TAB D

This is Exhibit "D" referred to in the

Affidavit of Li Yin Fan,

sworn before me this 20

day of August, 2012

Person Authorized to take Affidavits

Katherine K. Y. Lam
Solicitor,
Hong Kong SAR
Messrs. Simon Si & Co.

Report

JAAKKO PÖYRY CONSULTING

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23 March 2006
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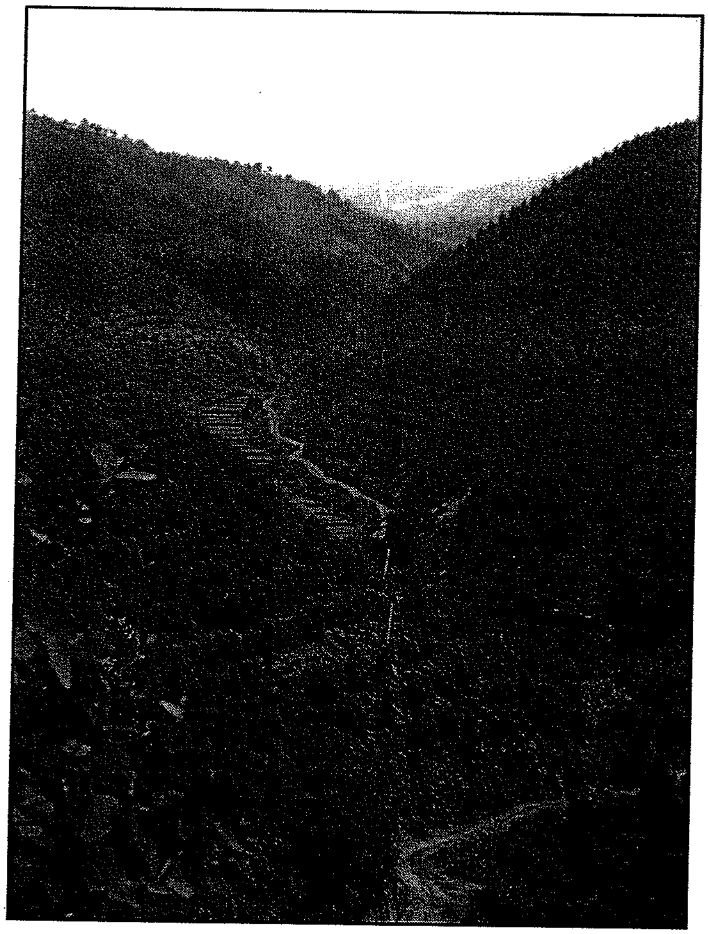

Valuation of China Forest Assets As at 31 December 2005

Sino-Forest Corporation

JAAKKO PÖYRY
Jaakko Pöyry Consulting

Preface

At the request of Sino-Forest Corporation (**Sino-Forest**), Jaakko Pöyry Management Consulting (Asia Pacific) Ltd, (**Jaakko Pöyry Consulting**) has prepared this report. It contains the opinion of Jaakko Pöyry Consulting as to the value of the existing plantation forest assets of Sino-Forest in China as well as a prospective valuation of the proposed forest development plans.

This report is issued by JP Management Consulting (Asia-Pacific) Ltd (Jaakko Pöyry Consulting) to Sino-Forest for its own use.

This report presents an independent valuation, as at 31 December 2005 of Sino-Forest's forest assets in Southern China. Forest valuations are prepared for various purposes, and this may influence the valuation method used. Jaakko Pöyry Consulting has prepared this valuation for asset reporting purposes.

JP MANAGEMENT CONSULTING (ASIA-PACIFIC) LTD

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23 March 2006

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CERTIFICATION

Jaakko Pöyry Consulting certifies to the following statements to the best of our knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, opinions, and conclusions.
- Jaakko Pöyry Consulting has no present or prospective interest in the subject property, and no personal interest or bias with respect to the parties involved.
- Jaakko Pöyry Consulting's compensation for completing this assignment is not contingent upon:
  1. the development or reporting of a predetermined value or direction in value that favours the cause of the client,
  2. the amount of the value opinion,
  3. the attainment of a stipulated result, or
  4. the occurrence of a subsequent event directly related to the intended use of this appraisal.
- Previous high level inspections have been associated with valuations carried out by Jaakko Pöyry Consulting in 2000, 2001, 2003 and 2004.
- A qualitative inspection was made of a sample of Sino-Forest areas in Heyuan City, Guangdong Province and Jiangxi Province over the period 5 December 2005 to 16 December 2005.
- The report has been prepared by staff consultants, retained consultants and office support personnel of Jaakko Pöyry Consulting.

The Jaakko Pöyry Group is a client and technology-oriented, globally operating consulting and engineering firm with offices in 35 countries. It has three core areas of expertise: forest industry, energy, and infrastructure and environment. Group companies employ 4600 people. Jaakko Pöyry Group Oyj is listed on the Helsinki Stock Exchange.

The Forest Industry Consulting business group provides its clients advice in business strategy, processes and operations designed to enhance stakeholder value. The business group's expertise covers the complete supply chain, from raw materials to technology, markets and financing. Consulting and advisory services are provided in three main practice areas:

- Management Consulting
- Investment Banking
- Operations Management

The business group's brand name is Jaakko Pöyry Consulting.

Jaakko Pöyry Consulting is an independent management consulting company within the Jaakko Pöyry Group and is recognised as one of the world's leading advisors to the global forest industry cluster. The cornerstones of its operations are its strong business understanding and industry expertise. The business group's global network of around 300 experts covers all major forest products regions in the world.

JP MANAGEMENT CONSULTING (ASIA-PACIFIC) LTD

Andrew Fyfe
ASSOCIATE PRINCIPAL

ASSUMPTIONS AND LIMITING CONDITIONS

This report was prepared at the request of and for the exclusive use of the client, Sino-Forest Corporation. This report may not be used for any purpose other than the purpose for which it was prepared. Its use is restricted to consideration of its entire contents. This valuation represents an update of Jaakko Pöyry Consulting's 31 December 2004 forest valuation that was presented in Report 38A04520 Valuation of China Forest Assets as at 31 December 2004.

Details concerning the location and basic physical characteristics of the subject property were taken from data provided by Sino-Forest.

Jaakko Pöyry Consulting has viewed a sample of cutting right purchase contracts and has assumed legal descriptions to be authoritative. Maps, diagrams and pictures presented in this report are intended merely to assist the reader.

Jaakko Pöyry Consulting has undertaken a limited visual inspection of the forest resource from the ground in December 2005. Previous limited inspections have been associated with valuations carried out by Jaakko Pöyry Consulting in 2000, 2001, 2003 and 2004. This appraisal assumes that the sites visited by Jaakko Pöyry Consulting during its December 2005 field inspection represent the full range of conditions present. The forest inspection process has been limited to a high-level review.

Legal matters are beyond the scope of this report, and any existing liens and encumbrances have been disregarded, and the forest resource has been appraised as though free and clear under responsible ownership and competent management.

Unless otherwise stated in this report, the existence of hazardous materials or other adverse environmental conditions, which may or may not be present on the property, were neither called to the attention of Jaakko Pöyry Consulting, nor did the consultants become aware of such during the inspection.

Jaakko Pöyry Consulting recognizes the possibility that any valuation can eventually become the subject of audit or court testimony. If such audit or testimony becomes necessary as a result of this valuation, it will be a new assignment subject to fees then in effect. Jaakko Pöyry Consulting has no responsibility to update this report for events and circumstances occurring after the date of this report.

Any liability on the part of Jaakko Pöyry Consulting is limited to the amount of fee actually collected for work conducted by Jaakko Pöyry Consulting. Nothing in the report is, or should be relied upon as, a promise by Jaakko Pöyry Consulting as to the future growth, yields, costs or returns of the forests. Actual results may be different from the opinion contained in this report, as anticipated events may not occur as expected and the variation may be significant.

SUMMARY

Valuation

Jaakko Pöyry Consulting has assessed the value of the 324 296.2 hectares (ha) of forest assets owned by Sino-Forest as at 31 December 2005 to be **USD728.5 million**. This is the result of a valuation of the existing planted area and uses an 11.5% discount rate applied to real, pre-tax cash flows.

Jaakko Pöyry Consulting has also prepared an existing forest valuation that **includes** the revenues and costs of re-establishing and maintaining the plantation forests for a 50-year period (perpetual valuation). However, to date Sino-Forest only has an option to lease the land under the purchased trees for future rotations, the terms of which have yet to be agreed. Sino-Forest is embarking on a 200 000 ha expansion of its estate in Heyuan City. Jaakko Pöyry Consulting has determined the valuation of the Sino-Forest forest assets based on a perpetual rotation (including the planned expansion in Heyuan City) using a real pre-tax discount rate of 11.5% to be **USD968.4 million** as at 31 December 2005.

The following table presents the results of the valuation of the Sino-Forest estate. The results are shown at real discount rates of 10.5%, 11.5% and 12.5% applied to real pre-tax cash flows.

Table 1:
USD Valuation as at 31 December 2005

Forest Component	Real Discount Rate Applied to Pre-tax Cash Flows		
	10.5%	11.5%	12.5%
	USD million		
Existing forest estate of 324 296.2 hectares, current rotation only	752.9	728.5	705.4
Existing forest, and all future rotations including the 200 000 ha expansion in Heyuan City	1 055.2	968.4	895.0

Value Change

The change in appraised value between 31 December 2004 and 31 December 2005 is attributable to the following factors:

- The purchase of new forest areas
- Revision of the valuation discount rate
- The sale of existing forest areas within the estate, and
- An increase in maturity within the estate because of biological growth.

Table 2:
Components of Value Change – USD millions

	Incremental Forest Value	Contribution to Change in Value	% Contribution to Change
		USD millions	
Value as at 31 December 2004	**565.6**		
Change in Discount Rate	575.3	9.7	1.7
Changes in Log Pricing	575.3	0.0	0.0
Forest Area Changes and Annual Growth	728.5	153.2	27.1
Value as at 31 December 2005	**728.5**	**162.9**	**28.8**

Discount Rate

A valuation based on a discounted cash flow approach requires the identification of an appropriate discount rate. In selecting the rates there are two broad approaches:

- Deriving the discount rate from first principles. A common expression of this approach turns first to the Weighted Average Cost of Capital (WACC). This recognises the costs of both debt and equity. The cost of equity may be derived using the Capital Asset Pricing Model (CAPM) method.
- A second approach is to derive implied discount rates from transaction evidence.

WACC Analysis

Jaakko Pöyry Consulting has commissioned Dr Alastair Marsden, Auckland UniServices Limited, to prepare a report on the cost of capital for a generic forest investment located in China. His report is included in Appendix 3.

Dr. Marsden concludes that depending on the modelling assumptions a range of discount rates might be proposed for a forest-owning venture in China. His derived range of rates is shown in **Table 3**.

Table 3:
Estimate of Post-tax WACC by Marsden

Lower Bound	Average Estimate	Upper Bound
5.0	**6.6**	8.2

In the first instance, the conventional formulation of WACC generates a rate for application to post-tax cash flows, which includes the cost of debt. Dr Marsden has applied a transformation to his initial results and this process has produced an average WACC for application to real pre-tax cash flows of 9.9% **(Table 4)**.

Table 4:
Estimate of Real Pre-tax WACC

Lower Bound	Average Estimate	Upper Bound
7.5	**9.9**	12.3

Implied Discount Rates

In common with other valuers of southern hemisphere planted forests, Jaakko Pöyry Consulting maintains a register of significant forest transactions. The available evidence is then analysed in order to derive the discount rate implied by each transaction. The process involves preparing a credible representation of the forest's future potential cash flows and then relating these to the actual transaction price.

From this type of exercise conducted in Australia and New Zealand, Jaakko Pöyry Consulting has observed derived discount rates for recent transactions to generally fall within the range of 8-10%. These are real rates, applied to post-tax cash flows.

As yet Jaakko Pöyry Consulting has little implied discount rate data for the Southern China region. As the commercial plantation forest industry develops and more forests change hands, empirical evidence from which to derive implied discount rates will arise. The capacity to utilise implied discount rates in this valuation is limited to considering how the forest investment in China compares with such investment in other locations.

Commercial forestry in Southern China is still developing and faces some challenges, these include:

- The reliability of forest descriptions
- The accuracy of yield prediction
- Achieving high growth in a consistent manner.

It is Jaakko Pöyry Consulting's opinion that for many forest investors, investing in plantation forestry in China would be considered a riskier proposition than, for instance, investing in the industry in Australia or New Zealand.

Incorporating Risk in the Discount Rate

If forest investment in China is at present perceived to be a more risky proposition than like activity in other international locations, the issue then becomes how to quantify this difference. The textbook treatments of the subject suggest that the discount rate should be regarded as a simple catch-all for any and all forms of perceived risk. It may be a very blunt instrument in such a role and it is therefore preferable to attempt to acknowledge risk in the development of the cash flows to which the discount rate is applied. However, building risk-inclusive cash flows is itself less than straightforward. This is especially the case in emerging investment environments where the empirical evidence with which to model risks is not readily accessible. A propensity to load the discount rate remains.

The Discount Rate Applied in Valuing the Sino-Forest Resource

Given the complexities in identifying what margin above other implied discount rates that forestry in Southern China should attract, Jaakko Pöyry Consulting is disinclined to place weight on an implied discount rate derivation for this resource. Disconcertingly, the range of rates suggested by the alternative approach - the WACC/CAPM - is very broad.

Ultimately we have exercised our professional judgement in selecting a rate at the upper end of the WACC/CAPM range. This is a real rate of 11.5%. In selecting such a rate we have been inclined to recognise that investors in forestry in Southern China will inherently be taking a long term view, and do have grounds for optimism on the forest industry's future there. The fundamental factors that affect forestry performance are favourable. Importantly, too, the definition of market value for the forests requires that there be not just willing buyers, but also willing sellers. If the only purchase offers to be extended involved very high discount rates we would expect that forests would not be willingly sold.

In the current market Jaakko Pöyry Consulting considers that 10.5% to 12.5% is representative of the range of real pre-tax discount rates that might be expected in forest transactions in Southern China. A discount rate of 11.5% has been selected and applied to pre-tax cash flows. The derivation of the discount rate for the Sino-Forest resource will certainly warrant ongoing attention in future valuations.

Log Prices

Sino-Forest generally sells the plantations on a standing basis and therefore does not sell logs direct to the market. However, current forecast mill gate log prices have been assumed for the purpose of the plantation cash flow forecasts. These are presented below in **Table 5**.

Table 5:
Pulpwood and Sawlog Forecast Prices, 2005 – 2010

Pulpwood & Sawlog Grade	2005	2006	2007	2008	2009	2010+
	RMB per m^3					
Acacia Pulp	300	300	300	300	300	300
Acacia Bark	200	200	200	200	200	200
Poplar <8 cm	300	300	300	300	300	300
Poplar 8-12cm	355	355	355	355	355	355
Poplar 12-20cm	410	417	421	429	433	433
Poplar >20cm	485	485	492	500	500	500
C.Fir 6-14cm	540	540	540	540	540	540
C.Fir 14-20cm	860	860	867	875	875	875
C.Fir >20cm	1000	1000	1008	1017	1025	1025
Pine <8 cm	350	350	350	350	350	350
Pine 8-14 cm	450	450	450	450	450	450
Pine14-20 cm	550	558	566	566	574	574
Pine>20 cm	650	650	656	656	664	664
Euc <8 cm	350	350	350	350	350	350
Euc 8-14 cm	390	390	390	390	390	390
Euc 14-20 cm	440	440	449	455	455	462
Euc >20 cm	580	580	592	601	601	610

Log prices associated with domestic grades are still below their imported counterparts. The concept of export parity suggests that there is room for further upside in domestic log prices. Jaakko Pöyry Consulting's projected log prices are flat in real terms for all but the sawlog grades where a modest improvement in price, supported by strong demand, is assumed.

Change in Area through Forest Acquisitions

Subsequent to Jaakko Pöyry Consulting's 31 December 2004 valuation (Report #38A04520) Sino-Forest has increased the area of its estate from 241 810 ha to 324 296.2 ha; an overall increase in area of 82 486.6 ha (**Table 6**). Various areas of standing timber have been sold, with the major acquisition of new forest are confined to Guangdong, Guangxi and Jiangxi provinces. The majority of the recently purchased area has been in Jiangxi province where some 47 646 ha of standing timber has been purchased.

Table 6:
Summary of the Existing Sino-Forest Plantation Forest Area

Province	City	Type	Area under trees (ha) 31 Dec 2004	Area under trees (ha) 31 Dec 2005	Change in Area (ha)
Fujian		Planted (WOFE[1])	375.9	416.2	40.3
		Purchased	2 306.7	2 306.7	0.0
Guangdong	Gaoyao	Planted (CJV[2])	5 854.0	6 228.8	374.8
		Purchased	10 607.4	17 166.9	6 559.5
	Heyuan	Planted (CJV)	7 481.0	7 481.0	0
		Planted (WOFE)	0	11 194.0	11 194.0
		Purchased	91 376.6	97 686.9	6 310.3
Guangxi		Planted (CJV)	9 174.0	10 997.2	1 823.2
		Purchased	31 219.8	50 955.1	19 735.3
Jiangxi		Planted (CJV)	8 857.0	7 608.5	(1 248.5)
		Purchased	74 557.2	108 015.7	33 458.5
Heilongjiang		Planted (CJV)	0	0	0
		Purchased	0	4 239.2	4 239.2
Sub-Total		Planted (WOFE)	375.9	11 610.2	11 234.3
		Planted (CJV)	31 366.0	32 315.5	949.5
		Purchased	210 067.7	280 370.5	70 302.8
Grand Total			**241 809.6**	**324 296.2**	**82 486.6**

[1] Wholly Owned Forestry Enterprise (WOFE)
[2] Cooperative Joint Venture (CJV)

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Appendices

Appendix 1: Heyuan City Field Visit and Site Inspection
Appendix 2: Market Overview
Appendix 3: WACC Analysis

1 INTRODUCTION

JP Management Consulting (Asia-Pacific) Ltd (**Jaakko Pöyry Consulting**) has been requested by Sino-Forest Corporation (**Sino-Forest**) to prepare a valuation of the existing and prospective forest assets of Sino-Forest in Southern China. Jaakko Pöyry Consulting has previously conducted forest valuations on specific areas within the forest estate in 2000, 2001, 2003 and 2004.

This valuation presents an update of Jaakko Pöyry Consulting's 31 December 2004 forest valuation that was incorporated in Report 38A04520.

The data for this valuation has been provided by Sino-Forest and its associated Cooperation Joint Venture (CJV) companies. Within this valuation exercise Jaakko Pöyry Consulting has confined its field visits to Guangdong and Jiangxi Provinces as this is where some of the largest recent land acquisitions have been made and forest establishment activities initiated. A field inspection report is presented in Appendix 1. It is Jaakko Pöyry Consulting's intention to visit other regions in a process of rolling inspections so that all of Sino-Forests's operations are visited within the annual valuation update process over time.

2 SCOPE AND PURPOSE

This valuation update employed the following methodology:

- The valuation employs a Net Present Value (NPV) of future cash flows approach.
- The cash flows and discount rate are expressed in real terms.

As a valuation update, the exercise has specifically addressed the following:

- Material changes to the land base between 31 December 2004 and 31 December 2005.
- Acknowledgement of prevailing log prices.
- Acknowledgement of expectations for future log prices.
- Acknowledgement of new evidence of market perception of forest value demonstrated in recent transaction announcements.
- Acknowledgement of WACC estimates as provided by UniServices Auckland Limited
- Recognition that the forest estate is now 12 months further along the cash flow stream that was projected in the course of the 31 December 2004 valuation

2.1 Matters Outside the Scope of the Valuation Update

In the absence of any prominent evidence of material change, Jaakko Pöyry Consulting has not adjusted the valuation for the following factors:

- Yield tables
- Costs of goods sold (i.e. harvesting and transport) except for costs associated with recent land acquisitions
- Direct costs of forest operations (establishment, silviculture, etc) except for costs associated with recent land acquisitions.

2.2 Purpose

The purpose of the valuation is to estimate the market value of the forest for asset reporting purposes; "market value" is defined as:

> *"the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming that the price is not affected by undue stimulus. Implicit in this definition is the consummation of a*

sale as of a specified date and the passing of title from seller to buyer under conditions whereby

- *The buyer and seller are typically motivated.*
- *Both parties are well informed or well advised, and acting in what they consider their own best interests.*
- *A reasonable time is allowed for exposure in the open market.*
- *The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale"*[3].

[3] Uniform Standards of Professional Appraisal Practice, The Appraisal Institute (www.appraisalinstitute.org).

3 VALUATION METHODOLOGY

3.1 Outline

Accompanying the global expansion in planted forests has been ongoing refinement of the processes employed in forest valuation. The valuation of stands of forest, which are mature and ready for harvesting, is comparatively straightforward. The assessed volume can be multiplied by prevailing stumpages to provide an estimate of realisable value.

The valuation of "immature" stands is however, more complex. Three methods of valuing immature forests are described below:

- Realisation value of current timber content
- Analysis of transaction evidence
- Discounted cash flow techniques.

3.1.1 Realisation Value of Current Timber Content

That is the value based on the merchantable content (or "standing stock") at the time of the valuation. While this value is both tangible and comparatively straightforward to calculate, it ignores the higher value associated with holding the stands to economic maturity. This method has two obvious limitations:

- For plantation forests, the timber realisation value of the stand may be very low for most of the rotation length. Then in the final years of the rotation, the marginal rate of wood value growth is usually so great that any rational investor would be expected to see the balance of the rotation out, before realisation.

- For a plantation resource of any significant size, it is unlikely that the market can absorb all of the forest wood content at once without log prices being depressed.

The first effect leads to an unduly conservative valuation while the second can lead to an unreasonably optimistic result. It would be plausible but unlikely that the two effects might neatly cancel one another. However, Jaakko Pöyry Consulting's preference in valuing plantation forests is to avoid this method altogether.

3.1.2 Analysis of Transaction Evidence

In principle, sales transactions of forests should provide the most valid basis for valuing immature forests - if this were the case, forests could be treated on a comparable basis to other real estate, with market transactions used to demonstrate price. In some parts of the world this has proven a workable and popular approach. In China, however, there are practical difficulties. The most important of these is that the trade in immature forests has generally been too sporadic to provide a reliable statistical basis for assessing forest value.

Furthermore, to usefully interpret sale values it is necessary to recognise key attributes of the forest such as its maturity, vigour, terrain, proximity to market and silvicultural tending status. Rarely are these parameters publicly available, and it is consequently difficult to unravel sale results to produce useful benchmark values.

It has become generally recognised among plantation forest valuers and analysts that if a sales-comparison approach is to be applied, it is unlikely that forests with just the same combination of key factors will be found. This disqualifies the prospect of simply comparing forest values on a value per hectare basis.

Lack of available comparable sales data for China means Jaakko Pöyry Consulting has not been able to develop this approach for this independent valuation appraisal.

3.1.3 Discounted Cash Flow Techniques

The value of a forest can be established with most certainty at two points in the rotation - the beginning and the end. At the beginning, the costs of establishment are identifiable and the forest can be valued on the basis of the funds invested within it.

At the end, the forest can be valued on the realisation value of its timber content. A value at intermediate ages may be determined by applying the principle of compound interest growth, which provides a convenient linkage to the end-points. Such an approach falls within the general classification of Discounted Cash Flow (DCF) analysis. Two DCF techniques are available:

- Compounding of investment inputs, and
- Discounting of anticipated future returns.

Compounding of Costs

This method takes the costs involved in establishing the forest and accumulates these with compound interest to the forest's current age. This is then declared the forest's value. The rationale is that it is this price that forest owners would have to receive if they were to obtain a satisfactory rate of return on their investment to date. The method is equivalent to the accountants' concept of capitalising establishment costs plus interest, although the forest valuer is more inclined to adopt assumed costs which are standard and current at the time of the valuation.

By using costs that are current, along with a real (inflation-corrected) compounding rate, the valuation is updated for inflation. The use of industry standard costs ensures that only costs consistent with efficient practice are recognised.

Forest valuers treat the compounding approach, and likewise capitalisation, warily. In practice a high cost forest does not necessarily become a high value forest and yet this is what the method can imply. Compounding rates are therefore generally set conservatively low and the method is phased out before mid-rotation, to be replaced by discounting.

Discounting Future Revenue

This method starts with the expected future net revenue from clearfelling the forest and then discounts back to provide the value of the stand at younger ages. Discounting is the reverse process to compounding and again it is necessary to select an appropriate real interest rate. The higher the discount rate the lower the present forest value. Importantly, the analysis is exclusively driven by future net revenue expectations. Thus, forestry development costs that predate the valuation are ignored. Provided that the eventual revenues are as good as or better than the valuation assumes, an investor purchasing the forest at the derived value is assured of a rate of return on investment at least equivalent to the discount rate.

The discounting approach provides the Net Present Value (NPV) of the future net revenue stream and is the most satisfactory surrogate for the way in which the market values planted forests. Of the DCF methods, it is the most commonly applied system in commercial forestry. As the terminology implies, the NPV approach involves projecting the anticipated future net income stream, and then discounting this, at a suitable cost of capital, in order to acknowledge the lower economic value of delayed receipts.

- The NPV approach generally involves adopting the standpoint of a potential forest purchaser. To this individual or entity, funds previously invested in the forest are irrelevant – the exclusive focus is on the forest's future earning capability.
- A crucial parameter within the NPV analysis is the discount rate. The longer the period before income realisation, the greater the reduction in value due to discounting. Forest investments are generally of a long term and their value is especially sensitive to the discount rate.

