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China's Development of a Plantation-based Wood Pulp Industry A Summary of Government Policies and Financial Incentives, with a Focus on South China

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China has accounted for more than 50% of the world's overall growth in paper and paperboard production since 1990. With production across all grades reaching 43.0 million tonnes in 2003, China is now the world's second largest producer, surpassed only by the US. The country's aggregate paper and board production is expected to reach 68.5 million tonnes per year by 2010, as domestic producers modernize their operations and as international producers seek to capture a share of China's growing market (He and Barr, 2004). While much of the paper China consumes is made from recovered paper, a growing portion is being made from virgin wood pulp.

To meet this growing demand, the Chinese government has actively promoted the development of a domestic wood pulp industry. It has done so by setting ambitious capacity expansion targets for projects that integrate wood pulp and high-grade paper production and by allocating 5.8 million hectares for the establishment of fast-growing pulpwood plantations. The government has also allocated substantial capital subsidies for pulp and plantation projects, including several billion dollars worth of loan interest subsidies, discounted credit, and extended repayment periods for loans from state-owned banks.

In spite of the government's substantial support, the development of a competitive wood pulp industry in China faces several fundamental challenges:

1. The cost of growing wood fiber in China is considerably higher than it is in countries like Indonesia and Brazil.
2. There are signs that government subsidies may be encouraging pulp producers to develop large-scale mills before fully securing a sustainable wood supply.
3. Many of the risks and social impacts associated with fast growing plantation development in China have not been fully evaluated.

This brief summarizes China's recent government policies to promote the development of a domestic wood pulp industry, and examines how these are playing out in the key region of coastal South China. It has been extracted from a more detailed analysis by C. Barr and C. Cossalter published in *The International Forestry Review* in December 2004.

Government promotion of China's wood pulp industry

The Chinese government has used a variety of policy measures to promote the development of a domestic wood pulp industry. China's Tenth Five-Year Development Plan, covering the period 2001-2005, called for paper capacity to increase by 14 million air-dried tonnes per year (Adt/yr) by 2010 and prioritized the expansion of projects that integrated fast-growing pulpwood plantations, wood pulp production, and high-grade paper production (SFA 2002b). Specifically, it set a short-term target for domestic wood pulp capacity to triple in size from its 2000 level by reaching 2.2 million Adt/yr by 2005.

To implement these targets, the National Development and Planning Commission (NDRC) in 2001 issued a list of 42 priority pulp and paper projects which will involve approximately US$ 24 billion in investment from both domestic and foreign sources by 2010 (AF&PA 2004). The NDRC has scheduled 13 of these projects which involve the integration of high-grade paper production with fast-growing plantations – including three large-scale chemical pulp mills – for fast-track investment approval and government financial incentives.

As in other key sectors, the government has offered significant financial incentives and capital subsidies to support priority pulp and paper projects. The China Development Bank, one of four government policy banks, and the Agricultural Bank of China, a state-owned commercial bank, have provided loans with interest rates up to 10% lower than the standard loan interest rates set by the Central Bank (AF&PA 2004). These loans often come with an extended repayment period, in some cases as long as 10-15 years.

Through 2003, the government allocated loan interest subsidies totaling US$ 2.13 billion (RMB 17.6 billion) to support the NDRC's 13 high-priority pulp-paper and plantation projects (AF&PA 2004). Under this scheme, borrowers investing in priority projects are allowed to forego interest payments on loans from state-owned banks for a period of 2-3 years, or longer. In some cases, these incentives not only allow borrowers to avoid interest payments but also to secure larger loans than they might otherwise obtain.

The Chinese government has also promoted foreign investment in the sector (SFA 2002b). In March 2002, the NDRC included the following in the government's list of industry segments where foreign investment through joint ventures is encouraged:

- Wood base development for pulp and paper processing;
- Chemical pulp with annual capacity over 300,000 Adt/yr;
- Mechanical pulp (CTMP, BCTMP, APMP)[1] with annual capacity over 100,000 Adt/yr;
- High-grade paper and paperboard (except newsprint).

To reduce bureaucratic hurdles for investors and to facilitate fast-track approvals, the NDRC devolved to provincial governments substantial authority over the investment approval process for forestry and pulp-paper projects (AF&PA 2004).

Capital subsidies for plantation development

The government has also promoted the development of industrial tree plantations. According to the State Forest Administration (SFA)'s strategic plan, the government has budgeted RMB 71.8 billion – or US$ 8.6 billion – to finance the development of 13.3 million ha of fast-growing, high-yielding (FGHY) plantations during the period 2001-2015. Some 5.8 million ha or approximately 45% of the targeted area, is intended to be used for fast-growing plantations for pulpwood.

