



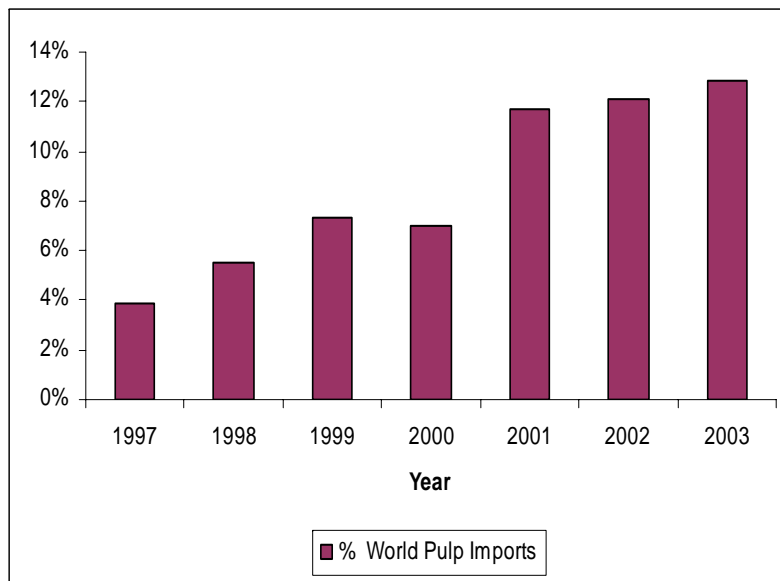
Does China Have a Comparative Advantage for Growing Pulpwood?

The case of coastal Southern China

By Christian Cossalter, CIFOR

**International Forum on Investment and Finance
in China's Forestry Sector
Beijing, September 22-23, 2004**

China's Imports of World Market Pulp 1997-2003



- 3.88% of the Global Market in 1997
- 12.86% in 2003

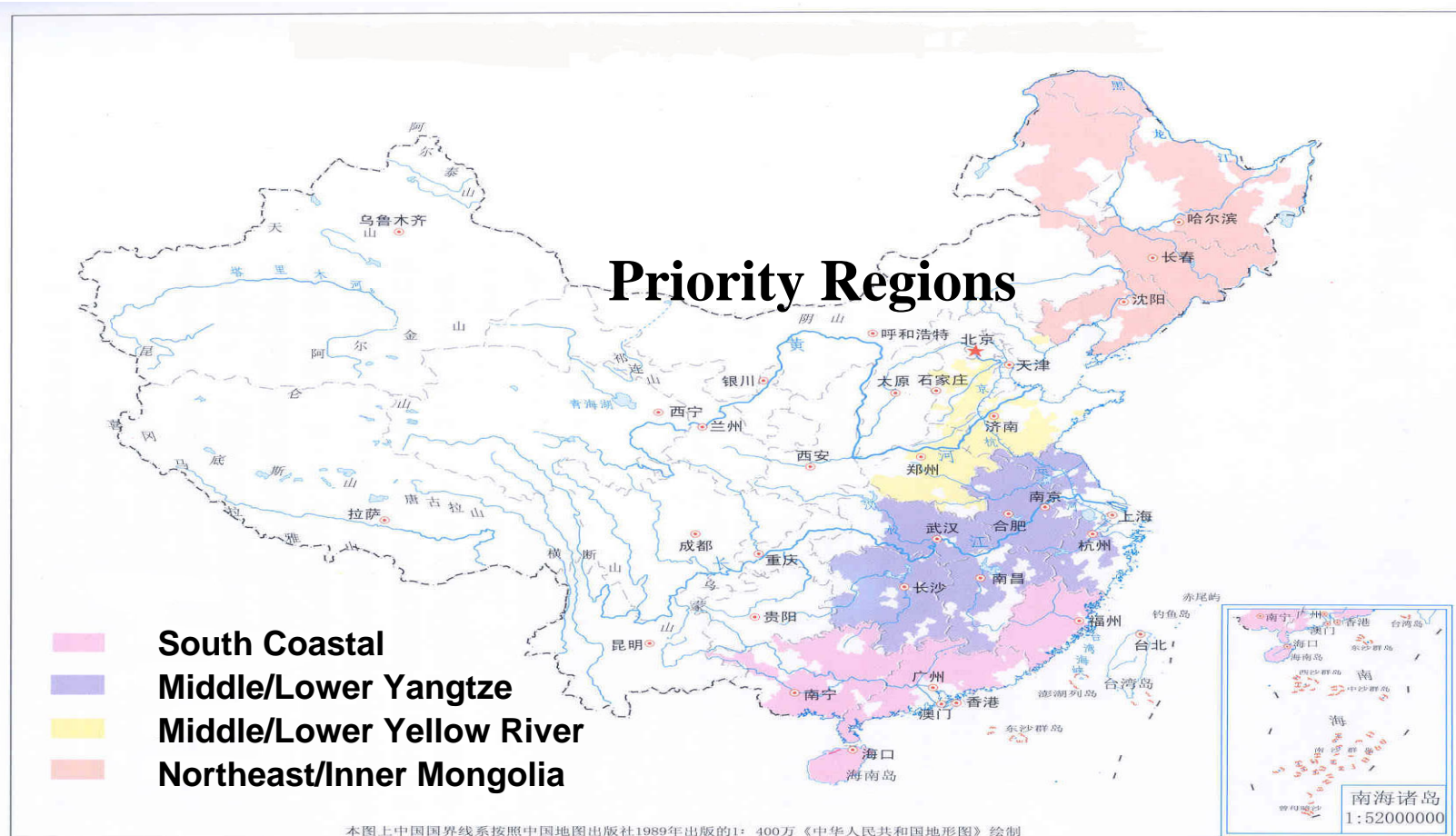
A 26% growth p. a. for China while growth was 1.6% for the rest of the World

More than 50% of the 21.2 million tons imported between 1999 and 2003 came from Canada, Indonesia and Russia

Source: Hawkins Wright 2004

China's Fast-Growing High-Yielding Plantation Program

Establishing Highly Productive Commercial Plantations to Support Domestic Forest Industries is one of the 6 National Priorities of the
State Forestry Administration