In recent years there has been a burgeoning of the literature addressing the derivation of discount rates for investment appraisal. While there is no agreement on a single appropriate rate for planted forests, and nor is there likely to be, evidence suggests some narrowing of the range of consensus.

Besides the selection of discount rate the following features of the NPV approach also require consideration:

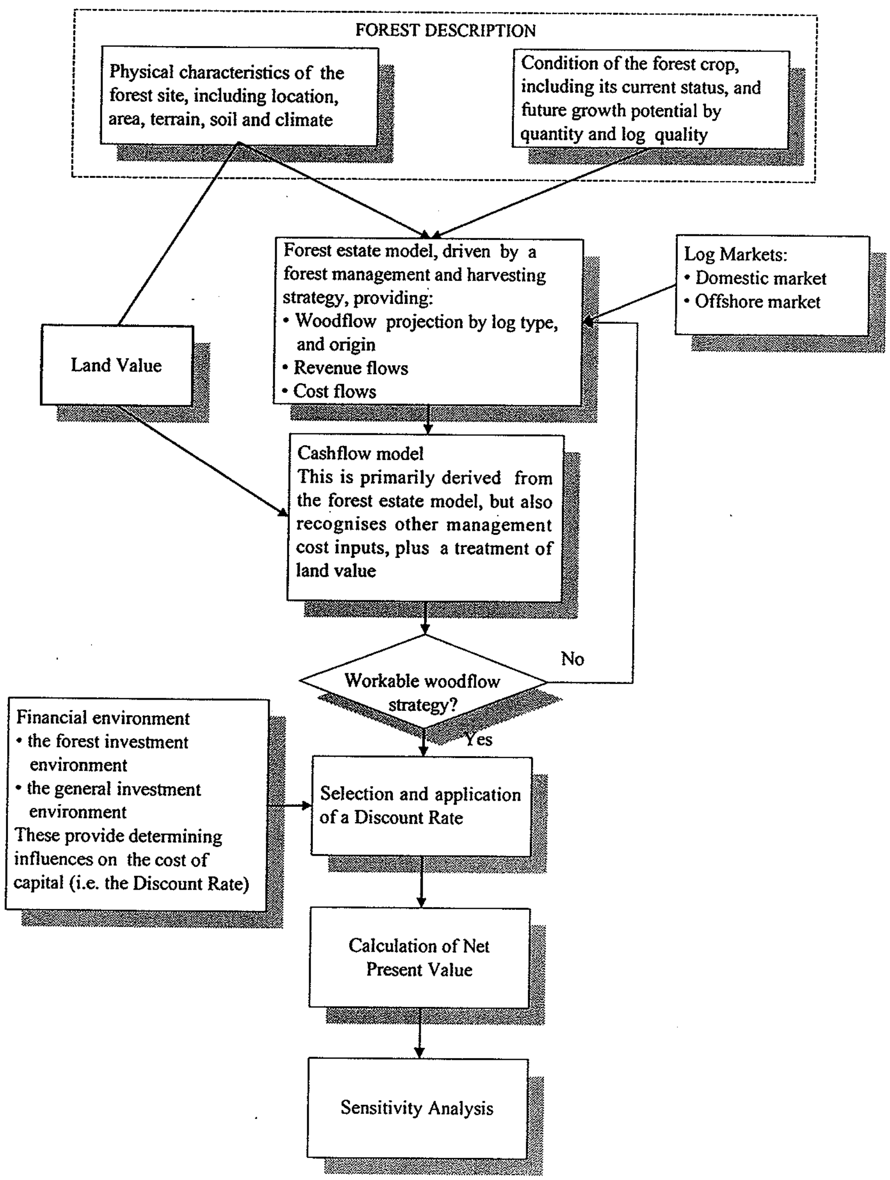
- The period of analysis. The alternatives available with planted forests are to model the forest in perpetuity (i.e. the current rotation and succeeding crops), or confine the analysis to the cash flows arising from the current crop.
- Terminal value. If the analysis is confined to the current rotation it is necessary to acknowledge any terminal value arising as the investment is exited, such as the realisable value of freehold land.
- Harvesting strategy. Alternatives include cutting the forest in order to produce a non-declining yield, cutting to produce a smoothed yield flow, or cutting each stand as it reaches a fixed "optimum economic rotation" age.
- Analysis of pre-tax or post-tax cash flows. Both approaches have been demonstrated in valuing planted forests. For cash flows derived on a pre-tax basis a pre-tax discount rate is applied. Post-tax cash flows should be

discounted at a post-tax discount rate. If the discount rates have been consistently derived, either approach should lead to the same forest value.

Within this valuation Jaakko Pöyry Consulting has valued the forests using an NPV approach. Cash flows attributable to both the existing rotation and planned future rotations of the forest have been included. The forest estate has been modelled on a perpetual basis for both the existing and succeeding rotations, thereby recognising the expected long-term management intentions and continued sustainability of the estate. The valuation is based on real pre-tax cash flows.

Figure 3-1 provides a diagrammatic representation of the valuation process

Figure 3-1:
Schematic Outline of the Valuation Process



The first stage of the valuation process involves assembling a comprehensive description of the forest. Key components of this include an area statement and information on the forest growth potential.

At the heart of modern forest management is a forest estate modelling system that incorporates supply chain optimisation using linear programming techniques. This technology enables the collective resource to be modelled to meet various aims, including resource level constraints as well as the supply of various forest products into their end-use markets.

The forest estate modelling software used in this valuation is FOLPI[4], a licensed product of the New Zealand Forest Research Institute (NZFRI). The linear programming engine is MOSEK 3.2, supplied by MOSEK ApS, Copenhagen Denmark. Further software routines for data preparation, optimisation, supply chain management and reporting processes have been utilised. These comprise proprietary tools and modules developed by Jaakko Pöyry Consulting.

Following confirmation that the results of the forest estate modelling process are managerially workable, the generation of wood flows and the allocation of products to markets enables the derivation of cash flows upon which a DCF valuation can be based. Application of the discount rate to these cash flows produces a net present value for the forest. The responsiveness of this valuation to changes in the input variables can then be tested with a variety of sensitivity analyses so as to derive a spread of potential forest values.

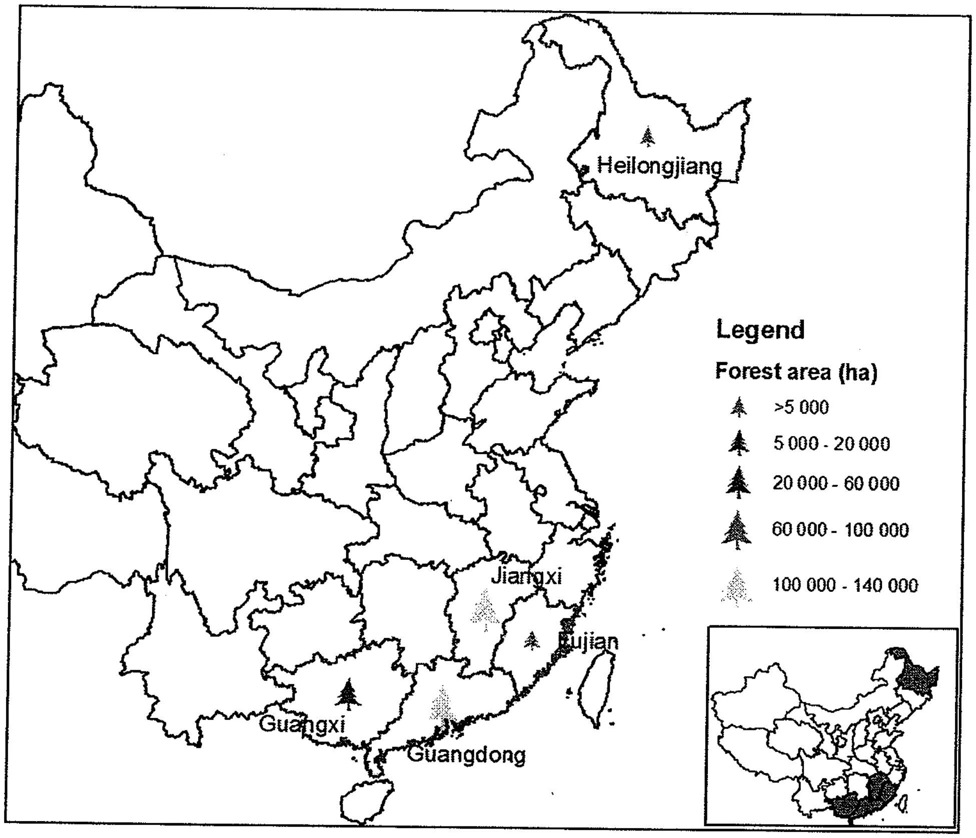
[4] FOLPI - Forest Orientated Linear Program Interpreter.

4 FOREST DESCRIPTION

4.1 Resource Location

Map 4-1 presents the location of Sino-Forest's existing plantation forest resource.

Map 4-1:
Location of Sino-Forest's Plantation Resource



4.2 Forest Area

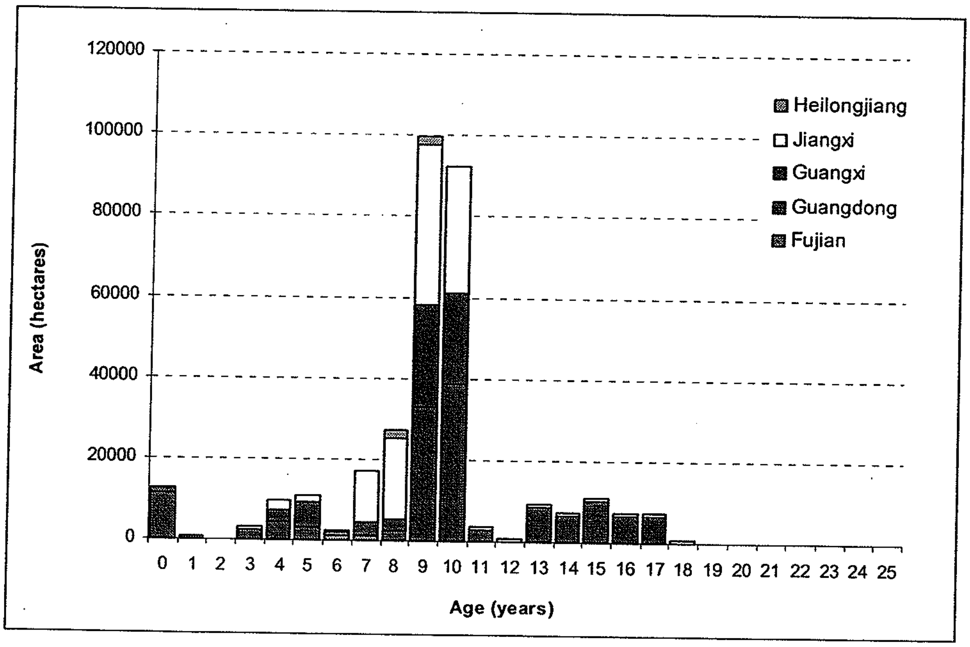
The following table and figures summarise the existing Sino-Forest plantation forest resource.

Subsequent to Jaakko Pöyry Consulting's 31 December 2004 valuation (Report #38A04520) Sino-Forest has increased the area of its estate from 241 810 ha to 324 296.2 ha; an overall increase in area of 82 486.6 ha (Table 4-1). Various areas of standing timber have been sold, with the major acquisition of new forest confined to Guangdong, Guangxi and Jiangxi provinces. The majority of the recently purchased area has been in Jiangxi province where some 47 646 ha of standing timber has been purchased.

Table 4-1:
Summary of the Existing Sino-Forest Plantation Forest Area

Province	City	Type	Area under trees (ha) 31 Dec 2004	Area under trees (ha) 31 Dec 2005	Change in Area (ha)
Fujian		Planted (WOFE[5])	375.9	416.2	40.3
		Purchased	2 306.7	2 306.7	0.0
Guangdong	Gaoyao	Planted (CJV[6])	5 854.0	6 228.8	374.8
		Purchased	10 607.4	17 166.9	6 559.5
	Heyuan	Planted (CJV)	7 481.0	7 481.0	0
		Planted (WOFE)	0	11 194.0	11 194.0
		Purchased	91 376.6	97 686.9	6 310.3
Guangxi		Planted (CJV)	9 174.0	10 997.2	1 823.2
		Purchased	31 219.8	50 955.1	19 735.3
Jiangxi		Planted (CJV)	8 857.0	7 608.5	(1 248.5)
		Purchased	74 557.2	108 015.7	33 458.5
Heilongjiang		Planted (CJV)	0	0	0
		Purchased	0	4 239.2	4 239.2
Sub-Total		Planted (WOFE)	375.9	11 610.2	11 234.3
		Planted (CJV)	31 366.0	32 315.5	949.5
		Purchased	210 067.7	280 370.5	70 302.8
Grand Total			**241 809.6**	**324 296.2**	**82 486.6**

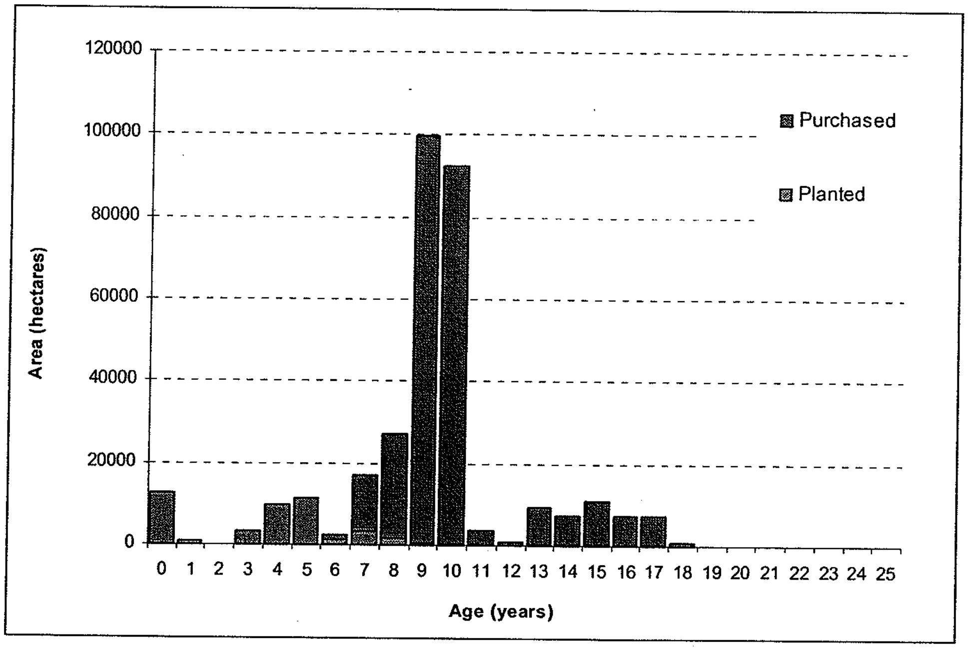
Figure 4-1:
Provincial Area Age-class Distribution



The age-class structure of the plantation resource is uneven (Figure 4-2) and can be divided between the Sino-Forest planted resource, which exhibits a young age-class profile, and the purchased forest areas which exhibit a primarily mid rotational age-class profile.

[5] Wholly Owned Forestry Enterprise (WOFE)
[6] Cooperation Joint Venture (CJV)

Figure 4-2:
Area Age-class Distribution



4.3 Species

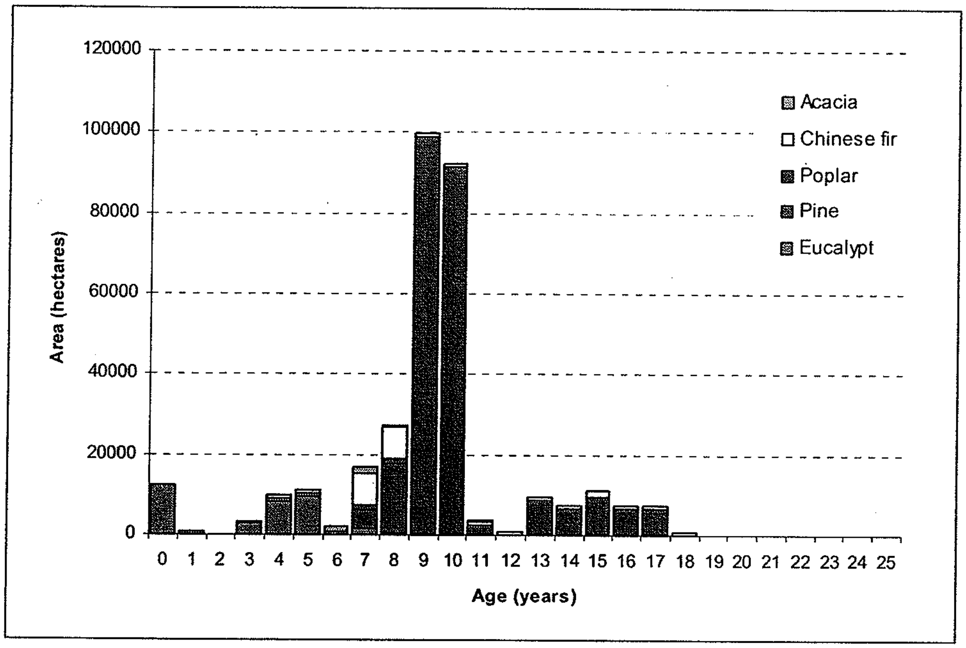
Sino-Forest has two main classes of forest land, those areas planted by the CJV companies and those areas of existing plantation for which the cutting rights have been purchased. The areas planted by the CJVs are primarily fast growing *Eucalyptus urophylla* x *Eucalyptus grandis* hybrids with smaller areas of poplar species (mainly in Jiangxi Province).

The existing forests for which the cutting rights have been purchased comprise a number of species including:

- Masson pine
- Slash pine
- Chinese fir
- Eucalyptus species
- Poplar species
- Acacia species

As Figure 4-3 illustrates, pine species account for the largest planted area followed by eucalyptus species, Chinese fir, poplar species and acacia species.

Figure 4-3:
Species by Age-class



4.4 Plantation Growth and Yield

Sino-Forest and its CJVs provided Jaakko Pöyry Consulting with basic data relating to the growth and yield of the existing plantations. Jaakko Pöyry Consulting combined these with information gathered from its own field measurements and other third party sources to reach its own conclusions relating to growth and yield of the existing and proposed future forest plantations.

A range of inventory data are used to describe forest yield. The development of yield tables usually begins at the time a stand is planted when an area is assigned to a yield table projection based on a number of factors including soil type, location, productivity of surrounding stands and genetic composition.

Early estimates of yield are then refined as data are collected from quality control inspections and inventory activities. Through the ongoing capture of data, the precision of growth and yield estimates is progressively improved.

Jaakko Pöyry Consulting's previous field inspections have included a high level inventory from which indicative yield tables have been derived. These inventory initiatives included the measurement of a range of age-classes to give an indication of growth rates. Stand boundaries were also measured using GPS (Global Positioning System) equipment to evaluate the accuracy of the area statement.

For each stand visited during the inventory, 10 trees were randomly measured for diameter at breast height (1.3 m) as well as total tree height. Height was measured to the tip of the tree using a digital vertex. A stocking measurement was also made for the purposes of calculating stand volumes. Finally, several stands were measured for area using the GPS equipment and then checked back against the tabulated stand record data.

4.4.1 Tree Volume Calculations

Using diameter and height as variables, individual tree volumes can be calculated. Appropriate volume equations for each species were acquired from various sources.

The tree volume equations used by Jaakko Pöyry Consulting are as follows:

Eucalyptus

$V (m^3) = 0.01774597 - 0.00429255D + 0.0002008136D^2 + 0.000494599DH + 0.00001125969D^2H - 0.001782894H$

North American

$V (m^3) = 0.19328321((D/100)^2)H) + (0.007734354(D/100)H + (0.82141915 (D/100)^2)$

Chinese fir

$V (m^3) = 0.000037 D^2H$

Slash pine

$V (m^3) = 0.0001155362D^{(1.9788108856-0.005574216(D+2*H))} \times H^{(0.5034278471+0.008969134(D+2*H))}$

Both D (diameter at breast height) and H (tree height) are expressed in metres

By multiplying the average tree volumes with the measured stockings, a measure of individual stand yields is produced.

4.4.2 Yield Table Formulation

A growth curve for each species was formulated using the following non-linear equation:

Equation (1) $\ln (V) = \alpha + \beta / T^2 + \gamma / TN$

where:

V = volume per hectare (m^3/ha)

T = age (in years)

N = stocking (stems per hectare)

α is the intercept

β and γ are the x variable parameters.

To replicate observed natural mortality, original stockings were reduced by 5%.

Processing the field data using Equation (1), the following yield curves for each species were produced.

Figure 4-4:
Eucalyptus Growth Curve

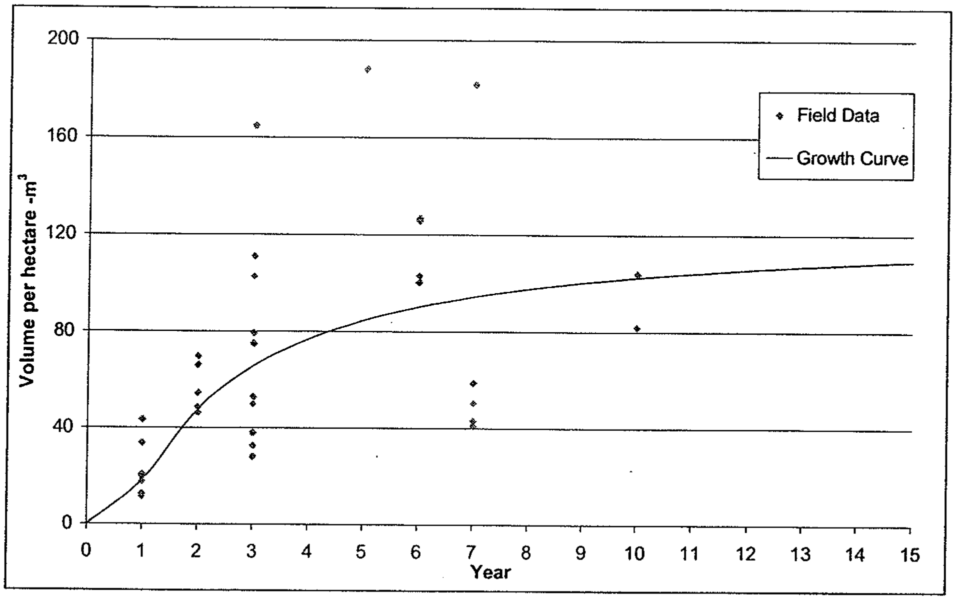


Figure 4-5:
Pine Growth Curve

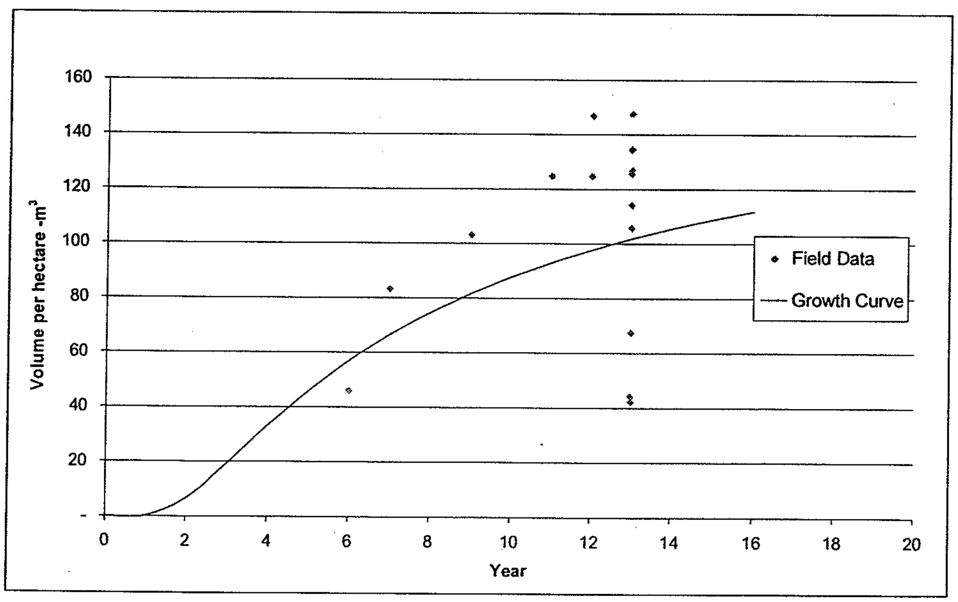
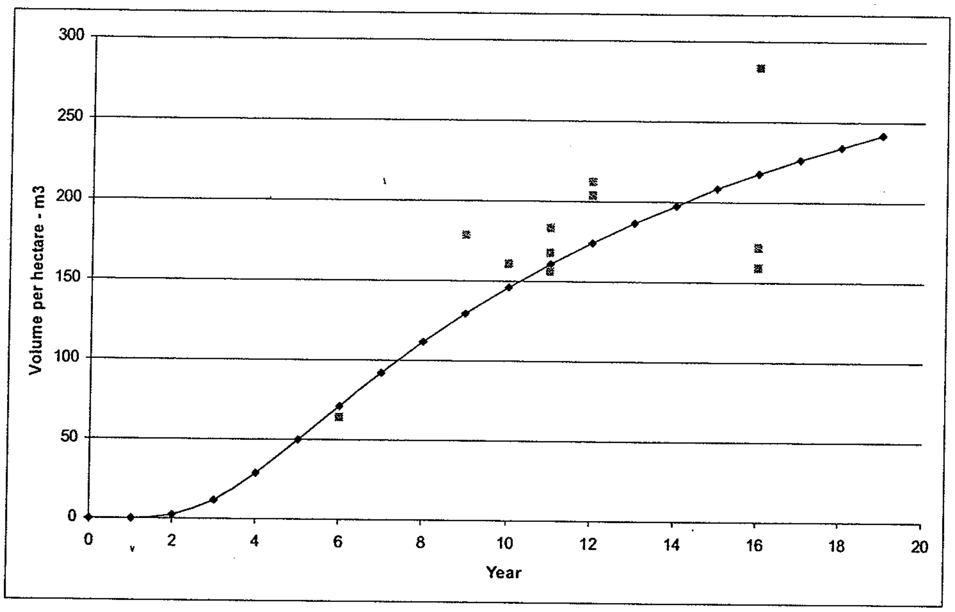


Figure 4-6:
Chinese Fir Growth Curve



From these curves, a set of yield tables were established and applied in the valuation process.

