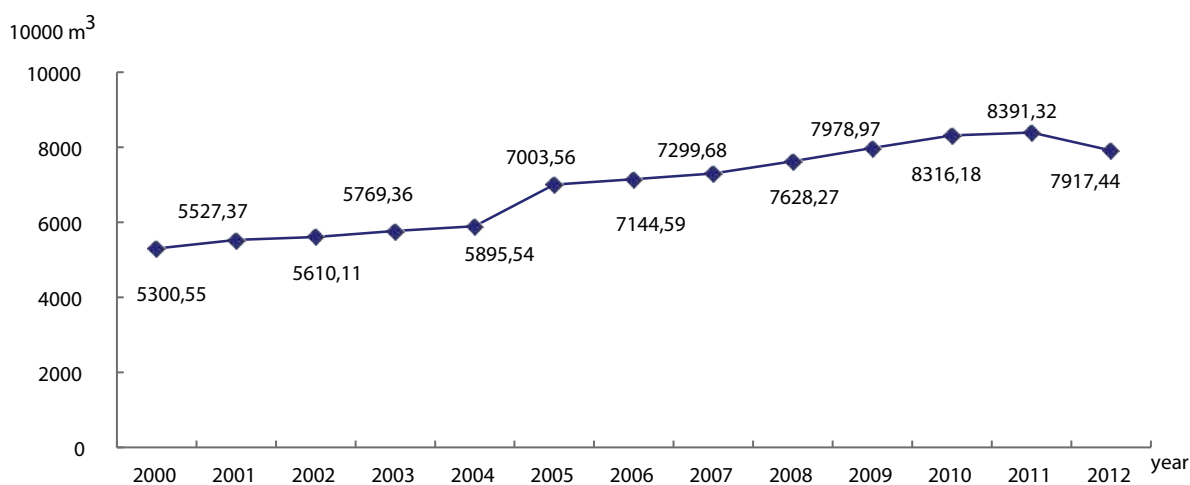


Figure 7.8. Change of forest volume of sample counties.

Table 7.3 Jobs created by afforestation in sample counties.

Project	Data
Annual average afforestation on barren mountains and sand from 2000 to 2012	184384.1 ha
Labor force needed for afforestation per ha	90 persons
employment standards of rural labor force	150 persons
Labor force used in the program	110,600 persons

Note:

1. Annual average afforestation from 2000 to 2009 refers to afforestation on barren mountains and sand; afforestation on converted land is not included.
2. Labor force needed for afforestation per ha is quoted from the employment standard of *State Forestry Bureau's Evaluation on Investment of Wind Break*
3. Employment standard of rural labor force is quoted from the State Statistics Bureau.

net income of rural residents from sample counties was CNY 1447.90, and per capita net income of rural residents from sample households was CNY 1625.12, when the national per capita net income was CNY 2253. This shows that per capita net income of rural residents from sample counties and per capita net income of rural residents from sample households was 71.82% and 100.08% that of national per capita net income. Sample households received CNY 379.25 subsidies per person. To look at the changing pattern of their income, from 2008 to 2009, the number of people seeking jobs outside their county decreased, resulting in a widening income gap between sample counties, sample households and the national standard. As the impact of the financial crisis was wearing off, revenue from people who worked outside their hometown contributed

to the narrowing gap of per capita net income between sample counties, sample households and the national standard. Therefore, the program has contributed to the shift in the rural labor force.

In 2000, the per capita net income of program households and non-program households was CNY 1589.91 and CNY 1643.27, respectively, which shows that the per capita net income of program households was lower than that of non-program households. In 2012, per capita net income of program household and non-program household stood at CNY 8036.6 and CNY 7908.64, respectively, an increase of CNY 6446.69 and CNY 6265.37, respectively compared with that of 2000 (Table 7.4). This was solid evidence that the DCP helped to increase people's income and narrow the income gap.

Table 7.4 Comparison between per capita net income between program households and non-program households.

Household	Program households			Non-program households			Synthesized difference
Year	2000	2012	2012–2000	2000	2012	2012–2000	
Number	(1)	(2)	(3) = (2) – (1)	(4)	(5)	(6) = (5) – (4)	(7) = (6) – (3)
Net income	1589.91	8036.6	6446.69	1643.27	7908.64	6265.37	–181.32

### 7.3.5 Make progress with democracy

The questionnaire and special survey on households have shown that during the process of the program, we used the principle of “government-led, participation out of residents’ willingness, people-oriented”, and applied the practice of publicity, consultation, posting of notice, filing etc. to ensure people’s right to know, to participate and to supervise. The majority of (320 out of 327) household questionnaires reported that there was a notice for CCFP posted in their village and they knew about the policy of CCFP. Six out of 21 special surveys on households reported that this was the first time that there had been a notice for CCFP posted in their village, and 15 out of 21 special surveys on household reported that they had a satisfactory publicity system in their village. Farmers suggested that the government should work to enhance the management and supervision of CCFP. This feedback has influenced government into being more scientific and democratic in its decision-making processes.

## 7.4 Constraints

The first phase of the program has been successful since it started 12 years ago. However, there were problems, which are expected to be addressed in the second phase of the program.

### 7.4.1 Departmental and regional cooperation requires improvement

This program has involved many departments such as agriculture, forestry and water management. In addition, it was a systematic project which characterized by extensive scope, dire natural conditions, difficulty in management and restoration. Its difficulties also were related to the multiple choices it produced. For instance, the program needed to find a balance between ecological protection and restoration, the survival and development of farmers, poverty reduction and achieving social stability and prosperity. It also needed to combine the interests of the central

government, the local government, and farmers. It still dealt with the synergetic development between program areas and areas that benefited from the program. We have struck a balance between ecological protection and economic development as the program was progressed and consolidated. To summarize what we have experienced from the first phase of the program, we found that local farmers suggested with many new modes of management such as “several household unite to manage, self-management, and professional management”. But the departmental and regional cooperation needs to be improved. First, the planning of program areas was not cohesive enough. As this was a cross-administrative regions program, although the departments involved (provincial, autonomous region or city-level) in each program area had their own plan, they needed to know what each other had been doing. Besides, there was also lack of cohesion with relevant provinces, autonomous regions and cities. The local program was not included in the overall program. All of these has led to the unclear knowledge about resources and their distribution. The fight for land and water has limited the development of the program. Second, regional coordination was far from satisfactory. The program areas and areas benefited from the program did not have a clear interests distribution and cost-sharing. There were no rules to follow when it came to the supportive methods and regulations from areas benefited from the program to the program areas. They still had to negotiate whenever they wanted to cooperate.

### 7.4.2 The policy coordination for agricultural development and ecological protection needed to be enhanced.

The agricultural subsidies strongly affected SCP. Since 2006, to promote agricultural development and increase grain production, the central government issued a series of preferential policies, such as grain subsidies with an increased mode and amount of subsidy. The subsidy for planting grain improved farmers’ comparative benefits, but

the extension of the subsidy for CCFP reduced farmers' comparative benefits. Those two factors to some extent dampened people's enthusiasm for consolidating the achievements of CCFP. The monitoring data shows that people's interest in planting grain was generated by these preferential policies, leading to the increase in grain acreage. We've also learnt that the subsidy for planting grain in Datong and Yunyuan County, Shanxi Province was CNY 70 per mu, higher than the subsidy for Yuncheng. Besides, the grain prices have been spiking, so farmers thought that income generated by planting grain was higher than the current subsidy for CCFP, and even higher than the extension of the subsidy for CCFP. Some of the participating farmers stopped signing contracts after CCFP ended, and they went as far as asking to return the converted land back. The imbalance between economic development and ecological protection has posed enormous pressure on the implementation and consolidation of the program.

The pastureland management was not well combined with its use. Closing pastureland was designed to protect pastureland from degradation and desertification due to overgrazing. But closing it did not stop it from being used. In 2012, a group of experts sent by the National Development and Reform Commission pointed out that the proper use of pastureland would benefit its restoration, but an absolute closing off of it would lead to the unsustainable development of it, and would not benefit its restoration. At the same time, 'closed in the daytime but grazed at night' often occurred in some of the program areas.

#### **7.4.3. The investment in afforestation was insufficient and science and technology support was weak. The long-term mechanism for consolidating the achievements of the program has not yet been established.**

The investment in afforestation of the program was not sufficient. From 2000 to 2008, the subsidy provided by the central government was

CNY 100 per mu for forest plantation, and in 2009, it increased to CNY 200 per mu. But the monitoring data shows that the cost of 1 mu of Chinese pine (Mongolia scotch pine), poplar (elm) and *Caragana microphylla* was CNY 140.95, CNY 133.93 and CNY 132.91, respectively, all above the subsidy level of CNY 100 per mu. The prices of seedlings and labor force costs were increasing each year. In 2012, the labor force cost was CNY 110 per day in 21 sample counties, the average cost of afforestation, closing off mountains for afforestation and air seeding for afforestation was CNY 662.65 per mu, CNY 160.95 per mu and CNY 203.81 per mu, respectively. The investment fell short of its actual needs. The fund for replanting and management was also insufficient. In recent years, droughts in spring in these program areas were severe, which not only lowered the survival rate of newly planted trees, but also posed a threat for those already planted trees. We often felt overwhelmed by replanting work as some of the newly converted land had to be replanted for three consecutive years in order to pass the inspection. At the beginning of the program, there was no fund for replanting or management, making the consolidation of the program even harder.

The science and technology support was weak. At the initial phase of the program, there was science and technology support, which largely facilitated its implementation. But such support stopped in the later phase of the program. Currently, the program is at a critical juncture, which was evidenced by some pending and difficult problems such as the increased amount of vulnerable land, rocky areas, and the absence of technology for vegetation restoration in arid areas. They have significantly affected the improvement of the quality, the benefits and the modernization of the program. The monitoring result has shown that in 2012, in 21 sample counties, forest damaged by droughts took up 92.64% of the total damaged forest of the program.

The long-term mechanism for consolidating the achievements of the program has not yet been established. The program area was abundant in vegetation resources but the newly planted shrubbery was not fully used because of the lack of policy support. This has not only increased management pressure but also led to a waste of resources. In addition, farmers did not get enough economic benefits from ecological construction. Their interest in planting and managing was seriously dampened, which limited the sustainable development of the program. The monitoring data shows that the utilization ratio of *Caragana microphylla* was only 20% because the method of felling them and then using them as feedstock was rather basic. The practice under the Sino-Germany Financial Cooperation Program on Prevention of Desertification proved that the utilization ratio of *Caragana microphylla* could reach over 90% if it was processed after being felled.

#### **7.4.4 The water resources allocation needed to be defined more clearly and the support facilities for water resources needed to be enhanced.**

There needs to be a clear water resources allocation. Water is the source of life, and it is the basis and guarantee of the program. Before the first phase of the program started, we did not have a clear picture of the total amount and bearing capacity of water resources in the program areas, nor did we clearly define the ratio and method of water use for production and ecology, resulting in a fight for water resources during the implementation of the program. The special survey found out that since Zhangjiakou City in Hebei Province adopted an agricultural facility, its Zhangbei County's 180,000 mu vegetation (only 50,000 mu using drip irrigation) had outstanding economic performance. But since that vegetation needed a large amount of water, the underground water lever dropped. According to local residents, ten

years ago, they just needed to dig a well 8 m deep to reach water, but today, they had to dig over 20 m to reach water. This shortage of water has led to an increase in the mortality rate of poplar. The ecological result has been largely affected. The support water facility was not closely linked with agricultural and forestry facilities. For instance, in some program areas, the support water facility was far away from agricultural and forestry facilities, which made it difficult for it to effectively serve afforestation. The lack of coordination has affected the results of the program.

## **7.5 Policy recommendations**

### **7.5.1 Enhance regional coordination**

We suggest that national policy should clearly define the development and allocation of land and water resources, and their relationship in addressing economic development and ecological protection. We must incorporate planning of SCP into the planning of the relevant province, autonomous region or city, to enhance coordination, contribute to solving problems of allocation of land and water resources, and use coordination methods in prevention, protection and consolidation of the program. We hope that departmental and cross-regional coordination can be intensified. The areas which benefited from the program did not have a clear interest in distribution and cost-sharing. There were no rules to follow when it came to the supportive methods and regulations in areas that benefited from the program.

### **7.5.2. Coordinate agricultural development and ecological protection.**

We must improve subsidies for CCFP and establish a coordinated mechanism between investment in ecological development, forest land protection and agricultural subsidies and food prices so as to reduce the gap between the two.

We must strictly implement central government's policy of forest land protection and agricultural development. Unregistered land and newly cultivated land should not be eligible to receive central government's subsidies for agriculture.

There should be integration between the restoration and utilization of pastureland and a balanced system for pastureland to carry livestock. As long as the pastureland is well preserved, herdsman should be encouraged to graze and use pastureland resources in a scientific and sustainable way. We should promote the ecological restoration of pastureland through sustainable grazing. There should also be a balance between protection and utilization, ecological protection by the central government and economic development by farmers.