China's Fast-Growing High-Yielding Plantation Program

period 2001-2015

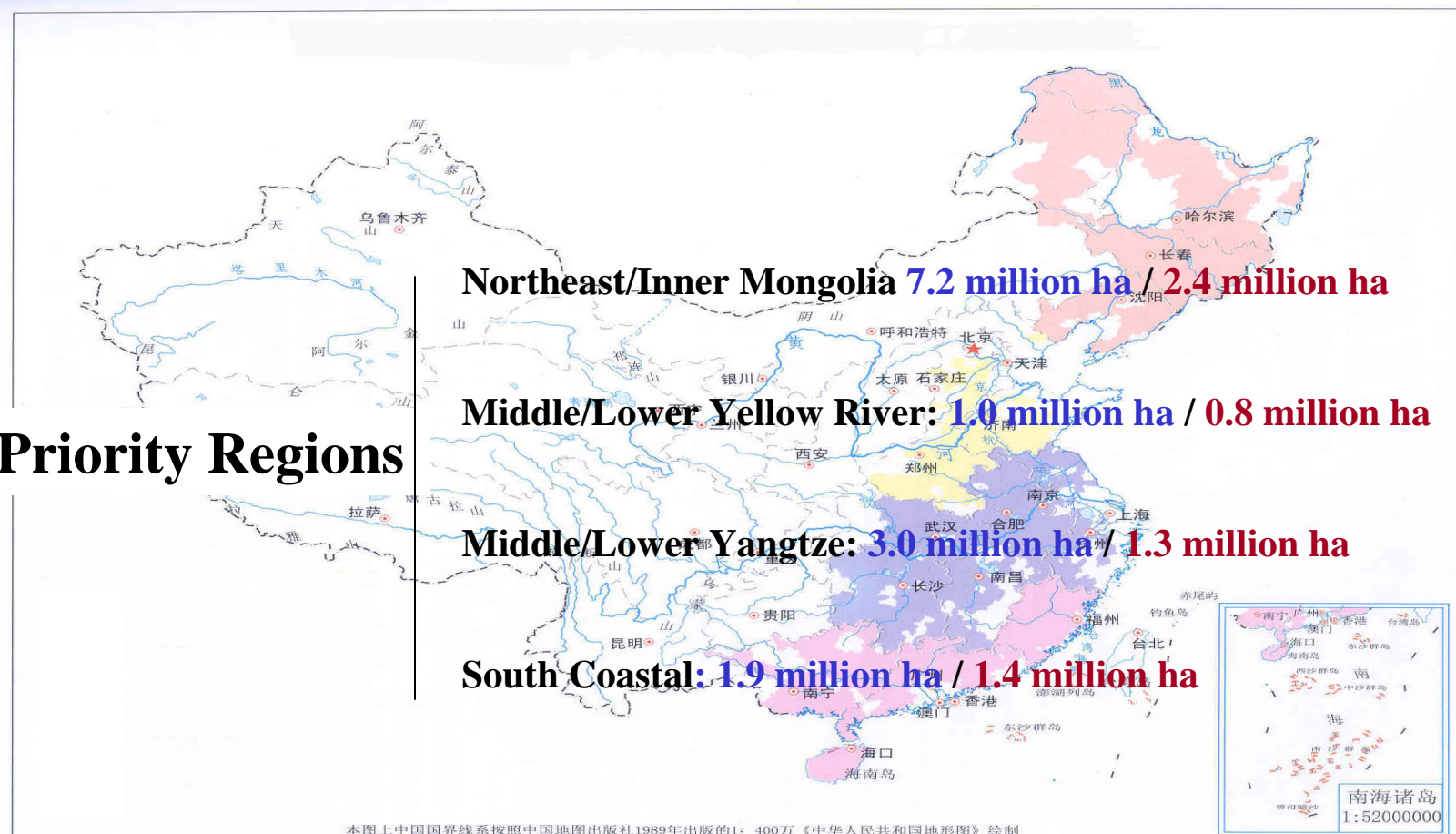
Overall target area:

13.1 million ha to be planted

Pulpwood plantations will account for:

5.9 million ha (45%)

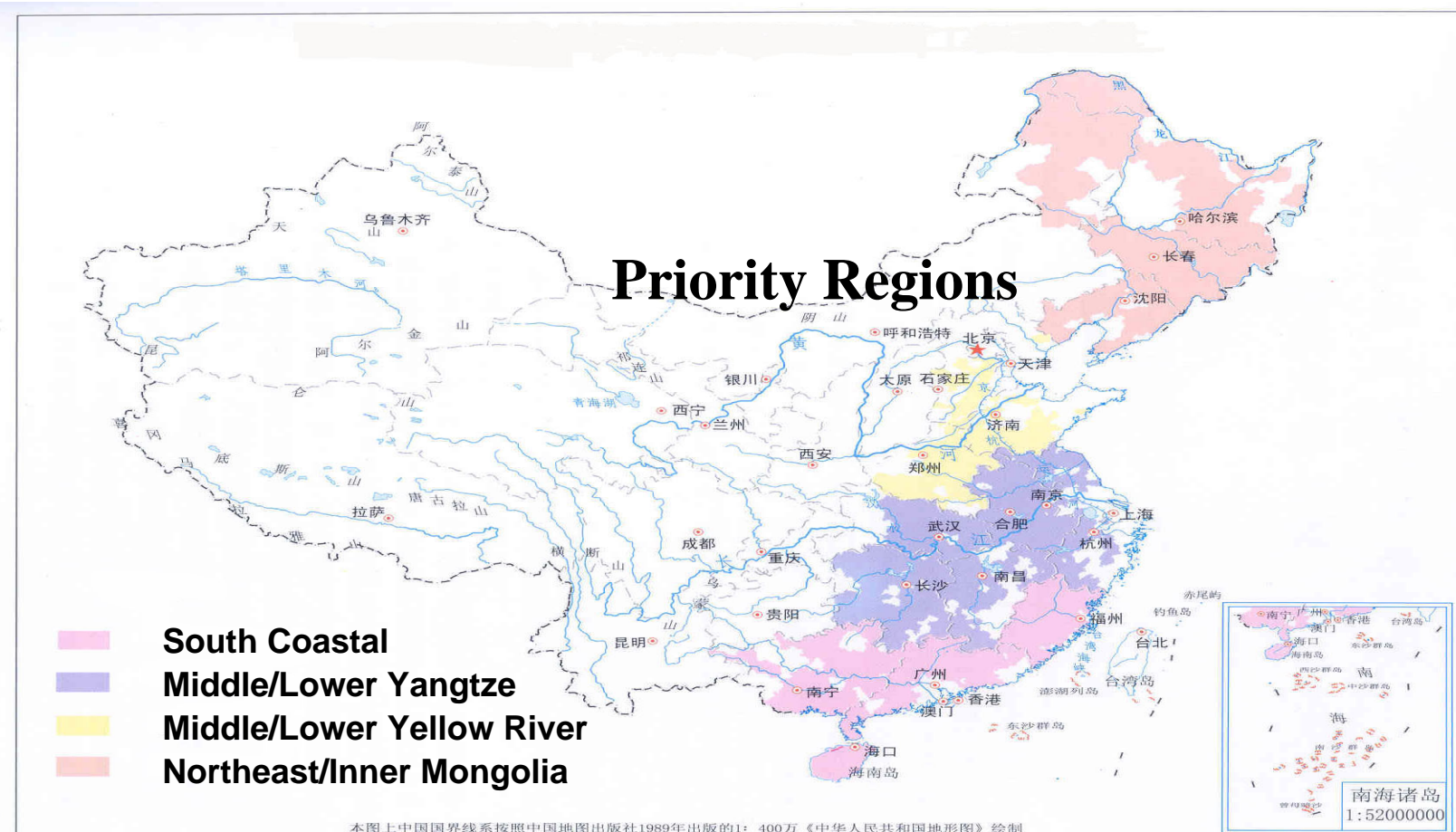
4 Priority Regions



China's Fast-Growing High-Yielding Plantation Program

	<u>2001-2005</u>	<u>2006-2010</u>	<u>2011-2015</u>
Targets for			
Pulpwood plantations	2.7 million ha	2.4 million ha	0.8 million ha

86.5 % of the planned pulpwood plantations in place by end 2010



Where Financial Analysts See Advantages for Investment in Pulp and Paper Emerging Markets ?

Emerging Market Strategies

Source: Merrill Lynch

	Low Cost Advantage			Capital cost	Attractive Market
	Raw materials	Assets	Construction		
China			X	XX	X
SE Asia	X		X		
Latin America	XX				
Russia	X	XX			X

- Capital expenditures, based on the low cost of raw materials, have been most successful
- Emerging market acquisitions are often expensive and investments driven by attractive market opportunities have had mixed success
- China: the world's second largest market with rapid investment growth stimulated by easy access to cheap financing

Southern China's pulpwood prices are relatively high:

- *RMB 300/green t (sub): West Guangdong (equiv. USD 36.5 / t)*
- *RMB 235/green t (sub) in Hainan (equiv. USD 28.6 / t)*

Is this a consequence of high production costs ?