The field data collected for poplar species was insufficient to construct a yield curve. The data from various sources were aggregated and an average mean annual increment (MAI) was calculated in order to determine the recovered volume used during the forest valuation process. A recoverable volume MAI of 8.9m^3/ha/yr is assumed.

Most of the recent acquisition areas in Heyuan City are poorly stocked pine forest areas with very low yield of current standing volume. Sino-Forest's managers in Heyuan estimate that the total standing volume associated with these areas is 2 to 3/m^3/mu (30 to 45 m^3/ha) and that 60% of this volume will be merchantable. Within this valuation a recoverable yield of 18m^3/ha has been assigned to these areas with no biological growth assumed.

Jaakko Pöyry Consulting recommends that a more effective and accurate inventory program be designed and implemented to better capture the information required to generate reliable yield tables.

4.4.3 Future Yield Development

It is assumed that existing poplar plantations will be replanted into poplar but that all other new plantation establishment will be into fast growing eucalyptus plantations.

Jaakko Pöyry Consulting has assumed an increase in yield of MAI 2.5 m^3/ha/year for second rotation eucalyptus plantations and the same again for third rotation eucalyptus plantations. Following the third rotation no further yield improvement has been assumed. Such an increase in yield is predicted to result from genetic improvements in planting stock, through Sino-Forest's tree improvement programme, and through improved silvicultural practices as Sino-Forest gains experience and expertise in the management of fast growing eucalyptus plantations.

4.5 Plantation Risks

In addition to risks relating to the key assumptions there are other risks associated with establishing a biological resource. In the Sino-Forest plantations the key identifiable risks include:

- Fire
- Frost
- Pest and Disease
- Typhoons

Fire

Fire has historically not been a major threat in South China plantation forests. However, with the increase in eucalyptus plantation area there is a correspondingly greater fire risk. This risk can be mitigated by the implementation of fire prevention techniques such as the construction of firebreaks inside plantations, the development of human resources trained in fire fighting and supported by physical infrastructure such as portable fire fighting equipment. Given that the resource is geographically fragmented and comprises discreet forest blocks that are generally less than 500 ha in size the opportunity for a singular catastrophic event is remote.

It is evident from field visits in Heyuan City that farmers have used burning as a land preparation tool in the past. Sino-Forest has also used fire to prepare land for planting but will move away from this practice in future to reduce negative consequences for soil fertility as organic matter is volatilised and lost to the atmosphere.

Recently established and young stands are at greatest risk to fire damage as they are more likely to suffer crown damage that compromises their growth. In older stands close to harvest age the impact of fire may be less significant as much of the timber affected is able to be recovered and marketed with little discount.

Sino-Forest has fire insurance cover.

Frost

Frost damage is a risk on higher altitude inland sites and was responsible for the poor yield seen in much of the 1996 eucalyptus plantings. The risk of frost damage is mitigated by careful attention to site selection and the avoidance of frost prone sites.

Pests and Disease

As the area of single species plantations increases so does the potential risk of pest and disease problems. To date there appears to have been no serious pest or disease outbreaks. This risk is mitigated by the large research and development effort assigned to eucalyptus development.

Most of the pest and disease problems have so far occurred in the poplar plantations. Two pathogens impact the growth and quality of the poplar hybrid resource. Borer impacts on the quality of logs and has the effect of increasing the pulpwood supply by making the butt log unsuitable for veneer where an attack is severe. The caterpillar of the 'Yangzhou Moth' predates the leaves and can compromise growth if an attack is left unchecked. Adult borer is controlled by the application of a biological pesticide. Larvae are controlled by inserting a 'poisonous stick' into the hole in the stem that represents the entry point of the larvae.

Leaf eating caterpillars are controlled by the application of pesticide if levels of infestation are such that 30% of the crown is affected. Poplar plantations are currently inoculated against these problem pests and disease as a routine part of plantation establishment and maintenance. Local Forest Bureaus maintain disease control stations and provide forecasts on pathogen levels and the need for control. In keeping with good forest practices, Sino-Forest plants trees produced from a number of different clones; this reduces the risk of a weakness in any one clone being propagated throughout the plantations and provides genetic diversity. The clones that have been planted to date have been assessed for resistance against disease.

Typhoons

On average the coastal areas of Southern China suffer a number of typhoons each season during July to September. While in general the forest damage is localised and confined to young age-classes, every 20 years or so a typhoon is likely to cause significant damage. The inland coastal strip affected is in the region of up to 200 km from the coast. The risk of typhoons is generally limited to some Sino-Forest's plantation areas in Guangxi. This risk is reduced by the high stocking rates and short rotations of the eucalyptus plantations.

5 COSTS

5.1 Operational and Production Costs

Based on data supplied by Sino-Forest and its own consulting experience in China, Jaakko Pöyry Consulting believes that operation and production costs have not changed materially since its 31 October 2003 valuation of Sino-Forest's forest asset.

As China's economy develops, cost structures will change and as such operational costs will continue to be the subject of attention in future valuations.

5.2 Establishment Costs

The following tables give the operation costs for establishing *Eucalyptus spp.* in Southern China. Values vary slightly from district to district but for the purposes of this valuation regional average costs have been employed (Table 5-1) for regions other than the recent acquisition areas in Heyuan.

Table 5-1:
Operation Costs for Eucalyptus Planted Rotation (RMB per ha)

Operations	Planted Forest (R1)						
	Year						
	0	1	2	3	4	5	6
Planning	12	0	0	0	0	0	0
Operations design	9	0	0	0	0	0	0
Site preparation	450	0	0	0	0	0	0
Terracing	1395	0	0	0	0	0	0
Fertiliser	975	975	975	0	0	0	0
Planting (incl. seedling cost)	570	0	0	0	0	0	0
Thinning	0	0	0	0	0	0	0
Tending	0	345	345	0	0	0	0
Protection	0	75	58	58	57	57	57
R&D	0	120	30	30	7	7	7
FB Service Charge	0	493	141	9	6	6	6
Overheads	150	150	150	150	150	150	150
Lease	150	150	150	150	150	150	150
Total	3711	2308	1849	397	371	371	371
Total RMB per ha							**9378**

The largest individual cost is terracing. Terraces are manually formed on the contour prior to planting. Sino-Forest employs this technique in the belief that it facilitates soil conservation through preventing erosion that might otherwise occur in heavy rain events.

The operational decision to re-establish, by either coppice or 'new seedlings', is made on a case-by-case basis. It is anticipated that the second rotation will be established largely by way of coppice. Operational costs associated with coppicing are lower than those associated with establishment by seedling as there is no site preparation or terracing required. The growing costs associated with the coppiced rotation are approximately two thirds that of the first rotation crop (Table 5-2).

Table 5-2:
Operation Costs for Eucalyptus Coppice Rotation (RMB per ha)

Operations	Coppiced Plantation Forest (R2)				
	Year				
	7	8	9	10	11
Planning	0	0	0	0	0
Operations design	9	0	0	0	0
Site preparation	0	0	0	0	0
Terracing	0	0	0	0	0
Fertiliser	900	600	0	0	0
Planting (incl seedling cost)	0	0	0	0	0
Thinning	900	0	0	0	0
Tending	345	345	345	0	0
Protection	75	58	58	57	57
R&D	120	30	30	7	7
FB Service Charge	235	103	43	6	6
Overheads	150	150	150	150	150
Lease	150	150	150	150	150
Total	2884	1436	776	371	371
Total RMB per ha					**5838**

The total cost associated with the first two rotations is given in Table 5-3.

Table 5-3:
Total Operation Costs for Planted Crop and First Coppice

Total Operation Cost	Planted Crop (Rotation 1)	First Coppiced Crop (Rotation 2)	Total Cost
Total RMB per ha	9378	5838	15216

First rotation establishment costs associated with the acquisition areas in Heyuan City are detailed in Table 5-4. The total cost for the first rotation in the acquisition areas is greater than the cost assumed for Sino-Forest's other operation. Much of the increase is associated with fertiliser costs with four fertiliser operations specified in the costing presented to Jaakko Pöyry Consulting.

Table 5-4:
Operation Costs for Eucalyptus Planted Rotation (RMB per ha)

Operations	Planted Forest (R1 - Heyuan)						
	Year						
	0	1	2	3	4	5	6
Operations Design	12	0	0	0	0	0	0
Site preparation	359	0	0	0	0	0	0
Fire Break	45	0	0	0	0	0	0
Roading	180	0	0	0	0	0	0
Planting (incl. seedling, hole digging etc)	1753	0	0	0	0	0	0
Fertiliser	2554	1018	1018	0	0	0	0
Tending	390	0	0	0	0	0	0
Supervision	180	30	30	0	0	0	0
Maintenance	45	45	45	45	45	45	45
Protection	45	90	57	57	57	57	57
R&D	0	120	30	30	7	7	7
Contingency	45	15	15	15	15	15	15
Overheads	210	150	150	150	150	150	150
Lease	225	225	225	225	225	225	225
Total	6043	1693	1571	522	500	500	500
Total RMB per ha							**11329**

5.3 Costs of Production

5.3.1 Harvesting Costs

Harvesting costs differ significantly between provinces and have therefore been treated separately (Table 5-5). Harvesting methods in all four provinces were generally manual based with little or no mechanical assistance. The rates used apply for all species.

Table 5-5:
Harvesting Costs by Province

Harvest Costs (average all species)	
Province	**RMB per m^3**
Guangxi	55.00
Fujian	35.00
Guangdong	50.00
Jiangxi	50.00

Jaakko Pöyry Consulting has identified that the key factors influencing manual harvesting costs include labour cost, tree size, log length and topography.

5.3.2 Transport Costs

Individual transport rates for each province have been employed (Table 5-6)[7]. A loading and unloading cost of RMB4.92/m^3 was applied to all four provinces. Average distances are based on distances to major mills and have been limited to 150 km, as it is assumed that longer haul distances will be avoided by marketing volume to smaller local mills closer to the resource.

Table 5-6:
Transport Costs by Province

Province	Transport Unit Rate RMB/m^3/km	Loading (RMB/m^3)	Unloading (RMB/m^3)	Average Distance	Average Total Cost (RMB/m^3)
Guangxi	0.574	4.92	4.92	150	95.94
Fujian	0.574	4.92	4.92	100	67.24
Guangdong	0.328	4.92	4.92	80	36.08
Heyuan City	0.492	4.92	4.92	150	83.64
Jiangxi	0.738	4.92	4.92	150	120.54

When Sino-Forest sells its standing timber to wood-traders, both the harvest and transport costs are accounted for by the wood-trader at the time of purchase.

5.4 Taxes at Harvest

Once the trees are harvested and sold, taxes to both local provincial government and state government are levied. These include reforestation, forest protection and infrastructure taxes. The taxes can vary between location and between species. A summary of the taxes used in the valuation is presented in the following table.

[7] Rates include road tolls.

Table 5-7:
Taxes at Harvest (Average all Species)

Province	RMB/m³
Guangxi	55.00
Fujian	19.88
Guangdong	47.00
Jiangxi	72.00

5.5 Overhead Costs

The cost of the direct supervision required for plantation establishment and management has been identified as 10% of the direct operational costs.

The overhead costs associated with both the CJV companies and the management of the purchased trees has been identified by the companies as RMB150/ha/year. Sino-Forest has not identified any corporate overhead costs related to running this business. Jaakko Pöyry Consulting has allocated a further RMB150/ha/yr for corporate overheads.

5.6 Cooperation Joint Ventures

The forest area originally planted by Sino-Forest has been managed under a Cooperation Joint Venture (CJV) set up between Sino-Forest and PRC incorporated forestry trading companies (the commercial arms of government forestry bureaus). The key points of the CJV agreements are:

- The forestry trading company provides the land for the plantation forests.
- Sino-Forest will pay all the plantation establishment and maintenance costs.
- At harvest the wood produced is shared 30% to the forestry trading company and 70% to Sino-Forest.
- Jaakko Pöyry Consulting has only valued Sino-Forest's 70% share in this valuation.

It is assumed that areas currently planted under CJV agreements will be replanted under this model into the future. Table 5-8 below identifies the existing planted area by CJV company:

Table 5-8:
Planted Area by CJV Company

Province	City	CJV Company	Planted Area (ha)
Fujian		Zhangzhou Jia Min Forestry Development Ltd.	416.2
Guangdong	Gaoyao	Gaoyao City Jiayao Forestry Development Ltd.	6 228.8
	Heyuan	Heyuan City Jianhe Forestry Development Ltd.	7 481.0
Guangxi		Guangxi Guijia Forestry Company Ltd.	5 886.5
Jiangxi		Jiangxi Jiachang Forestry Development Company Ltd	7 608.5
Total			**27 621.0**

Note that the Fujian company is not a CJV but a Wholly Owned Forestry Enterprise (WOFE), and thus rather than a CJV agreement this company operates under articles of association.

5.7 Land Rental

It is assumed that the existing purchased forest areas will be harvested and replanted in fast growing eucalyptus hybrids and that the land will be leased and an annual rental paid.

Sino-Forest has identified the currently preferred methodology that will be followed for future plantation development as: purchasing the cutting rights to existing plantation forests and, following harvest, leasing the land for the establishment of fast growing eucalyptus plantations (and poplar in Jiangxi Province).

Sino-Forest has advised that it expects to pay an annual land rental of RMB10/mu/year. The land rental associated with the recent acquisitions in Heyuan is reported as RMB15/mu/year. These levels of land rental are common in Southern China for land designated for forestry i.e. RMB8 to 15/mu/year. These rentals are associated with hill country that it is generally unsuited to agricultural purposes.

Annual land rentals as high as RMB40/mu/year have been observed for forestry designated land in Southern China. Rentals of this magnitude are associated with flat land that is suitable for agricultural purposes.

5.8 Log Traders Margin

Sino-Forest currently sells most of its logs to log traders on the stump (that is standing in the forest). Jaakko Pöyry Consulting has calculated the stumpage price as the delivered to mill gate log price minus the cost of transport and harvest which the log trader must pay. However, in addition to the harvest and transport costs the log traders' margin must also be deducted from the stumpage price paid for the logs. Jaakko Pöyry Consulting has assumed the log traders margin to be 5% of the gross stumpage price.

5.9 Exchange Rate

An exchange rate of 1 USD = 8.07 RMB has been applied throughout this valuation.

6 LOG PRICING

6.1 Valuation Log Prices

Sino-Forest generally sells the plantations on a standing basis and therefore does not sell logs direct to the market. However current forecast mill gate log prices have been assumed for the purpose of the plantation cash flow forecasts and are presented below in Table 6-1.

Table 6-1:
Pulpwood and Sawlog Forecast Prices, 2005 – 2010

Pulpwood & Sawlog Grade	2005	2006	2007	2008	2009	2010+
	RMB per m^3					
Acacia Pulp	300	300	300	300	300	300
Acacia Bark	200	200	200	200	200	200
Poplar <8 cm	300	300	300	300	300	300
Poplar 8-12cm	355	355	355	355	355	355
Poplar 12-20cm	410	417	421	429	433	433
Poplar >20cm	485	485	492	500	500	500
C.Fir 6-14cm	540	540	540	540	540	540
C.Fir 14-20cm	860	860	867	875	875	875
C.Fir >20cm	1000	1000	1008	1017	1025	1025
Pine <8 cm	350	350	350	350	350	350
Pine 8-14 cm	450	450	450	450	450	450
Pine14-20 cm	550	558	566	566	574	574
Pine>20 cm	650	650	656	656	664	664
Euc <8 cm	350	350	350	350	350	350
Euc 8-14 cm	390	390	390	390	390	390
Euc 14-20 cm	440	440	449	455	455	462
Euc >20 cm	580	580	592	601	601	610

Log prices associated with domestic grades are still below their imported counterparts. The concept of export parity suggests that there is room for further upside in domestic log prices. Jaakko Pöyry Consulting's projected log prices are flat in real terms for all but the sawlog grades where a modest improvement in price, supported by strong demand, is assumed.

6.2 Market Overview

Jaakko Pöyry Consulting has provided an in-depth analysis and forecast of the various China forest products markets in Appendix 2 of this report. This analysis has been used in the review and formation of the log price forecast shown in Table 6-1 above.

7 FOREST ESTATE MODEL

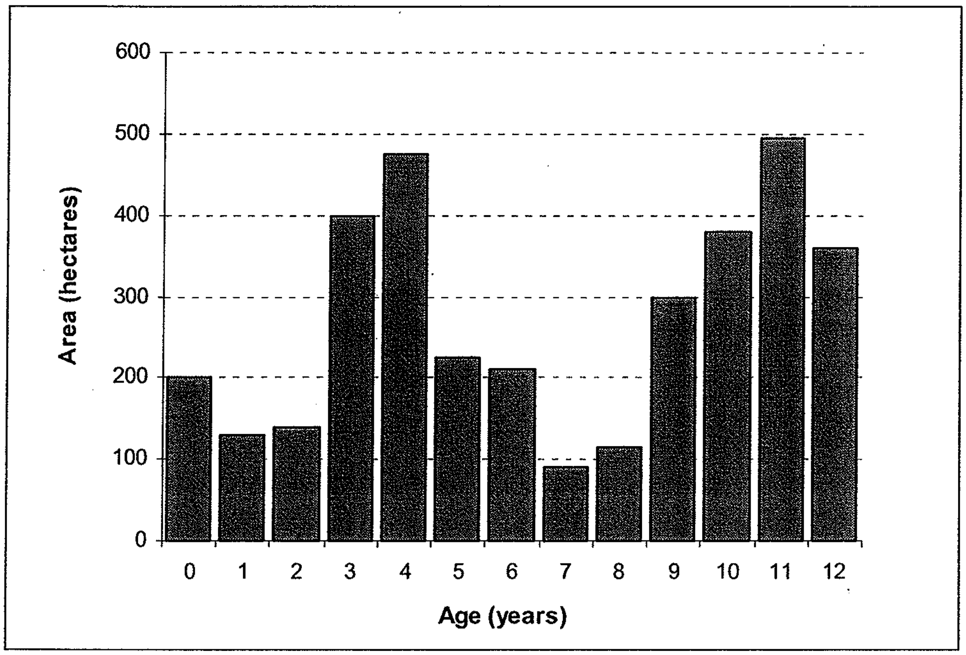
7.1 Overview

For any forest, but particularly forests of significant size, there is an important choice in how the forest's future management is modelled. The alternatives are:

- A stand-based (bottom-up) approach. Individual stands within the forest are effectively considered in isolation. Once their yield potential at a certain target age is identified, data are accumulated to provide a result for the forest as a whole.
- A forest estate (top-down) approach. All stands are modelled collectively to achieve some desired result from the total forest resource.

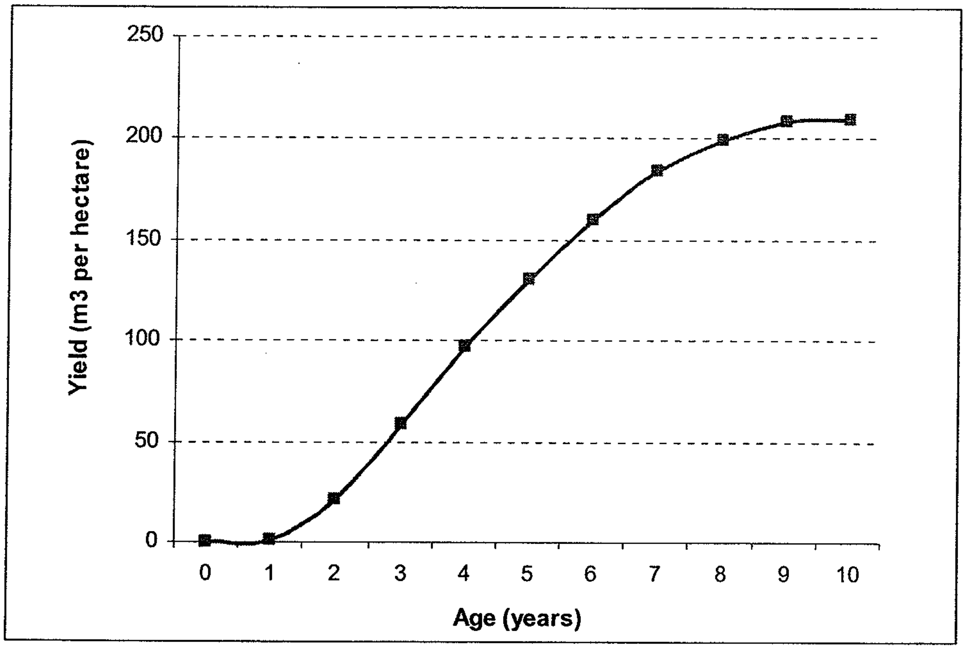
The most common manifestation of the distinction is in the production profile of the resource. The age-class distribution of an example forest is shown below. Characteristically, most plantation forests have an irregular age distribution and Figure 7-1 illustrates this feature.

Figure 7-1:
Example Forest Estate Age-class Distribution



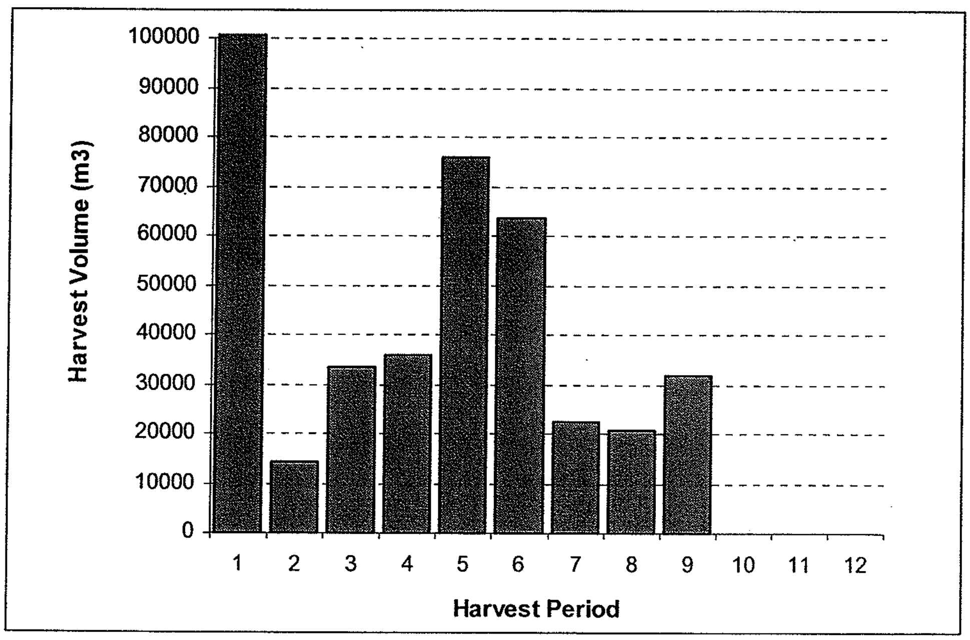
Assume, for convenience that all stands share the same yield table as illustrated by Figure 7-2.

Figure 7-2:
Example Forest Estate Yield Table



Were the forest to be managed on the stand-based approach, each stand might be cut at some externally determined target age. A commonly applied concept is that of the optimum economic rotation age. Accumulating the results gives an irregular wood production, as shown below. The harvest profile effectively becomes the mirror image[8], with a scaling factor, of the age-class distribution (Figure 7-3).

Figure 7-3:
Example Harvest at Fixed Rotation Age



[8] Note that the full extent of the harvest in the first period is not shown as all ages >9 years are assumed harvested.

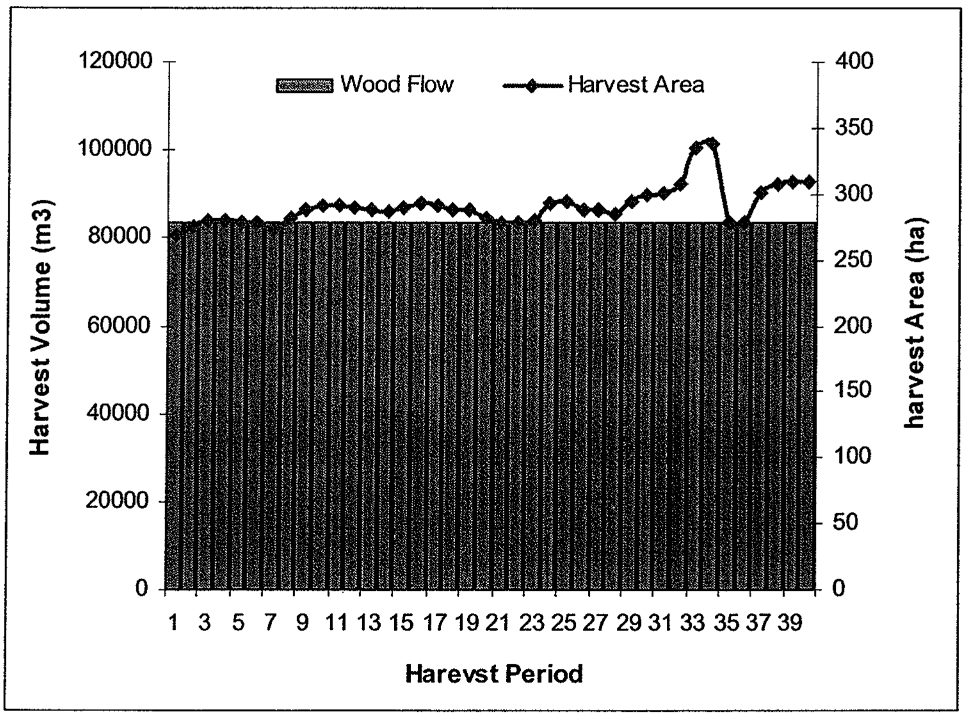
In practice, it may be unrealistic to harvest all stands at a fixed rotation age. Most plantation forest estates have, through various circumstances, an uneven age-class distribution. A harvesting strategy that employs a fixed rotation age will lead to a wood flow profile that reflects the age-class distribution as illustrated in Figure 7-3 previously.