### **7.5.3. Increase investment in forestry and enhance science and technology support to establish a long-term mechanism for consolidating the achievements of the program.**

We suggest that investment in afforestation of this program should be increased to CNY 650 per mu, and at the same time, arrange funds for replanting and management. Establish a dynamic mechanism, which will link investment in afforestation of this program with the price of labor force and seedlings.

We should prioritize a scientific approach to desertification control. The central government should continue to incorporate difficulties in the processing of dust and sandstorm control into key science and technology projects, so as to address the technology bottleneck. Priority should be given to: the introduction of improved breeds, seed selection, container nurseries, afforestation techniques, support technology on the control of desertified land and efficient management of desertified areas to improve our capacity for independent innovation in combating desertification.

We should enhance publicity for prevention and control of desertification to improve the industrial chain. We hope that breeding technology, water conservation and preservation of soil moisture, afforestation technology, vegetation restoration and management methods can be improved. Conversion, application and contribution rates from science and technology achievements should be enhanced to ensure high quality development. We need to attract more talented persons who specialize in desertification control into the program. We should take advantage of the enormous talents in Beijing and Tianjin, and establish a panel of experts in the prevention and control of desertification to provide support for the second phase of the program. We recommend that a professional training program in control of desertification for people with different educational backgrounds be set up. We should enhance follow-up industries to improve economic benefits of the program. In this way, participating farmers will be encouraged to plant and manage.

### **7.5.4. Allocate water resources more clearly, and intensify support water resources facilities.**

We need to know the total amount of water resources in the program area in order to adopt methods for allocation of water resources when rainfall is high or low in that year. Based on the principle of "planting trees on right sites, setting up fences for particular diseases, planting shrubbery or grass according to the specific land condition", we should integrate forestry and agricultural measures with water resources to improve the efficiency of water usage and prohibit the practice of using water resources for economic development instead of ecological development.

A comprehensive control measure that combines biological and engineering approaches is needed. In severely affected mobile and semimobile

desertified areas, we can use a sand belt to help restore vegetation. In severely affected pastureland, we can set up rails and nets to prohibit grazing, and we can plant grass and replant to restore vegetation. Water conservation facilities should be combined with forestry and agricultural measures

to increase their integrated effects. On the basis of protecting the existing vegetation, water resources facilities must be incorporated into forestry and agricultural construction, to achieve a healthy ecological environment in the program area.





# 8

## Monitoring report on socioeconomic benefits of wildlife protection and nature reserve development program (NRP)<sup>1</sup>

Yu, Tao; Tang, Xiaobin; Jian, Ninghong; Xia, Yufang

2012 was the seventh year that the social economic impacts of Wildlife Protection and Nature Reserve Development Program (hereafter referred to as NRP) was monitored by the central government of China. In 2012, all the existing 40 sample nature reserves were covered in the monitoring.

In 2011, two sample villages merged and were renamed Zhedai Village of Zhejiang Jiulong Mountain National Nature Reserve. Because two years of information of Zhedai Village became available in 2012, Zhedai Village is included in the monitoring process of 2012, and the total number of sample villages increases to 69.

Monitoring activities in 2012 followed the routine approach of permanent sample tracking and monitoring, and the data were collected through surveys at nature reserve level and village level. In order to improve monitoring indicators, in 2012, adjustment was made to the monitoring indicators of nature reserves and sample villages, and the total number of indicators was 286. Compared with 2011, this was 2 more indicators, 4 new indicators, 2 eliminated indicators, and 1 indicator with a modified title.

<sup>1</sup> Due to data adjustment of some sample nature reserves and sample villages for previous years, some data in this report don't match with that in monitoring reports of previous years.

The number of indicators for sample villages was 91 in 2012. There was 1 more indicator than that in 2011. In addition, in order to reflect the social, ecological and economic benefits of the program, nature reserve questionnaire and sample household questionnaire were used to collect information that could not be quantified. In total 40 questionnaires were distributed to the leaders of every sample nature reserve management bureau, with one bureau per questionnaire; and all of them were returned with feedback. Sample household questionnaires were distributed to 69 sample villages, with 10 questionnaires per village, and all the 690 questionnaires were returned with feedback.

This report is an analysis of the social economic benefits of the NRP, based on the monitoring data of 40 sample nature reserves, 69 sample villages and the questionnaires on 40 nature reserves and 690 rural households.

## 8.1 Introduction to the sample nature reserves and sample villages

### 8.1.1 Sample nature reserves

#### **a. The total area decreased slightly, while there was minor adjustment in functional zones**

In 2012, the total area of 40 sample nature reserves was 4.3547 million ha. As categorized by functional zones, the core area was 1.5007 million ha, or 34.46% of the total; the buffer zone area was 0.8328 million ha, or 19.13% of the total; the experimental area was 2.0212 million ha, or 46.41% of the total. The state-owned land area was 3.4802 million ha, or 79.92% of the total; the collectively-owned land area was 0.8745 million ha, or 20.08% of the total. The area over which the nature reserve had users' rights was 2.4439 million ha, or 56.12% of the total area. Compared with that of 2011, the total area of 40 sampled nature reserves decreased slightly, with only minor

adjustment of functional zone, in which:

- the size of total area of 40 sample nature reserves was 3 ha less;
- the size of core area was 2378 ha less, the buffer zone area was 1033 ha less;
- the size of the experimental area was 1342 ha more;
- the size of state-owned area was 203 ha more;
- the size of collectively-owned area was 206 ha less;
- the area over which the nature reserve had users' right was 56 ha more.

There were two reasons for the changes in total area and functional zones.

1. The area of Fanjin Mountain National Nature Reserve decreased by 3 ha because of the use of different software. In 2011, the total area of Fanjing Mountain National Nature Reserve was 43,414 ha, which was determined by a survey of forest resources in 2006 and became 43,411 ha in 2012 using GIS software of 'forest protection and utilization planning', which comprised a core area which was 3797 ha less, a buffer zone which was 2800 ha bigger, and an experimental area which was 994 ha bigger.
2. There was a minor adjustment in terms of functional zone in the national nature reserve of Yellow River Delta in ShanDong Province, which caused the size of the core area to be 1419 ha bigger, the size of the buffer zone to be 1767 ha less, and the size of the experimental area to be 348 ha bigger.

#### **b. The number of staff decreased while the number of retired staff increased; staff salaries and the living cost of retired staff went up**

Up to the end of 2012, in the 40 sample nature reserves there were 6299 employees (including enterprise employees) with an average annual salary of CNY 31,553.79; and there were 2916 retired staff, with an annual living cost of

CNY 22,560.53. Compared with that of 2011, the number of employees was 61 less, while the per capita salary increased by 13.62%. The number of retired staff was 74 more, and the per capita living cost went up by 7.64%. The reasons for employees' salary increase were mainly the following: (i) local subsidy increased. In 2012, the local governments in the regions where several nature reserves are located increased the level locality allowance and subsidy. In 2012, the following nature reserves benefited from the growth of work allowance and subsidy for marginal and difficult regions: Yiwulv Mountain Nature Reserve in Liaoning, Fenglin Nature Reserve and Nanwenghe Nature Reserve in Heilongjiang, Nanling Nature Reserve in Guangdong, etc. (ii) In addition, in the same year, the Performance-based Salary Reform of Institutional Organizations was completed in Fanjing Mountain Nature Reserve in Guizhou, and the salary based on performance was paid. (iii) The subordinate enterprises of nature reserves raised salary level of employees. In 2012, subordinate enterprises of Jinggang Mountain Nature Reserve in Jiangxi Province raised salary standard, and the annual average salary of 1368 employees increased to CNY 19,800 in 2012 from CNY 12,100 of the previous year, at a rise of 63.64%.

#### **c. The number of households in communities of nature reserves decreased slightly, while the total population was bigger**

In 2012, the 40 sample nature reserves covered 157 townships (towns), 523 administrative villages and 86,456 households. The total population was 0.359 million. There were 64,377 living in the core area, 38,371 living in buffer zones, and 256,289 living in experimental areas, accounting for 17.91%, 10.78% and 71.31% of the total, respectively. There were 179 people who emigrated to other places from nature reserves, among whom 39 moved from Liupan Mountain Nature Reserve in Ningxia as a result of rebuilding of a shanty area; 100 people moved to other places from the neighboring regions of the Fenglin Nature Reserve Management Bureau in Heilongjiang; 40 staff and their families moved

to houses outside of Changbai Mountain Nature Reserve in Jilin Province. Compared with that of 2011, the number of households in sample nature reserves was 23 fewer, while the total population increased by 828.

#### **d. Regional economy further developed**

In 2012, the total territory of 40 sample nature reserves was 19.6603 million ha, with a population of 23.2228 million. The total local financial revenue was CNY 74.867 billion and GDP (current price) was CNY 6.01376 trillion. The average per capita salary of employees was CNY 30,728.30, and the per capita net income of rural resident was CNY 6743.29. Compared with 2011, the growth of employee annual salaries was CNY 2382.75, at a rate of 8.41%; the increase of rural per capita net income was CNY 921.41, a rise of 15.83%.

#### **8.1.2 About sample villages**

Among the 69 sample villages covered in the monitoring of 2012, 30 were inside nature reserves and 39 were outside. A total of 224 households who participated in the questionnaire survey lived inside nature reserves, accounting for 32.46% of the total 690 surveyed households; in which, 16 households live inside the core area, 44 lived in buffer zones and 164 households lived in the experimental area

#### **a. The total land area remains the same, with some changes in land types**

In 2012, the total area of the 69 sample villages was 304,218.15 ha, in which villages inside nature reserves covered an area of 204,380.78 ha and those outside nature reserves occupied an area of 99,837.37 ha. Land designated as nature reserves was 148,020.69 ha, or 48.66% of the total (Table 8.1). Compared with 2011, the total area of sample villages remained unchanged, while there was minor adjustment of land structure, in which cultivated land decreased in area by 4 ha, water area increased by 3 ha, and other types of land

Table 8.1 Types of land in 69 sample villages (ha).

Types of land	Total area (mu)	% of the total	Designated as nature reserves	
			Area (mu)	% of total area
Total land size in the village	304,218.15	100.00	148,020.69	48.66
In which:				
cultivated land	16,632.26	5.47	4,034.24	24.26
Forest land	155,849.49	51.23	93,002.55	59.67
pasture	119,532.35	39.29	46,650.15	39.03
water	5,201.53	1.71	3,428.33	65.91
Others	7,002.52	2.30	905.42	12.93

were 1 ha larger. This was because some villages built roads or developed animal husbandry, which changed the overall land structure.

#### **b. Total population increased slightly, and some residents emigrated to other places**

As of 2012, the number of households at year-end were 21,526 and the total population was 83,349 in the 69 sample villages. Of these, 6691 households lived inside the nature reserve with a population of 25,223, and 14,835 households lived outside the nature reserves, with a population of 58,126. The number of households and the population size increased, 415 households and 523 people more compared with that of 2011, or 1.97% and 0.63% higher, respectively. The number of households in villages inside nature reserves increased by 128 households, and its population grew by 417, while the number of households outside nature reserves increased by 287 households and the population grew by 106. In 2012, 71 people moved out of the sample villages.

#### **c. There was a minor increase of labor force**

The total labor force in 69 sample villages was 44,253, which was 53.09% of the total population. Out of the total labor force, 13,426 lived inside nature reserves and 30,827 lived outside nature reserves. Compared with 2011, the labor force of 2012 increased by 451, at a rate of 1.03%, in

which, the labor force growth in villages inside nature reserves was 308, at a rate of 2.35%; the growth of labor force in villages outside nature reserves was 143, at a growth rate of 0.46%.

#### **d. Number of households and population inside nature reserves have increased**

In 2012, in the 69 sample villages there were 4421 households and 16,972 people living inside nature reserves, in which 4008 households and 15,491 people lived in villages inside nature reserves, and 413 households and 1481 people were residents of villages outside nature reserves. Compared to 2011, the number of households living inside nature reserves increased by 44, and the population was 245 more, which was 1.01% and 1.46% of growth, respectively. The number of households and the population living outside nature reserves increased by 9 and 22 more, representing 2.23% and 1.51% of growth, respectively.

## **8.2 Progress of NRP**

### **8.2.1 Investment**

In 2012, the planned investment in 40 sample nature reserves in engineering implementation was CNY 129.2506 million, and the actual disbursement was CNY 135.1436 million, with a disbursement ratio of 104.56%. The actual completed investment was CNY 95.467 million, with a completion rate of 70.64% (Table 8.3).

Table 8.2. Demographic information of communities living inside nature reserves among the 69 sample villages.