Four tree-growing business models are presented

- ❑ They involve a number of economic actors with different operating modes, different social obligations and therefore different overheads.
- ❑ In addition of being highly variable among tree-growers, overhead costs are sometimes not known with precision
- ❑ It was also difficult to obtain consistent data / information on Taxes;

Discounted Cash Flow Analysis

Costs in RMB/mu

<u>Activity</u>	Year						
	0	1	2	3	4	5	6
Land Lease							
Land underbrushing (Manual)	(0.55)	Data are from Company records and/or obtained through interviews; The Excel model was developed by Emile Jurgens (emile@aya.yale.edu)					
Land clearing (Machine)	(4.20)						
Soil cultivation (Machine)	(11.31)						
Other pre-planting work (Manual)	(4.82)						
Planting	(18.38)						
Urea (at planting)	(9.53)						
Potassium (at planting)	(12.60)						
Phosphate (at planting)	(17.75)						
Seedlings	(27.60)						
Bagasse (at 6 months)	(25.10)						
Tending (Machine)	(8.00)	(16.00)					
Tending (Manual)		(24.00)	(12.00)				
Supervision / Protection	(5.00)	(5.00)	(5.00)	(5.00)	(5.00)	(5.00)	
Harvest/Debarking							(221.00)
Taxes							(90.00)
Transport by road							(190.00)
Revenue							1,899.45
Total	(144.84)	(45.00)	(17.00)	(5.00)	(5.00)	(5.00)	1,398.45
Present Value	(145)	(43)	(15)	(4)	(4)	(4)	1,000
Future Value of Costs	203	60	21	6	6	5	501

Discounted Cash Flow Analysis

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Parameters

Discount Rate	5.75%
MAI (m3/mu/y)	1.34
Rotation (years)	6
Wood Recovery	75%
Tonne/m3	1.05
Sale Price (RMB/t)	300.0

Net Present Value RMB/mu	785.32
IRR:	39.5%
Compounded Costs (RMB/m3)	132.86
Stumpage Costs (RMB/m3)	49.77

Self-Financed & Managed Plantations by a State Forest Company

Producer:

Previous Land use:

Plantation type:

Silviculture:

Tree species:

Commercial harvest:

A State Farm on its own land

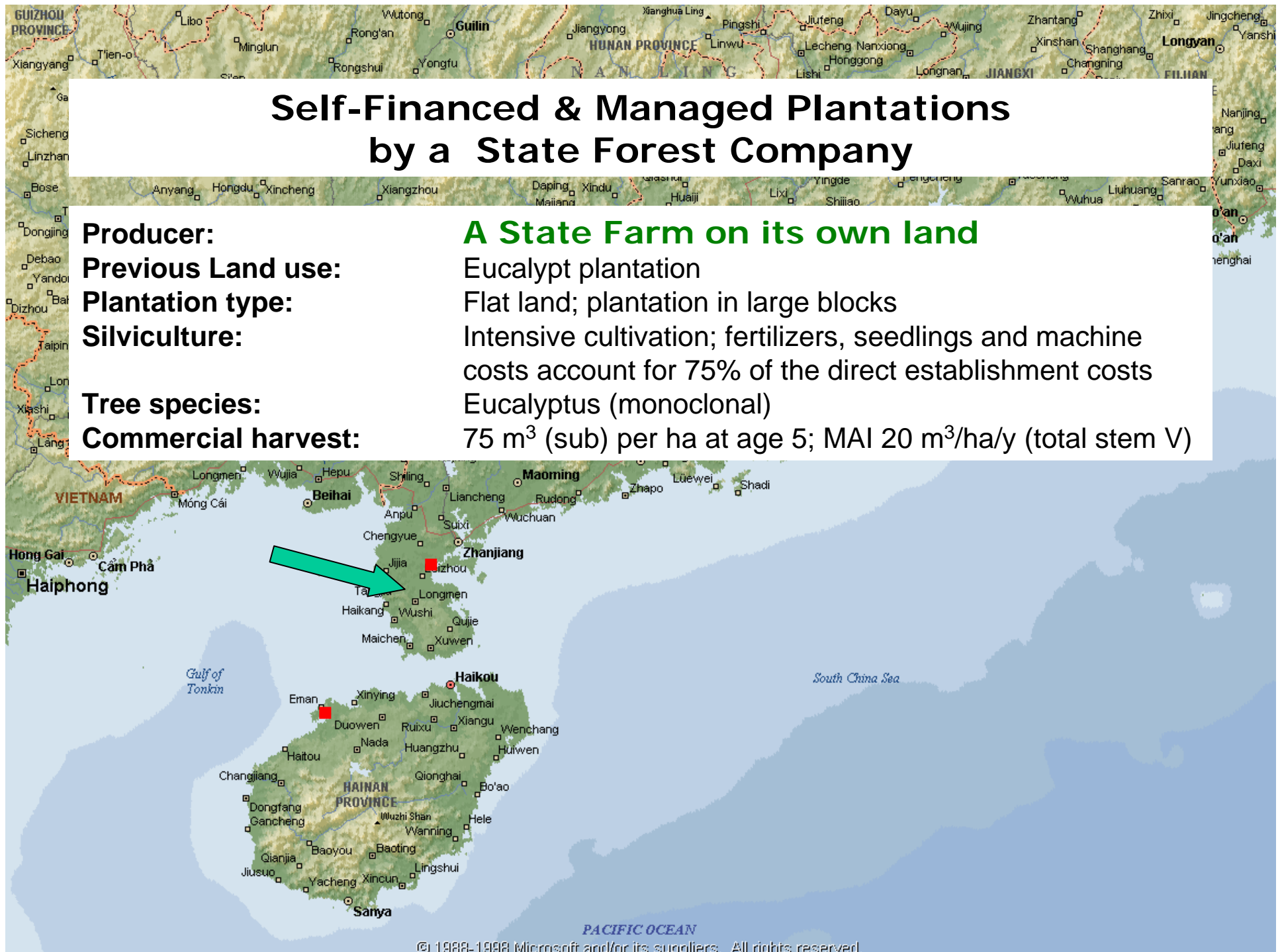
Eucalypt plantation

Flat land; plantation in large blocks

Intensive cultivation; fertilizers, seedlings and machine costs account for 75% of the direct establishment costs

Eucalyptus (monoclonal)

75 m³ (sub) per ha at age 5; MAI 20 m³/ha/y (total stem V)



Self-Financed & Managed Plantations by a State Forest Company

Plantation development costs: Low end; 12% overheads DR: 5.75% DR: 10%

Plantation to mill 70 km by road	NPV (USD/ha):	1,149.0	870.0
	IRR:	39.2%	39.2%
	Stumpage Value (USD/m ³)	7.9	9.5
	Compounded costs - mill gate (USD/m ³)	18.1	19.6
Plantation to mill 150 km by road	NPV (USD/ha):	889.0	657.0
	IRR:	34.0%	34.0%
	Stumpage Value (USD/m ³)	7.9	9.5
	Compounded costs - mill gate (USD/m ³)	22.6	24.2

Plantation development costs: High end; 12% overheads DR: 5.75% DR: 10%

Plantation to mill 70 km by road	NPV (USD/ha):	832.0	572.0
	IRR:	25.8%	25.8%
	Stumpage Value (USD/m ³)	12.8	15.2
	Compounded costs - mill gate (USD/m ³)	23.6	26.0
Plantation to mill 150 km by road	NPV (USD/ha):	572.0	358.0
	IRR:	20.8%	20.8%
	Stumpage Value (USD/m ³)	12.8	15.2
	Compounded costs - mill gate (USD/m ³)	28.2	30.6

