

ECOLOGY

China's Forestry Reforms

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Since 2000 (1), there have been rapid and extensive changes in forestry policy in China. Investments in the forestry sector since 2000 have exceeded the total investments in the period 1949–99. For its Six Key Forestry Programs (SKFPs) alone, China has invested 183.5 billion renminbi (RMB) (ca. U.S.\$22 billion) in the last 6 years and will invest a further 539.8 billion RMB (ca. U.S.\$68 billion) in the next 4 years (table S1 in supporting online material). Here, we provide an update on the major forestry reforms introduced since 2000.

Massive investment in the SKFPs, strong demand for wood, and increasing pressure from environmental groups has led to calls for reform of forest ownership. Forests are considered the last battleground for much-needed land-tenure reforms in China, where old laws and practices still present a major barrier to the development of China's forest estate. In 2004, several provinces in the south began to reform forest ownership policies, introducing cuts in forest taxes, free-market mechanisms for forest asset transfers, and private support systems for forestry. These reforms are intended to improve forest infrastructure, enhance the competitive power of Chinese wood products, and improve environmental quality.

China is facing many problems that affect social harmony, including growing pressure on the environment and natural resources. Past government policies have favored economic growth over the environment, but the central government has now proposed a science-based approach to development designed to realize balanced sustainable development (2). However, in practice, local governments continue to put economic growth ahead of any concern for the environment, which has led some critics to call for stronger central government control.

China's rapid economic growth, increased capital investment, and growing middle-class consumption have driven up the demand (and prices) for wood products. China not only needs wood to meet domestic demand, it also has a growing and very successful export

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Forest police patrol in a protected forest area. China has about 60,000 specially trained forest police to enforce policies such as the logging ban.

industry. In 2006, the forest products trade in China was worth U.S.\$47.07 billion, a 23% increase over 2005. Forest product imports were valued at \$19.39 billion (a 10% increase over 2005) and exports at \$27.68 billion (a 34% increase). The trade in the first 6 months of 2007 was valued at \$27.2 billion, a 35% increase over the same period in 2006 (3). By 2006, China had emerged as the world's largest exporter of furniture, accounting for 43% of U.S. and 33% of European wood furniture imports (4). To meet the growing international demand for sustainability assurances in the production of forest products, China is developing a national certification standard and will seek endorsement of its standard by the international Program for the Endorsement of Forest Certification (PEFC).

The Six Key Forestry Programs

The SKFPs cover more than 97% of China's counties and target 76 million hectares of land for afforestation. The Natural Forest Protection Program (NFPP) was introduced in 1998 after a logging ban prompted by the most devastating floods in Chinese history (1). After a series of pilot studies, five additional programs were established to promote a more sustainable forest policy (table S2).

Advances and successes. During the past 8 years, the NFPP has brought 98 million ha of forest under effective protection. Logging nat-

Forestry management policies in China have changed direction to encourage sustainability while balancing land-use, economic growth, and demand for forest products.

ural forest has been banned in the upper reach of the Yangtze River and in the middle and upper reaches of the Yellow River. Timber production in the Northeast and Inner Mongolia has been successfully reduced from 18.24 million m³ in 1997 to 10.99 million m³ in 2006 (6), and 0.67 million displaced forestry workers have been resettled (5).

There has also been significant progress in afforestation, with 28 million ha of plantations established in the past 6 years (6). The Conversion of Cropland to Forest Program (CCFP)—which pays farmers to plant trees rather than crops—has converted 8.8 million ha of cropland into forests (6). Under the CCFP, soil erosion has been reduced by 4.1 million ha, representing a 4.1% annual reduction. For the first time since the establishment of the People's Republic of China, desertification has been reversed, from an annual increase of 3436 km² at the end of the 20th century, to the current annual reduction of 1283 km² (5). This has been largely achieved through the Sand Control Programs for areas in the vicinity of Beijing and Tianjin, the Three-North Shelterbelt Development Program and the Shelterbelt Development Program along the Yangtze River Basin programs. During 2001–06, 831 natural reserves were created, and 19.5 million ha of forestland and special sites were protected under the Wildlife Conservation and Nature Reserves Development Program (6).

The total area of plantations in China now amounts to 53 million ha, with forest cover increasing from 16.6 to 18.2%, and the forest stock volume increasing from 11.567 billion m³ to 12.456 billion m³ since the start of the SKFPs (7).