The FGHY plantation program covers four priority geographic regions:

1. coastal South China
2. The lower and middle reaches of the Yangtze River
3. The lower and middle reaches of the Yellow River
4. Northeast China/Inner Mongolia

In aggregate terms, the largest area allocated for pulpwood plantation development is in Northeast China/Inner Mongolia, where 2.4 million ha of plantations are planned to produce pulpwood fiber (see Table 1). However, in the coastal South China and Yellow River regions, the areas planned for pulpwood are substantially larger relative to the total area allocated for FGHY plantations than they are in the other two regions.

The government has structured the FGHY program around 99 priority projects, which are eligible to receive subsidized financing to encourage fast-growing plantation development (SFA 2002a). Thirty-nine of these projects involve the development of pulpwood plantations subsidized through loan interest subsidies,

Table 1. *FGHY plantation area targets by region, 2001-2015*

Region	Provinces	Total FGHY (ha)	FGHY for Pulpwood (ha)	**Pulpwood as % of Total**
South Coastal	Guangdong, Guangxi, Hainan, Fujian	1.9 m	1.4 m	74 %
Lower-Middle Yangtze River	Zhejiang, Jiangxi, Hubei, Hunan	3.0 m	1.3 m	43 %
Lower-Middle Yellow River	Hebei, Henan, Shandong	1.0 m	0.8 m	80 %
Northeast China/ Inner Mongolia	Inner. Mongolia, Liaoning Heilongjiang, Jilin	7.2 m	2.4 m	33 %

Source: State Forest Administration

discounted loans from state banks, and extended repayment periods. Financing will come from four sources:

- State-owned banks will provide 70% of the overall financing for the FGHY program – or approximately US$ 6.1 billion – in the form of discounted loans to state forest farms, private sector plantation companies, and farmers' cooperatives. The China Development Bank and the Agricultural Bank of China, in particular, will provide loans with reduced interest rates and an extended 10-15 year repayment period.
- The Ministry of Finance will allocate 20% of the FGHY program's total financing – or approximately US$ 1.7 billion – through loan interest subsidies.
- Local governments are responsible for providing 3% of the program's financing.
- Plantation companies receiving the discounted government finance are responsible for contributing 7% of their project's financing from their own funds or from commercial sources (SFA 2002a; AF&PA 2004).

Pulp and plantation development in South China

Coastal South China – encompassing the provinces of Guangdong, Hainan, Guangxi, and Fujian -- represents the most active region for the development of kraft pulp production in China. In recent years, proposals have been considered for the development of at least five large chemical pulp mills in the region with a combined capacity of up to 5.6 million tonnes/ year (see Table 2). Reports of what the sponsors of these projects are considering, and the status of their plans, have varied widely and have changed over time.

Wood and land requirements

In spite of the uncertainties involved, the ambitious plans and large-scale investments already being made in hardwood pulp production in South China raise a number of critical questions about the region's fiber resource base. Most significantly, perhaps, how much pulpwood fiber can the region's plantations supply on a sustainable basis? And how much land will be required to do so?

If it is assumed that 4.15 cubic meters (m3) of pulpwood (solid wood under bark) are needed to produce 1.0 Adt of pulp, it can be estimated that some 4.15 million m3 of pulpwood will be needed annually to support every 1.0 million tonnes of pulp capacity that is brought online. Table 3 shows the projected wood demand of the region's pulp producers at various levels of installed capacity, and the approximate land area that would be needed to supply the volumes of wood if these were to be obtained from local plantations.

Figure 1: Development of hardwood kraft pulp mills in the region

Table 2. *Wood-based pulp mills (capacity > 500,000 Adt/year) planned for South China, as of mid-2005*

Project Name	Province	Planned/Proposed Capacity (Adt/yr)	Status (mid-2005)
APP-Jinhai	Hainan	2,400,000	Pulp line 1 with 1.2 million Adt/yr installed at end-2004
APP-Qinzhou	Guangxi	1,200,000	Approval pending for first phase of 300,000 Adt/yr
Stora Enso-Hepu	Guangxi	600,000 - 1,000,000	Approval pending – however, Stora Enso is considering a new industrial concept while studying feasibility of plantation resource base
Fuxing	Guangdong	700,000	Status uncertain -- UPM Kymmene withdrew from project in November 2004; Shandong Chenming considering a greenfield mill project
RGM-Xinhui or Fujian project	Guangdong or Fuijian	700,000	Proposed – not yet approved
Total		**5,600,000 - 6,000,000**	

Fast-growing plantation development

Each of the planned mills in coastal South China has structured its wood supply strategies around the development of fast-growing eucalyptus plantations. The main species being used are *Eucalyptus urophylla, E. tereticornis (12ABL Congo)* and a *Eucalyptus grandis x E. urophylla* hybrid, which are well-suited for the growing conditions found in much of Hainan, Guangdong, and Guangxi. Large areas of eucalyptus have, in fact, been planted in the three provinces over the past decade, and clonal forestry has now become widely used.