Market price: USD 36.5 / green tonne at the mill gate

Self-Financed & Managed Plantations by a Pulp and Paper Company

Producer:

Previous Land use:

Plantation type:

Tree species:

Commercial harvest:

A Pulp Cie on leased community land

Agricultural land with marginal productivity for agriculture

Flat land; a 4 ha block. Land lease accounts for 66 % of all direct costs prior harvesting

Eucalyptus (monoclonal)

Expected 135 m³ (sub) per ha at age 6; MAI 30 m³/ha/y

The Pulp Company

- *Invested per ha USD 741.3 (year 0) + USD 295.8 (year 1) + USD 222.7 x 3 (year 2, 3 & 4) + USD 131.5 (year 5) for land lease and silviculture;*
- *Expect to harvest 142 tonnes at year 6 with a market value, at the mill gate, of 142 x USD 28.6 = USD 4061.2*

The Community

Will receive:

- *USD 219.1 per ha (equivalent to RMB 120 per mu) every year between year 0 and 4*
- *USD 127.8 per ha (equivalent to RMB 70 per mu) at year 5*

Self-Financed & Managed Plantations by a Pulp and Paper Company

**Plantation development costs: Medium to High
8% overheads**

DR: 5.75%

DR: 10%

Plantation to mill 50 km by road	NPV (USD/ha):	174.0	- 148.0
	IRR:	7.9%	7.9%
	Stumpage Value (USD/m³)	18.9	22.6
	Compounded costs – mill gate (USD/m³)	28.2	32.0
Plantation to mill 100 km by road	NPV (USD/ha):	- 159	- 411.0
	IRR:	3.6%	3.6%
	Stumpage Value (USD/m³)	18.9	22.6
	Compounded costs – mill gate (USD/m³)	31.7	35.4
Plantation to mill 220 km by road	NPV (USD/ha):	- 959	- 1042
	IRR:	-11.1%	-11.1%
	Stumpage Value (USD/m³)	18.9	22.6
	Compounded costs – mill gate (USD/m³)	40.0	43.7

Current market price: USD 28.6 / green tonne at the mill gate

Joint-Investment Model

Private Investor / Pulp and Paper Company

Producer:	Private investor on community land
Previous Land use:	2 rotations of eucalyptus 12 ABL
Plantation type:	Flat land; an 80 ha block
Silviculture:	Labor-intensive (35 % of direct establishment costs is labor costs); fertilizers & seedlings account for 34.5 %.
Tree species:	Eucalyptus (monoclonal)
Commercial harvest:	Expected 97.5 m ³ (sub) per ha at age 5; MAI 26 m ³ /ha/y

The Pulp Company

- **Invested USD 575.2 (year 0) + USD 63.9 (year 4).**
- **Will receive 42 tonnes free of charge delivered to the mill gate at year 5 with a market value of $42 \times \text{USD } 28.6 = \text{USD } 1201.2$**

The Private Investor

- **Invested USD 224.5 (year 0) + USD 54.8 (y 1) + USD 14.6×3 (y 2, 3 & 4) for land lease and silviculture.**
- **Will sell 60 tonnes at the mill gate with a market value of $60 \times \text{USD } 28.6 = \text{USD } 1,716$**

Joint-Investment Model

Private Investor / Pulp and Paper Company

Plantation development costs: Medium to High

Private investor: 3.5% overheads; P & P Cie: 8% overheads

DR: 5.75%

DR: 10%

Analysis on entire investment

**Plantation to mill
35 km by road**

NPV (USD/ha):	641.0	360.0
IRR:	17.5%	17.5%
Stumpage Value (USD/m ³)	13.1	15.9
Compounded costs - mill gate (USD/m ³)	21.3	24.1

**Plantation to mill
105 km by road**

NPV (USD/ha):	300.0	79.0
IRR:	11.8%	11.8%
Stumpage Value (USD/m ³)	13.1	15.9
Compounded costs - mill gate (USD/m ³)	26.0	28.7

Analysis on Private investor's share

**Plantation to mill
35 km by road**

NPV (USD/ha):	409.0	282.0
IRR:	25.8%	25.8%

**Plantation to mill
105 km by road**

NPV (USD/ha):	68.0	2.0
IRR:	10.1%	10.1%

Analysis on Pulp & Paper Company's share

NPV (USD/ha):	232.0	77.0
IRR:	12.6%	12.6%

Current market price: USD 28.6 / green tonne at the mill gate

Share Benefit Agreement Between a Pulp & Paper Company and Land Users

Producer:	Community on its own land
Previous Land use:	Low-productivity eucalyptus exserta
Plantation type:	Flat land; a 113 ha block
Silviculture:	Low-input silviculture for a low-fertility site: weeding and fertilization were sub-optimal
Tree species:	Eucalyptus (monoclonal)
Commercial harvest:	60 m ³ (sub) per ha at age 6; MAI 13 m ³ /ha/y

The Pulp Company

- Invested USD 445.5 (year 0) + USD 27.4 (year 1) + USD 829.3 (year 6).
- Harvested 63 tonnes at year 6 with a market value, at the mill gate, of $63 \times \text{USD } 28.6 = \text{USD } 1801.8$

The Community

- Is to receive USD 306.7 per ha equivalent to RMB 28 per mu and per year.
- The Pulp Company is proposing to share the benefit on the base of RMB 100/m³ (equivalent to USD 12.17/ m³)

Share Benefit Agreement Between a Pulp & Paper Company and Land Users

Plantation development costs: Medium to Low
Pulp & Paper Company: 8% overheads

		DR: 5.75%	DR: 10%
Plantation to mill 50 km by road	NPV (USD/ha):	30.5	- 106.0
	IRR:	6.6 %	6.6 %
	Stumpage Value (USD/m³)	14.6	18.4
	Compounded costs mill's gate (USD/m³)	29.3	33.2

Current market price: USD 28.6 / green tonne at the mill gate

There are plantations established under the 'Share-Benefit Agreement' scheme that are more productive and therefore are (or will be) more profitable to both parties. However:

- ❑ *Land users, in general, have been reluctant to enter into this type of agreement due to the lack of accurate information and guaranty with respect to cost assessments, yield prediction and estimation of income earning.*
- ❑ *There has also been a strong belief – supported by several cases - that growing pulpwood under this type of agreement would provide less benefits than many other land use options.*

In Hainan, the 'Share Benefit' model is no longer proposed to potential land users (Official statement of August 6, 2004).

Growing Pulpwood in Southern China

Production (Direct) Costs

- ❑ They vary substantially depending on where the pulpwood is grown and who grows it;
- ❑ They are the lowest on State-owned land (no expenditure on land lease) when plantations can be established on large blocks with some degree of mechanization (site preparation and weeding);
- ❑ They are generally higher in Hainan, for several reasons:
 - There is little available State-owned land for new plantations;
 - It is expensive to leasing land with medium to high soil fertility;
 - Where land can be leased at lower prices (granitic soils and low-fertility sedimentary sands) plantation yield is low due to low soil fertility;
 - Plantation blocks are generally small in size and scattered (less possibility of achieving economy of scale from tree planting to harvest);
 - Transport costs are more expensive.