An irregular wood flow may be inappropriate for various reasons:

- Marketing - an irregular supply may prejudice market confidence.
- Logistical considerations of harvesting and transport.
- Supply commitments to associated processing plants.
- Regularity of cash flow from which to fund ongoing forest management.

To meet these considerations other harvesting strategies are likely to be preferred. A forest estate modelling approach can therefore be used to smooth the harvest rate, achieving this by manipulating both the age and area of harvest[9] (Figure 7-4).

Figure 7-4:
Example Smoothed Forest Harvest



The choice of modelling method has a bearing on the results of a forest valuation. For each stand, examined in isolation, it is possible to identify an optimum economic rotation age. At this rotation length, the NPV of the stand is maximised. If the optimum economic rotation is employed as the target clearfelling age in a stand-based model, this will produce the highest theoretical value for the forest.

However, if a forest estate modelling approach is employed, this invariably involves some departure from the optimum economic rotation age; a lower value for the forest results. The extent of difference between the modelling approaches

[9] Note that the chart series for the average age of harvest is not shown. It does however vary over time.

depends on the degree to which the harvest age varies from the theoretical optimum.

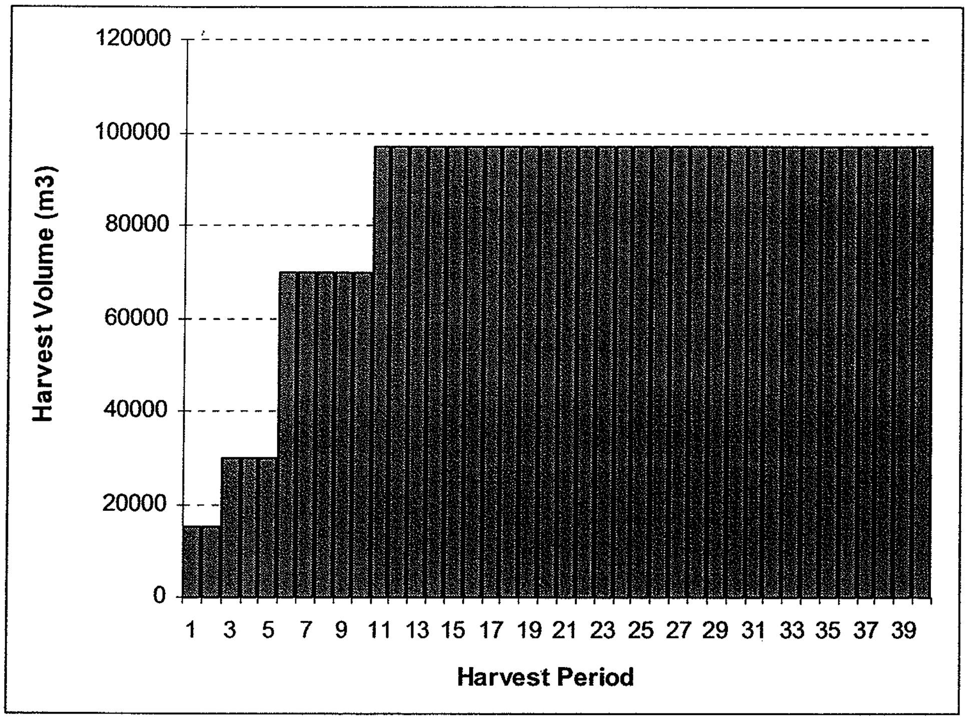
7.2 Observed Practice in Wood Flow Modelling

It is Jaakko Pöyry Consulting's observation that wood flow modelling for valuation purposes invariably involves smoothing of wood flows. For large resources (in excess of a few hundred hectares) a non-declining yield is the most common default representation. To a large extent the degree of smoothing implemented is determined by the resource's age-class distribution.

The modelling profile adopted in forest valuations is guided by two factors:

- What the forest valuer believes is a credible and pragmatic profile, and
- What the market evidently assumes in determining what forest purchase value it is prepared to pay.

Figure 7-5:
Example Non-Declining Yield Profile



Jaakko Pöyry Consulting has profound misgivings with production profiles for any particular forest that involve large fluctuations in wood flow. They may lead to real inefficiencies in start-up and withdrawal of harvesting operations, a less than enthusiastic participation by market partners, and forest financial flows that are most inefficient to manage.

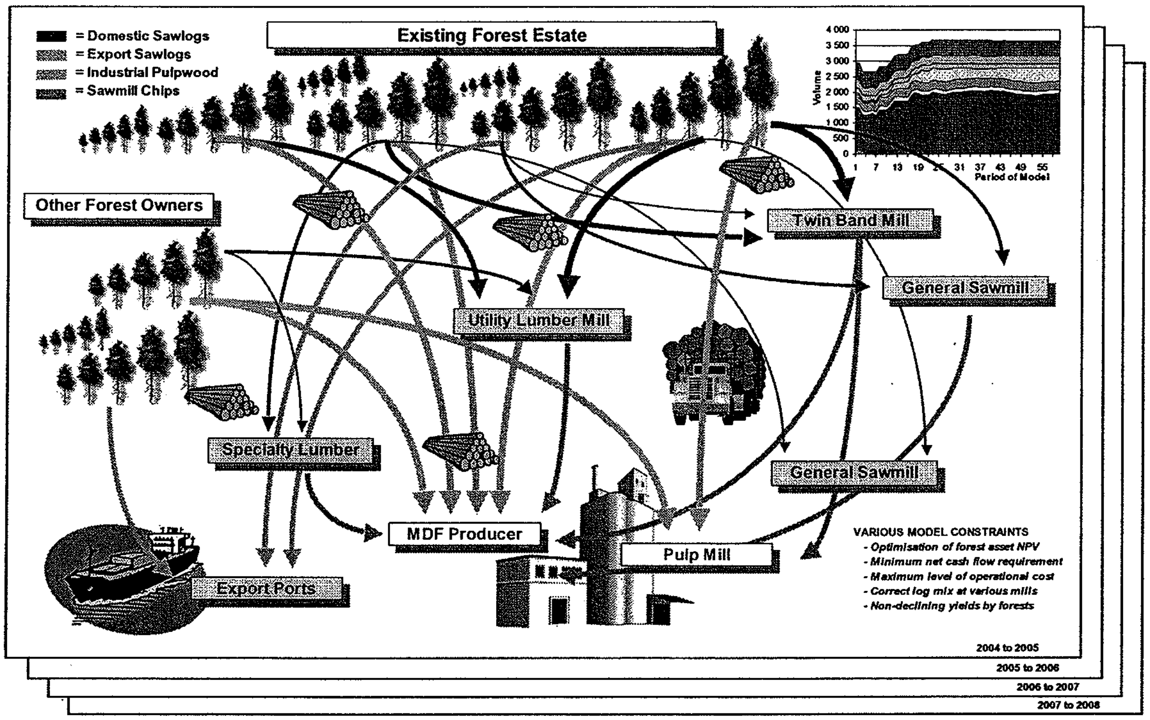
Jaakko Pöyry Consulting's perception of the market for forests is that most investors prefer valuations based on pragmatic wood flow profiles. Jaakko Pöyry Consulting has consistently been engaged in preparing and evaluating managed wood flow profiles for intending forest investors.

7.3 Modelling Supply and Demand

Forest estate modelling provides the means to manage the collective output of the estate to best effect, managing supply chain optimisation by matching production by log type to the various markets. These include; local sawmills, panel mills and pulpmills, local and distant forest product users, and export ports.

A schematic outline of the entire forest estate modelling concept used to project future wood flows as well as projected costs and revenue by destination is shown below.

Figure 7-6:
Schematic Illustration of the Forest Estate Model



As illustrated, the model maintains the identity of the forest units within the collective resource. Each has a distinct age-class distribution. The linear programming model operates on a year-by-year basis, with each year being unique in respect to clearfell age, location of harvest and the quantities delivered to various destinations.

7.4 Croptype Allocation

Forest estate modelling has conventionally taken the approach of allocating each stand in the forest to a croptype. Croptype definition is initially productivity-based, with all stands within a croptype expected to share the same yield table. Factors affecting yields include the species, site characteristics and silvicultural regimes of the stands - thus croptypes are normally distinct with respect to these attributes. With increasing sophistication in the modelling process, other criteria for differentiation may also apply. Forest location, slope classification, soil type and tenure are also commonly distinguished.

The practice of aggregating stands into croptypes has largely been driven by limits on the computational capacity of available computers. With processing speeds continuing to increase rapidly, the requirements for aggregation are diminishing. It is increasingly practicable to construct models in which each stand is a croptype in its own right. The improved modelling resolution that this offers is attractive, although greater automation of model construction also becomes necessary. The forest estate model that has been constructed to describe the Sino-Forest estate employs a substantial measure of aggregation, but retains a high degree of resolution inasmuch as geographical identities are maintained and the coppicing of future stands is modelled.

7.5 Model Constraints

The linear programming based framework allows the specification of a variety of constraints. The following types of constraint are included within both the wood flow model and the supply chain optimisation model:

- Lower and upper harvest age limits.
- Overall objective of optimising the NPV of future cash flows.
- Croptype allocation for replanting/regeneration of future crops, with an accompanying variety of replanting constraints and limits.
- Harvest constraints, which in turn include a range of further options such as non-declining yields and product smoothing capabilities.
- Cash flow and budgeting constraints, such as maximum expenditure and minimum cash flow requirements on an annual basis.
- Supply chain management such as the delivery of required product mixes to specific destinations over a managed time horizon.

In order to provide variations in the mix and volume of the products available from each stand at clearfell, the age at which harvest can occur is allowed to vary. The linear programming model determines the year of harvest and is constrained to a range of ages that are realistic industry standards. The minimum and maximum clearfell ages for each species are shown in Table 7-1.

Table 7-1:
Clearfell Age Restrictions

Period	Species	Minimum Clearfell Age	Maximum Clearfell Age
1 to 48	Eucalypt (existing)	5	12
1 to 48	Eucalypt (new crop)	6	6
1 to 48	Eucalypt (coppice)	5	5
1 to 48	Pine	10	25
1 to 48	Poplar	6	12
1 to 48	Chinese Fir	15	20
1 to 48	Acacia	6	10

After an initial period when croptypes are allowed a wide range of clearfelling ages, the maximum harvest age is reduced so that a more tightly defined clearfell range exists. The reasons for doing this are threefold:

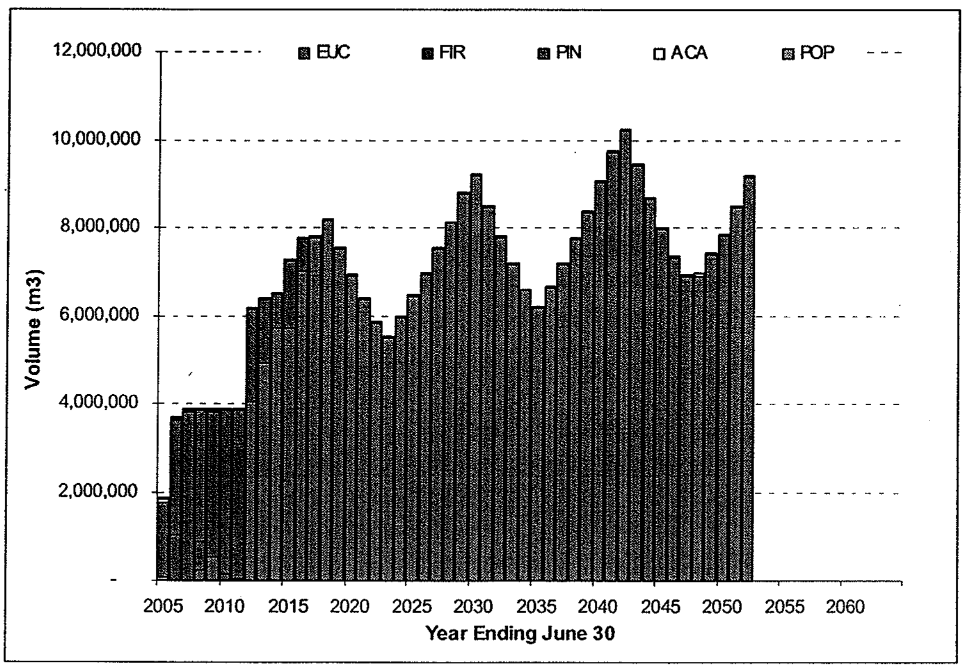
- At the start of the modelling process there are some stands containing old trees, and the model must acknowledge these exist.
- Lowering the maximum clearfell age after a period of time prevents the model from deferring the harvest age unduly in so-called end-play effects.
- A narrower band of possible harvest ages enhances the model's processing speed.

It is possible to specify periods within which the harvest of a class of products may increase at any time but cannot subsequently decline. As the concept suggests, this is commonly referred to as a non-declining yield (NDY) constraint. The forest estate model has used both NDY constraints and smoothing constraints to allow the harvest of any mix of log products from various forest origins to be smoothed between annual periods.

7.6 Wood Flow and Allocation Model Results

Figure 7-7 illustrates the wood flow profile for the collective resource over the 48-year period of the valuation. This clearly shows the dominance of eucalypt within the estate, once the existing areas of Chinese fir and pine are harvested and new eucalypt plantations established.

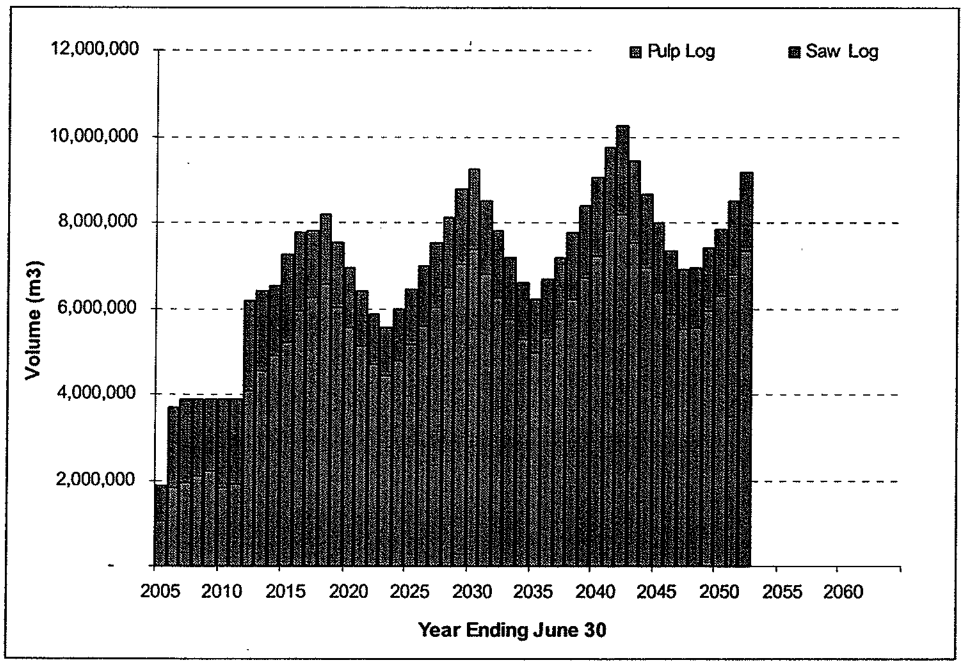
Figure 7-7:
Wood Flow by Species



Jaakko Pöyry Consulting has modelled the Sino-Forest estate over a 48 year period. This enables the current estate to be harvested close to its optimum economic rotation age and results in a wood flow profile that shows long-term variation between 4 000 000 m^3 and 10 000 000 m^3.

It is Jaakko Pöyry Consulting's expectation that Sino-Forest will continue to actively manage and acquire new forest areas and that these will be complimentary to the wood flow forecast shown below. Using a forest estate modelling system it is possible to arrive at the level and period of establishment that is necessary to produce complimentary wood flows to those shown in Figure 7-8. Such wood flows will allow a non-declining level of future annual wood flow to be achieved, indicatively at around 10 000 000 m^3 per annum.

Figure 7-8:
Wood Flow by Log Type



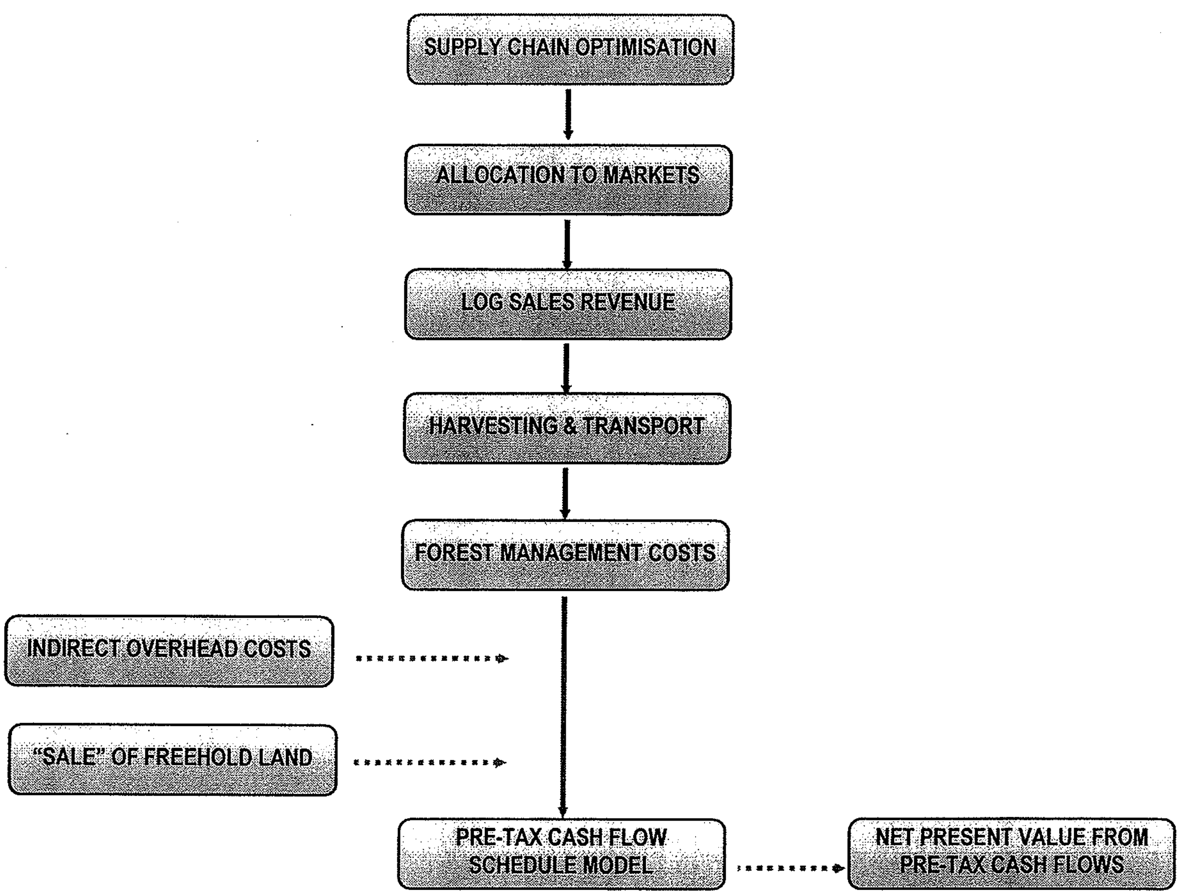
8 DISCOUNTED CASH FLOW VALUATION

8.1 Overview

The diagram below illustrates the structure of the valuation model. Generation of the initial inputs (the wood flows) has been described in the previous section. These wood flows are then optimised in their delivery throughout the supply chain to the various end-use markets. Revenue is generated at each destination, the price point being delivered at mill gate (AMG) or at wharf gate (AWG). Harvesting and transport costs, annual forest management costs, indirect overhead costs and the net cost of land are deducted from this revenue to give an operating margin.

The linear programming model generates all of these costs streams, since their profile depends on the harvesting strategy and age-class structure of the forest.

Figure 8-1:
Schematic Illustration of the Forest Valuation Process



8.2 Treatment of Taxation

Astute forest investors are expected to prepare valuations on the basis of post-tax cash flows. However, in general the accessible information with which to interpret transaction evidence almost always excludes any evidence of the buyer's taxation position. Accordingly, when forest valuers have sought to derive implied discount rates, these have largely been based on pre-tax cash flows.

This valuation has been based on real pre-tax cash flows.

8.3 Scope of the Analysis

In this context, scope refers to the time span of the analysis. The forest estate modelling process can provide projections of cash flows far into the future. Providing the existing forest is replanted into productive croptypes, it would be possible to run the analysis indefinitely. Two alternatives are demonstrated in forest valuation:

- **Perpetual cash flows** - the forest is modelled as an ongoing business, where stands are replanted as they are felled. All revenue and costs associated with the sustained venture are modelled in perpetuity. In practice, the model is extended to the point where, after the discounting process, incremental cash flows are effectively immaterial. A figure in the order of sixty years is not uncommon when modelling a large plantation resource.

- **Current rotation analysis** - only the revenue and costs associated with the existing tree crop are included in the analysis.

In general, Jaakko Pöyry Consulting prefers to confine the analysis to the current rotation. The justification for this approach is that future rotations, which include a degree of conjecture, are excluded from the analysis. The current rotation approach is especially compelling when future rotations appear either spectacularly profitable, or especially unprofitable. In either case it could be anticipated that some modifying influence would prevail.

If subsequent rotations are unprofitable, the forest owner will look to contain costs and increase log prices. If there is no prospect of either, a rational investor will quit forest ownership.

If subsequent rotations appear super-profitable, it can be anticipated that there will be competition for the underlying land and its price will increase. When charged with a higher land price, the profitability of the tree crop, and hence its value, will decline.

The approach is consistent with wider business appraisal that generally seeks to confine the analysis to the current investment cycle, and thereby avoid unnecessary conjecture. However, a disadvantage of the current rotation approach is the requirement to identify any terminal value associated with the investment. In forest valuations, the obvious candidate for the terminal value is the value of the land. Application of the current rotation approach assumes that the freehold land is either actually or notionally sold as the current crop is harvested.

8.4 Timing of Cash Flows

Tree planting within the Sino-Forest estate most commonly takes place over the months, February to April. By convention, stands are generally assumed to have been fully established by 30 June. The yield estimation process has generated yields that are projected to apply on the full anniversary of planting. Thus, for example, trees planted in 1975 were aged 23 full years on 30 June 1998 and the yields corresponding to 23 years of age were assumed to be available at that date.

With large forests that are subject to continuous harvesting, it would be impractical to fell all stands just as they turn their nominated target age. Instead, in a valuation model of the type represented here, they are expected to be felled across the span of a year. Commonly applied financial modelling procedures would suggest that the assumption that revenues arise at year-beginning would seem unduly aggressive. Seemingly, a more realistic approach would be to assume that cash flows arise no sooner than mid-year.

However, between the exact anniversary of planting and the felling operations, the tree crop will have grown. If the harvest age is near to the optimal economic rotation age, the marginal rate of value growth will be close to the discount rate.

Treating the revenue flow as a point event at the planting anniversary is therefore an acceptable assumption. In principle, cost flows should be treated differently – it would appear more realistic to consider them as occurring at mid-year. For convenience they, like revenues, have been treated as coinciding with the stand anniversary. This approach results in them being discounted less, and therefore represents conservatism in the valuation process.

8.5 Date of Valuation

The date of the valuation is 31 December 2005. Jaakko Pöyry Consulting uses proprietary software that allows the isolation of both the cash flows arising from the current rotation and all future rotations at any point in the valuation horizon. The cash flows contributing to the Sino-Forest valuation arise during the 50-year period beginning 1 January 2006 and ending 30 June 2065.

9 DISCOUNT RATE

A valuation based on an NPV approach requires the identification of an appropriate discount rate. In selecting the rates there are two broad approaches:

- Deriving the discount rate from first principles. The most common expression of this approach turns first to the Weighted Average Cost of Capital (WACC). This recognises the costs of both debt and equity. The cost of equity may be derived using a Capital Asset Pricing Model (CAPM) method.

- A second approach is to derive implied discount rates from transaction evidence.

9.1 Discount Rate Derived from WACC/CAPM

Jaakko Pöyry Consulting has commissioned Dr Alastair Marsden Auckland UniServices Limited to prepare a report on the cost of capital for a generic forest investment located in China. His report is included in Appendix 3.

Dr Marsden concludes that depending on the modelling assumptions a range of discount rates might be proposed for a forest-owning venture in China. His derived range of rates is shown in Table 9-1.