Problems and obstacles. The booming economy has placed greater pressure on a system not yet capable of balancing the growth in wood demand with environmental needs and social justice. Although the central government has been proactive in trying to improve China's forestry basis, the on-the-ground effects at the state and local levels have been mixed (see figure, p. 1556). For example, the central government has been providing major funding for tree-planting, but local governments lack the funding to implement the programs effectively (8).

Transfer of responsibilities to local governments means that there is no guarantee of continued funding for the stewardship of the new forests. It is also unclear whether resettled workers and local farmers are directly benefiting from some of the projects. In areas covered by the logging ban, the decline of community services may have exacerbated their economic difficulties. Local corruption is widespread and underregulated corporations have been accused of usurping user rights and failing to compensate farmers for their land.

Reforming China's complex system of forest ownership and user rights is critical to the long-term implementation of its forestry programs. Land ownership reforms will provide farmers with rights to plant trees for income and will give incentives to protect forests. The reforms involve transfer of land to individuals or companies, and compensation packages for those not receiving land. In the CCFP program, the delay in ownership reform has resulted in farmers planting their forest land even though they have no property rights. In some areas impacted by the NFFP program, the needs of local people have been inadequately considered and compensation levels have been too low to offset their losses. Progress in the Forest Industrial Base Development Program, which focuses on fast-growing and high-yielding commercial timber plantations, has been slow, with uncertainty over forestland ownership, resulting in only 0.19 million ha of new plantations established in the last 6 years (6).

Ownership Reforms and Auxiliary Policies

Forest ownership reform started in Fujian and Jiangxi provinces and has been extended to the provinces of Zhejiang, Liaoning, Heilongjiang, Shandong, Anhui, and Guangdong.

The central government has removed or

reduced forestry taxes to encourage tree planting and forest products manufacturing. Local governments have removed provincial taxes and some fees on forest products. For example, Fujian province has reduced forest product taxes and fees from 46% of the total sale price to 26%. Simultaneously, the government is using transfer payments to support local governance organizations that used to be financed by forest taxes and fees. The Jiangxi provincial government lost \$182.5 million in tax revenue but had this sum supplied instead by transfer payments. As a direct result of this change, the average annual cash income for each farmer increased by 13%, or just over \$10 (9).

To provide a mechanism for the trading of forest assets—land and timber—China established its first pilot futures market, the Fujian Yong'an Forestry Elements Market in 2004. The market consists of a forest and forestland registration center, a forest resource evaluation center, a timber and bamboo exchange, a legal and technical service center, and a labor training center. By May 2007, the market had bought and sold 20,766 ha of forest and provided purchasing loans worth \$63.8 million (10). In Jiangxi province, there are now 36 such markets established or being set up, and the number of deals has exceeded 3000, valued at \$120 million (9).

Future Forest Management Structures

The Chinese government is beginning a new phase of forestry reforms intended to open the forest sector to much greater individual and corporate participation, largely through private sector financing. This represents a major break from the past, when most forestry activities were managed through the government. It aims to increase China's forest cover to 26% by 2050, to improve environmental quality, and to develop a competitive forest industry that depends largely on a domestic fiber supply.

To achieve these goals, several changes in policy are being instituted (11), beginning with the separation of ecological and commercial forests, each having separate management policies. However, the policies for managing ecological forests and commercial forests are not yet fully in place and need to be integrated with sustainable forest management systems.

The government will strictly protect ecological forests, increasing fire, pest, and biodiversity protection and preventing logging or the conversion of ecological forests to other uses. Local communities and farmers will be compensated if their land is classified as ecological forest. On commercial forests,

the government will grant much greater leeway to develop management plans and will allow farmers the freedom to determine harvest age (based on economic maturity), apply intensive forest management, select tree species, pursue economic benefits, and harvest on their own timetable based on agreed forest management plans. The government will also allow regional planners to use private funding to achieve these goals. The government will no longer control, but rather, encourage, the development of the commercial wood products trade.

Although the reforms represent a major shift in policy, the government will continue to be the ultimate authority in regional planning, zoning, and policy direction. The government will still govern forest asset ownership and transference rights, such as issuing licenses for land-use rights, forest ownership, and ownership exchange. It will set regulations to require forest practices to follow sustainable forest management and will encourage the private or public sector to fill gaps to provide services for forest management, such as management consultation, road-building, nurseries, wood markets, and logging.

References and Notes

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Supporting Online Material

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