Growing Pulpwood in Southern China

Production (Direct) Costs

- ❑ Small investors and middleman (chengbaoren) are able to establish and manage cost-efficient plantations in small blocks when soil fertility is adequate and the cost of land lease is contained within the RMB 100/mu/year limit (USD 182.6/ha/y);

Growing Pulpwood in Southern China

Sale Prices & Production Costs

- ❑ Comparison between Western Guangdong and Hainan shows that sale prices are the highest where tree growers operate in open market conditions / have more than one option for selling their wood. It is also where production costs are the lowest (Zhanjiang & Maoming prefectures).
- ❑ In Hainan, pulpwood is produced at higher costs and sold about 22% cheaper. Until recently the Hainan domestic demand for wood chips (essentially from the panel industry) was low. Most of the production was exported to Korea, Japan and Taiwan. Two State-owned organizations are sharing the chips export monopoly;
- ❑ Aligning Hainan prices with Western Guangdong is likely to create better dynamics toward investment in small-scale plantations. The next slide summarizes the effect of a sale price increase on the feasibility of the joint-investment model (Private investor / Pulp & Paper Company).

Growing Pulpwood in Southern China

Joint (Private Investor/Pulp & Paper Company) Investment

The private investor

❑ Invests USD 224.5 (y 0) + USD 54.8 (y 1) + USD 14.6 x 3 (y 2, 3 & 4) for land lease and silviculture.

❑ Will sell 60 tonnes at the mill gate (y 5).

60 t sold at year 5

Sale price: USD 28.6 / t

DR: 10%

Plantation to mill: 105 km

NPV (USD/ha): 2.0

IRR: 10.1%

60 t sold at year 5

Sale price: USD 36.5 / t

DR: 10%

Plantation to mill: 175 km

NPV (USD/ha): 18

IRR: 11.3%

The Pulp & Paper Company

❑ Invests USD 575.2 (year 0) + USD 63.9 (year 4).

❑ Will receive 42 tonnes free of charge delivered to the mill gate at year 5

42 t delivered free of charge

Sale price: USD 28.6 / t

DR: 10%

NPV (USD/ha): 77

IRR: 12.6%

42 t delivered free of charge

Sale price: USD 36.5 / t

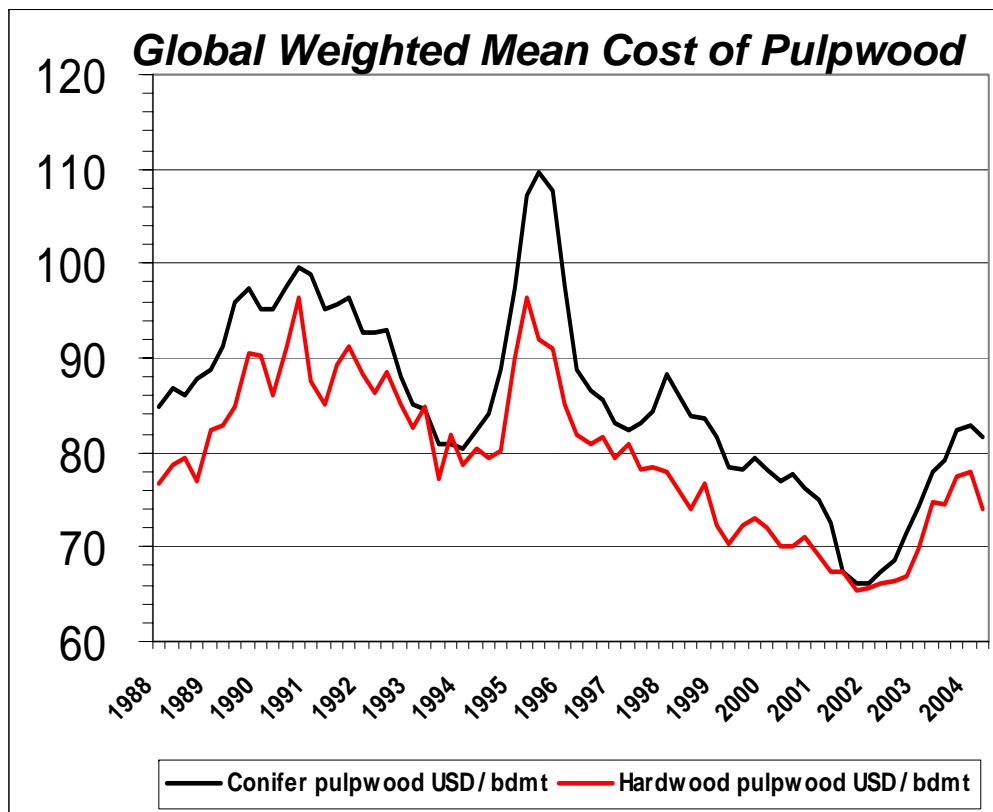
DR: 10%

NPV (USD/ha): 482

IRR: 18.5%

Growing Pulpwood in Southern China

Local Production Costs & the International Market



□ During the second quarter 2004, West Guangdong prices (*RMB 300 / green t (sub) equiv. to USD 78.5 / BDt*) were approximately 6 % higher than the Global Weighted Mean Delivered Prices for hardwood pulpwood;

□ At current pulpwood sale prices, chips can be produced for less than USD 85 per BDt. This is still lower than what the cheapest imported plantation wood chips would cost (*above USD 100 (c.i.f) per BDt*)

How much pulpwood is Southern China able to grow at competitive prices?

The land availability issue

Will local supplies of pulpwood be sufficient to satisfy the rapidly increasing demand of China's new pulp production lines?

Challenge faced by the new large-scale mills to secure adequate plantation land to support their needs for virgin wood fiber

- ❑ In rural areas, Government institutions manage only a small portion of the land
- ❑ To a large extent, State and Provincial Forest Farms have planted all the land that they had available