Table 9-1:
Estimate of Post-tax WACC by Marsden

Lower bound	Average estimate	Upper bound
5.0%	**6.6%**	8.2

By definition the formulation of WACC employed by Dr Marsden is associated with post-tax cash flows and includes the cost of debt. Dr Marsden has transformed his estimate of nominal post-tax WACC to an 'equivalent" real pre-tax WACC through a simple transformation with appropriate qualification. The average estimate of WACC to apply to real pre-tax cash flows is 9.9% (Table 9-2).

Table 9-2:
Estimate of Real Pre-tax WACC by Marsden

Lower bound	Average estimate	Upper bound
7.5%	**9.9%**	12.3

9.2 Implied Discount Rates

In common with other valuers of Southern Hemisphere planted forests, Jaakko Pöyry Consulting maintains a register of significant forest transactions. The available evidence is then analysed in an effort to derive the discount rate implied by each transaction. The process involves preparing a credible representation of the forest's future potential cash flows and then relating these to the transaction price.

From this type of exercise conducted in Australia and New Zealand, Jaakko Pöyry Consulting has observed derived discount rates for recent transactions to generally fall within the range of 8-10%. These are real rates, applied to post-tax cash flows.

As yet Jaakko Pöyry Consulting has little implied discount rate data for the Southern China region. As the commercial plantation forest industry develops and forests are transacted, empirical evidence from which to derive implied discount rates will arise.

The capacity to utilise implied discount rates in this valuation is limited to considering how the forest investment in China compares with such investment in other locations.

Commercial forestry in Southern China is still its infancy and faces some challenges, these include:

- The reliability of forest descriptions
- The accuracy of yield prediction
- Achieving high growth rates in a consistent manner.

It is Jaakko Pöyry Consulting's opinion that for many forest investors, investing in plantation forestry in China would be considered a riskier proposition than investing in the industry in Australia or New Zealand, for instance.

9.3 Incorporating Risk in the Discount Rate

If forest investment in China is at present perceived to be a more risky proposition than like activity in other international counterparts, the issue then becomes how to quantify this difference. The textbook treatments of the subject make it clear that the discount rate cannot be regarded as a simple catch-all for any and all forms of perceived risk. Because the discount rate may be a very blunt instrument in such a role it is preferable instead to attempt to acknowledge risk in the development of the cash flows to which the discount rate is applied. However, despite this principle, there is an inclination by potential purchasers to load the discount rate where they feel uneasy.

9.4 The Discount Rate Applied in Valuing the Sino-Forest Resource

Given the complexities in identifying what margin above other implied discount rates that forestry in Southern China should attract, Jaakko Pöyry Consulting is disinclined to place weight on an implied discount rate derivation for this resource. Disconcertingly, the range of rates suggested by the alternative approach - the WACC/CAPM - is very broad.

Ultimately we have exercised our professional judgement in selecting a rate at the upper end of the WACC/CAPM range. This is a real rate of 11.5%. In selecting such a rate we have been inclined to recognise that investors in forestry in Southern China will inherently be taking a long term view, and do have grounds for optimism on the forest industry's future there. The fundamental factors that affect forestry performance are favourable. Importantly, too, the definition of market value for the forests requires that there be not just willing buyers, but also willing sellers. If the only purchase offers to be extended involved very high discount rates we would expect that forests would not be willingly sold.

The derivation of the discount rate for the Sino-Forest resource will certainly warrant ongoing attention in future valuations.

In the current market Jaakko Pöyry Consulting considers that 10.5% to 12.5% is representative of the range of real pre-tax discount rates that might be expected in forest transactions in Southern China. A discount rate of 11.5% has been selected and applied to pre-tax cash flows. It is Jaakko Pöyry Consulting's perception that with a carefully timed and managed sale, other buyers could be attracted who would be willing to accept a similar pre-tax discount rate.

10 DCF VALUATION RESULTS

Jaakko Pöyry Consulting has determined the valuation of the Sino-Forest assets as at 31 December 2005 to be **USD728.5 million.** This is the result of a valuation of the existing planted area and uses an 11.5% discount rate applied to real, pre-tax cash flows.

Jaakko Pöyry Consulting has also prepared an existing forest valuation that **includes** the revenues and costs of re-establishing and maintaining the plantation forests for a 50-year period (perpetual valuation). However, to date Sino-Forest only has an option to lease the land under the purchased trees for future rotations, the terms of which have yet to be agreed. Sino-Forest is embarking on a 200 000 ha expansion of its estate in Heyuan City. Jaakko Pöyry Consulting has determined the valuation of the Sino-Forest forest assets based on a perpetual rotation (including the planned expansion in Heyuan City) using a real pre-tax discount rate of 11.5% to be **USD968.4 million** as at 31 December 2005.

The following table presents the results of the valuation of the Sino-Forest estate. The results are shown at real discount rates of 10.5%, 11.5% and 12.5% applied to real pre-tax cash flows.

Table 10-1:
USD Valuation as at 31 December 2005

Forest Component	Real Discount Rate Applied to Pre-tax Cash Flows		
	10.5%	11.5%	12.5%
	USD million		
Existing forest estate of 324 296.2 hectares, current rotation only	752.9	728.5	705.4
Existing forest, and all future rotations including the 200 000 ha expansion in Heyuan City	1 055.2	968.4	895.0

10.1 Merchantable Volume

Table 10-2 outlines the merchantable standing volume of the existing Sino-Forest plantations. Merchantable standing volume has been calculated from the planted areas that are at least four full years of age as at 31 December 2005. Thus 16 774.6 ha aged less than 4 years are not included.

Table 10-2:
Merchantable Standing Volume as at 31 December 2005

Planting Year	Planted Area (ha)	Average Standing Volume (m^3 per ha)	Total Volume (m^3)
2001	9 815.5	3	29 447
2000	11 172.9	75.8	846 906
1999	2 267.9	75.4	171 000
1998	16 924.1	80.8	1 367 467
1997	27 304.4	80.9	2 208 926
1996	99 716.2	82.1	8 186 700
1995	92 457.7	88.3	8 164 015
1994	3 583.8	99.6	356 946
1993	820.8	174.3	143 065
1992	9 460.4	52.4	495 725
1991	7 287.3	38.9	283 476
1990	10 993.9	66.9	735 492
1989	7 287.3	41.2	300 237
1988	7 287.3	42.2	307 524
1987	874.3	227.1	198 554
1986	53.6	111.9	5 998
1985	53.6	111.9	5 998
1984	53.6	111.9	5 998
1983	53.6	111.9	5 998
1982	53.6	111.9	5 998
Total	307 521.8	77.7	23 825 470

11 RISKS AND SENSITIVITY ANALYSIS

The wood supply and average delivered wood costs presented in this report are based on a number of assumptions and are at risk should any of these assumptions fail to be achieved in practice.

11.1 Sensitivity Analysis

A sensitivity analysis has been conducted that addresses the main drivers of value within the current rotation valuation model. These are:

- Discount rate and log price changes (in combination)
- Changes in the level of fixed overhead costs
- Changes in the costs of production (logging and loading, transport etc).

Table 11-1:
USD Current Rotation Valuation Only – Log Price Sensitivity

Scenario	Real Discount Rate Applied to Pre-tax Cash Flows		
	10.5%	11.5%	12.5%
	Current Rotation Value (USD million)		
1.5% Real Price Increase	800.0	773.1	747.8
0.5% Real Price Increase	768.3	743.1	719.3
No Real Price Increase (Base)	752.9	728.5	705.4
1.0% Real Price Decrease	722.7	699.7	678.1

Note: The period of real compounding price growth starts in 2007 and runs for five years to 2011. Prices are then held flat.

Table 11-2:
USD Current Rotation Valuation Only – Overhead Cost Sensitivity

Scenario	Real Discount Rate Applied to Pre-tax Cash Flows		
	10.5%	11.5%	12.5%
	Current Rotation Value (USD million)		
RMB 225 fixed cost per ha per	744.1	713.3	697.0
RMB 150 fixed cost per ha per	752.9	728.5	705.4
RMB 75 fixed cost per ha per	761.7	730.3	713.8

Table 11-3:
USD Current Rotation Valuation Only – Harvest Cost Sensitivity

Scenario	Real Discount Rate Applied to Pre-tax Cash Flows		
	10.5%	11.5%	12.5%
	Current Rotation Value (USD million)		
12% Harvest Cost Increase	721.0	687.7	675.7
Base Harvest Cost	752.9	728.5	705.4
12% Harvest Cost Decrease	784.8	759.2	735.0

12 VALUE CHANGE

The change in appraised value between 31 December 2004 and 31 December 2005 is attributable to the following factors:

- The purchase of new forest areas
- Revision of valuation discount rate
- The sale of existing forest areas within the estate, and
- An increase in maturity within the estate because of biological growth.

Table 12-1 itemises the components of the overall value change.

Table 12-1:
Components of Value Change – USD millions

	Incremental Forest Value	Contribution to Change in Value	% Contribution to Change
		USD millions	
Value as at 31 December 2004	**565.6**		
Change in Discount Rate	575.3	9.7	1.7
Changes in Log Pricing	575.3	0.0	0.0
Forest Area Changes and Annual Growth	728.5	153.2	27.1
Value as at 31 December 2005	**728.5**	**162.9**	**28.8**

APPENDIX 1

Field Visit and Site Inspection

1 INTRODUCTION

As part of the valuation process, a brief field inspection was undertaken by two Jaakko Pöyry Consultants; one in Jiangxi province, and the other in Heyuan City, Guangdong.

Sino-Forest forest assets span the following provinces; Fujian, Guangdong, Guangxi, and Jiangxi. Given the timeframe and resources with which the valuation exercise is constrained, it is not feasible to visit all of the regions within which Sino-Forest has its forest assets. It is Jaakko Pöyry Consulting's intention to visit a different area of the resource as part of its annual valuation exercises.

Jiangxi Province has been selected for the field inspection associated with this year's valuation exercise on the basis that it is an area where a large number of Sino-Forest's plantation expansion initiatives have been focused. 23 725 ha of plantation area has been purchased or secured in Jiangxi Province since Jaakko Pöyry Consulting's 31 December 2004 valuation exercise.

The field visit to Jiangxi Province focused on:

1. A qualitative review of a sample of the area purchased subsequent to the 31 December 2004 valuation.

2. Gaining a comprehensive understanding of the plantation, infrastructure and market environment in Jiangxi Province.

The following narrative and photo essay is intended to provide current and potential investors in Sino-Forest with an understanding of the business and its environment in Jiangxi Province.

2 JIANGXI PROVINCE FIELD INSPECTION AND SITE VISIT

Sino-Forest plantations in Jiangxi province are managed under two different models:

- The first management model is a Co-operative Joint Venture (CJV) between Sino-Forest and the PRC incorporated forestry trading company - Jiangxi Jiachang Forestry Development Company Ltd.

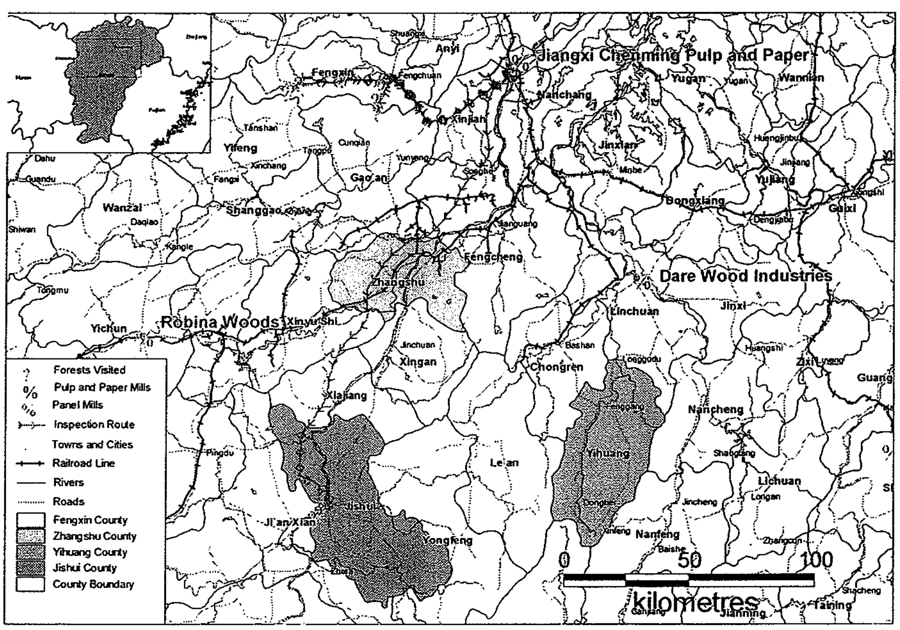
- The second management model is the direct management of forest areas by Sino-Forest Hong Kong based staff. It is under this direct management model that most of Sino-Forest plantation areas in Jiangxi province are administrated.

Two representatives from Jaakko Pöyry Consulting undertook field inspections in Jiangxi Province during 8-12 December 2005. The field inspections were conducted along with staff from Sino-Forest CJV company – Jiangxi Jiachang Forestry Development Company Ltd.

2.1 Plantations

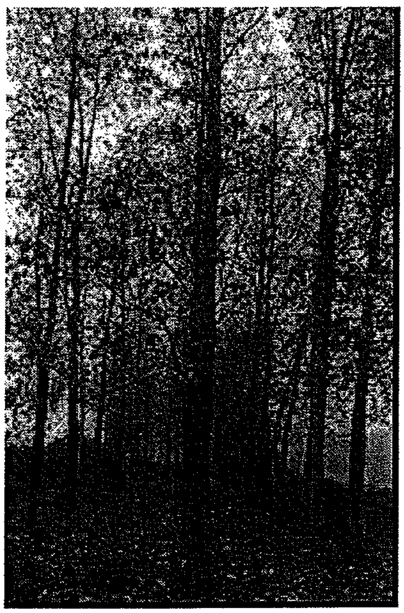
Jaakko Pöyry Consulting inspected Sino-Forest plantations in Fengxin County and in Jishui County (Figure 1). Forests were inspected in Fengxin and Jishui Counties. Sino-Forest purchases in 2005 were located in Fengxin, Zhangshu and Yihuang Counties.

Figure 1:
Map of Field Inspection in Jiangxi Province



In Jishui County Sino-Forest owns around 400 ha (6 000 mu) of poplar plantations along the banks of the Gan River. The poplars are harvested at around 7 years of age and yield on average around 75 m^3/ha of recoverable volume. A number of poplar species and clones have been planted including Italian 214 and black poplar from North America (Photo 1).

Photo 1:
Sino-Forest poplar plantations near Wenfeng Town in Jishui County. Italian 214 poplars planted in 2000 along the bank of the Gan River (left). American black poplar planted in 2002 on an island of the Gan River (right).



In Fengxin County Sino-Forest has purchased 23 725 ha of slash pine plantations in 2005. The majority of stands purchased are in the age range of 8 to 15 yrs of age. The slash pines are grown on a rotation length of 16 to 18 yrs and as the plantations near harvestable age the rights to harvest the standing timber is sold to other companies. When slash pine stands are harvested they yield on average around 115 m^3/ha of recoverable volume (recoverable MAI 7 m^3/ha/a) according to Sino-Forest regional staff. There is a large variation in yields, with poorer sites yielding as low as 75 m^3/ha and the best sites as high as 225 m^3/ha.

A small inventory was undertaken by Jaakko Pöyry Consulting in slash pine stands in Fengxin County (Table 1) to confirm that the newly acquired plantations were similar to the yield estimates used in the valuation (see Section 7). The results of the inventory showed an average recoverable MAI of 7.8 m^3/ha/a. The inventory confirmed the regional staff estimates discussed above.

Table 1:
Jaakko Pöyry Consulting Inventory Results from Fengxin County

County	Town	Village	Age-class	Total Standing Volume (m^3/ha)	Recoverable Volume (m^3/ha)	Recoverable MAI (m^3/ha/a)
Fengxin	Dong Ken	Houtian	1993	121.0	90.7	7.6
Fengxin	Shangfu	Gaohu	1993	149.6	112.2	9.4
Fengxin	Chián	Hetang	1994	110.1	82.6	7.5
Fengxin	Chián	Hetang	1994	147.3	110.5	10.0
Fengxin	Chián	Huangcheng	1993	74.6	55.9	4.7
Fengxin	Chián	Yanli	1993	131.7	98.7	8.2
Fengxin	Huibu	Zha	1990	155.3	116.5	7.8
Fengxin	Huibu	Zha	1990	139.2	104.4	7.0
					Average	**7.8**

Photo 2:
Inventory plot being measured in slash pine purchased by Sino-Forest in 2005

The plantation was planted in 1993 and is located near Yanli Village, Chián Town in Fengxin County. The plots average DBH was 13.7cm, height was 11.1 m and stocking was 1900 stems/ha. Note most slash pine stands in the county had scarring as a result of local farmers tapping the trees for resin production. Chemicals are extracted from the resin to produce turpentine.

Photo 3:
Slash pine plantation near Zha Village, Huibu Town in Fengxin County

The plantation in Photo 3 was purchased by Sino-Forest in 2005 and had been planted in 1990. The plantation is located on rolling hills with the flatter intersecting plains used for agriculture.

2.2 Log Markets

Markets for harvested timber have grown markedly in the last few years within the region of Jiangxi Province where Sino-Forest has increased plantation purchases. Two large world scale MDF facilities as well as two softwood pulpmills are situated within the region. These mills utilise smaller diameter logs less than 12cm SED with a preference for pine. The 4 mills capacities and potential wood intakes are summarised in Table 2.

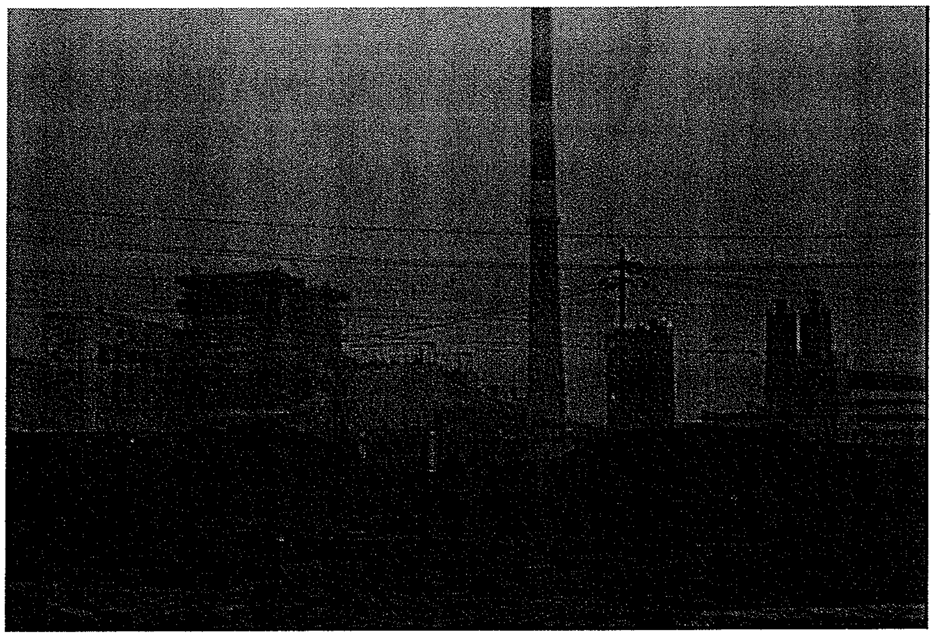
Table 2:
Large Processing Facilities in Northern Jiangxi Province

Mill	Location	Capacity	Potential Log Intake
Robin Group MDF	Yichun	300 000 m^3	480 000 m^3
Dare Group MDF	Fuzhou	250 000 m^3	400 000 m^3
Chenming Group pulp and paper mill	Nanchang	187 000 t/a	460 000 m^3
Jiangxi Paper Industry mill	Nanchang	85 000 t/a	290 000 m^3

The MDF plant located at Yichun is owned by the Robin Group while the facility at Fuzhou is owned by the Dare Group. The Robin Group mill in Fuzhou first commenced production in 2004 and has recently had its capacity increased to 300 000 m^3. The Dare Group mill commenced production in 2004 and has a capacity of 250 000 m^3. The combined panel capacity of the two MDF mills is likely to demand up to 900 000 m^3 of wood annually.

The pulp and paper mill north of Nanchang belongs to the Chinese owned Chenming Group and commenced production in March 2005 (Photo 4). It has a softwood BCTMP facility with a capacity of 187 000 t/a requiring an annual softwood intake of around 460 000 m^3. A smaller softwood pulpmill also exists in Nanchang owned by the Jiangxi Paper Industry with a capacity of 65 000 t/a of bleached softwood mechanical pulp and 20 000 t/a of unbleached softwood chemical pulp. The combined pulp capacity of the two pulpmills is likely to demand up to 750 000 m^3 of wood annually.

Photo 4:
Jiangxi Chenming Pulp and Paper Mill around 20kms north of Nanchang City



The above mill commenced production in March 2005 and has a capacity of 190 000 t/a of BCTMP softwood pulp.

Large diameter logs from the region are processed at a number of smaller sawmills and veneer mills within the region as well as being transported out of the region to larger processing centres in Zhejiang and Jiangsu Provinces.

Jaakko Pöyry Consulting visited a number of small processing facilities in the town of Dacheug Town in Gaóan County. The processing facilities were typical of many of the smaller regional processing facilities found in China and included a sawmill (Photo 5), blockboard plant (Photo 6) and a veneer / plywood mill (Photo 7). Whilst the facilities are individually small, collectively they consume large volumes of logs annually as there are hundreds within each province.

Photo 5:
Chinese fir sawmill in Dacheug Town in Gaóan County. The sawmill cuts around 2 000m^3 per year of logs for use in blockboard and for packaging timber.

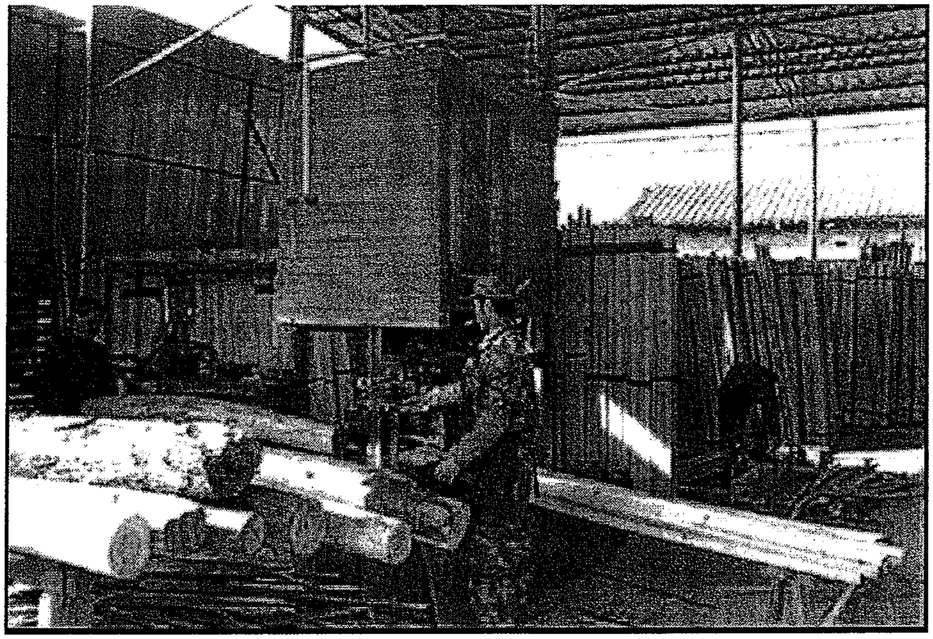


Photo 6:
Blockboard panels at Dacheug Town in Gaóan County. The core of the panels are made from small boards of Chinese fir bonded together, while the surface of the panel is made from thin poplar veneer.