(Households, persons)

	2011	2012	Increase/decrease compared with that of 2011	Growth rate in 2012 compared with 2011
Total number of households living inside nature reserves	4377	4421	44	1.01
In which: Villages inside nature reserves	3973	4008	35	0.88
Villages outside nature reserves	404	413	9	2.23
Total population living inside nature reserves	16727	16972	245	1.46
In which: Villages inside nature reserves	15268	15491	223	1.46
Villages outside nature reserves	1459	1481	22	1.51

Table 8.3 Planned investments, disbursement and completion of nature reserve engineering program in the 40 sample nature reserves (CNY 10,000).

Investment	Planned	Disbursed	Completed	Disbursement rate (%)	Completion rate (%)
Total investment	12925.06	13514.36	9546.70	104.56%	70.64%
In which: central government	11444.46	12244.46	8393.52	106.99%	68.55%
Local matching fund	1480.60	1269.90	1153.18	85.77%	90.81%

Compared with the investment in 2011, the total planned investment in 40 nature reserves was CNY 8.0959 million less in 2012; the decrease was at a ratio of 5.89%. While the disbursement rate of 2012 was 28.24 percentage points higher than that of 2011, the completion rate of 2012 was 10.2 points lower than that of 2011.

Investment from the central government continued to increase according to the analysis of funding sources. In 2012, central government investment in 40 sample nature reserves for Nature Reserve Project was CNY 114,4446 million, accounting for 88.54% of the total investment. Local matching funds was CNY 14.8060 million, 11.46% of the total and 12.79% of deduction. Compared with

that of 2011, the disbursement rate of the central investment and the local matching funds in 2012 increased by 27.99% and 17.81%, respectively.

In 2012, planned investment in conservation and restoration activities in 40 sample nature reserves was CNY 48.3830 million, or 37.43% of the total planned investment; planned investment in scientific research and advocacy was CNY 15.8320 million, or 12.25% of the total planned investment; planned investment in infrastructure projects was CNY 35.0106 million, or 27.10% of the total plan; investment plan in other activities was CNY 30.0050 million, or 23.22% of the total. It's noted that planned investment in conservation and restoration was

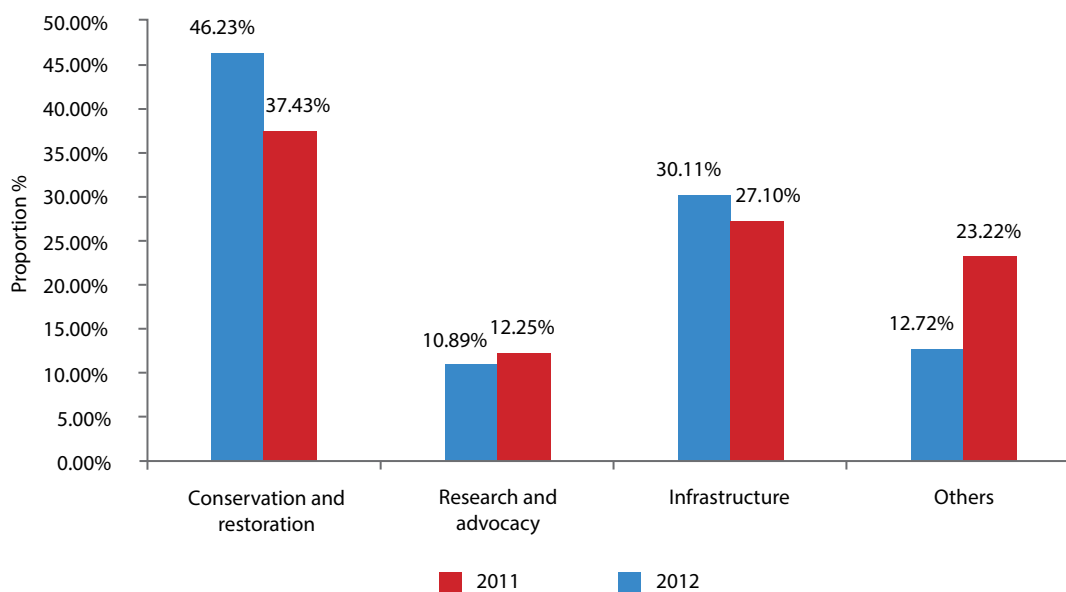


Figure 8.1 Proportion changes in investment plan in different construction projects in nature reserve development.

8.85% less than its portion in 2011, and the portion of infrastructure projects in 2012 was 3.01% lower than that of 2011; but the planned investment in scientific research and other activities increased by 1.36% and 10.50%, respectively. The above figures show that in 2012, infrastructure projects and conservation and restoration projects were still the priority of NRP, although their portion of investment decreased. In the meantime, the investment in scientific research and advocacy was strengthened. Figure 8.1 shows the changes of planned investment in the Nature Reserve Engineering Program.

In 2012, in the 40 sample nature reserves, CNY 36.4680 million of investment in conservation and restoration projects was completed, CNY 11.0157 million of investment in scientific research and advocacy project was finished, CNY 22.3469 million of investment was spent on infrastructure projects and CNY 25.6364 million was utilized for the completion of other projects. Figure 8.2 shows the actual expenditure.

Since the beginning of the NRP, from 2001 to 2012, the cumulative investment plan in 40 sample nature reserves has been CNY 1.672 billion, in which CNY 1.343 billion came from the budget of central government, accounting for 80.32% of the total plan; local matching funds was CNY 329 million, or 19.68% of the total. The cumulative disbursement funding was CNY 1.457 billion, which makes the disbursement rate reach 87.14%, in which the disbursement rate of central government investment was 94.72% and that of local matching funds was 56.18%. In the same time period, the cumulative completed investment was CNY 1.222 billion and the completion rate was 83.87% (Figure 8.3).

### 8.2.2 Implementation

In 2012, the main projects implemented in 40 sample nature reserves were:

1. Construction of conservation and restoration facilities. Twenty-one protection stations were newly set up; 6 protection stations were

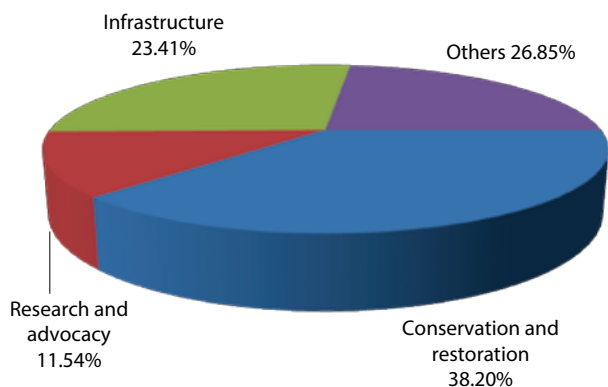


Figure 8.2 Proportion of expenditure on construction projects in 40 sample nature reserves.

rebuilt; 3 wildlife rescuing stations were newly established; 7276.3 mu of construction work was completed; 501.7 ha of habitats was improved; 2 artificial caves and 668 mu of animal houses were built; 58 km of firewalls and 99.1 km of fences were set up; 4 outlook towers for fire prevention were built; 53 border monuments, 2021 boundary posts and 1227 information plates were set up; and 842.0 ha of cofferdams was constructed.

2. Construction of research, monitoring and advocacy facilities. One bird banding station, 3 meteorological observation stations, 4 hydrometric and water quality monitoring stations, 1 key species monitoring spot and 4 ecological positioning stations were built. The total construction area was 1365.2 mu. A total of 87 permanent sample plots were newly established; 348.27 km of permanent sample routes were identified; 280 mu of research buildings and 1700 mu of advocacy buildings were newly completed.
3. Infrastructure construction. 645.3 km of patrolling trails, 4 management and protection ports were newly established; and 210 mu of office was built for Nature Reserve

management bureau (branch bureaus and local stations).

Since the beginning of the Nature Reserve Engineering Program in 2001, the achievements of conservation and restoration projects in the 40 sample nature reserves include: 279 protection stations that have been newly established, reconstructed or improved and expanded; the total construction area was 71,990.1 mu; cumulatively 39 wildlife rescuing stations were set up, with a total land construction area of 61,876.0 mu; 23 pest and disease control and quarantine stations were built, with a total construction area of 3285.0 mu; the total area of improved habitat was 32,520.9 ha, with the construction of 16 artificial caves, 18,541.0 mu of animal houses, 963.8 km of biological fire-resistant belt, 1672.9 km of firebreaks, 1390.2 km of fences, 377.6 ha of nursery gardens of rare plant species, 122 outlook towers for fire prevention, 2086 boundary monuments, 15,774 boundary posts, 3892 information plates, 19,529.3 ha of cofferdams, and 113.0 km of protection forest (grass) belts.

The construction of scientific monitoring and advocacy facilities has made following progress in 40 sample nature reserves: cumulatively 9 bird banding stations have been set up with a construction area of 1861.0 mu; 59 ecological positioning monitoring stations with a construction area of 10,163.5 mu; 52 meteorological stations with a construction area of 7333.7 mu; 6 soil monitoring stations with a construction area of 3260.0 mu; 31 hydrometric and water quality monitoring stations with a construction area of 537,565.1 mu; 65 key species monitoring stations with a construction area of 6568.0 mu; 39 terrestrial wildlife-borne infectious diseases monitoring stations with a construction area of 2711.0 mu; 1247 permanent sample plots, 3042.2 km of permanent sample routes, 33,046.4 mu of scientific research buildings and 44,663.0 mu of

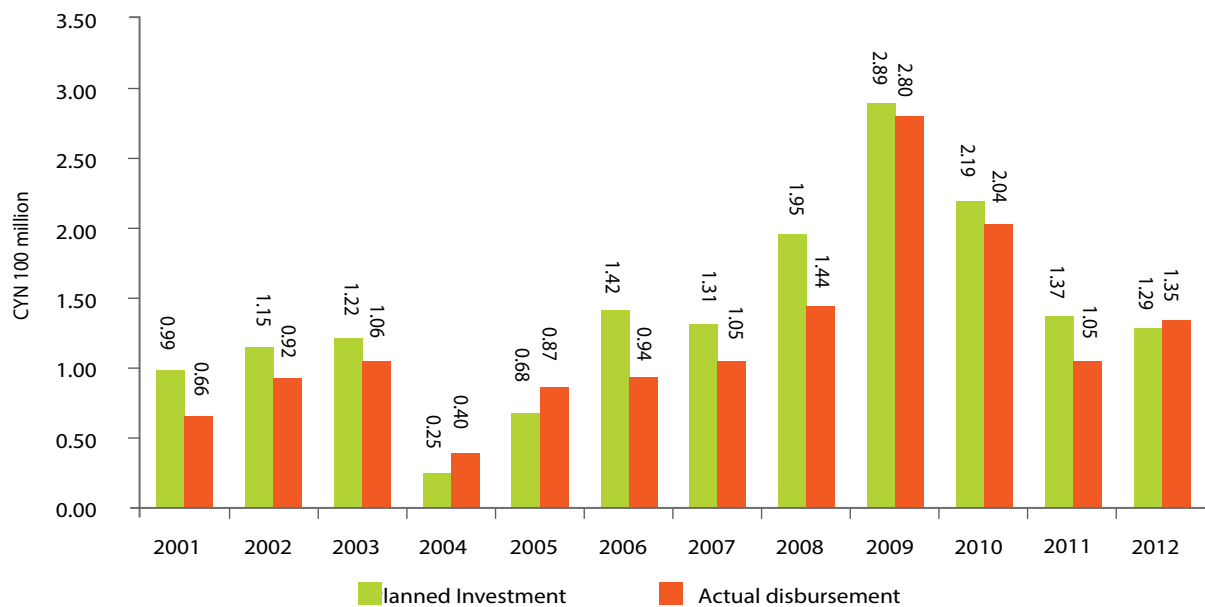


Figure 8.3 Capital investment in construction in sample nature reserves, 2001-2012.

buildings for advocacy. In addition, cumulatively 2986.4 km of new patrolling trails was built, 16 management and protection ports were set up, and 90,223.6 mu of offices were constructed for nature reserve management bureaus (branch bureaus and stations).

## 8.3 Social, economic and ecological benefits of the Nature Reserve Development Program

### 8.3.1 Social benefits

#### a. Various means of advocacy and education with remarkable effects

In 2012, 8.2821 million people went to the 40 sample nature reserves for teaching, visiting or tours; in which 5.7975 million were tourists, or 70.00% of the total. The number of visitors for teaching, visiting and tour increased by 13.18% in 2012 compared with that of 2011, and it was 5.12 times more than that of 2000 when NRP started, with an average annual growth rate of 28.68%. Since the beginning of NRP, the contents and coverage of advocacy and education programs

have been enriched and expanded continuously, and the effects are showing gradually (Figure 8.4).