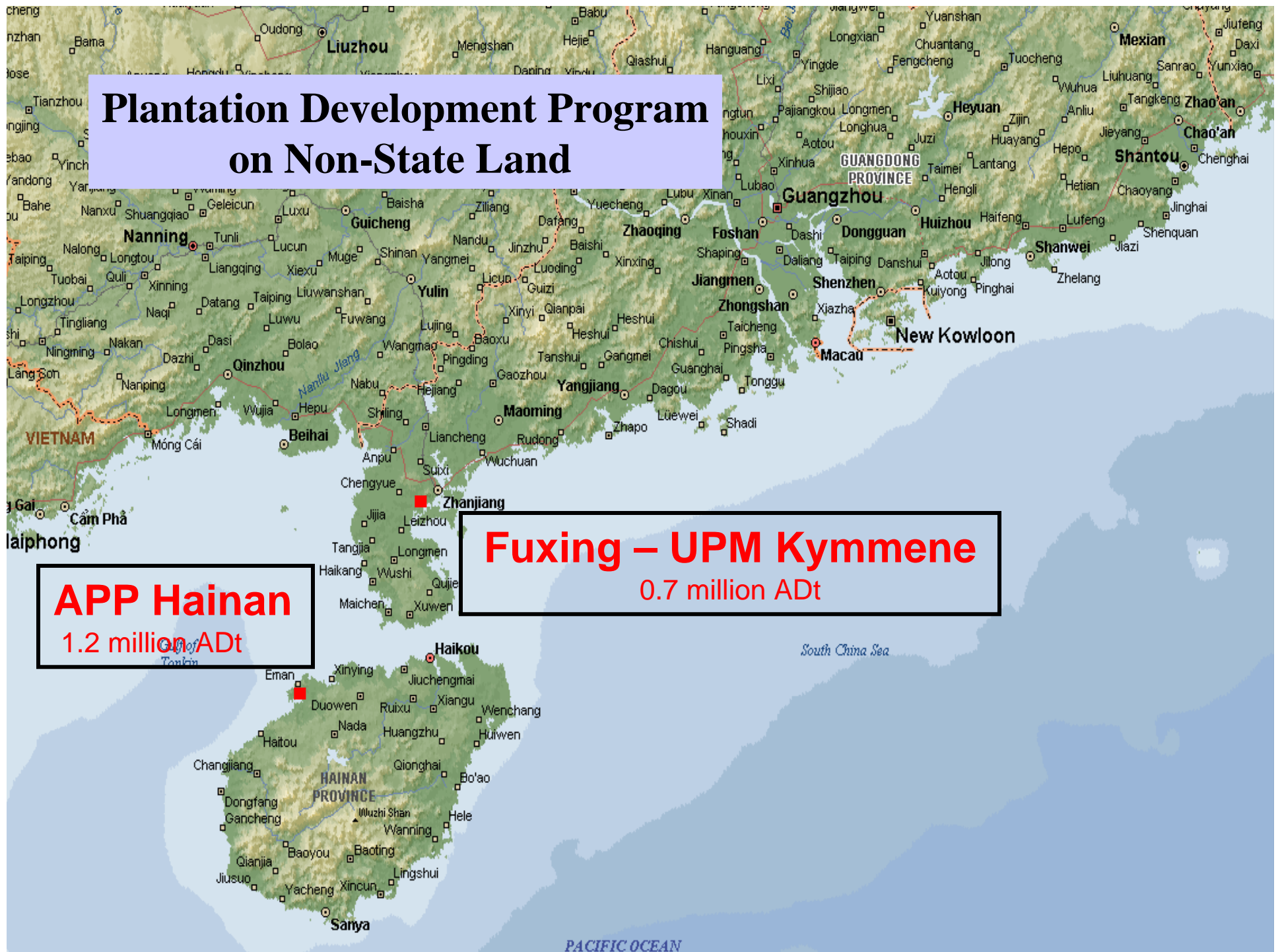


Most of the plantation expansion, driven by the new fiber demand of the pulp industry, is expected to take place on collectively-owned land (township, village) & on small individual farms

Plantation Development Program on Non-State Land

APP Hainan
1.2 million ADt

Fuxing – UPM Kymmene
0.7 million ADt





Plantation Development Program on Non-State Land

An overall program of 200,000 ha, of which

- ❑ 45% is entirely on land with collective & individual user rights (membership scheme)
- ❑ 25% on leased land. Only part of this will be on State-owned land
- ❑ 30% under wood supply contracts

APP Hainan
1.2 million ADt

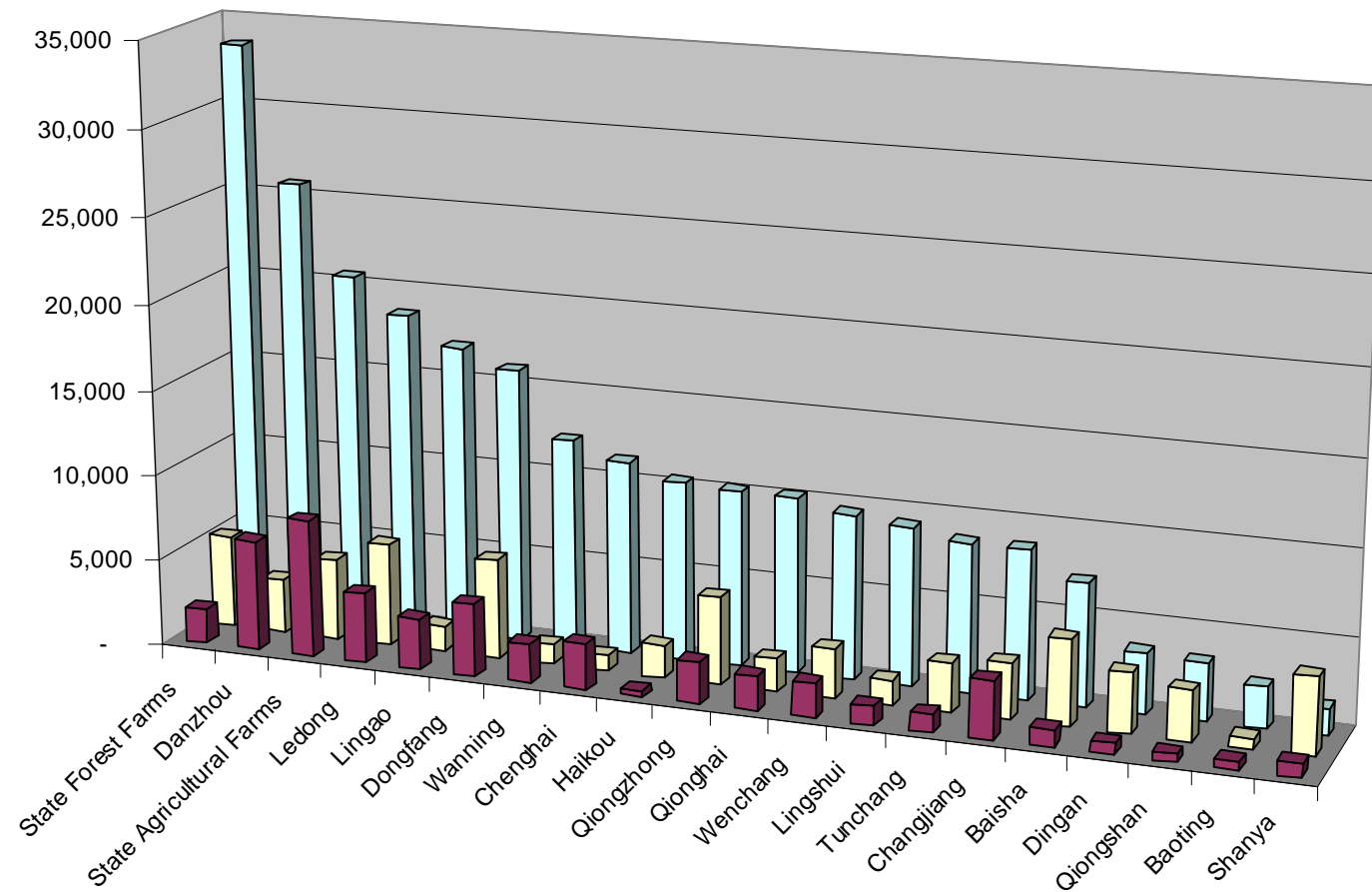
Fuxing – UPM Kymmene
0.7 million ADt

- ❑ 77% of the overall plantation program (233,000 ha)
- ❑ 84% of 97-2003 plantations (63,530 ha)
- ❑ 100% of 2003 plantations of which 1/3 was leased land and 2/3 was land under the shared benefits agreement scheme

JINHUA - APP PULPWOOD PLANTATIONS in HAINAN

Area planted (1997-2003) and future plans

hectares



■ 2004 Plantation target

■ Total Planted in 97, 99, 00 & 2003

■ APP's overall plantation target


October 2004: APP will launch its commercial production of wood pulp at Yangpu

The 1.1 million Adt capacity mill will require:

- ❑ 2. 025 million BD tons of chips during the first 12 months of operation. This is approximately 10 times the current export capacity of Hainan
- ❑ 2.520 million BD tons of chips during the following 12 months of operation (Oct. 2005 – Sept. 2006) This is 12 times the current export capacity of Hainan