Based on provincial forest inventory figures, it is estimated that by the end of 2002, the three provinces had approximately 750,000 ha of standing eucalyptus plantations (Cossalter 2004a). However, at least a portion of these have been planted for environmental purposes and are not likely to be available for commercial use. During 2000-2004, the region's plantations have expanded at approximately 65,000 ha annually. Growth rates and productivity levels in South China are highly variable, with mean annual increments (MAI's) generally ranging between 10 and 20 m3/ha/yr depending on site conditions and plantation management practices (Cossalter 2004a).

Over the last few years, pulpwood plantations in South China have produced approximately 2.0 million m3/yr of small-diameter logs which have been exported in the

Table 3. *Effective wood demand and approximate net plantation area needed according to potential pulp capacity levels*

Pulp Capacity (Adt/yr)	Wood Demand (m3/yr)	Net Plantation Area Needed (ha)		
		MAI = 12 m3/ha/yr	MAI = 15 m3/ha/yr	MAI = 18 m3/ha/yr
1,000,000	4,150,000	432,000	346,000	288,000
1,500,000	6,225,000	648,000	519,000	432,000
2,000,000	8,300,000	864,000	692,000	576,000
2,500,000	10,375,000	1,080,000	865,000	720,000
3,000,000	12,450,000	1,296,000	1,038,000	864,000
3,500,000	14,525,000	1,512,000	1,210,000	1,008,000
4,000,000	16,600,000	1,728,000	1,383,000	1,152,000
4,500,000	18,675,000	1,944,000	1,556,000	1,296,000
5,000,000	20,750,000	2,160,000	1,729,000	1,440,000
5,500,000	22,825,000	2,376,000	1,902,000	1,584,000
6,000,000	24,900,000	2,592,000	2,075,000	1,728,000

Note: Wood demand is based on the assumption that 4.15 m3 of roundwood (solid wood under bark) is needed to produce 1.0 Adt of pulp. Approximate net plantation area is based on the assumption that plantations are managed on a 5 year rotation; and 20% of harvested volume is non-commercial.

form of wood chips, principally to Japan, South Korea, and Taiwan. Smaller volumes have been used by plywood and medium-density fiberboard (MDF) mills, as well as a few medium-scale pulp and paper mills located in southern China, and in one case, in Shandong Province.

Company-community partnership models

At present, the sponsors of each of the planned pulp mills are competing with one another to secure an adequate land base for their respective plantation development initiatives. Due to the population density in South China, much of the suitable land is already held by local communities and farmers' cooperatives. Pulp companies are therefore seeking to gain access to plantation land by establishing partnerships with these groups, often with the assistance of provincial and municipal governments, and they are using a number of different models to do so (Cossalter 2004a; Wenming *et al.* 2002).

Land lease model: Under this model, companies lease land from local communities – for periods that sometimes range up to 30 years – and then establishing and managing the plantations themselves. The company typically assumes full responsibility for financing the project and makes annual payments to the community, but manages the site directly.

Land lease and joint financing model: A second model is structured around a joint financing arrangement between the pulp company and a private investor – generally a local forestry company -- although again, the plantations are developed on land that is leased from communities. The pulp company and the private investor generally share the cost of plantation development, and the latter assumes responsibility for managing the site, harvesting the wood, and delivering it to the mill site. Typically, the pulp company receives a predefined portion of the harvest, while the private investor retains the right to sell the remainder to the mill at the prevailing market price.

Production-sharing model: A third model is structured as a production-sharing arrangement between the pulp company and the local community or land-owner. The pulp company assumes full responsibility for financing the plantation development on community land, and the community is responsible for managing the site. The company pays the community an area-based fee for each year of the rotation period, and the wood harvested is divided between the company and the community according to an agreed ratio. Often the company provides a guarantee that it will purchase the community's portion of the wood at a pre-determined price.