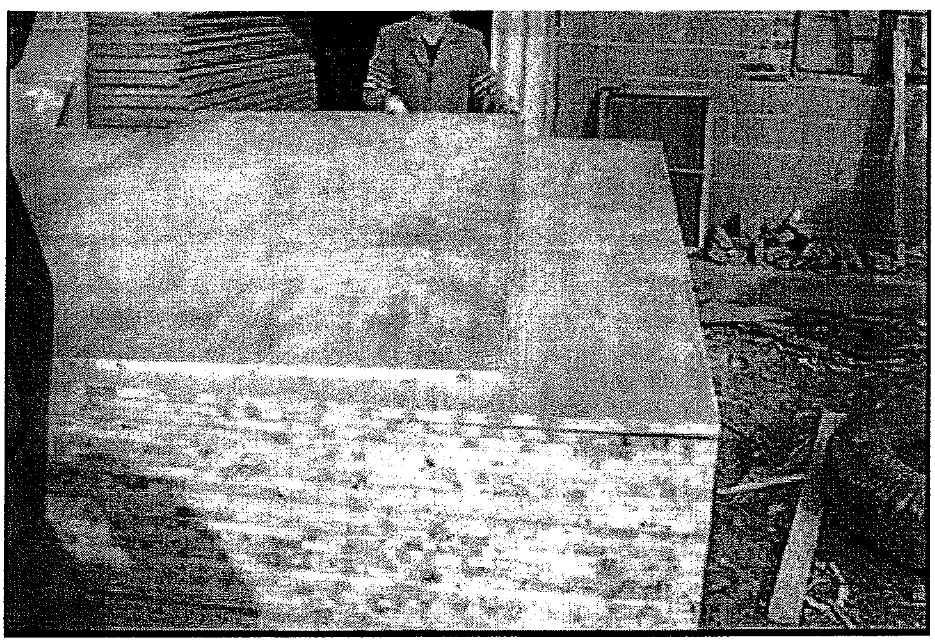
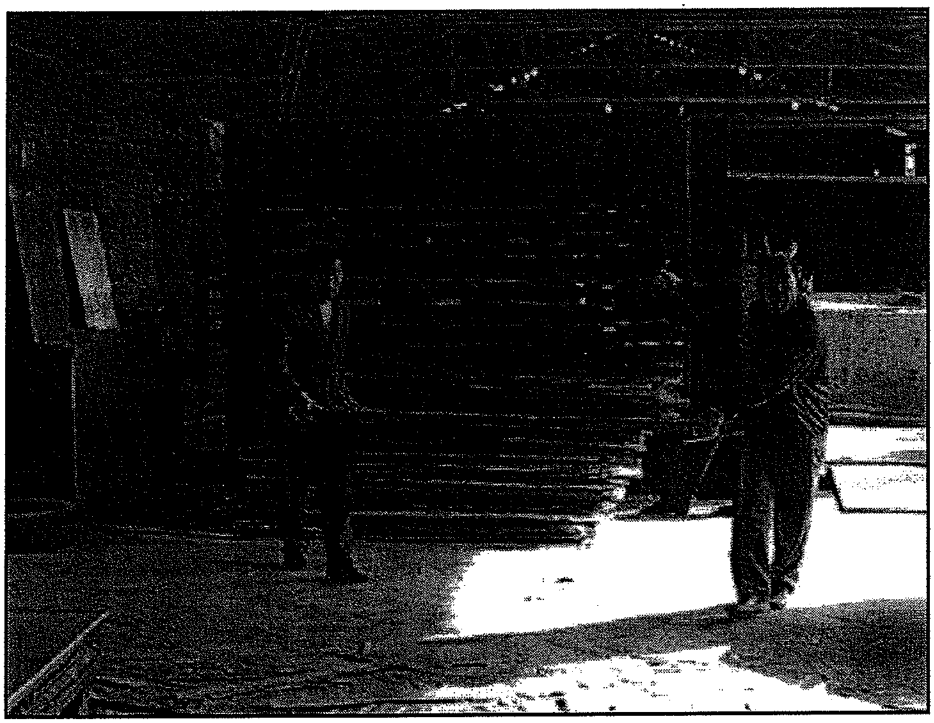


Photo 7:
Plywood panels being produced at a plant in Dacheug Town in Gaóan County. The pine veneers are bonded together under pressure in the press. The plant currently produces around 100 boards per day (around 700 m^3) but has the capacity to produce up to 300 boards per day (around 2 100 m^3) in the future.



Logs sold outside the region are often transported by river barges (Photo 8). The Gan River flows through the centre of Jiangxi province and is a tributary of the Yangtze River. This allows logs to be transported to large regional processing centres located closer to the large coastal cities. Jaakko Pöyry Consulting visited a log holding yard and wharf in Jishui County (Photo 9).

Photo 8:
Barge on the Gan river in Jishui County. The barges can each carry up to 500-600 m^3 of logs. The logs are transported to markets in Nantong in Jiangsu Province. The trip takes around 7-10 days depending on river levels and costs around RBM60-70/m^3 plus a loading and unloading fee of RMB20/m^3.

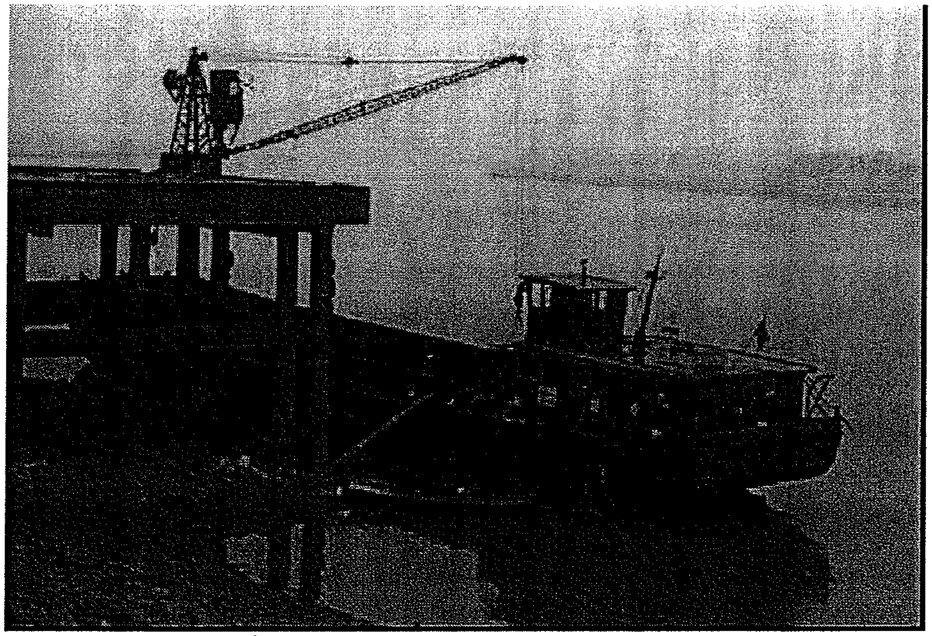


Photo 9:
Chinese fir log holding yard on the Gan River in Jishui County. The logyard has a maximum throughput capacity of 6 000-7 000 m^3 per month. Logs travel to the log yard by truck for an average of 50kms from surrounding forest areas before being loaded onto barges for transporting to Nantong in Jiangsu province

2.3 Infrastructure

The primary road network in the region consists of well maintained state and provincial highways providing access between major urban centres. There are a number of recently built state expressways between the major provincial centres.

The secondary road network (Photo 10) between smaller towns and villages is adequate for transport of logs to regional markets and processing centres. Roading to the plantation areas will require temporary upgrading and maintenance during harvesting operations. In the flatter areas the current road network generally provides good access for trucks of 10-15 tonne capacity (Photo 10) to existing forest plantations. In steeper area and less accessible areas agricultural tractors and/or smaller trucks are currently used to transport logs out to larger roads.

Photo 10:
Standard of typical county level road in Fengxin County

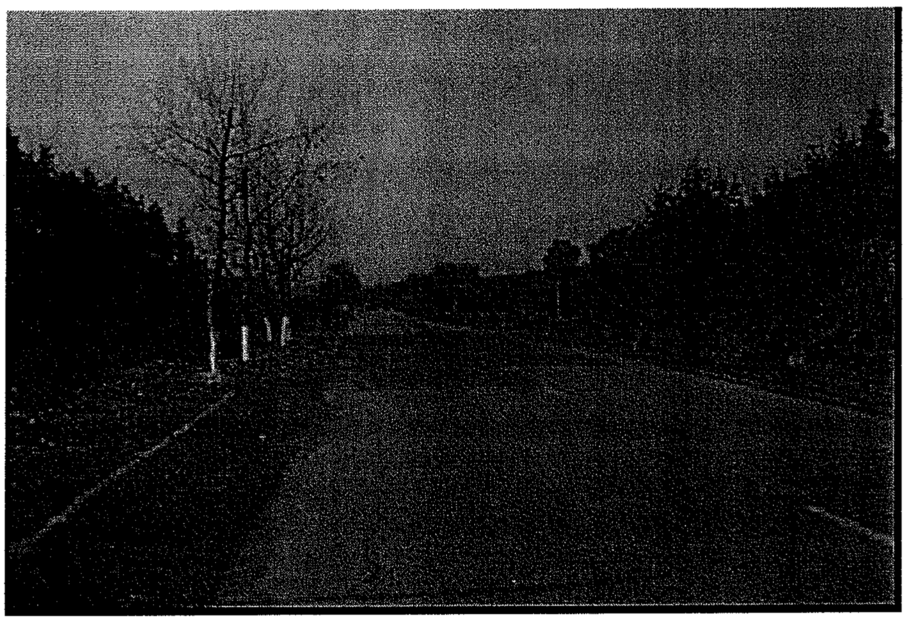
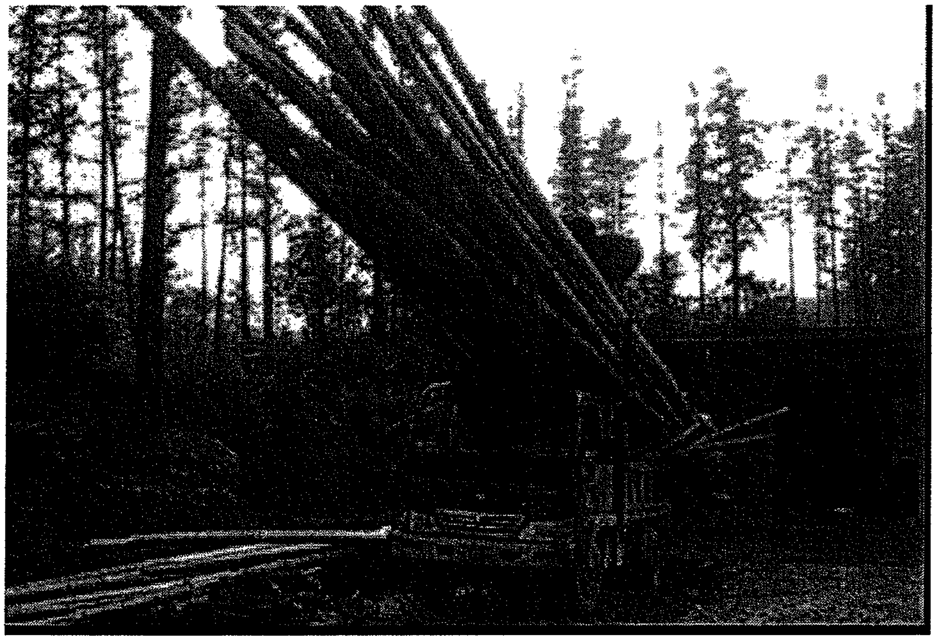


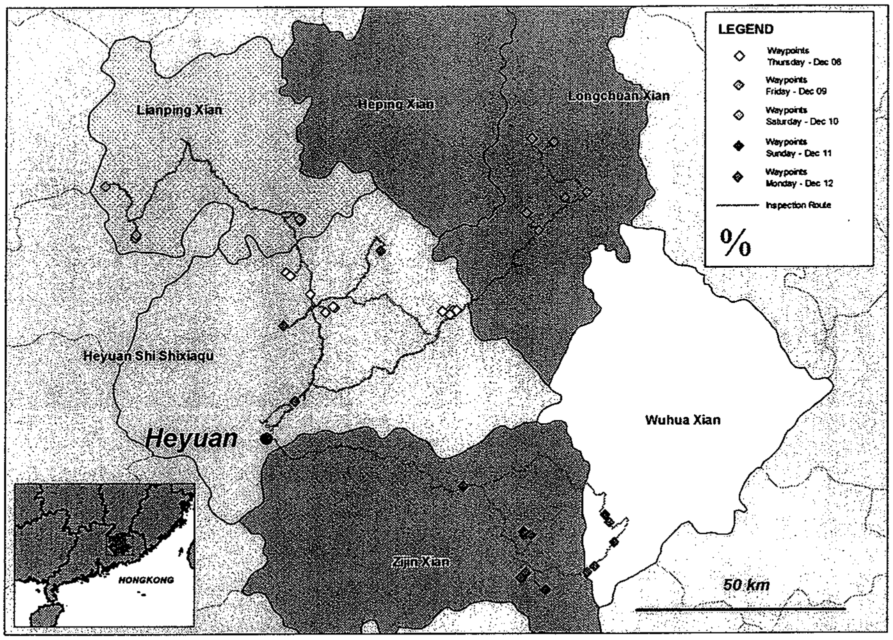
Photo 11:
Chinese fir logs being loaded onto a 10-15 tonne truck in Fengxin County for transport to market.



3 HEYUAN CITY

The Heyuan inspection was completed over five days, and spanned five counties (Figure 2). The main focuses of the field inspection were the newly purchased forests (including cutting rights-only purchases) and the newly planted eucalypt forests.

Figure 2:
Overview of December 2005 Field Inspection Locations



3.1 Existing Resource (Purchased by Sino-Forests)

Sino-Forest conducts two types of forest purchases:

1. Forestry Right Purchase. *(Approx. 20 000 ha traded in 2005)* Sino-Forest purchases the right to harvest and sell the timber from the current forest owner(s) (usually a collective of farmers). The forest is valued by Sino and a lump sum paid. Sino then effectively on-sells the forest rights to local timber traders who are responsible for constructing forest roads, harvesting, transporting and selling the logs.

2. Forest Lease Purchase. *(Approx. 4 300 ha purchased in 2005)* Sino-Forest leases the land from the current owner(s) with the intention of establishing a plantation forest resource. Leases vary in length from 30 to 50 years. In addition, Sino also purchases the right to harvest any existing standing timber (as per the forestry right).

Resource Quality and Yield

From the field inspection, the quality of the existing forests purchased by Sino appears highly variable, with a full range of qualities evident (Photo 12). An overall assessment of the quality and potential yield of the purchased forests is difficult due to the size of the resource and the limited time available for the inspection.

The purchased forest comprises several species including Masson pine, slash pine and Chinese fir. The pines account for the majority of the forest.

Recoverable volumes from the forest are similarly difficult to ascertain without a major inventory. Sino has quoted yields for the pine species of approximately 40 to 50m^3/ha (inc. bark) of which 70% will be recoverable.

Photo 12:
An example of the inherent variablilty. The trees shown in the left image stand no more than 20m away from the trees shown in the right image.

Terrain

Steep terrain can increase the costs associated with harvesting operations and harvest roading construction. Where Sino is purchasing only the forestry right, the increased cost is likely to be represented in the amount Sino pays to the forest owner(s) for the forest right. Similarly, the additional costs will be reflected in the price at which Sino can sell the forest-right on to the log trader who ultimately bears the costs of removal.

Where Sino has leased the land for plantation establishment, terrain becomes more significant:

- Sino is responsible for constructing and maintaining forest roads for the length of the agreement.
- Steep terrain also increases the cost of establishment.
- Erosion is generally more prevalent in steeper profiles.

- Aspect and water run-off can affect the soil moisture, and ultimately the productivity of the soil.

Plantation forests are generally located in areas where rice production is impractical. Rice paddies occupy the majority of the flat terrain, including valley beds, therefore forests are largely restricted to more sloping terrain. The degree of slope varies widely, however the majority of forest visited appeared to have a moderate-to-steep profile.

Sino has a self-imposed restriction of a maximum of 35° slope angle for sites purchased for forest plantation development. Areas steeper than this may be considered if the site is particularly productive. Often steeper land is included in the purchase of a large block of land as the farmers will not exclude steep regions from the overall sale area.

It is anticipated that the more desirable flatter terrain will become less available over time.

Photo 13:
This land, cleared in preparation for plantation establishment, shows the typical land form found in the Heyuan region.

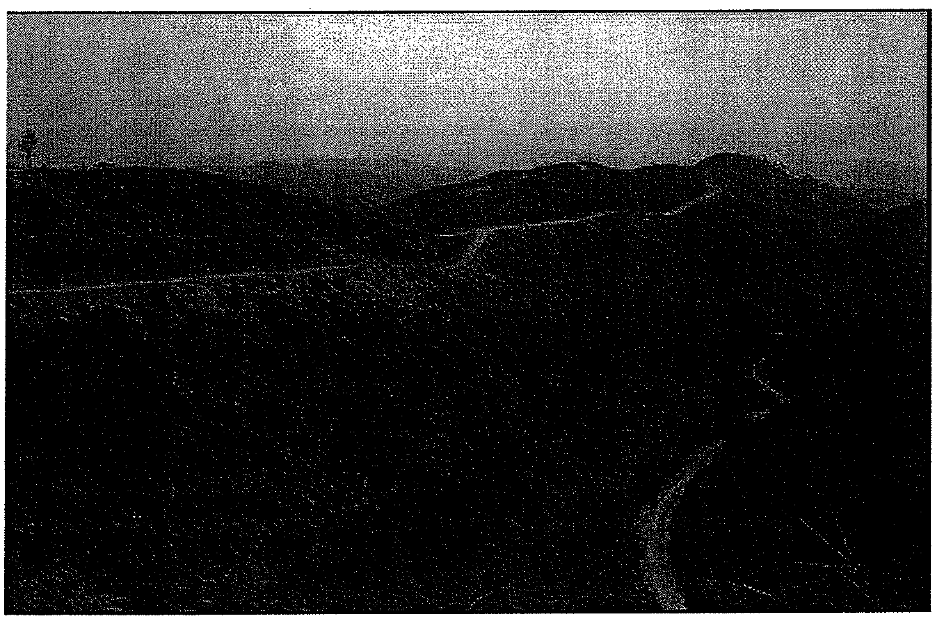


Photo 14:
Dong Yuan County – Block II, Compartment 6, 1992 Slash pine. Stocking **approximately** 1000 stems/ha. Resin tapping occurs on most trees.

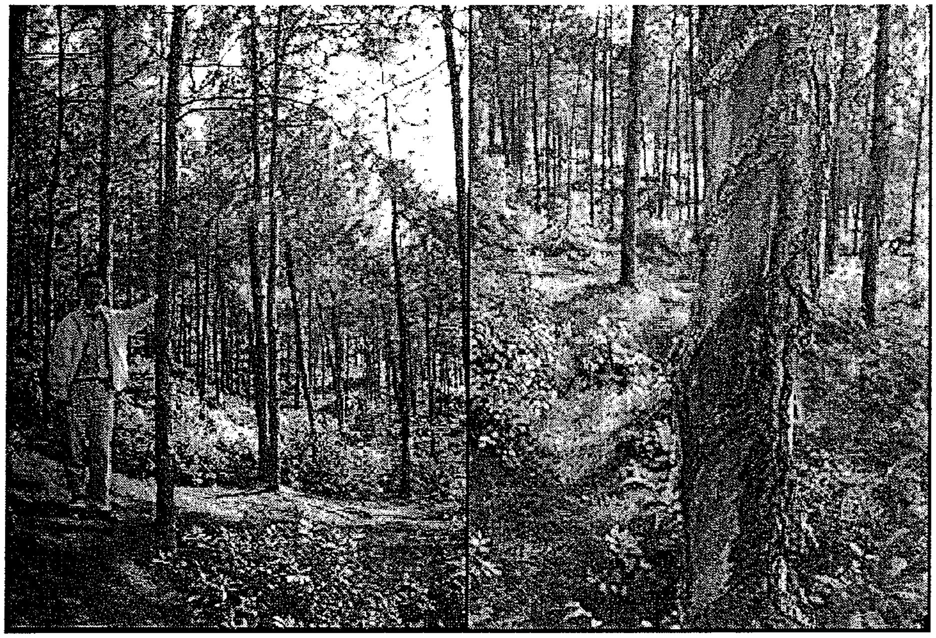


Photo 15:
Dong Yuan County – Block II, Compartment 6

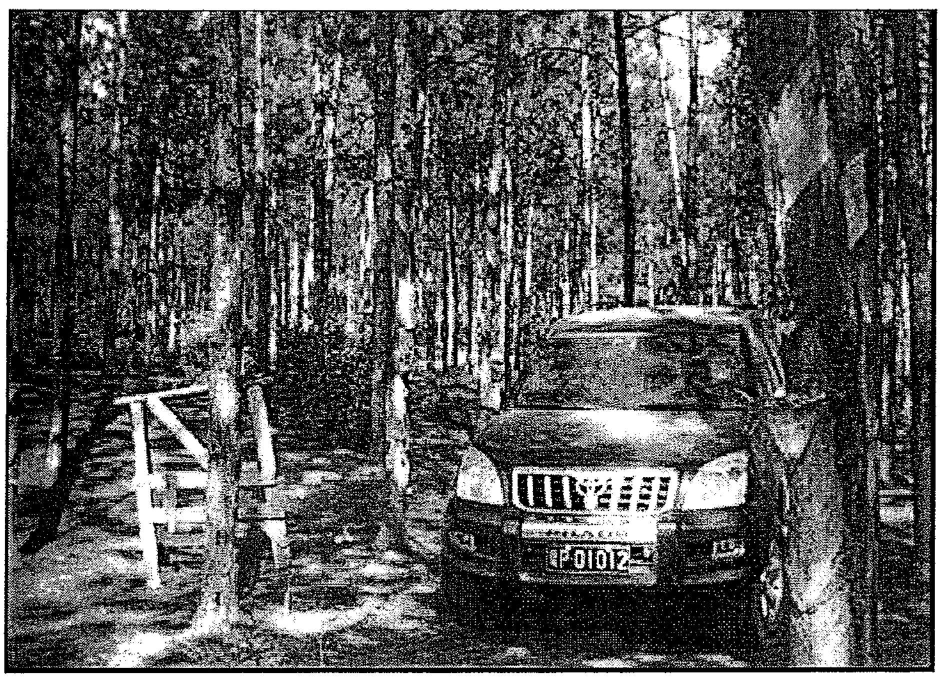


Photo 16:
Dong Yuan County – Block I Stand 12. The growth rates here appear similar to that of Block II (above).

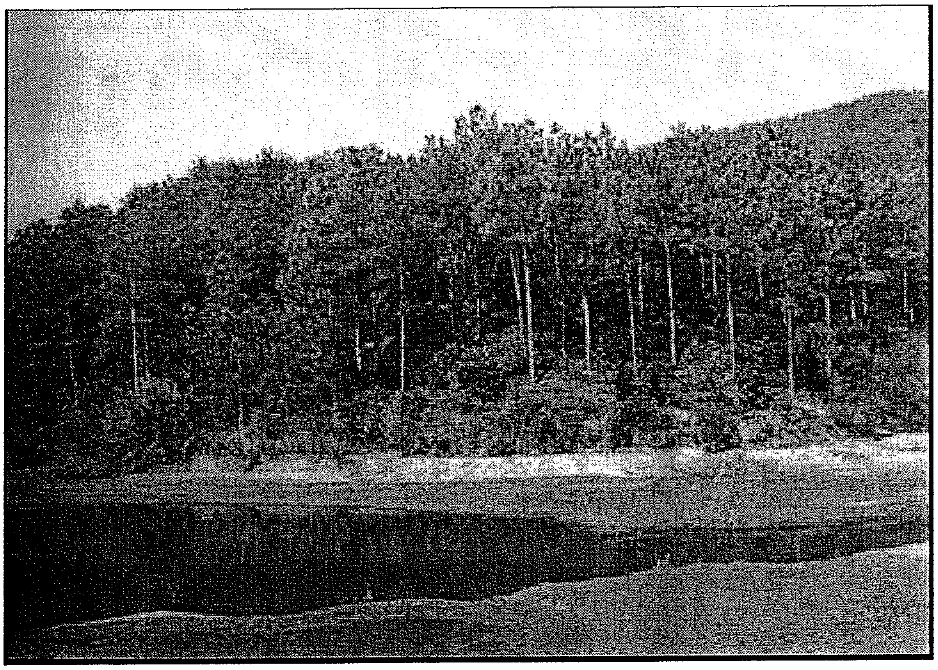


Photo 17:
Dong Yuan County – Block I. The steepness of the terrain increases into the distance.

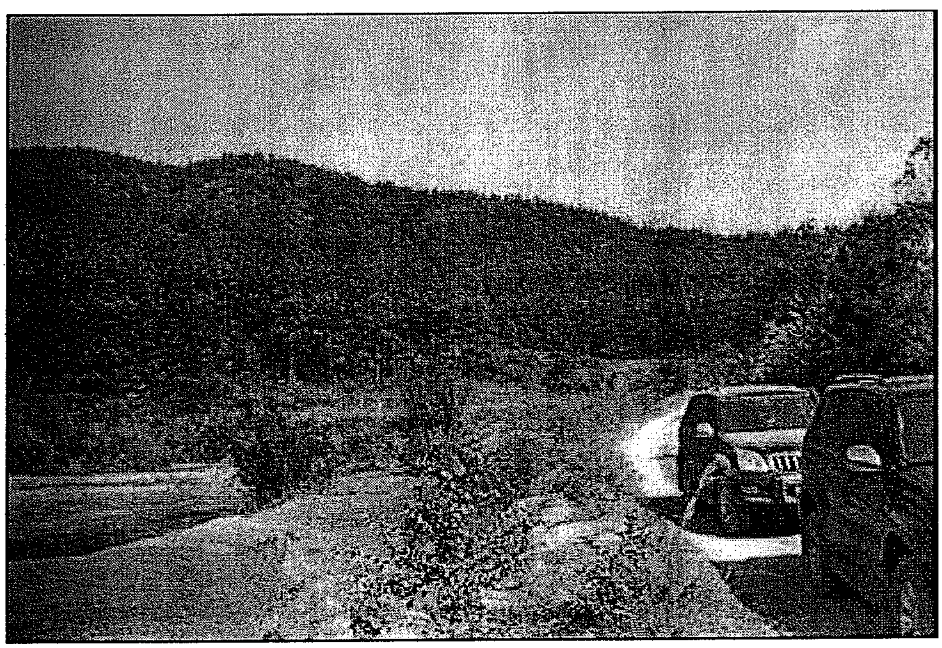


Photo 18:
Long Chun County, Feng Nian Town, Huang Ling Village. Harvesting in large area of naturally growing pine. Due to the natural nature of the forests, stockings tend to be very high, resulting in small diameter trees.