Nature reserves adopted various forms of advocacy with rich contents. As reflected by the nature reserve questionnaires, in 2012, there were 39 sample nature reserves which carried out different types of education and advocacy activities, including: 1) thematic activities such as the Flower Expo; 2) celebration activities during important memorial days or festivals, such as World Wetland Day, Earth Day, Bird-loving Week, etc.; 3) lectures and exhibitions on environmental protection; 4) Internet and TV-based advocacy and awareness raising activities to disseminate knowledge of ecological protection; 5) depending on the capacity of nature reserves, they prepared advocacy posters, billboards, brochures and calendars, and some even opened wetland museums for free, etc. All achieved very good effects.

As reflected by community participation and effects of advocacy, it's obvious that there was a high involvement of communities that ensured



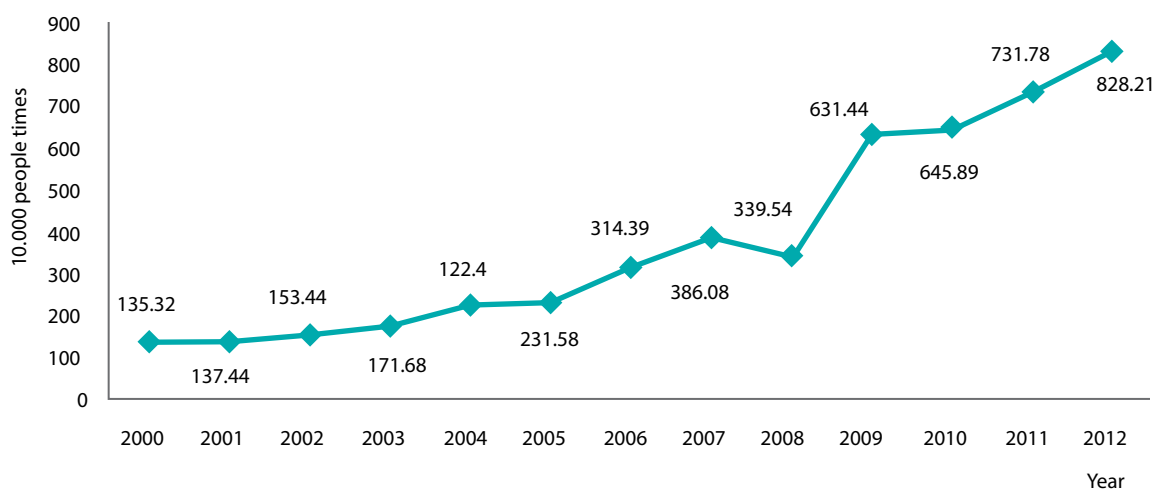


Figure 8.4 Visitors received by the 40 sample nature reserves for advocacy and awareness-raising activities.

the effects of advocacy activities. Among the 690 households who filled out the household questionnaires, 89.86% confirmed that they knew about advocacy activities carried out by nature reserves, and 61.59% of households had participated in relevant activities. The effects of advocacy activities were tangible, with 82.75% of households getting to know the Regulation of Nature Reserves of the People’s Republic of China; among which 15.80% said they knew almost all the contents, and 66.38% households knew some of the contents.

Looking at the ways that households got relevant information and knowledge, 73.76% believed advocacy activities organized by nature reserves were the main information sources, 34.49% learned from TV programs, 4.49% and 4.35% of households learned from the Internet or newspapers and magazines, and 5.51% of households got the information from flyers and by presentations from local officials. When asked about their attitudes and reaction towards illegal activities, 88.26% of households’ answered that they would stop the activity or report to management agencies. The intensive and strong advocacy activities organized by nature reserves to raise awareness

of the Regulation of Nature Reserves and related laws and policies on ecological protection have definitely strengthened communities’ legal sense, and enhanced their pro-activity in stopping illegal activities.

**b. Employment opportunities were somehow fewer, with the major sector being tourism service**

In 2012, there were 51,428 job opportunities provided by the 40 sample nature reserves to the nearby regions, 641 fewer than that of 2011, at a deduction ratio of 1.23%; in which, 9058 jobs were in construction activities in nature reserves, 13,322 jobs in income generating activities and 29,048 jobs were in business dependent on economic activities in nature reserves. Compared with the period before NRP began, in 2012, the sample nature reserves provided 287.17% more job opportunities to the society, leading the overall trend of employment increase at an annual rate of 13.02% (Figure 8.5). In 2012, the reason for fewer employment opportunities offered by nature reserves was that there was a sharp decrease of jobs in one of the nature reserves due to ongoing construction projects of ring roads; tourism service facilities and others had been completed by the

end in 2011, and there was a big drop in new construction projects. As a result, the jobs offered by that nature reserve were 950 fewer in 2012 than in 2011, a drop of 18.48%. Figure 8.6 shows the structure of employment opportunities provided by nature reserves in 2012.

If categorized by sectors of jobs provided by or dependent on nature reserves, it can be found that in 2012, 26,333 jobs were in tourism services, 51.21% of the total; 55,391 were in business services, 10.48% of the total; 4,989 were in farming activities, or 9.70%, 4,862 were in animal husbandry, or 9.45%; 1,585 were in industrial production, or 3.08%; and 8,268 were in other sectors, or 16.08%. The above data make it clear that tourism service is the main sector that provides job opportunities. Compared with that of 2011, the number of jobs in animal husbandry, farming, tourism services, industrial production and business services all increased to some extent: the job growth of farming, tourism services and business services were 17.89%, 2.76% and 13.30% respectively.

Analysis on the employments of communities in jobs offered by or dependent on nature reserves showed that in the 69 sample village, 3,248 rural

farmers got jobs in 2012. Figure 8.7 shows the jobs structure on sample villages in jobs provided by or dependent on nature reserves. Compared with that of 2011, the number of jobs dependent of nature reserves was 65 less. The number of farmers involved in construction, tourism souvenir processing, transportation and other business reduced by 42, 2, 56 and 108 people respectively. However, there was an increase in the number of farmers involved in tourism, catering, and tour guiding services, respectively 30, 91 and 22 people more than that of 2011. The number of households running family hotel was 24 more than that of 2011.

According to the household questionnaire collected from 690 rural households, there were 77 households whose family members get jobs in nature reserve related-activities, 112 people in total, which accounts for 52.09% of total household labor force. Most of them were involved in construction works inside nature reserves, collection and marketing of local and specialty products, seedling nursery and marketing, tour guiding, catering, hotel services, forest ranging, information collection and resource management, etc.

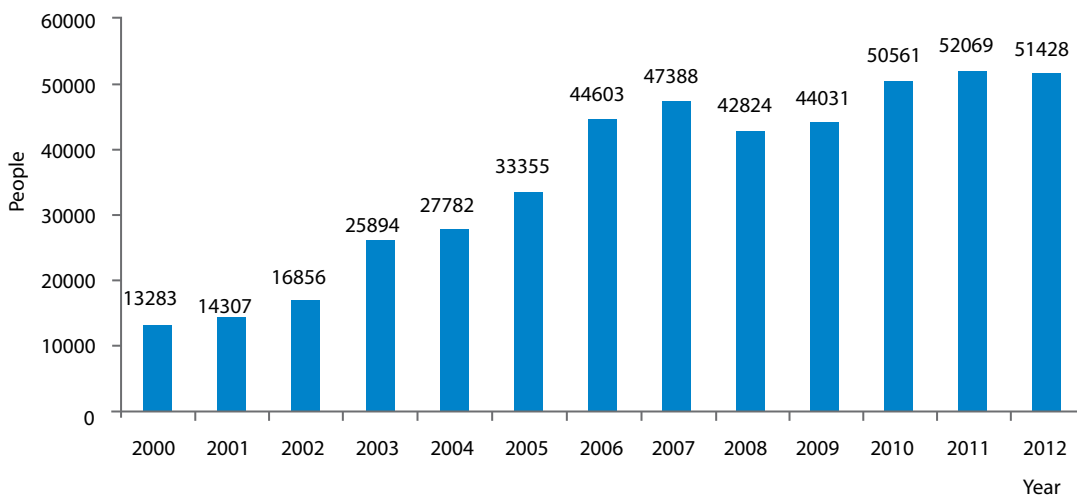


Figure 8.5 Employment provided by the 40 sample nature reserves, 2000–2012.

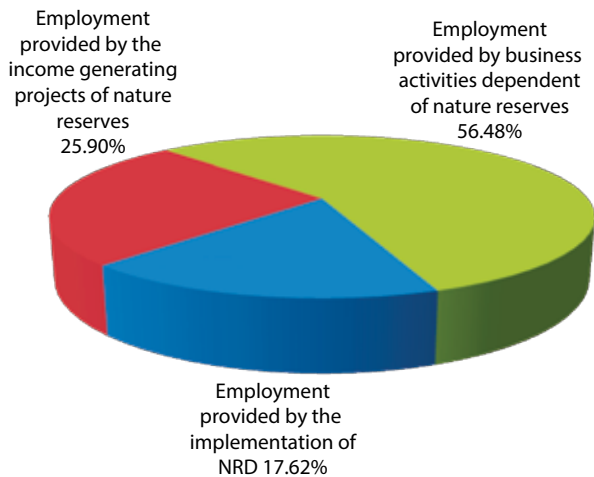


Figure 8.6 Composition of employment provided by the 40 sample nature reserves.

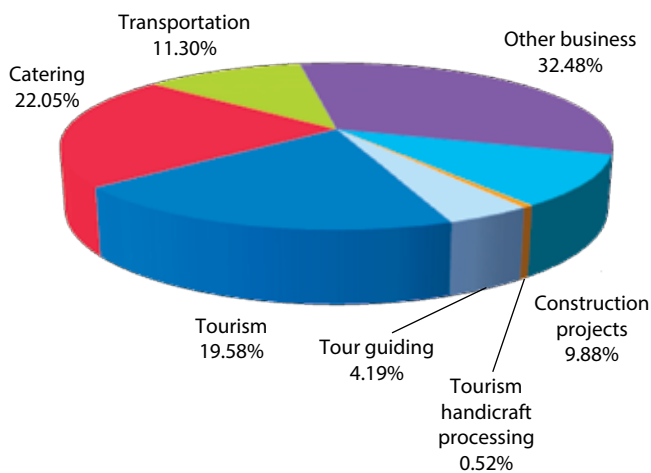


Figure 8.7 Structure of jobs dependent on nature reserves in the 69 sample villages

### c. Income growth of employment was slightly slower

The NRP has provided job opportunities to local communities and helped increase their income level. In 2012, CNY 626 million of community income was generated dependent of the 40 sample nature reserves, CNY 43 million less than that of 2011, at a decrease of 6.37%. Compared with the

year 2001 when NRP started, community income from employment in nature reserves or dependent of nature reserves was 6.83 times more, with an annual growth rate of 20.57% (Figure 8.8). The structure of income dependent of nature reserves can be found in Figure 8.9.

The data of community income from nature reserves or dependent on nature reserves show that in 2012 the total income of community employment dependent on nature reserves was CNY 54.6420 million, CNY 6.2801 million less than that of 2011, at a rate of 10.31%. Structural analysis of income sources demonstrated that the main income generating activities in sample villages were tourism, transportation, catering and family hotels. While the income of transportation and other business decreased by 45.74% and 2.48%, respectively compared with that of 2011, income of tourism, family hotels, tourism handicraft processing, catering, tour guiding and construction projects have gone up by 7.91%, 28.03%, 13.98%, 23.07%, 15.46% and 1.09%, respectively. Figure 8.10 shows the income sources of community employment in jobs dependent on nature reserves.