▪**Source:** Hainan Jinhai Pulp & Paper Co. Ltd

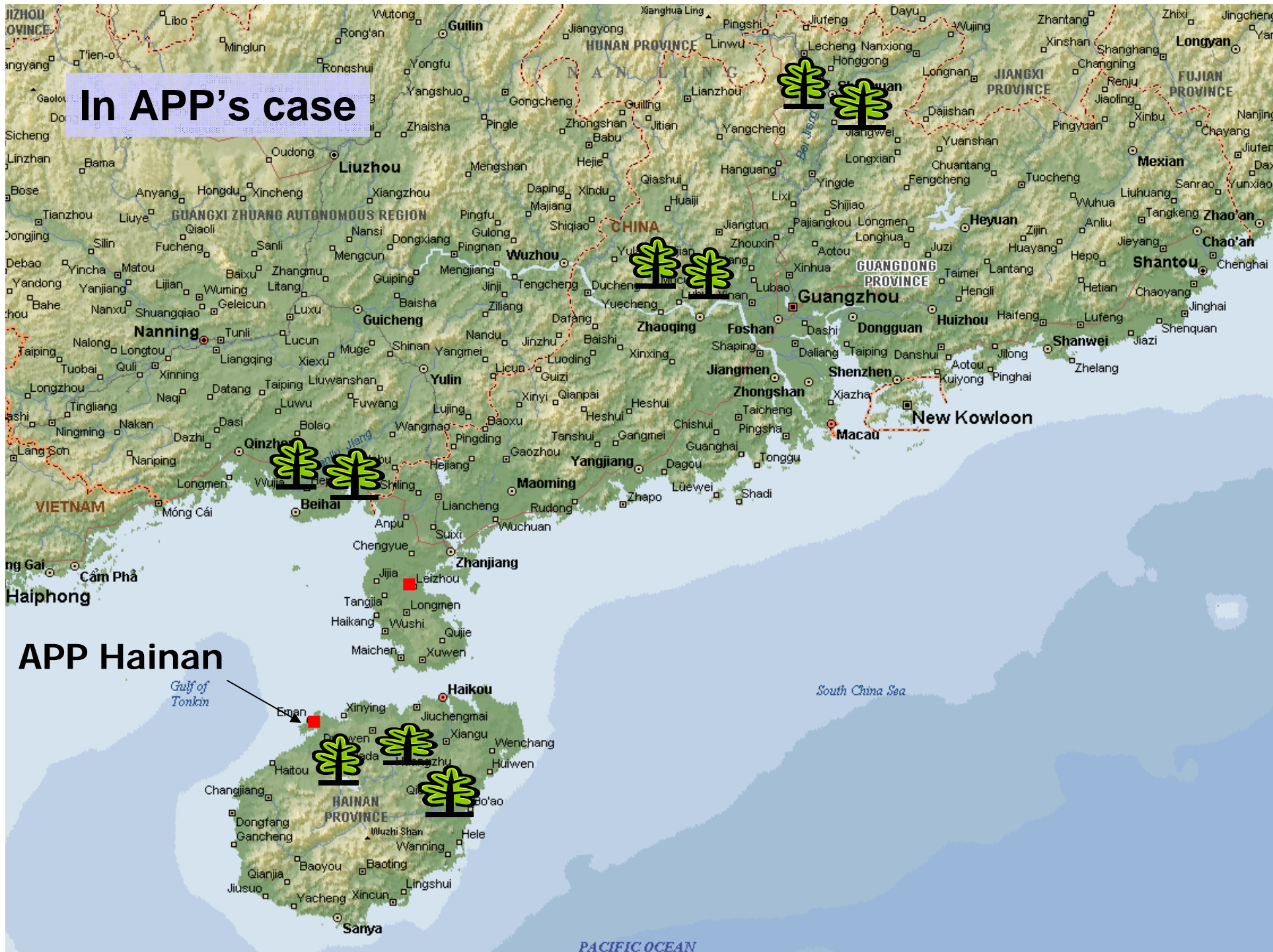


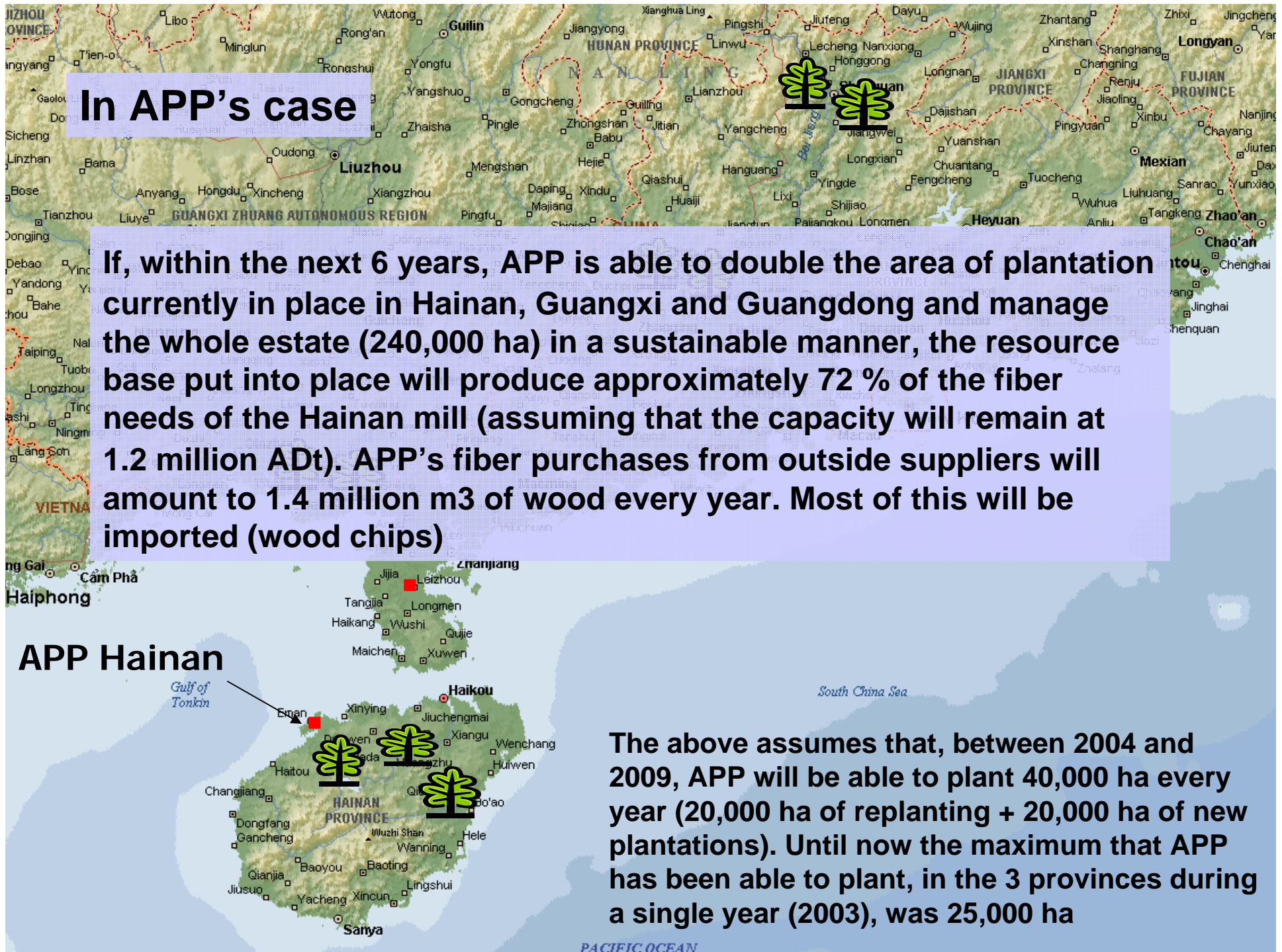


❑ Until 2004, Western Guangdong, Hainan and Guangxi were exporting approximately 1.1 million BDt of wood chips per year, equivalent to 2.3 million m³ of green wood (sub);

❑ The region will need to import between 6.4 and 8.9 million m³ of pulpwood over the next 5 years. The exact need will depend on whether the pulp capacity will increase during this period and if it increases how large will the new additions be;

❑ The Wood Supply situation beyond 2009 will depend upon what the big players (APP, Stora Enso; UPM Kymmene, Oji and APRIL) will be able to plant in 2004 and consecutive years





Considering the various obstacles that several Pulp Companies are facing, in their effort to secure an adequate plantation land base, it is likely that Southern China will remain largely reliant on imported wood chips beyond 2009.