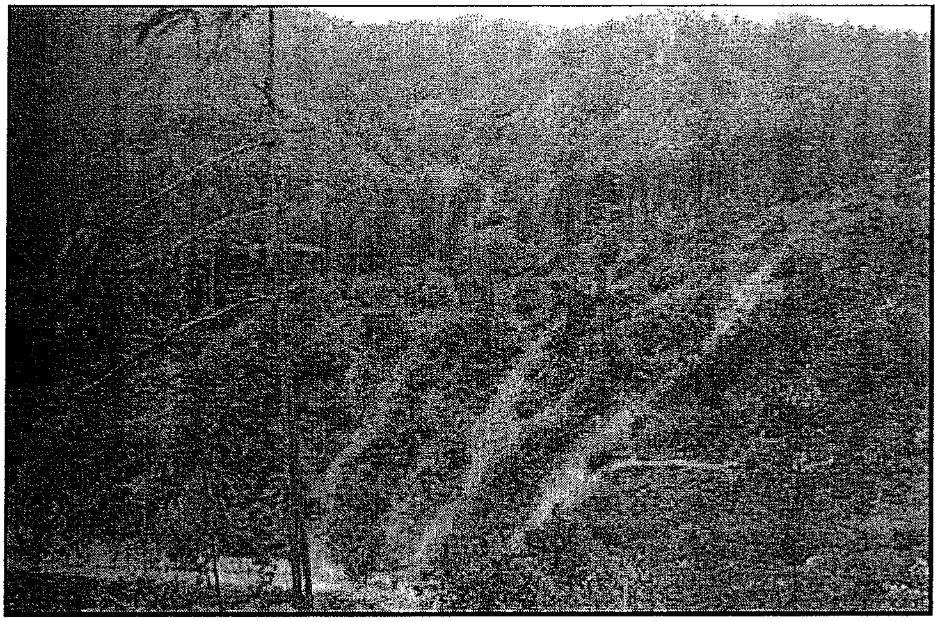


Photo 19:
Left: Remaining stumps indicate the sporadic nature of the stocking. *Right:* The harvested logs exhibit small diameters.

Photo 20:
Lian Ping County, Zhong Xin Town, Shui Chun Village. 1993 Slash pine. Quality and **form are** highly variable. Diameters appear to average around 9cm.

Photo 21:
Stocking and form appears to become more variable closer to hill tops

Photo 22:
Better growth and form exhibited at the bottom of slopes, near the roadside. In areas of better growth, resin tapping is generally encountered.

Photo 23:
Zi Jin County, Long Wo Town, Huang Tian Village, Block I. The general quality of this forest block appears poor.

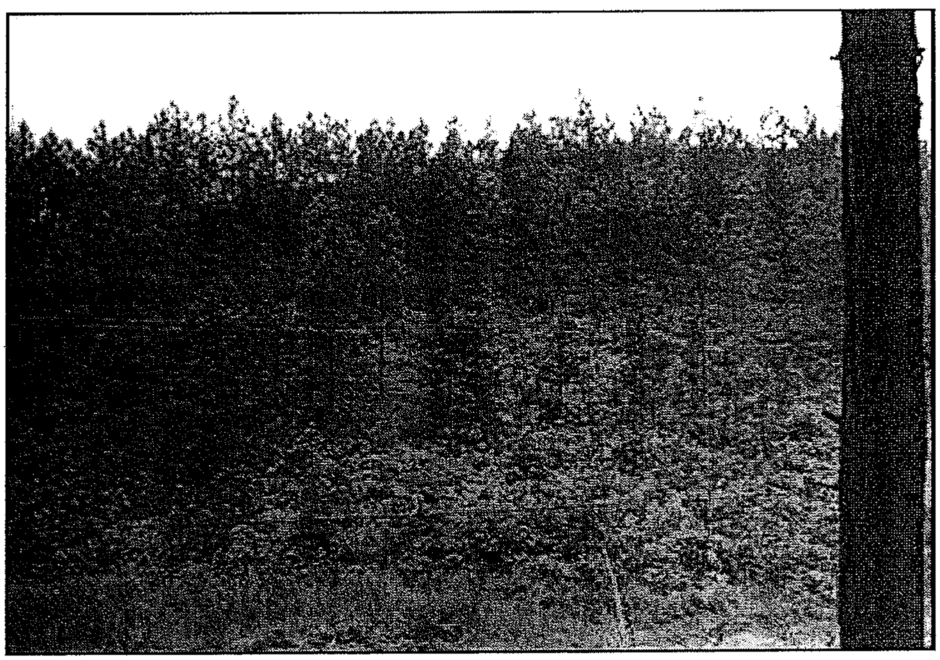
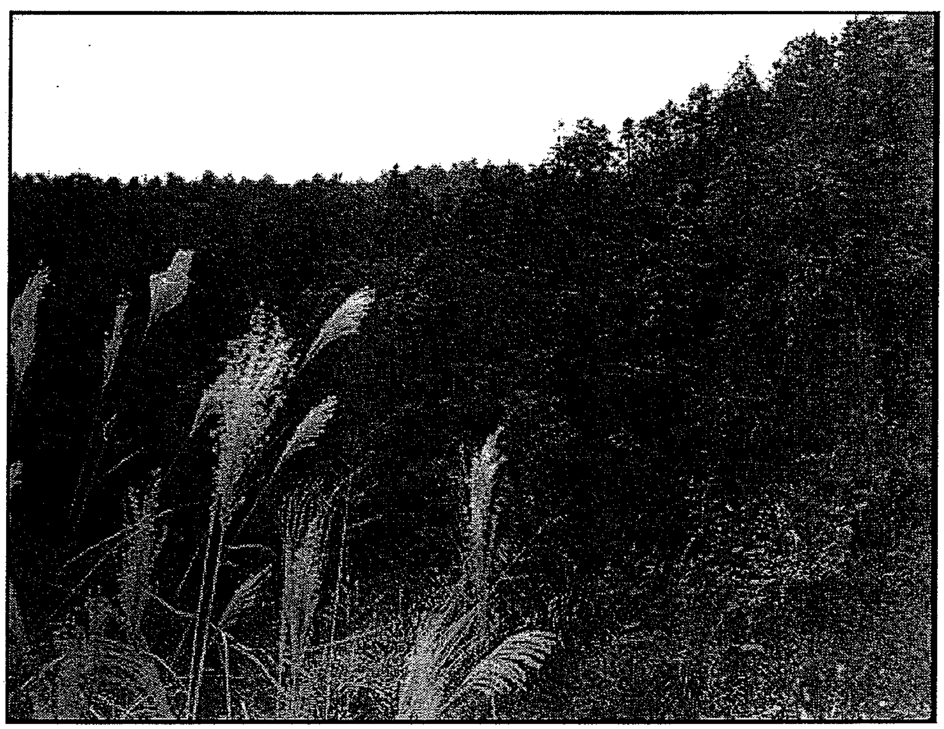


Photo 24:
Some areas of better growth occur near the roadside.

Photo 25:
Chinese fir is also present



3.1.1 Planted Forest (Planted by Sino-Forests)

During the 2005 field inspection, Jaakko Pöyry Consulting has targeted areas undergoing preparation for planting and areas of new (2005) planting.

The survival and growth of the 2005 planting appears to be encouraging. In most instances, trees planted in April/May of 2005 have already grown from an initial height of 20cm to several meters high. In some areas where planting has been delayed until June/July, the growth and survival rates have been significantly compromised.

Stockings (usually 1 666 stems/ha) appear to be quite high. This may have an influence on the future productivity of the forests, especially after the closure of the forest canopy. Sino is trialling stockings of 1 335 stems/ha in more fertile locations.

Dong Yuan County

Photo 26:
Bai Zha Town. Approximately 600 ha of U6 eucalypts planted in April 2005. The estimated planted stocking is 1 666 stems/ha.

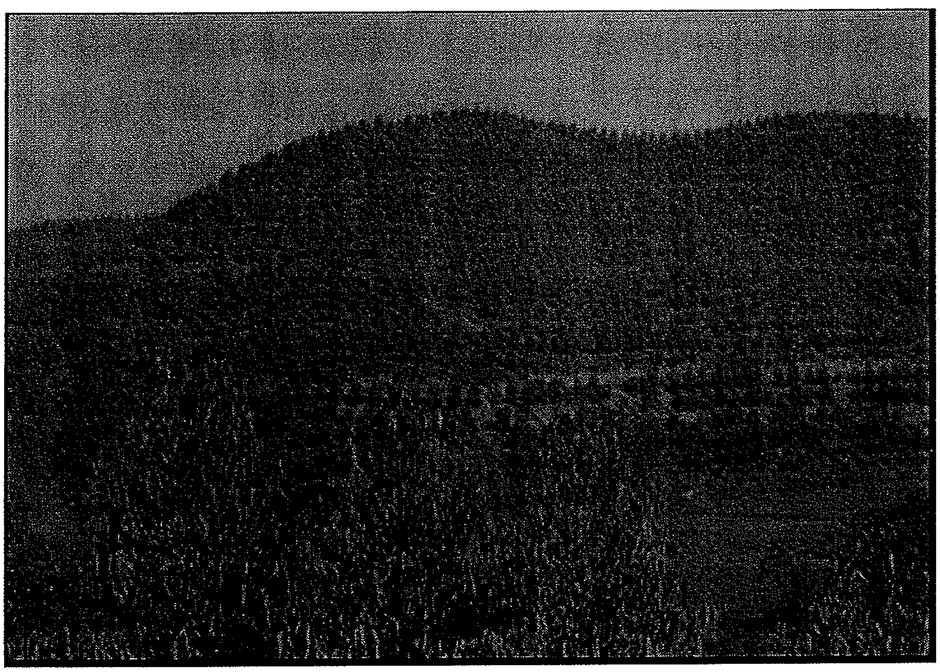


Photo 27:
Land form is moderate to steep. This is typical of the land forms seen throughout the field inspection.

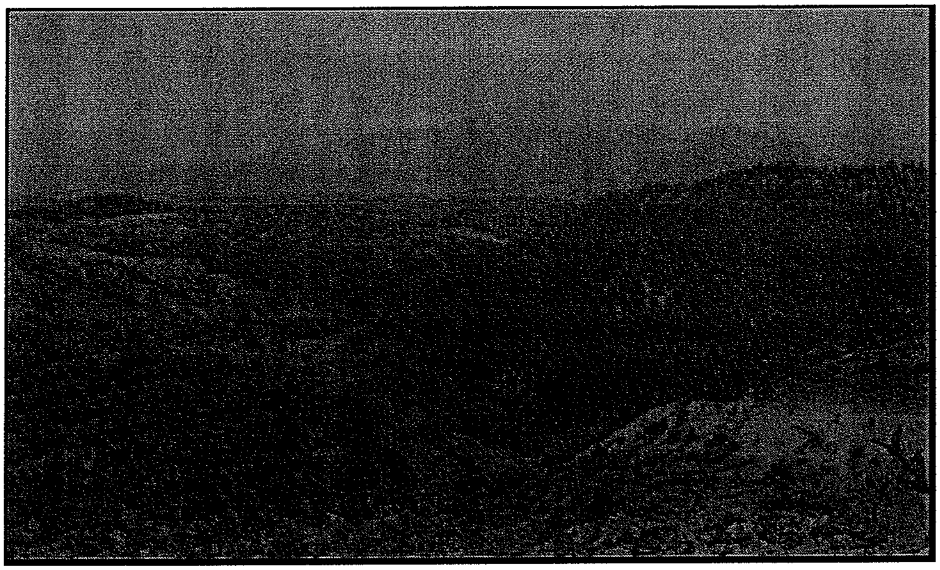
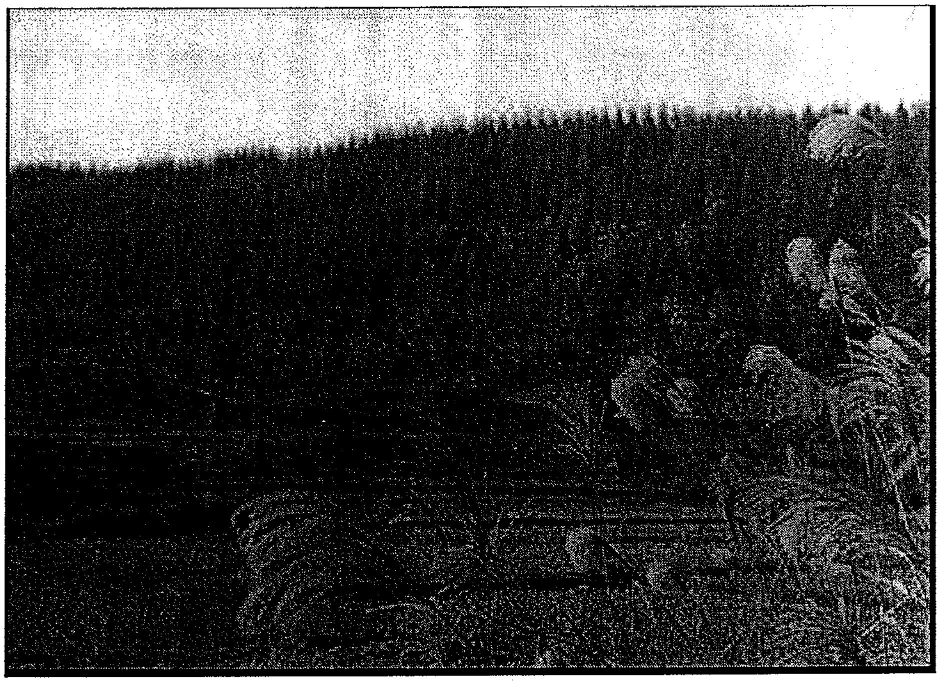


Photo 28:
The eucalypts appear to be growing well in this region. Heights of up to 2.5 to 3m are common. Future planting in this area is expected to target fewer stems per hectare (1 335 stems/ha)

Photo 29:
Shun Tian Town. Planted in April 2005. Similar growth patterns and land form as above.



Long Chun County

Photo 30:
***Left:* 300 ha of *E.Dunii* spaced at 1500 stems/ha. This species is being trialled as part of the 2005 planting. *Right:* A typical sized stem.**

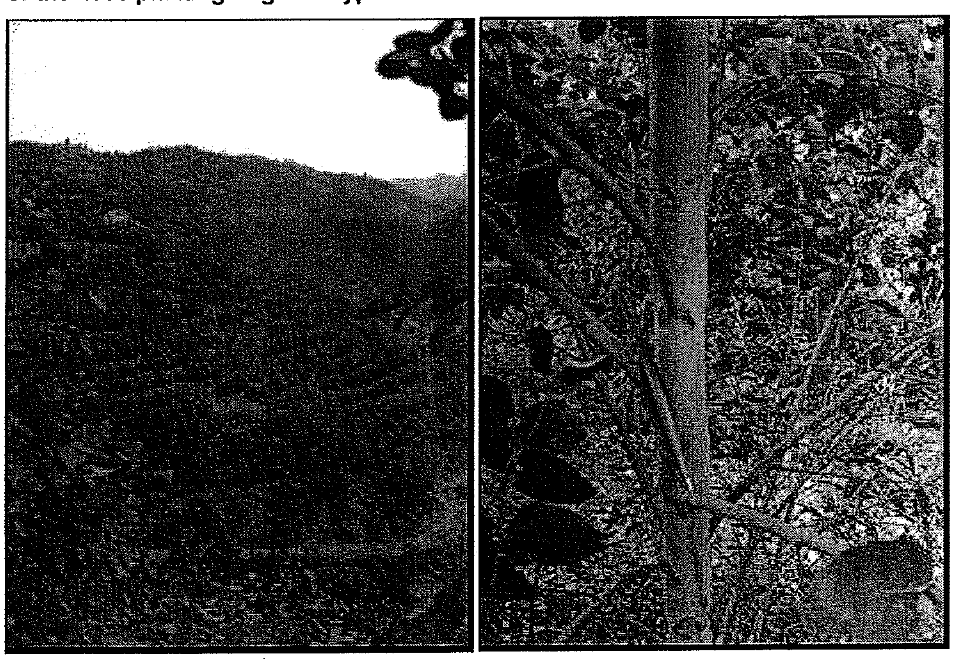
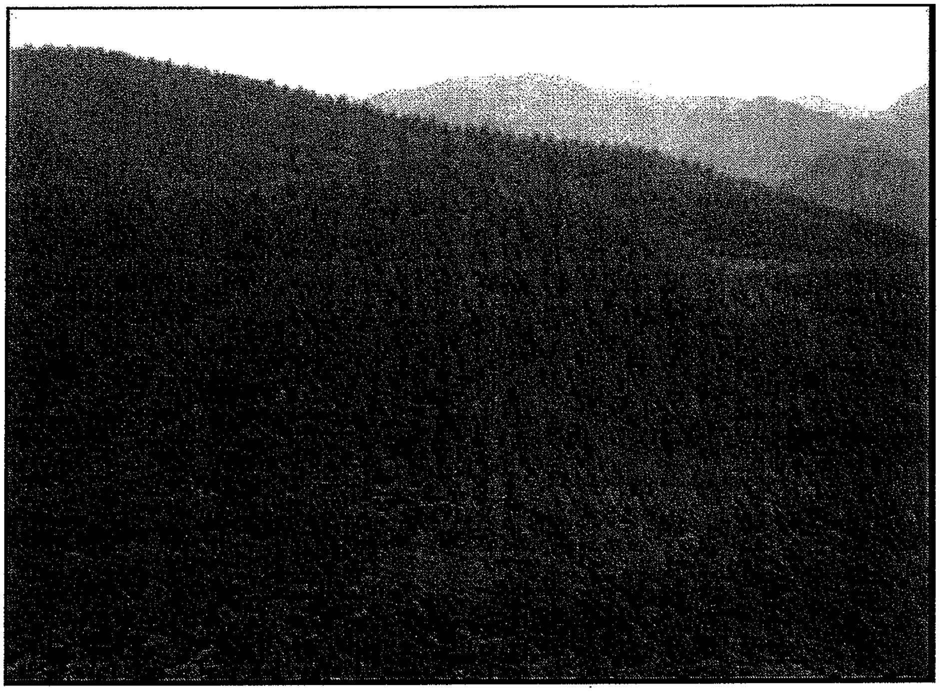


Photo 31:
Survival rate appears to be high, resulting in a well stocked forest. Again, the land form here is typical of what was encountered during the inspection.



Lian Ping County

Photo 32:
Long Jie Town, Long Pu Village. Planted slightly later than usual in June/July. This delayed planting seems to have had a negative impact on growth and survival.

Photo 33:
Reduced growth and increased weed competition is evident. **A fire break is pictured in the distance.**

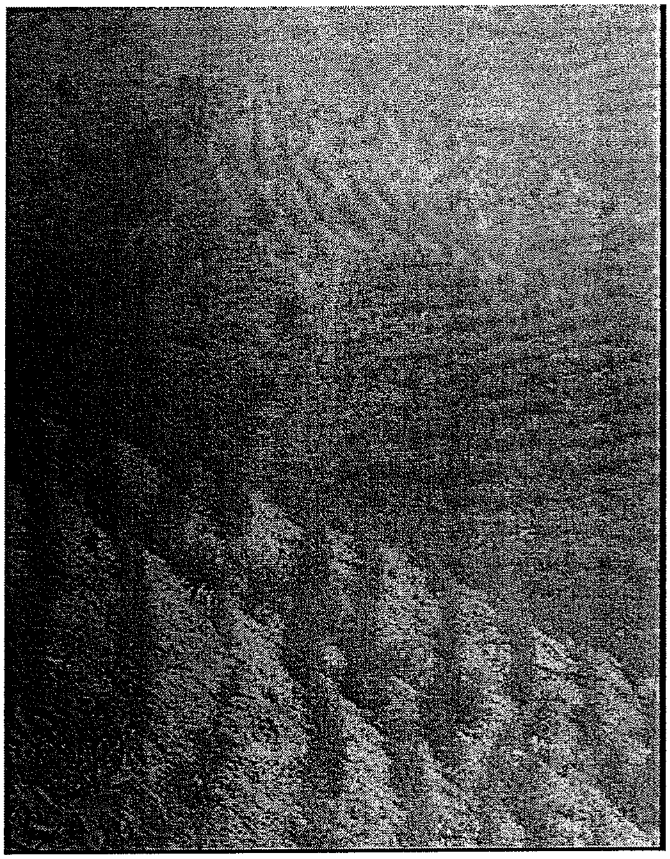
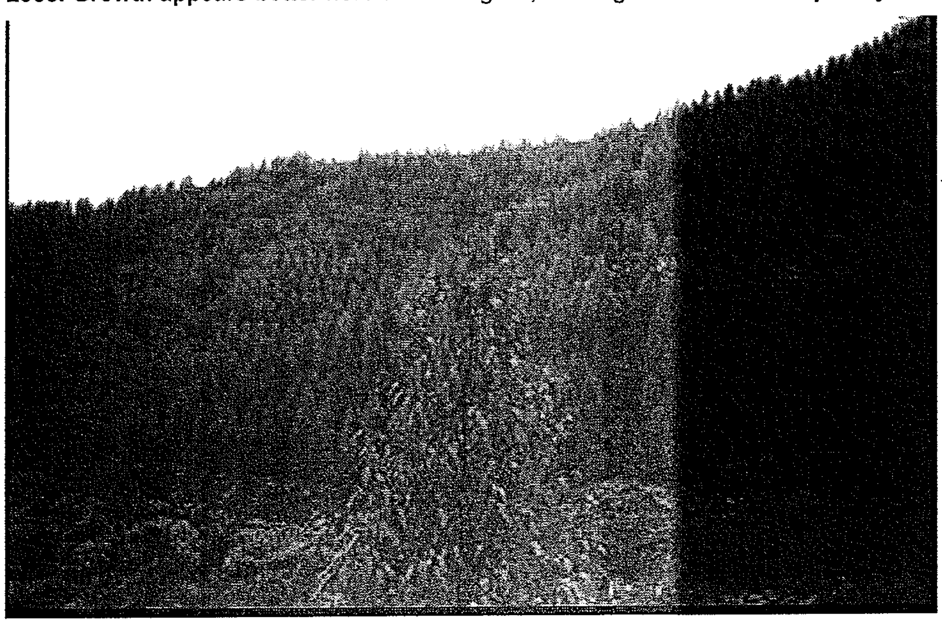


Photo 34:
Long Jie Town, Chang Sah Village. 300 ha spread over 4 blo**cks. Planted May/June 2005. Growth** appears better here than Long Pu, although su**rvival is still patchy.**



Zi Jin and Wuhua County

Photo 35:
Long Wo Town, Zhugin Village. Both suvival and growth rates **in this region appear good.** Diameters of approximately 4cm and heights of 5m were **observed.**