In addition, the comparison between villages inside and outside nature reserves showed that in 2012, the total income dependent of nature reserves in villages inside nature reserves was CNY 32.5350 million, and it was CNY 1.2809 million more than that of 2011, with a growth of 4.10%. This amount of income takes up 7.75% of the total income of villages inside nature reserves. The income dependent on nature reserves in villages outside nature reserves was CNY 22.1070 million, 5.23% of the villages' total income, but CNY 7.5610 million less than that of 2011, with a decrease of 25.49%. The average per capita income dependent on nature reserves in villages inside nature reserves was CNY 8500 more than that of villages outside nature reserves; the number of visitors received by family hotels in villages inside nature reserves

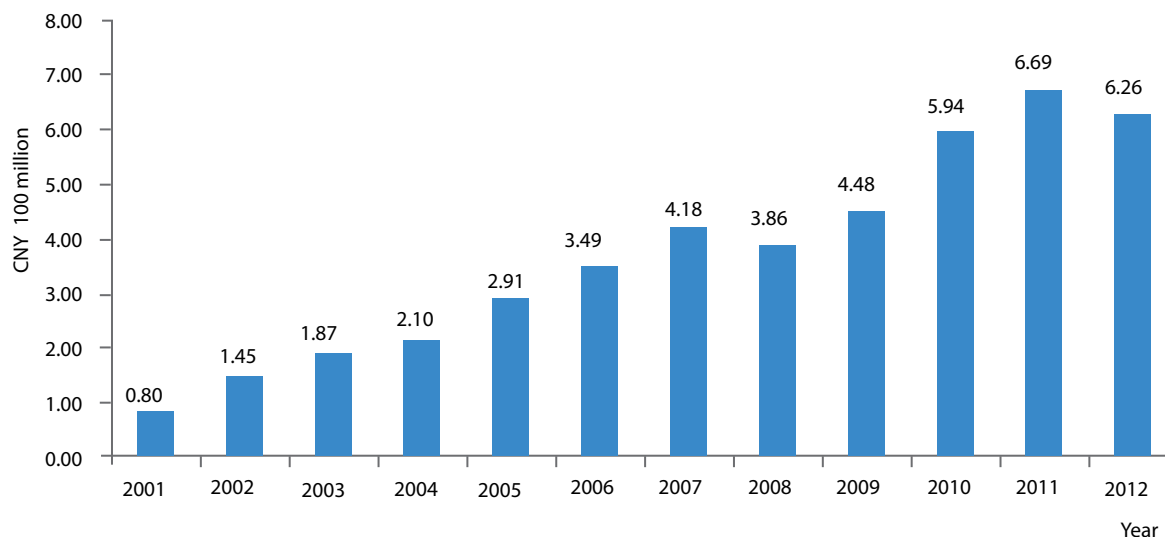


Figure 8.8 Income changes of employees in jobs provided by or dependent on sample nature reserves, 2001–2012.

was also bigger than that in villages outside nature reserves at 586 visitors per household per year, which created more income for villages inside nature reserves – CNY 22300 per household on average.

According to the household questionnaire, the total household income of the 77 families whose family members get jobs dependent on nature reserves was CNY 3.9339 million in 2012, of which CNY 2.1287 million was attributed to employment in or dependent on nature reserves, accounting for 54.11% of the total income. The average annual income of the 112 farmers who were employed in jobs dependent on nature reserves was CNY 19,000.

**d. The number of poor households has decreased as a result of efforts in promoting community economy**

In 2012, the total economic revenue of the 69 sample villages was CNY 842.8481 million, CNY 169.2117 million more than that of 2011, at a growth rate of 25.12%. The economic revenue of the 30 villages inside nature reserves was CNY 419.8802 million, a growth rate of 35.81% compared with that of 2011. The revenue

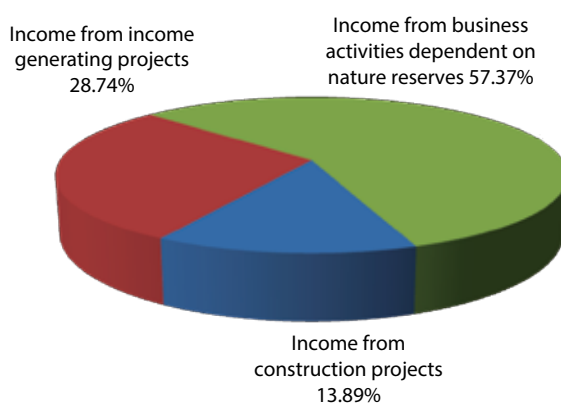


Figure 8.9 Structure on income of jobs provided by or dependent of the 40 sample nature reserves.

of the 39 villages outside nature reserves was CNY 422.9679 million, with an increase of 16.05% compared with that of 2011. The revenue growth rate of villages inside nature reserves was 19.76 percentage points higher than that of villages outside nature reserves. Table 8.4 shows the income sources of sample villages.

Compared with that of 2011, the major factor contributing to the fast growth of revenue of

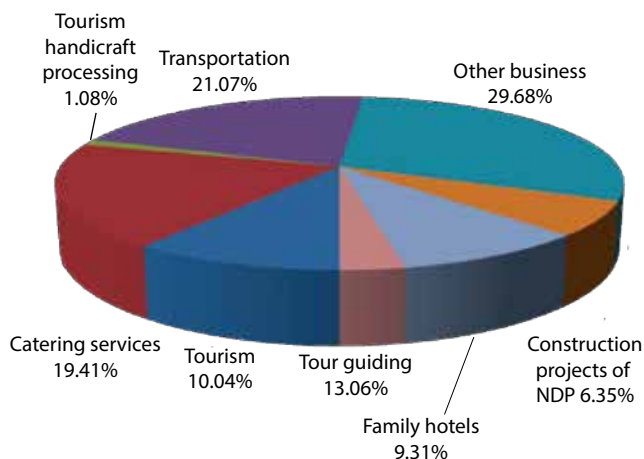


Figure 8.10 Structure of income dependent on nature reserves in the 69 sample villages.

villages inside nature reserves was the rapid growth of fisheries revenue, which was 60.13%, and the portion of fisheries revenue as part of the total revenue in the sample villages was 58.35% in 2012. The reason for this remarkable increase in fisheries revenue should be attributed to a big harvest in Beicheng Village in Changdao Nature Reserve in Shandong Province. Boosted by a big jump in the seafood price, the total fisheries revenue of the village reached CNY 180 million in 2012, CNY 96.7430 million higher than that of 2011, with a growth rate of 116.20%. The revenue growth in Beicheng Village accounted for 57.17% of the total revenue growth in the 69 sample villages in 2012; by excluding this factor, the total economic

revenue of the 69 sample villages in 2012 was CNY 662.8481 million, CNY 72.4687 million more than that of 2011, at a growth of 12.27%.

The information of per capita rural net income in sample villages revealed that in 2012 the per capita rural net income in the 69 villages was CNY 5631.05, CNY 651.81 more than in 2011, at a growth rate of 13.09%, in which the per capita net income of rural residence in villages inside nature reserves was CNY 5695.25, with an increase of CNY 509.65 compared with that of 2011, at a growth rate of 9.83%. The per capita net income of rural residence in villages outside nature reserves was CNY 5581.66, which was CNY 761.16 higher than that of 2011, with a growth rate of 15.79%. The per capita net income of villages inside nature reserves was CNY 113.59 more than that of villages outside nature reserves. Although the rural per capita net income in sample villages was higher than that of the previous year, it was still less than the national average which was CNY 7917 in 2012, and the growth rate in sample villages was only 71.13% of the average growth rate across the country.

Poverty reduction in sample villages made progress in 2012. According to the national poverty line of CNY 2300 (constant price of 2010), in 2012, there were 3275 poor households in the 69 sample villages, which was 15.21% of the total households.

Table 8.4 Sources of economic revenue in 69 sample villages (CNY 10,000).

Year	Agriculture	Forestry	Husbandry	Fishery	Industry	Migration work	Other revenue
2011	17401.18	6016.47	7370.18	16420.05	5629.72	8636.68	5889.36
2012	18665.86	6271.33	8250.41	26293.62	6911.10	12040.35	5852.14
Increase (or decrease) between 2012 and 2011 (%)	7.27	4.24	11.94	60.13	22.76	39.41	-0.63

Compared with that of 2011, the number of poor households reduced by 87, and its proportion was 0.71 points lower. In 2012, there were 1200 poor households in the 30 villages inside nature reserves, 79 household fewer than in 2011, and its proportion of total households went down to 17.93% from 19.49% in the previous year of 2011, with 1.56 percentage points. There were 2075 poor households in the 39 villages outside nature reserves, 8 households fewer than in 2011; the proportion of poor households decreased to 13.99% from 14.32% of 2011, with 0.33 percentage point lower.

**e. Family income of community residence increased, and farmers' livelihood has been further enhanced**

A total of 69.86% of rural households has benefited from family income growth in 2012 compared with that of 2011, as reflected in the 690 household questionnaires. The reasons for income increase were mainly: more opportunities for migration work, increase in wages, growth of price of agricultural produce and economic crops, good harvest, more visitors that led to increased income of tourism services such as family hotels, restaurants and transportation, more government subsidies, etc. Among the family income of 2012, 6.28% was generated from resources inside nature reserves; in particular, the proportion of this source of income to the total family income in sample villages inside nature reserves was higher than that of villages outside of nature reserves, as much as 5.08 times that of the latter. It proves that strengthening nature reserves can not only contribute to natural environment protection, but also bring benefits to rural households living inside nature reserves. At household level, the average income of each rural household generated from nature reserves resources in sample households inside nature reserves was 8200, while the income from the same sources in the sample households living outside nature reserves was only CNY 1100,

with the former was as much as 7.45 times of the latter, leaving the latter far behind.

The expenditure of 690 sample households accounted for 48.92% of their total family income of 2012; of which, daily living expenditure took up 41.91%, productive expenditure was 19.30%, hospitality cost was 9.76%, education for children was 9.56%, medical costs were 8.28%, and others accounted for 11.19%. By deducting the expenditure, 69.86% of households confirmed there would be surplus of their income, 18.84% of households had a balanced budget, but 11.30% households couldn't make the ends meet.

Among the 690 sample households, 90.00% sample households believed that their living standard had improved compared with several years before, 2.03% didn't experience any changes, while 7.97% of households reported that their living standards went down. Reasons for increased living standard were: 265 households reported the increased wages of migration work; 228 households got more income from agriculture; 167 households reported the increase in government subsidies; 97 households attributed it to lower and exempting taxes and fees; 45 households believed it was a result of promoting industries of special characteristics by nature reserves that help raise family income; and 136 households thought that ecological tourism dependent on nature reserves provided more income; the yield of economic crops was bigger and the unit price went up, etc. Compared with the previous years, rural households' living conditions have improved. Among the 690 sampled households, 205 households have rebuilt or newly built houses, 110 households got access to tap water, 80 households started to use natural gas or bio-gas for cooking, 178 households purchased new transportation vehicles, 282 households bought color TVs, refrigerators and other electric appliances, 52 households reported either getting access to Internet, or building new livestock raising

farms, or opening rural tour gardens and hotels, etc. Only 71 households reported no marked changes in their living conditions.

The analysis of sample households' social insurance revealed that in 2012, 100% of the 690 sampled households participated in the rural medical cooperation insurance and 90.72% got benefits. The participation rate of rural pension insurance was 80.87%; the other 19.13% of households claimed that they didn't participate in the rural pension system due to either limited economic capacity or lack of understanding of relevant policies.

#### **f. Income of migration work keeps increasing**

In 2012, the total income of migration in the 69 sample villages was CNY 120.4035 million, 14.29% of the total economic income of the sample villages. It was CNY 34.0367 million more than that of 2011, with an increase of 39.41%; in which, income growth in the villages inside nature reserves was CNY 4.4422 million, with a growth rate of 16.81%; and the income growth in villages outside nature reserves was CNY 29.5945 million, at a growth rate of 49.37%.

Among the 690 sampled households, 294 households reported family members migrating to work outside, or 42.61% of the total sample households. The total number of migration workers was 502 and the total migration income was CNY 6.9537 million, contributing 43.67% of the total family income. The per capita migration income was CNY 13,900. Among the 294 households, 255 households reported an increase in migration income in 2012 compared with that of 2011, 86.74% of households had migration workers; and the growth of migration income was CNY 2.6081 million, or CNY 10,200 per household. 22 households claimed a reduction of migration income in 2012 compared with that of 2011, or 7.48% of the total households with migration workers. The migration income decrease

was CNY 0.4051 million, or CNY 18,400 per household on average. 17 households reported no significant changes in migration income between 2012 and 2011, accounting for 5.78% of the number of households with migration workers.

### **8.3.2 Ecological a benefits**

#### **a. The number of wildlife species inside nature reserves increased and the species population has steadily grown**

Through a specific survey, patrolling and questionnaire collection, in 2012 it was found that the species of wildlife in nature reserves increased, the population of species further enlarged and the ecological environment continued to improve. In 2012, there were 664 major wild animal species in the 40 sample nature reserves; of which 75 are under first class state protection, and 69 species of wild animals are listed in the national 15 priority wild animals for protection. There were 776 major wild plant species, of which 32 are under the state first protection, and 521 have been listed in the 15 classes of priority wild plant protection. Compared with that of 2011, the number of major wild animals in the sample nature reserves went up by 6; the number of major wild plants increased by 9.

According to the feedback from nature reserve questionnaires in 2012, new species of wild animals were discovered in 7 sample nature reserves; of which, in Fanjing Mountain National Nature Reserve in Guizhou 2 brachy-limbed mogophrys and 56 Siberian spiny loach were discovered in specific survey and as observed by farmers; in Wolong National Nature Reserve in Sichuan Province, 10 wolves were spotted by farmers; in Jingtang Mountain National Nature Reserve in Jiangxin Province 10 tawny pipits were found thanks to the joint survey with scientific research institutes; in Zhanjiang Mangrove National Nature Reserve in Guangdong Province, 4 spoon-billed sandpipers were found during resource patrolling; in Xihu National Nature Reserve in Dunhuang of Gansu Province, 6 Xinjiang ground-

jay were discovered also during resource patrolling; 1 black stork was found during resource patrolling in Xiaowutai Mountain National Nature Reserve in Hebei Province; and 55 Eurasian bullfinches were discovered during the bird-watching and photographing activities in Yellow River Delta Nature Reserve in Shandong Province.