There might be strong temptation, on the part of certain players, to fulfill their fiber gap from non-sustainable sources in countries with governance problems.



Thank you
谢谢！

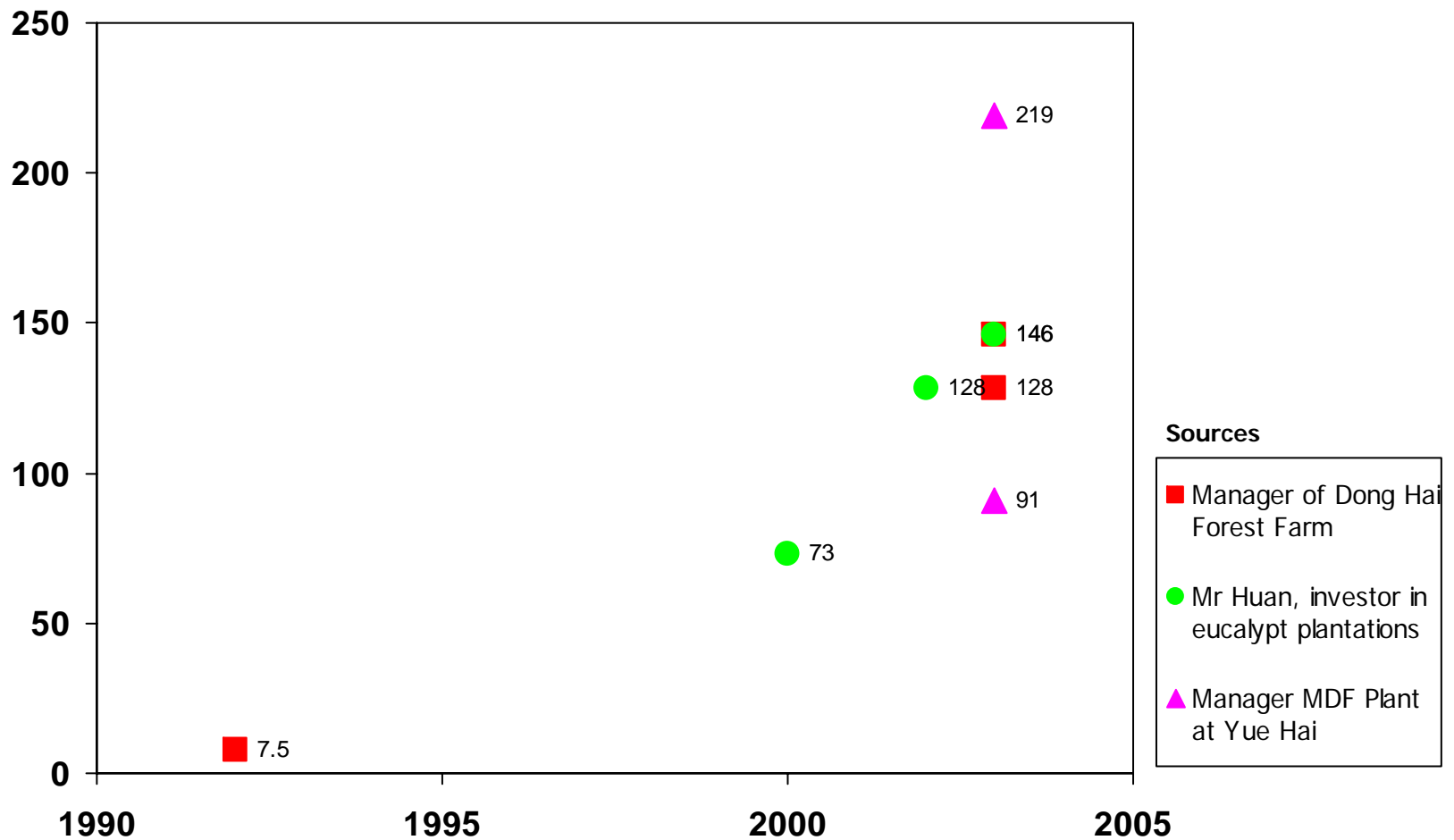


Land Leasing from communities and individuals

- **Is becoming the most common practice in Hainan with wide variation in price depending on the location, topography and soil fertility**
- **Currently USD 55 to 130 per ha, per year on the West coast (Danzhou prefecture) for land that is generally not suitable for agriculture. In the 90s' prices were below USD 50 for the same type of land**
- **Land lease prices on the East coast are higher. Soils are more fertile and there is a high demand for agricultural land**
- **Land lease contracts are generally for 30 years**
- **Down payment for the first 12 years (2 rotations) was the most common practice until this year**

Price Trends for Agricultural Land Leasing in Zhanjiang Prefecture

USD/ha/year





New partnership models between APP and 'land owners'

- APP provides USD 640 per ha to 'land owners' – in 4 allocations – for plantation establishment and maintenance (6-year rotation)
- The 'land owner' buys APP' seedling (clones)
- Fertilizer: Either provided by APP and deducted from second cash allocation (provided after planting work has been done) or the 'land owner' buys fertilizers at the market.
- APP requests that plantation yields at least 75 tons of green wood (s.u.b.) per ha at end of rotation (6 years)
- The 'land owner' will deliver 42 tons of green wood (s.u.b.) - free of charge - per ha planted to Yan Pu (APP mill gate)
- Additional production will be sold to APP at market price

New partnership models between APP and 'land owners'

- APP provides seedlings and technical assistance to 'land owners' for plantation establishment and maintenance (6-year rotation)
- The 'land owner' buys APP' seedling (clones)
- APP provides fertilizers and deducts their cost at time of harvest. Base of calculation is the market price for fertilizer at the time of harvest
- At the time of harvest all wood is sold to APP at the market price
- The 'land owner' has the possibility to harvest and deliver the wood to Yan Pu (APP mill gate)
- Most frequently APP will harvest and transport the wood and will deduct the corresponding costs



PRICE FOR DEBARKED GREEN EUCALYPT LOGS AT MILL GATE (chips plant)

Zhanjiang prefecture, September 2003

Source of data

9. Manager of Mazhang chips plant
8. Private investor in eucalypt plantations
7. Manager of Dong Hai Forest Farm
6. Manager of Tai Ping chips plant
5. Manager of a MDF mill owned by Leizhou F.B.
4. Manager of a chips plant owned by Leizhou F.B. *logs bought on the local market*
3. Manager of a chips plant owned by Leizhou F.B. *logs bought from Leizhou F.B.'s farms*
2. Manager of a Forest Farm under Leizhou F.B. *Logs bough outside Leizhou F. B. network*
1. Manager of a Forest Farm under Leizhou F. B. : *logs delivered to Leizhou F.B. chips plant*