Contracts with state tree farms: Under a fourth model, pulp companies are seeking to secure contracts with the region's state-owned tree farms, which have fairly substantial existing plantation areas. In some cases, the companies obtain cutting rights and assume responsibility for harvesting and transporting the logs to the mill site. In other cases, the pulp companies simply purchase logs from the state tree farms or from intermediaries.

Challenges for Chinese policymakers and planners

It remains to be seen whether the planting targets for the FGHY program in coastal South China and other regions over the next several years will be met. Moreover, there is little guarantee that the sites planted will achieve high levels of productivity on a sustained basis. While past experience has shown that large-scale plantation development initiatives in China have frequently been very effective at getting large areas of trees planted on an annual basis, it is not uncommon for a significant portion of these areas to have low levels of productivity due to infertile soils, inadequate site management, poor stocking and/or the use of inferior genetic materials.

In addition to the technical challenges associated with developing a commercial plantation resource base for a domestic pulp industry, Chinese policymakers and planners also face a number of important economic and institutional challenges.

Limits on China's competitiveness

In many parts of China, delivered wood costs are substantially higher than those found in more efficient pulp-producing countries. In 2004, delivered wood costs in South China ranged between US$ 20-25 for eucalyptus from state forest farms and US$ 30-40 per ton for eucalyptus grown on collectively owned land that is either managed by farmers' cooperatives or leased from local communities by plantation companies. By contrast, pulp producers in Indonesia are reported to pay US$ 12-25 per ton for 'mixed tropical hardwoods' harvested from natural forest and for plantation-grown Acacia mangium. In Brazil, where highly efficient eucalyptus plantations have been developed near the major mills sights, some producers report delivered wood costs as low as US$ 5-15 per ton.

The relatively higher wood costs in China can generally be attributed to the substantial cost in leasing land; high transport costs resulting from poor infrastructure and the need in many areas for heavy fertilizer inputs to compensate for

poor soil conditions. Given this disparity in wood costs, many analysts question whether China-based pulp producers can, in fact, compete with low-cost producers in Indonesia and Brazil – in spite of the considerable distance required to ship pulp from those countries to China (Asprem *et al*. 2004). Moreover, some analysts anticipate that the world will face a growing oversupply of market pulp over at least the medium-term, which would place further downward pressure on global pulp prices (Wright 2004).

Benefits for local communities

Pulp producers in South China and elsewhere will depend heavily on collectively owned land to secure their respective plantation bases – whether these areas are leased by the companies or developed through outgrower schemes with rural households and/or farmer cooperatives. It will be important for the companies involved and local governments to ensure that participating farmers have secure land tenure, clear incentives for growing pulpwood, and fair payment for the wood they produce.

Given the large volumes of wood that will potentially be consumed by the pulp mills currently planned for South China, the development of fast-growing plantations through company-community partnerships could hold considerable promise as a strategy for raising farmers' incomes. Further analysis is needed to assess the strengths and weaknesses of various partnership models and to evaluate the socio-economic impacts of pulp and plantation projects on surrounding communities.

Improved planning and regulation

There is a critical need for improved government planning and regulation with respect to large-scale kraft pulp mill projects. It will be essential for government planning agencies at the national and provincial levels to ensure that a fully legal and sustainable supply of wood fiber is secured before new pulp processing capacity is installed. This will require close coordination between the agencies responsible for industrial licensing – i.e. the NDRC and its provincial counterpart – and the State Forest Administration and provincial forestry bureaus.

Given the very large scale of modern pulp mills, which can have single production lines of 700,000 – 1,000,000 tonnes or more, there is also a need for pulp producers to develop accountable plans for meeting sustainability targets on key social and environmental issues. Government agencies at the national and provincial levels should monitor the companies' implementation of these plans to ensure that key targets are being met.

Financial due diligence and risk assessment

Finally, there is a need for stronger financial due diligence practices, particularly on the part of China's state banks, to assess both the economic risks and the social-environmental impacts of pulp capacity expansion projects (Spek 2004). Given the large amounts of capital required, there is a need for investment institutions to involve forestry experts in evaluating pulp producers' fiber supply strategies before new processing capacity is financed. China's state banks would likely benefit from participating in the Equator Principles initiative, sponsored by the World Bank Group's International Finance Corporation (IFC), and other international efforts to raise investment standards for socially and environmentally sensitive projects.

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Endnote

[1] CTMP refers to chemi-thermomechanical pulp; BCTMP is bleached chemi-thermomechanical pulp; and APMP is alkaline peroxide mechanical pulp.


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