New wild plant species were found in 6 sample nature reserves; in which, of Fanjing Mountain National Nature Reserve in Guizhou Province, 15 plants of red-flower *Schisandrae Chinensis fructus* were discovered during resource patrolling; 15 plants of marsh orchids with purple dots were found in Mount Tomor National Nature Reserve in Xinjiang during resource patrolling; 53 plants of festival quinoa were found in Zhanjiang Mangrove National Nature Reserve in Guangdong Province during resource patrolling; 100 plants of *Habenaria dentate* were discovered during specific survey in Panzhuhua National Nature Reserve in Sichuan Province; *Ceratoides Arborescens*, Alpine *Aletris*, *Adoxa*, rhizome of Japanese butterbur, *Lonicera minuta* were discovered in Gahaizecha National Nature Reserve in Gansu in a specific survey (no number of plants was reported); and *Artemisia aksaiensis* was found in specific survey in Xihu National Nature Reserve in Dunhuang in Gansu Province, with no detailed report of the number of plants.

According to the nature reserve questionnaires, in 2012, 27 nature reserves organized 29 specific resource surveys; in which, 20 sample nature reserves conducted wildlife specific surveys (15 on animals, 5 on plants); 3 sampled nature reserves carried out resource inventory survey, 2 organized a forest resource inventory, 1 implemented a wetland resource survey, 2 organized an integrated scientific investigation, and 1 conducted a biodiversity survey. It was found, based on the survey results, that building nature reserves can effectively protect and improve the habitats of wildlife, help the number of species increase continuously, and guarantee the steady growth of

wildlife population. Specific surveys and the main findings conducted in sample nature reserves in 2012 can be found in Table 8.5.

The data of local people's reporting of wild animals showed that among 690 sampled households, 345 believed that the frequency of seeing wild animals increased, 50.00% of the total sample; 120 households reported fewer times of spotting wild animals, 17.39% of the sample; and 197 households didn't think there was any change in the intensity of spotting wild animals, or 28.55% of the sample. Just 28 households didn't answer this question at all, or 4.06% of the total sample.

#### **b. Wildplant of minimum population was actively protected.**

According to the nature reserve questionnaires, among the sample nature reserves, there were 23 nature reserves that reported the existence of minimum population species, (in total 89) in which 70 were wild animal species including Guizhou golden monkey, *Ovophis monticola*, Przewalski's Gazelle; and 89 species were wild plants, including *Cunninghamia lanceolata*, *Ulmus elongate*, and *Horsfieldia willd.* All the 23 nature reserves where wild plant with minimum populations were found reported that necessary protection and management methods were applied, including: setting up protection plots either on the spot or in other places; through wildlife survey, infrared photo taking and inventory surveys to define the exact border of the habitat; exploration of artificial reproduction via a breeding nursery; setting up protection facilities, forbidding the collection and digging of wild plants; perfecting regulations to rescue the wildlife in compliance with laws; capacity building of scientific research and providing technological support; establishing archives of wild plant with minimum populations; strengthening advocacy and raising awareness of local communities; setting up advocacy boards, etc.

The living environment of wild plants with minimum populations has improved and their



Table 8.5 Wildlife specific surveys completed and major conclusions in sample nature reserves in 2012.

Nature Reserve	Title of survey	Survey conclusion
Mangshan National Nature Reserve, Hunan Province	Specific Survey of <i>Ovophis monticola</i> in Mangshan Mountain	Population of <i>Ovophis monticola</i> is about 1000, more than doubled the population size discovered in 2002 survey.
Wufeng Houhe National Nature Reserve, Hubei Province	Wild Monkey Resource Survey	2 groups of macaque's population were found, with one group of about 30 and the other group of about 100. Structure of the groups was reasonably balanced with both adults and young macaques
Zhanjiang Mangrove National Nature Reserve, Guangdong Province	Synchronous Survey of Wetland and Water Birds in Asia	The watering water birds have increased to 11,661 of 40 species from the previous records of 7493 of 39 species
Qinghai Lake National Nature Reserve, Qinghai Province	Wetland Birds and Endangered Species Monitoring	94,000 birds of 191 species, 864 Przewalski's gazelle, with a steady population
Wuyi Mountain National Nature Reserve, Fujian Province	Survey of Minimum Population Species in Fujian Province	Species of minimum population were found and under good protection, including common camptotheca Fruit, <i>Maddenia fujianensis</i> , <i>Magnolia sieboldii</i> , <i>Rubus in Fujian</i> , <i>Wuyishan Rhododendron</i> , etc.
Panzhuhua National Nature Reserve, Sichuan Province	Specific Survey of Yunnan Phoenix Tree	Biodiversity is well maintained, and 100 plants of <i>Habenaria dentate</i> were discovered
Gahaizecha National Nature Reserve, Gansu Province	4 <sup>th</sup> National TCM Resource Survey	Rich medical plant species in the nature reserve. Newly discovered species are: <i>Ceratoides arborescens</i> , alpine aletris, <i>Adoxa</i> , rhizome of Japanese butterbur, <i>Lonicera minuta</i> .
Xihu National Nature Reserve of Dunhuang, Gansu Province	Specific Survey of Wild Camels	The living area of wild camels has been significantly expanded, and the population has increased to 34 (often seen) from 13 (sporadically seen) at the beginning of this century
Shengjinhu National Nature Reserve, Anhui Province	Synchronized Survey of Wintering Water Birds	Species of wintering water birds increased to 36 species in 2012 from 34 species in 2011, but the number of birds recorded in 2012 was 75000, decreased from 87000 of 2011
Tianma National Nature Reserve, Anhui Province	Survey of Rare Orchids	Orchid plants are diminishing, and rare species are in urgent need for breeding and moving to other places for protection

population have remained steady or kept growing, thanks to methods to eliminate or mitigate factors leading to extinction or unfavorable to the species population. The nature reserve questionnaire revealed that four sampled nature reserves reported effective protection of wild plants with minimum populations, and these nature reserves are: Dayao Mountain National Nature Reserve in Guangxi, Jiulong Mountain National Nature Reserve in Zhejiang, Baotianman National Nature Reserve in Henan, and Liupan Mountain National Nature Reserve in Ningxia. Another 20 sampled nature reserves, such as Mangshan National Nature Reserve in Hunan and Wuyi Mountain National Nature Reserve in Fujian, haven't achieved effective protection of all the wild plants of minimum populations in their territory, among which two nature reserves have reached the protection level of 98%, four reached 90% of protection, another four were able to protect 80% of those discovered, three nature reserves achieved 60% of protection, two achieved 30–50% of protection, four were only able to protect 10% and one nature reserve effectively protected only 7.6% of wild plants with minimum populations.

Among the 120 species of extremely small populations listed in the National Rescuing and Protection Engineering Planning of Wildlife Species of Minimum Population (2011–2015), 26 have been found in 23 sample nature reserves.

#### **c. Size of forest land remained stable and forest quality has been increasing**

In 2012, the total woodland area in the 40 sample nature reserves was 2.5791 million ha, of which forest area was 1.2222 million ha, 47.39% of the total woodland, and 28.56% of the total territory of sample nature reserves. Compared with that of 2011, the forest area in sample nature reserves remained rather stable, with only some minor changes of the size of woodland and size of forest area in Fanjing Mountain the National Nature Reserve in Guizhou Province. Due to

the occupation of forest area for constructing a highway surrounding Fanjing Mountain, forest area in Fanjing Mountain National Nature Reserve decreased by 24.00 ha from that of 2011. Fortunately because of plantation project and natural restoration of discarded farmland, the forest area in Fanjing Mountain National Nature Reserve was 81.00 ha more than that of 2011.

In 2012, the living wood growing stock in sample nature reserves was 144.3817 million m<sup>3</sup>, in which forest stock was 140.0582 million cubic meters. Compared with that of 2011, the cumulative growing stock increased by 0.74%, forest stock increased by 0.57% and unit forest stock increased by 0.64 m<sup>3</sup> per ha.

#### **d. Ecological environment has been further restored and improved**

In 2012, the ecological environment in sampled nature reserves showed further improvement. Excluding the 12 nature reserves where no windy weather or no such statistics, the average number of days with strong wind in the other 28 nature reserves was 22–23, 3 days less than that of 2011. Excluding the 29 nature reserves where no sandstorms have occurred or there were no such statistics, the average number of days of sandstorms in each nature reserve was 13–14, cumulatively 9 days less than that of 2011. Taking out the four nature reserves without available rainfall information, the average precipitation in the other 36 sample nature reserves was 1137.73 mm, or 28.73 mm more than that of 2011.

Since the beginning of NRP, the cumulative size of restored wetland in sample nature reserves have been 23565.00 ha, in which 3374.00 ha, was completed in 2012. The cumulative size of degraded wetland was 11,231.20 ha with 7.00 ha added in 2012. Compared with that of 2011, in 2012, the size of newly restored wetland increased by 3035.00 ha, and in the meantime, the cumulative size of degraded wetland reduced by 33.00 ha.

In 2012, nine sample nature reserves were affected by invasive species, and the affected area was 4095.20 ha. Compared with that of 2011, the number of sample nature reserves affected by invasive species remained unchanged, while the affected area reduced by 754.00 ha, with a rate of 15.55%. Most of the nature reserves adopted proactive and effective methods to control the impacts of invasive species and effects have been achieved.

The main technology and methods are: 1) timely prevention by strengthening inspection and observation to stop invasive species from entering the territory; 2) active scientific research, bio-management and effective utilization of invasive species; 3) manual removal. Compared with 2011, only Wolong National Nature Reserve reported more sorts of invasive species, and only Zhanjiang Mangrove Forest National Nature Reserve in Guangdong and Panzhihua National Nature Reserve in Sichuan reported the trend of invasive species expansion on their territory.

Among the 690 sampled households, 568 believed that ecological environment had changed compared with that of before, 82.32% of the sample; 122 households didn't think there was any change, 17.68%. Among the 568 households who believed of some changes, 506 households thought local environment was much improved than before, 89.08% of the total number of households believing of environmental changes.

#### **e. Both the number of natural disasters and affected areas in communities of nature reserves reduced**

In 2012, 31 villages among the 69 sample villages were affected by natural disasters. The number of natural disasters was 64 and the affected area was 18731.86 ha. Compared with that of 2011, the number of natural disasters was 7 times less, and the affected area was 2656.17 ha smaller.

Except floods the impact of which deteriorated, the number of disaster occurrence and impacts of other types of disasters both went down.

Data of natural disasters in sample villages showed that in 2012, 26 droughts occurred in 19 sample villages affecting 16322.33 ha of farm land. Compared with that of 2011, the number of affected sample villages remained the same, but the number of disasters was 4 times less, and the affected area was 1693.37 ha less. 14 times of pest and diseases occurred in 9 sample villages affecting 1353.33 ha. Compared with that of 2011, the number of affected villages was reduced by 4, occurrence of disasters reduced by 6, and the affected area was 1617.67 ha less. 6 times of other types of disasters occurred in 4 sample villages with affected area of 185 ha. Compared with that of 2011, the number of affected villages went down by 1, the number of disaster occurrence decreased by 6, and the affected area was 143.50 ha less. 18 times of floods occurred in 13 sample villages with affected area of 871.20 ha, and the number of affected villages increased by 6 with affected area increasing by 798.37 ha, compared with that of 2011. Frequency of natural disasters occurred in sample villages can be found in Table 8.6.

Among the 494 households which returned valid household questionnaires, 239 households experienced yield increase of major crops in 2012, taking up 48.38% of the total valid sample; in which 25.94% of households attributed the yield increase to favorable weather with mild wind and sufficient rainfall, fewer diseases or pests.

#### **8.3.3 Economic benefits**

##### **a. The scale of investment in income generating activities has been further expanded, mainly concentrated in 3 nature reserves**

In 2012, the investment in income generating activities in sample nature reserves was CNY 917.733 million, CNY 166.626 million

more than that of 2011, with an increase of 22.18%. The biggest investment took place in 3 nature reserves, in which, investment of Changbai Mountain Nature Reserve in Jilin was CNY 460 million, accounting for 50.12% of the total investment; the investment of Yellow River Delta Nature Reserve in Shandong was CNY 226 million, 24.63% of the total investment; the investment of Fanjing Mountain Nature Reserve in Guizhou was CNY 169.26 million, 18.45% of the total. Excluding the above 3 sample nature reserve, the investment in income generating activities of other sample nature reserves was CNY 62.443 million, 6.8% of the total investment.

**b. Inputs on the third industry has been increasing continuously and ecological tourism services was the priority**

In 2012, the investment of sample nature reserves in primary industries was CNY 19.074 million, 2.08% of the total investment; investment in secondary industries was CNY 0.384 million, 0.04% of the total. The investment in tertiary industries was CNY 898.275 million, accounting for 97.88% of the total investment, showing that tertiary industry was the main investment area of nature reserves.

Compared with that of 2011, the investment of nature reserves on the tertiary industry kept augmenting with more investment in the amount of CNY 180.135 million, at a growth of 25.08%, and its proportion out of total investment increased by 2.27 percentage points. The investment in primary and secondary industry went down by CNY 6.49 million and CNY 7.019 million, respectively.

In 2012, the investment of sample nature reserves in husbandry activities was CNY 6.54 million, CNY 1.0721 million in planting activities, CNY 805.432 million in tourism services, CNY 1.5 million in industrial production at a proportion of 0.16%, and the investment in other income generating activities was CNY 77.31 million. Among the above activities, the investment in tourism services took up 87.69% of the total investment, evidence that tourism services was the key activities of investment in income generating activity in nature reserves. Figure 8.11 shows the investment structure of nature reserves in income generating activities. Compared with 2011, the investment in tourism services increased by CNY 159 million, at a growth rate of 24.61%. The investment in tourism services maintained sustained growth in recent years (Figure 8.12).

Table 8.6 Frequency and distribution of disasters in sample villages in 2011 and 2012.

Types of disasters	Year	Number of sample villages where disaster occurred				
		Total	In which: once	Twice	3 times	4 times and above
Droughts	2011	19	11	5	3	0
	2012	19	15	2	1	1
Floods	2011	7	2	4	1	0
	2012	13	9	3	1	0
Pest and diseases	2011	13	9	2	1	1
	2012	9	5	3	1	0
Others	2011	5	4	0	0	1
	2012	4	3	0	1	0

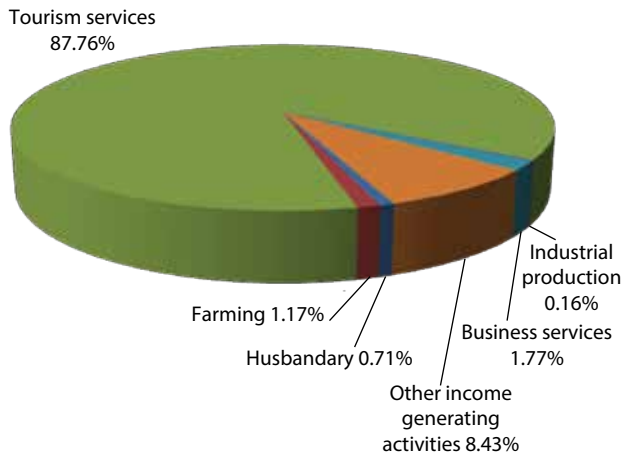


Figure 8.11 Structure of investments on income generating activities in sample nature reserves.

**c. Proportion of borrowed funds was increasing**

The sample nature reserves' investment in income generating activities in 2012 was CNY 917.733 million, in which, CNY 266.44 million was government financing, CNY 180.121 million was self-funded, and loans contributed CNY 371.56 million, and other sources including private investment was CNY 98.612 million. Compared

with 2011, the funding from government, borrowed funds and other sources increased by 8.49%, 48.59% and 53.71%, respectively, while self-raised fund decreased by 5.40% and the proportion of loans increased by 7.19 percentages. Government financing and borrowed funds were the major sources of funding, accounting for 29.14% and 40.49% of the total investment, respectively. The sources of investment in income generating activities in sample nature reserves can be found in Figure 8.13.

Excluding the three nature reserves with the biggest investment – Changbai Mountain Nature Reserve in Jilin, Yellow River Delta National Nature Reserve in Shandong and Fanjing Mountain National Nature Reserve in Guizhou – the total investment in income generating activities of the other sample nature reserves was CNY 62.443 million; of which, government financing accounted for 18.03%, self-funding was 67.34%, loans was 10.41% and funds from other sources took up 4.22%.

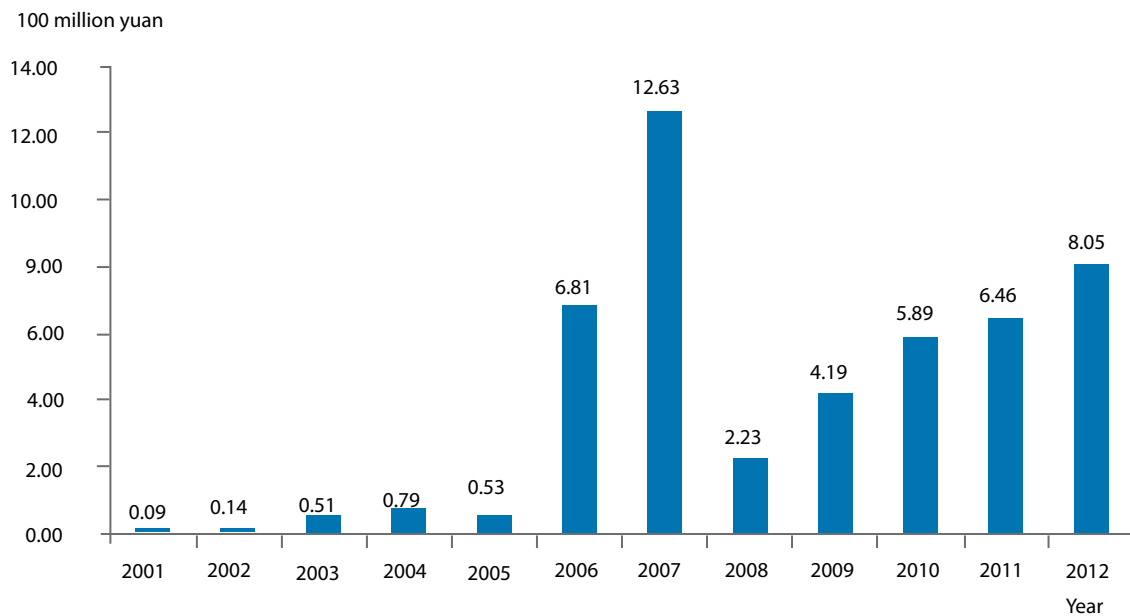


Figure 8.12 Investment in tourism services projects in sample nature reserves, 2001–2012.

#### d. The output value of income generating activities grew rapidly

The total output value of income generating activities in sample villages was CNY 1.097189 billion in 2012, increasing by 17.30% compared with that of 2011; in which, output value of the primary industry was CNY 55.847 million, accounting for 5.09%; output value of secondary industry was CNY 29.882 million, 2.72%; and output value of the tertiary industry was CNY 1.01146 billion, taking up 92.19%. Compared with 2011, the output value of primary and secondary industry increased by 0.76% and 19.98%, respectively, while the output value of secondary industry decreased by 19.19%. The proportion of the output value of the tertiary industry out of the total output value of income generating activities increased by 2.07 percentage points; while the proportion of primary and secondary industries went down by 0.84 and 1.23 percentage points.

Detailed analysis showed that within primary industries, the output value of planting tea and other materials for drinks was CNY 9.662 million, 0.88% of the total output value of all income generating activities; the output value of traditional Chinese medicine planting was CNY 10.72 million, 0.98%; output value of forest products collection was CNY 1.7 million, 0.15%; output value of flower planting was CNY 0.85 million, 0.08%; output value of terrestrial wild animal domestication and reproduction was CNY 90,000, 0.01%; output value of edible fungi, bamboo shoots and wild herbs planting was CNY 21.675 million, 1.97%; and output value of other activities was CNY 11.15 million, 1.02%.

Within secondary industries, the output value of artistic products made by carving natural plants was CNY 0.7 million, 0.06% of the output value of all income generating activities; output value of artistic products made from tree bark and reef

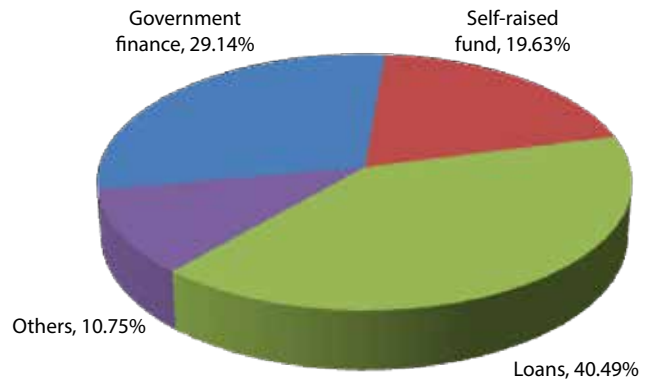


Figure 8.13 Sources of investments in income generating projects in sample nature reserves.

was CNY 0.458 million, 0.04%; output value of other activities was CNY 28.724 million, 2.62%. Within the tertiary industry, output value of tourism and hotels was CNY 504.294 million, 45.96% of the total output value of all income generating activities; output value of entrance tickets and other activities was CNY 507.166 million, 46.23%. The tertiary industry dominated by tourism was still the major income source in nature reserves.

Detailed analysis by sector showed that in 2012, the output value of animal husbandry activities in sample nature reserves was CNY 17.082 million, output value of farming activities was CNY 38.704 million, output value of tourism services was CNY 904.3711 million, output value of industrial production was CNY 28.3 million, output value of business services was CNY 65.944 million, and output value of other activities was CNY 42.788 million.

Among above sectors, the output value of tourism services took up 82.43% of the total output value of income generating activities in sample nature reserves, in which entrance ticket revenue was CNY 356.706 million, accounting for 39.44% of the sector total. Compared with 2011, the output value of tourism services, animal husbandry

and farming increased by CNY 179.08 million, CNY 5.576 million and CNY 39000 respectively, while the output value of industrial production, business services and other activities reduced by CNY 7.038 million, CNY 10.206 million and CNY 5.662 million respectively. The output value of tourism services increased by 24.69%, and its proportion of the total output value of income generating activities went up by 4.89 percentage points; of which, revenue of entrance tickets grew by CNY 53.988 million at a growth rate of 17.83%. Being the key engine of revenue increase, tourism services boosted the continuous growth of output value of income generating activities in sample nature reserves.

## **8.4 Nature reserves' capacity of scientific research and management further enhanced**

### **8.4.1. Rich achievements in scientific research with research capacity further enhanced**

In 2012, there were 890 research staff in the 40 sample nature reserves. The budget of scientific research was CNY 39.448 million, and the actual disbursement was CNY 32.328 million, making the disbursement rate 81.95%. There were 119 completed and ongoing research projects in 2012, and 51 outputs were completed. Compared with 2011, research funding increased dramatically by CNY 31.906 million and the number of outputs increased by 6.

According to the nature reserve questionnaires, in 2012, 26 nature reserves among the 40 sample nature reserves started 56 new research projects, and raised additional CNY 27.84 million for new research projects by applying for program funds from government agencies and research fund from institutes affiliated to provincial government, by cooperating with research institutes or universities,

and by self-funding, etc. Successful fund-raising provided strong support to scientific research activities in nature reserves.

Between 2010 and 2012, 17 sample nature reserves had independently led 43 research projects; 21 research achievements of 10 nature reserves had received prizes or awards from supervision agencies, of which 11 achievements had been awarded provincial level prizes, 10 got city or below city level prizes; 12 sample nature reserves had participated in 12 international cooperation research projects, in which 8 nature reserves had received funding support, 10 nature reserves had shared the achievements with partners, 9 nature reserves had built up research capacity after joining international cooperation projects, 6 nature reserves had received research facilities or had them renewed, communities inside 6 nature reserves had benefited from the research studies, and 9 nature reserves enhanced their international influence. Among the 40 sample nature reserves, 25 had applied the outputs of researches to daily management work.

According to the nature reserve questionnaires, in 2012, 503 researchers of sample nature reserves had a bachelor's degree or above, accounting for 56.52% of the total research staff. 335 researchers reached senior or middle-level technical level, 37.64% of total research staff. In 2012, there were 998 people times participating in various training, or an average of 1.12 times of training opportunity for each researcher.

### **8.4.2 The capacity of patrolling was strengthened, which effectively stopped illegal activities in nature reserves**

In 2012, there were 8684 patrollers in the 40 sample nature reserves and they completed 6.4283 million km of patrolling workload, of which, routine patrolling was 5.5915 million km, and inspection patrolling was 0.8368 million km. Per

capita routine patrolling workload was 643.88 km. Compared with 2011, there was a minor reduction of 0.15% of patrolling workload in sample nature reserves, but per capita routine patrolling workload increased by 113.95 km with a growth rate of 21.50%. Compared with 2000 before NRP started, annual patrolling workload increased remarkably by 4.0136 million km in sample nature reserves, at a growth rate of 166.22%; per capita routine patrolling workload increased by 480.58 km, at a growth rate of 294.30%.

Thanks to the implementation of NRP, with supplies of necessary facilities and equipment, the capacity of resource management and patrolling in nature reserves have been strengthened and the patrolling areas have been expanded, which have effectively stopped illegal activities in nature reserves. In 2012, 11,164 incidences of illegal entry were prevented in 40 sample nature reserves, 37.08% more than in 2011; 3400 people incidences of illegal entry were dealt with, and 1327 sets of illegal hunting tools were confiscated.

In 2012, 614 illegal cases occurred in sample nature reserves, in which 597 were investigated and punished, with a completion rate of 97.23%. Compared with 2011, there were 346 fewer illegal cases and the completion rate increased by 0.15 percentage points. In total 571 people times were punished; 102.70 m<sup>3</sup> of wood were confiscated, as well as 2488 animals or animal products, and 652 wild plants; 123.94 ha of illegal land reclaiming was punished.

#### **8.4.3 Capacity of disaster mitigation was improved and the impacts of disasters further reduced**

In 2012, 28,405.5 ha of land in sample nature reserves were affected by forest pest and diseases, rodents or other natural disasters. The areas under disaster prevention were 134,352.1 ha; in which, 21,728.4 ha suffered from forest pests and diseases, and the area under prevention was 85,873.1 ha;

6564.6 ha of area suffered from rodent, and the area under prevention was 48,479.0 ha; 112.5 ha of area suffered from freezing rain, freezing snow or other disasters.

Compared with 2011, land areas inside nature reserves that were affected by forest pests or diseases, rodent and other natural disasters reduced by 7214.9 ha, with a reduction rate of 20.26%; in which areas suffered from pests and diseases reduced by 6983.4 ha, and the area under prevention incidences reduced by 29,694.6 ha; areas suffered from rodent was 132.5 ha smaller, while the areas under prevention went up by 2128.4 ha; areas suffered from other disasters reduced by 99 ha.

Analysis of forest fires showed that in 2012, sample nature reserves put more efforts into intensifying the screening of fire hazards, and 614 fire hazards were found and eliminated during patrolling. Compared with 2011, the number of fire prevention increased by 152 times, at a growth rate of 32.90%. However, occurrence of forest fires and affected forest area in sample nature reserves increased compared with that of 2011 because of dry weather and short of rainfall in some areas, as well as natural factors such as lighting, etc. Fifteen forest fires happened in sample nature reserves and affected 335.5 ha of forest area; compared with 2011, the number of forest fires was 12 times more and the affected forest area increased by 317.6 ha.

#### **8.4.4 Initial effects can be found in monitoring and prevention of terrestrial wildlife-borne infectious diseases**

According to nature reserve questionnaires, up to 2012, there were 21 nature reserves among the 40 sample which had set up monitoring stations of terrestrial wildlife-borne infectious diseases; in which, there were 18 national-level monitoring centers and the cumulative capital inputs were CNY 10.025 million. Among the 21 sample nature reserves, 19 covered wild animal concentration



areas into effective monitoring; 8 tried to install monitoring equipment and facilities in the distribution areas of wildlife, taking consideration of the moving area, mobility and habitat types; 3 managed to include operation costs and epidemic prevention and control into local government budget, covering daily monitoring, risk screening, facility and equipment maintenance, etc.; 12 nature reserves reported they had the baseline information of key wild animal infectious diseases; 15 nature reserves included all the monitoring stations in the internet-based direct reporting system of terrestrial wildlife-borne infectious diseases monitoring, and 4 nature reserves had their monitoring stations partly linked to the internet-based system. In 2012, no wild animal epidemics occurred in the 40 sample nature reserves.

## 8.5 Existing problems

### 8.5.1 Income level of communities in nature reserves was still low

In recent years, along with the rapid economic and social development in China, income of communities in nature reserves has increased year by year. Survey data show that in 2012, per capita rural net income of the 69 sample villages was CNY 5631.05. Though there was a growth of 13.09% compared with that of 2011, the income of nature reserve communities lags far behind the national average which was CNY 7917 in 2012, and went up by 13.47% compared with that of 2011.

The per capita rural net income of the 69 sample villages was just 71.13% of the national average, and the growth speed was 0.38 percentage points lower than that of the national average. The gap between national average and sample villages enlarged from CNY 2156.50 in 2011 to CNY 2285.95 in 2012. Moreover, the per capita income of rural households in villages inside nature reserves

was even lower if the per capita income of villages inside and outside nature reserves was compared.

In 2012, the per capita rural net income of villages inside nature reserves was CNY 5695.25, 9.83% of growth compared with that of 2011; the per capita rural net income of villages outside nature reserves was CNY 5581.66, 15.79% increase than that of 2011. Compared with villages outside nature reserves, growth rate of per capita rural net income of villages inside nature reserves was 5.96 percentage points lower. The enlarging gap of income level and growth speed between nature reserve communities' and the national average would easily bring about discontent emotion against nature reserve construction among communities, and add more unstable factors to the neighboring areas of nature reserves, which would make nature reserves management more difficult, and could even bring about adverse effects to the successful construction of nature reserves. Therefore, it's in urgent needs to perfect and implement relevant policies to accelerate and promote income growth of communities.

### 8.5.2 Investment in scientific research, monitoring and infrastructure was limited, and can't meet the needs of conservation and management

The capital investment in infrastructure and research/advocacy was CNY 35.0306 million and CNY 15.8320 million respectively in 2012, only 27.10% and 12.25% of the total investment plan of sample nature reserves. Since the beginning of NRP in 2001, the cumulative investment of the 40 sample nature reserves in infrastructure has been CNY 562.1421 million, and that in researches and advocacy CNY 227.4826 million, 33.61% and 13.60% of the cumulative investment plan of the whole.

The feedback on the nature reserves questionnaires can also reveal the problem. Among the 40 sample

nature reserves, 20 reported that infrastructure couldn't meet work requirements; of which, 2 reported big gaps between existing infrastructure and the management needs in the field. As for research and monitoring, among the 40 sample nature reserves, 35 reported that existing facilities, equipment and instruments couldn't meet research needs, 87.5% of the sample. Moreover, all sample nature reserves reported the difficulties caused by funding shortages and capacity gaps in research and monitoring work, which have affected the implementation of research activities. All the above show that financial inputs on research, monitoring and infrastructure is relatively insufficient, a reason for the lagging behind of infrastructure and research monitoring projects in nature reserves, and the fact that the actual needs of conservation have not been fully addressed. In addition, due to lack of funds, less necessary activities were implemented, including the construction of demonstrative nature reserves, wild animal habitat restoration and returning back to nature, etc.

### **8.5.3 Capacity of monitoring and prevention of terrestrial wildlife-borne infectious diseases is insufficient**

In China, monitoring and prevention of terrestrial wildlife-borne infectious diseases is at the early stages since it occurred only recently. According to the feedback on the nature reserve questionnaire, up to 2012, there were still 19 sample nature reserves which had not set up monitoring stations of terrestrial wildlife-borne infectious diseases, 47.50% of the sample. Among the 21 nature reserves which had set up relevant stations or facilities, 2 had not included the concentration areas of wildlife into effective monitoring scope; in 13 nature reserves, the installment of monitoring facilities didn't match the distribution scope, moving area, mobility and habitat types of wildlife; in 18 nature reserves, cost of routine monitoring, risk screening and maintenance of facilities and equipment had not been covered by the local

fiscal budget; in 9 nature reserves, there was no baseline information of the key wildlife epidemics. Today, the insufficient capacity of nature reserves in terrestrial wildlife-borne infectious diseases monitoring can't satisfy the work needs in the field.

### **8.5.4 Wild plant with minimum populations in nature reserves in urgent need of rescuing and protection**

In recent years, along with the fast economic and social development in China, the demands for wild plant resources has been increasing, and many factors including resource damaging, plundering and environmental pollutions have put wildlife species under the threat of extinction. In the sample nature reserves, the protection of wild plant with minimum population is far from satisfactory. According to the feedback of nature reserve questionnaires, among the 23 nature reserves where wild plants with minimum populations have been found, 19 nature reserves have not implemented effective protection of all the species; in which, in 9 nature reserves, the effective protection rate is less than 60%, and the lowest protection rate is 7.6%.

## **8.6 Recommendations on strengthening nature reserve construction and management**

### **8.6.1 Further increasing communities' income by strengthening policy guidance**

To ensure the well-being of the people and improve their lives, we must further increase the income of communities inside nature reserves in order to help narrow the gap between the income level of nature reserve communities and the national average.

Recommendations:

1) to strengthen policy guidance and support and further promote employment and income generating activities for local communities. In the implementation of construction projects, it's

necessary to guide local people to make full use of available resources without damaging the resources in nature reserves, and encourage communities to develop farming and husbandry industries of with specialties and high added values by combining ecological and landscape advantages in the region. Tourism and related services business can be explored to a reasonable extent. By providing favorable policies on deduction or exemption of tax and other supporting policies such as low interest rate loans, government agencies can help communities explore new ways of employment and income generation.

2) to provide more capital inputs, increase compensation standards and implemented compensation policies. It is urgent to develop compensation policies relevant to damages caused by wild animals and have them implemented as early as possible. We must provide guidance to local government, by combining local situations, move faster on studying, formulating and implementing rules and regulations on compensation for damage caused by wild animals, with clarification of means of compensation, standards of compensation and the future trends of related work. In addition, further expand the pilots of fiscal subsidy of wild animal damage by making nature reserves the priority, in order to put compensation into practice soon, and effectively make up for communities' losses in the process of nature reserve construction and wildlife resource conservation.

### **8.6.2 Increasing capital inputs to strengthen infrastructure construction, and enhancing the capacity of research and monitoring**

We must strengthen infrastructure construction and enhance the capacity of research and monitoring. First we must augment, year by year, the proportion of nature reserve construction in the overall financial budget to increase inputs. We should address the needs of conservation and restoration projects, to increase the proportion

of budget in research and monitoring, and infrastructure; we should include co-management as a part of investment in order to coordinate the development of nature reserves and communities. Second, local government needs to pay more attention to nature reserves construction and ensure that local matching funds is made on time and in full to guarantee the successful completion of construction work.

### **8.6.3 Increasing the capacity of monitoring and preventing terrestrial wildlife-borne infectious diseases in nature reserves**

Protection targets in nature reserves, especially in the national nature reserves under the supervision of forestry bureaus, usually either natural ecosystems of highest representativeness in China, or the rarest and most endangered terrestrial wildlife species as well as their natural concentrated distribution areas, therefore it's very important to strengthen the monitoring and prevention system of terrestrial wildlife-borne infectious diseases.

Recommendations:

1) To strengthen the capacity of monitoring and prevention of terrestrial wildlife-borne infectious diseases in nature reserves; establish specific fund to meet the needs of field work in this aspect; further improve the existing monitoring and prevention systems, and supplement and allocate necessary facilities and equipment as needed to safeguard the safety of rare and endangered species in nature reserves.

2) To intensify surveys of terrestrial wildlife-borne infectious diseases to collect the baseline information, with the stronger support of science and technologies; in the meantime, to keep improving research conditions and introducing more professional talents in order to not only set up a high-efficiency research mechanism, but also promote the transformation and application research outputs.

#### 8.6.4 Enhancing the management of nature reserve construction and strengthening the conservation of living areas of wild plants with minimum populations

Nature reserves in China are natural concentrated distribution areas of most of the rare and endangered wildlife species; they are the priority areas for rescuing and protecting species with minimum populations. Therefore, nature reserve construction must be enhanced in order to achieve effective conservation of species with minimum populations inside nature reserves the first step to conserve species with minimum populations in general.

Recommendations: First we must construct more *in situ* protection spots in the native living areas of species with minimum populations in nature reserves. Second, in nature reserves where there are existing *in situ* protection spots of species with minimum populations, priority investment should be on infrastructure construction, and government at different levels and relevant agencies should attach more importance to resource caring, research and monitoring, and pest and disease prevention. Third, we must take advantage of research and monitoring capacity in nature reserves, and make full use of existing management conditions in nature reserves, to explore more advanced and effective conservation and management mechanisms for species with minimum populations.



## Impacts, experience and outlook of the coordinated development of eco-friendly forestry and livelihood-oriented forestry

A review of the decade-long monitoring and assessment of the socioeconomic impacts of China's key forestry programs

In 1998, massive floods occurred in China's Yangtze and Songhuajiang river valleys. In order to reverse the ecological degradation they caused and improve the living conditions of the Chinese people, we launched a number of globally visible key ecological programs, including the National Forest Protection Program, the Program for Conversion of Cropland to Forest and Grassland, and the Sandification Control Program for Areas in the Vicinity of Beijing and Tianjin. These programs have focused on the role of forestry in restoring and improving the ecosystem, and have significantly contributed to China's efforts to maintain ecological security and promote sustainable socioeconomic development. More than a decade has passed since then. China now boasts constantly expanding and diversifying eco-friendly forestry with growing global influence and remarkable achievements to date.