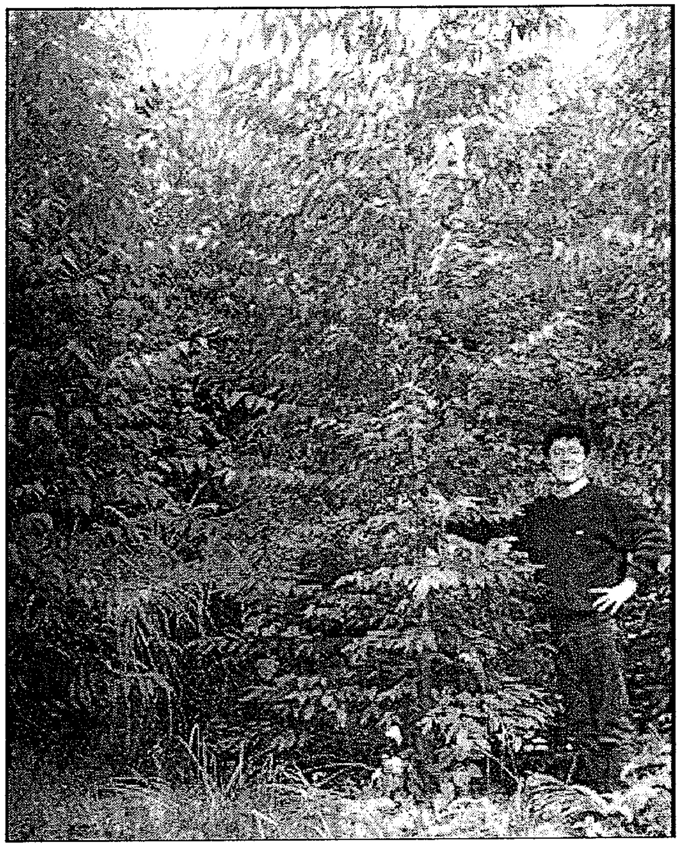


Photo 36:
Large areas removed for tomb construction are not uncommon

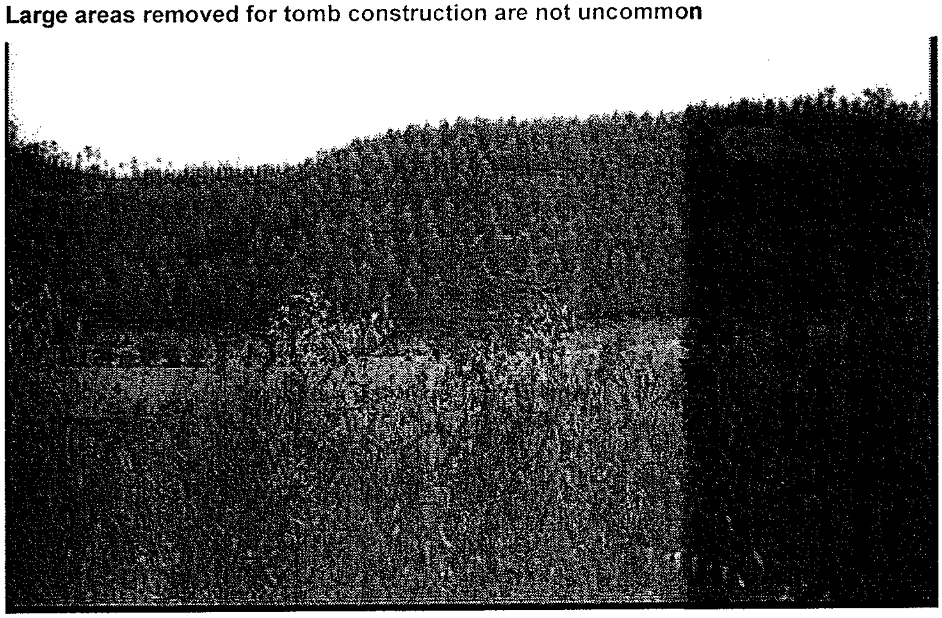
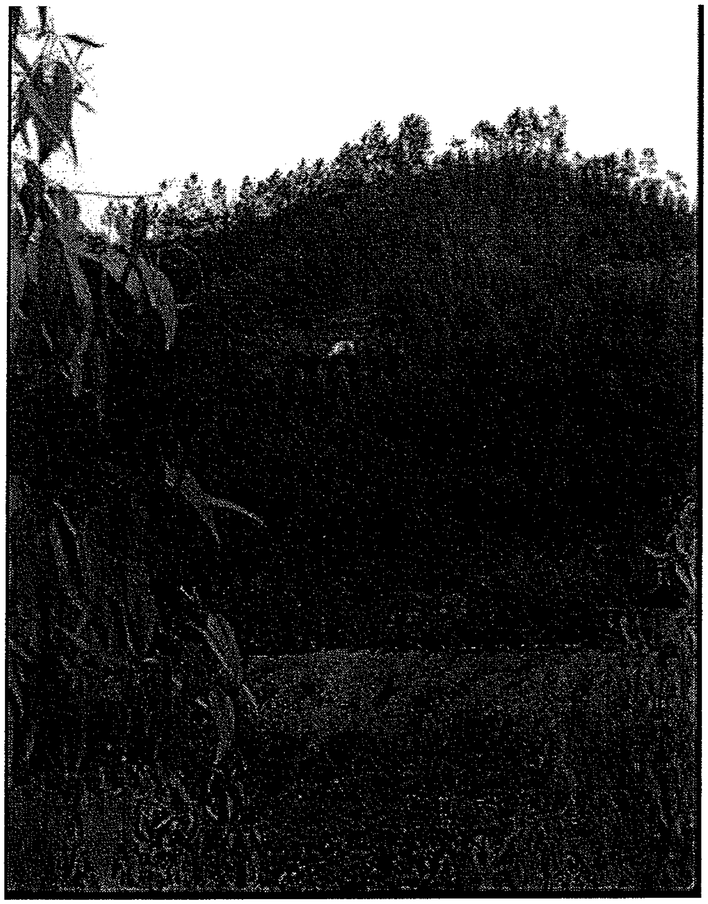
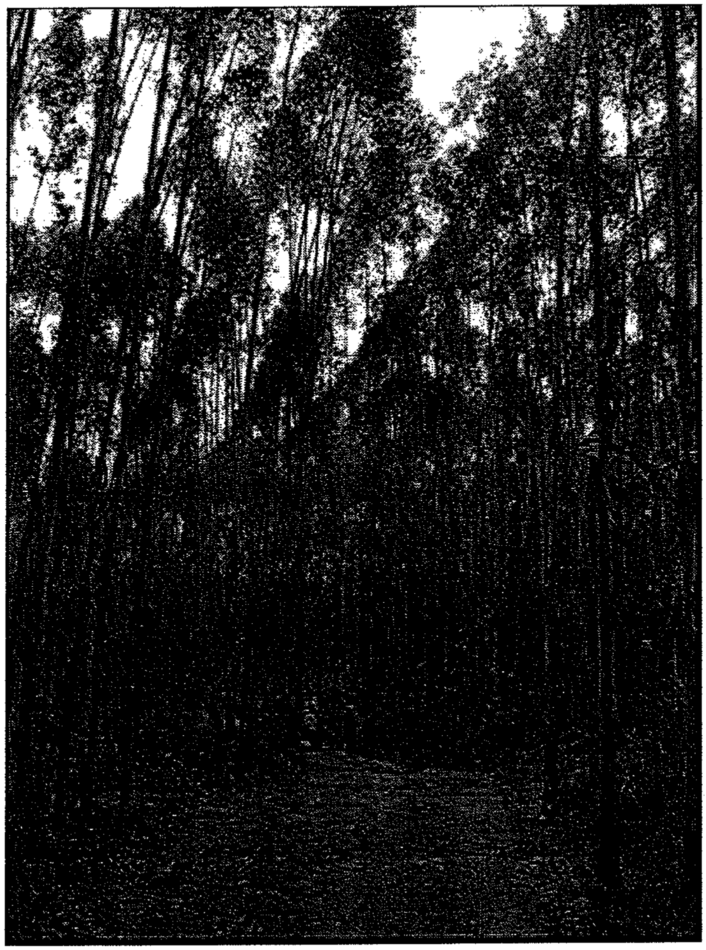


Photo 37:
Neighboring properties are protected by fire breaks along the plantation borders.



Mature plantation

Photo 38:
As part of the 2005 field inspection, a stand of 2001 planted eucalypts was visited. Diameters ranged between 8 -18cm and heights were approximately 18m. The terrain is flat-to-rolling, unlike the terrain of the 2005 planting.



APPENDIX 2

Market Overview

1 WOOD DEMAND IN CHINA

The current trend in world consumption of all wood products is a gradual shift from North America and Europe to Asia and South America. China is the most significant emerging consumer market. This regional shift in demand for wood products is due to more rapid economic growth in Asia and South America. The global change in consumption is mainly driven by China's production of paper and panel to meet its large domestic demand.

This chapter provides an overview of wood demand in China by analysing major end use industries that shape the country's forest products market. A brief summary of China's forest supply is presented, including an analysis of domestic roundwood production and imports. The fast development of the Chinese paper and panel industries will influence local provincial demand, and furthermore affect patterns of wood consumption and the geographic location of wood processing manufacturers. This study will conclude with a detailed estimate of wood demand in Guangxi.

It is difficult to get accurate data on the supply and demand situation for wood in China. There is no leading authority responsible for estimating the country's total wood consumption, although there are some national associations involved in wood value-added business chains from natural resources to final wood products. These organizations have been responsible for producing statistics. For example, the *State Forestry Administration* is in charge of forest inventory, the *China Paper Association* is responsible for paper and paperboard production, and the *State Forestry Administration* and *Chinese Society of Forestry* for panel and processed wood products. Often, data is estimated from different sections of the industry for different purposes. In addition, the use of differing methods when collecting the data makes accurate projections challenging.

Another problem lies in the terminology used to define wood consumption. Some popular articles in Chinese magazines regarding wood consumption contain estimates that often mix different units such as raw material and final forest products. To avoid confusion, here "stock" is used to refer to growing stock, "roundwood" refers to harvested timber, logs, or unprocessed roundwood, and "sawnwood" refers to lumber that has been processed. Roundwood is a unit used in the study when aggregating all forest products.

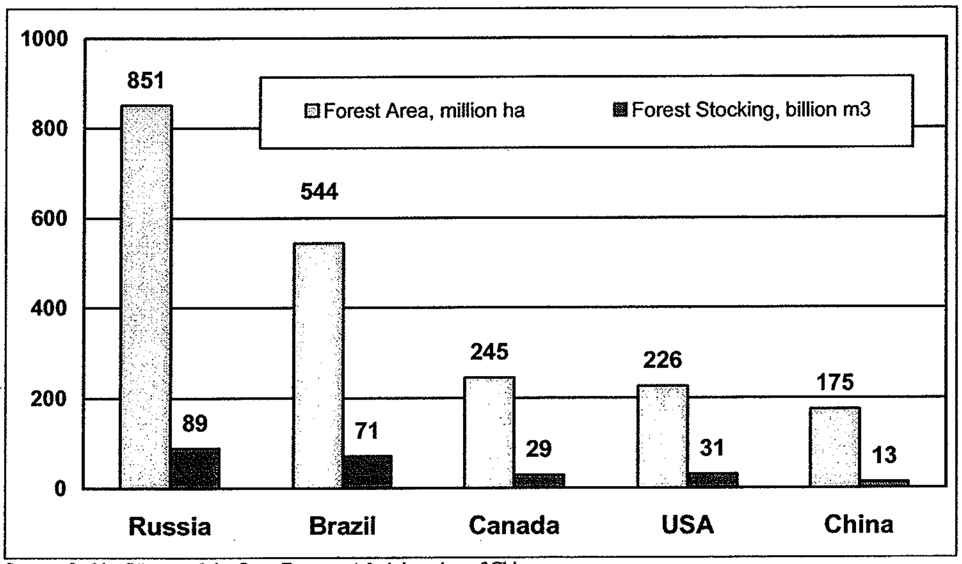
A careful estimate of China's wood consumption is presented in this study. The assumptions underlying the analysis are based not only on Jaakko Pöyry's comprehensive understanding of the forest industry, but also on production statistics published by these local Chinese associations.

1.1 Wood Supply in China

1.1.1 Domestic Supply

There is continuing debate as to whether China is too reliant on imported wood and wood raw materials. China is the fifth largest country in the world in terms of forest area, and the sixth largest country by stock volume of forest (Figure 1-1). China is a leading player in the global market of wood products including paper, panel and furniture products, as both a producer and consumer. With limited forestry resources, strong wood demand has driven the rapid expansion of forests for the past three decades. Forest area, stock and coverage have developed significantly as shown below. Figure 1-2 is based on the data examined from six National Resource Surveys during the period of the first (1973-1976), second (1977-1981), third (1984-1988), fourth (1989-1990, fifth (1994-1998) and the latest inventory (1999-2003).

Figure 1-1:
Leading Forest Countries in the World



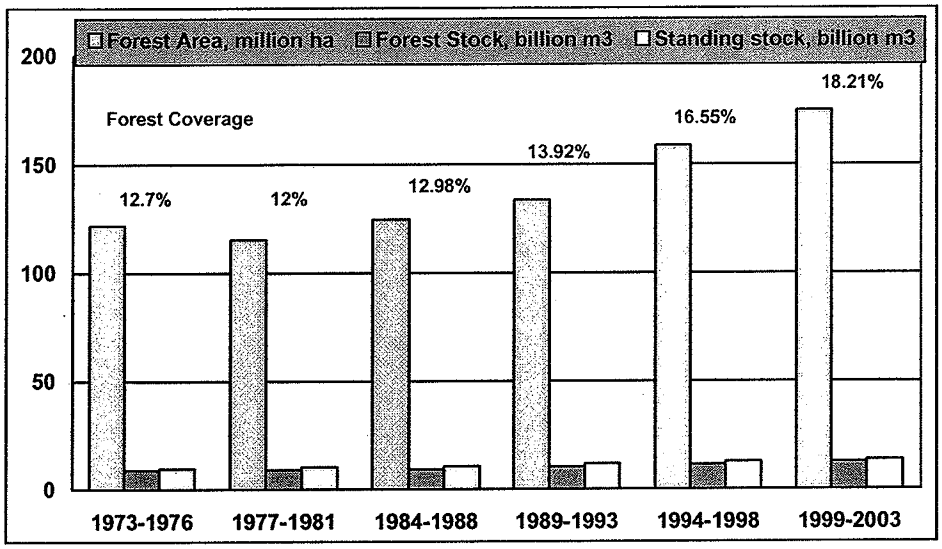
Source: Jaakko Pöyry and the State Forestry Administration of China

According to the sixth inventory, China has 175 million hectares (ha) of forest area and the forest coverage rate has reached 18.21%, an improvement from 12% during the 1970s. The per capita forest area of the Chinese people is about 0.13 ha, nearly half of the world average. Total standing stock reached 13.6 billion m^3 consisting of forest stock, protection trees and all other trees. Chinese forest stock reached 12.5 billion m^3, accounting for over 91% of the total standing stock volume.

As the largest country in the world in terms of forest plantation area, China has a high ratio of plantation to total forest resource. The ratio is estimated at 30% today, with 53 million ha of plantation area. Forest stock in plantation area reached 1.5 billion m^3, accounting for 12% of the total.

During the sixth survey period from 1999-2003, the annual increase of all standing stock ranged from 497 to 500 million m^3. On the other hand, the annual reduction of the stock was 365 million m^3. This implies that the governmental forest organisations of China have achieved their target of keeping the annual increase at a higher level than reductions.

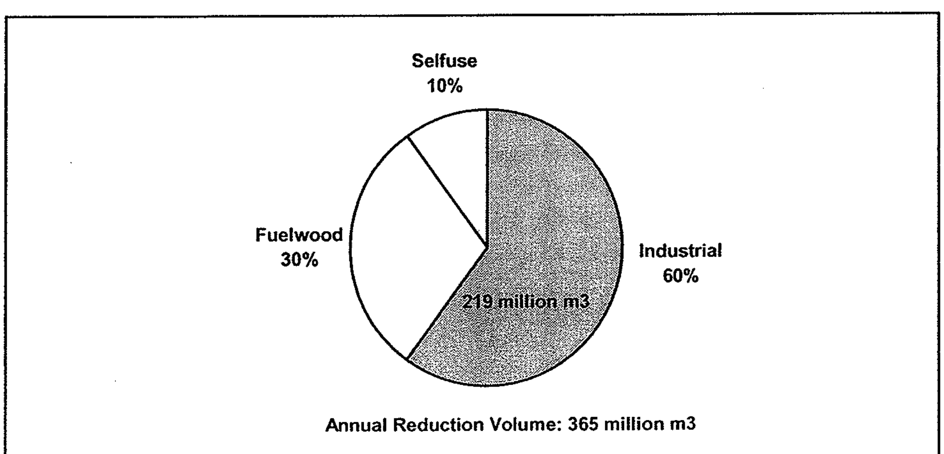
Figure 1-2:
Forest Inventories in China: 1973-2003



Source: State Forestry Administration of China

The 365 million m^3 reduction of standing stock is an important base from which to estimate wood consumption in China. One can look at domestically available wood supply or one can examine local production of forest products, as is studied in the following sections. The more relevant question we address is that of industrial usage. Industrial consumption, via commercial distribution, needs to be distinguished from the reduction figure less fuelwood and personal use in rural areas. It is estimated that non-commercial stock, including fuelwood and farmer's self use, accounts for about 40% of the total reduction (Figure 1-3). Thus, standing stock supply is estimated to be 219 million m^3 annually, while fuelwood and self use are 109.5 and 36.5 million m^3.

Figure 1-3:
Breakdown of Annual Standing Stock Reduction: 1999-2003



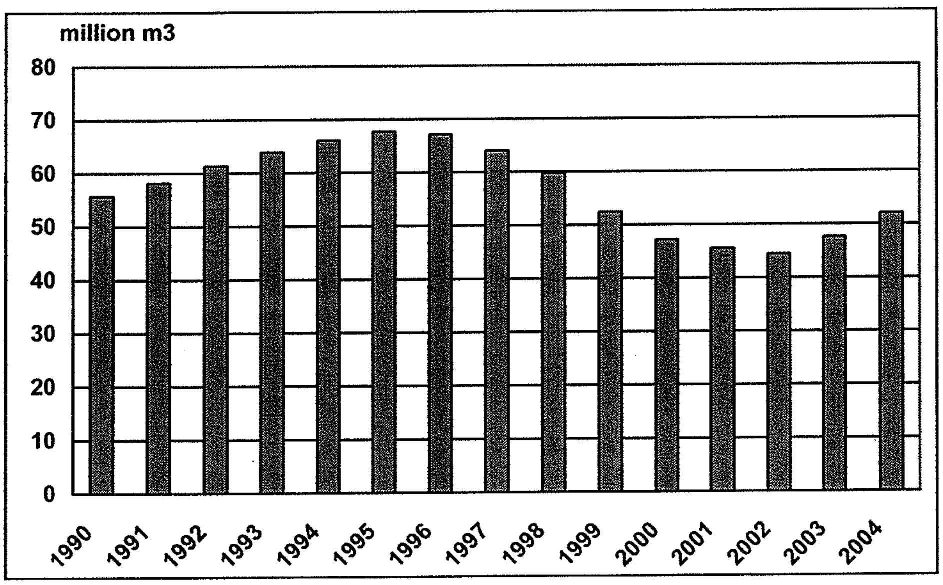
Source: Reduction number from the State Forestry Administration and proportions from Jaakko Pöyry Consulting

If assuming a 65% forest recovery rate and a 3% natural loss, then 219 million m^3 can be converted into 138 million m^3 roundwood. In addition, self used log in rural areas is about 33 million m^3, with a higher conversion rate of 90% yield and lower (1%) natural loss. As a rough estimate, the Chinese domestic roundwood supply was about 170 million m^3 per year during 1999 – 2003, arising from roundwood from national planned harvest, local harvests, and illegal harvest.

In 2004, the roundwood production quota planned by the *State Forestry Administration* was 52 million m^3, accounting for only 30% of the total roundwood production in the country. Annual harvest exceeded the national quota but only about 75 million m^3 in stock terms were recorded according to the sixth national survey. This converts to about 48 million m^3 roundwood, accounting for 28% of total roundwood production. In addition, the farmer self-used roundwood (33 million m^3) accounted for another 19%. Thus, the remaining 23% of roundwood supply covers illegal harvest and others not counted in local statistics.

Figure 1-4 shows the historical development of the national roundwood production quota from 1990 to 2004. Domestic planned roundwood production peaked during the period 1994 to 1996 while the lowest point was in 2002 and started to increase from 2003.

Figure 1-4:
National Planned Roundwood Production: 1990-2004



Source: State Forestry Administration of China

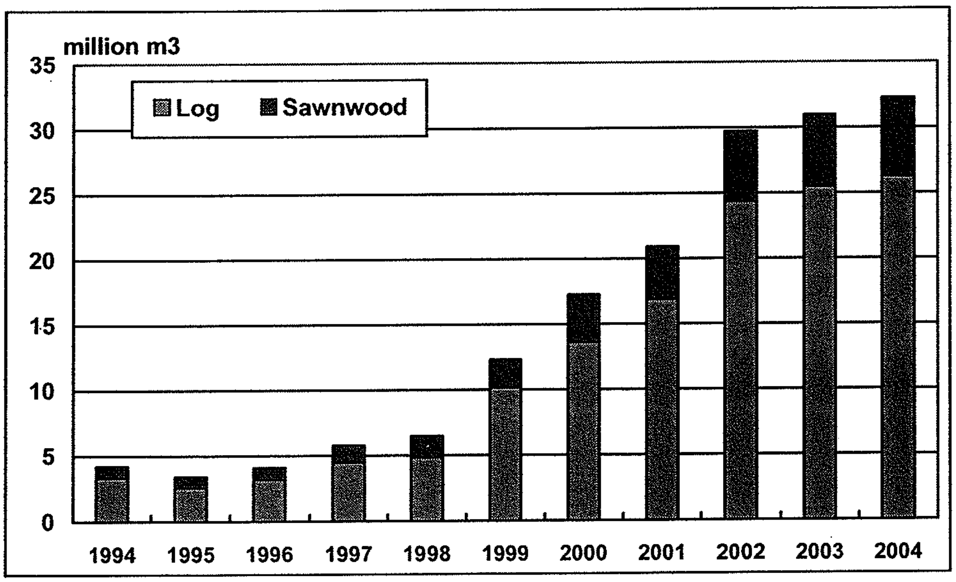
In 1997 and 1998, domestic roundwood supply decreased due to the Chinese Government's restrictions on timber harvest from forests in the northeast and key river catchment provinces. The reduction in wood supply from these regions is now being met through imports of wood and wood products and increased supply from fast growing plantations primarily located in southern China.

1.2 Import Supply

Although all countries are involved in international trade of wood products, only a few account for the bulk of exports and imports. On the import side, China became the second largest importing country of wood products next to the United States. China's imports of wood products ranks third after oil and steel products in terms of dollar value.

China became the largest log importer in the world surpassing Japan in 2001, and imported over 26 million m^3 log in 2004. Sawnwood imports have increased and reached 6 million m^3 in 2004. China is a dominant importer of raw materials and exporter of processed wood products especially furniture. China shows a trend of increasingly replacing domestic wood with imported wood and imported wood products (Figure 1-5). Domestic wood supply is below the self-sufficient level, thus China has been importing log and sawnwood to fill the consumption gaps resulting from strong domestic demand increase and local supply decrease. Figure 1-5 indicates fast growth in imported log and sawnwood since 1995.

Figure 1-5:
Wood Imports into China: 1994-2004



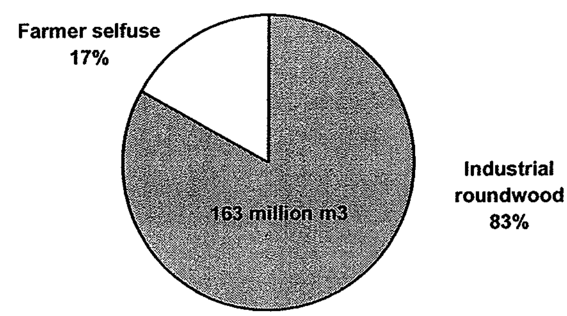
Source: World Trade Atlas

In 2004, the total imported log and sawnwood had increased by 7 times compared with ten years ago and reached 38 million m^3 in roundwood terms, assuming 50% sawnwood utilisation. Imported log and sawnwood now accounts for 74% of local national planned roundwood supply. Uninformed readers of the *China Forestry Statistical Yearbook* published by the *State Forestry Administration* may conclude that China is on the verge of an unsafe level of self-sufficiency. However, when considering all roundwood supply (170 million m^3), the wood raw material import level is 23%, which is still a reasonable amount for a large country such as China.

1.3 Wood Consumption in China

In 2004, China consumed about 196 million m^3 roundwood including 170 million m^3 from domestic supply and 26 million m^3 logs from overseas. A breakdown of the roundwood consumption is presented in Figure 1-6. Industrial requirements reached 163 million m^3, accounting for 83% of the total, while farmer self use accounts for 16%.

Figure 1-6:
Wood Consumption Breakdowns: 1999-2003



Source: Jaakko Pöyry Consulting

Industrial consumption is estimated in terms of the manufacturing processes of major forest products in China. The processing of wood products from roundwood to final consumers is presented in Table 1-1. The major products made from roundwood are sawnwood, fibreboard (MDF), plywood, particleboard, mechanical pulp and chemical pulp.

The breakdown of the industrial roundwood consumption of 163 million m^3 is presented by end-user industries in Table 1-2. China is a very large country with all kinds of tree species of varying diameters and ages, and all forms of manufacturing processes take place in sawmills, panel plants and pulpmills. As a result of such diversity, process parameters and conversion rates from final products into roundwood term are different across China.

The study sets up a framework of wood flow models, thus coefficients are mainly estimated based on Jaakko Pöyry Consulting's knowledge and general production processes used in China, subject to the assumptions in this study. The input-output coefficients in Table 1-2 describe how raw materials are used in the production process.

Table 1-1:
Wood Products Processes

Raw Materials	Intermediate Products	Final Products	End Uses
Industrial roundwood	Woodchips	Woodchip export	Japan, Korea and Taiwan
		Sawnwood Fibreboard (MDF) Particleboard Plywood Other boards	Construction and decorations Furniture manufacturers Mining Some agriculture and farmer uses
	Mechanical Pulp Chemical Pulp	Newsprint Printing and Writing paper	Newspapers Printers
Non-wood fibre pulp		Paperboard and packaging paper	Packaging manufacturers
RCP		Tissue	Consumers
Bamboo, sugar cane and other fibres			
Farmer self usages	without commercial channels		Farmer housing
Fuelwood		Fuelwood	Farmers

Source: Jaakko Pöyry Consulting

The Chinese panel industry, as the largest end-use industry of wood raw material, consumed about 97 million m^3 of wood in total. The Chinese panel industry also consumes some non-wood fibres. For example, bamboo may be a raw material component of plywood, while sugar cane is used in particleboard manufacturing. Sawmills consumed about 59 million m^3 to produce sawnwood and railway sleepers in 2004. The paper industry used 9.2 million m^3 to make woodpulp, an estimate based on the percentages of softwood and hardwood consumed in China.

Table 1-2:
Industrial Roundwood Consumption by Major End-using Industries

End Use	Domestic Production million	Unit Wood Consumption m^3/unit	Wood Consumption million m^3
Woodpulp	2.5 t	3.8 m^3/t	9.2
Fibreboard (MDF)	15.6 m^3	1.7 m^3/ m^3	26.0
Particleboard	6.4 m^3	1.7 m^3/ m^3	10.4
Plywood	21 m^3	2 m^3/ m^3	40.0
Other panels	11.4 m^3	1.8 m^3/ m^3	20.0
Sawnwood	15.3 m^3	2 m^3/ m^3	31.0
Railway sleeper	22.6 m^3	1.3 m^3/ m^3	28.2
Woodchip export	1 t	2 m^3/t	2.2
Total			**163.0**

Source: Productions from local statistics and conversion rates from Jaakko Pöyry Consulting

China's demand for wood is higher than 208 million m^3 if consideration is taken of imported processed forest products such as pulp, paper, panel and others. Table 1-3 shows wood equivalent consumption of imported value added wood products, about 118 million m^3. Railway sleepers are the leading end-use for imported wood, while the pulp and paper industry is the second largest importer with a total wood equivalent amount of 56 million m^3.

Table 1-3:
Imports of Major Wood Products in 2004

End Use	Import Volume million	Unit Wood Consumption m^3/unit	Wood Equivalent million m^3
Sawnwood	6 m^3	2 m^3/ m^3	12.0
Woodpulp	7.3 t	4.3 m^3/t	31.0
Paper	6.4 t	3.9 m^3/t	25.0
Fiberboard (MDF)	1.2 m^3	1.7 m^3/ m^3	1.9
Particleboard	0.7 m^3	1.7 m^3/ m^3	1.1
Plywood	0.8 m^3	2 m^3/ m^3	1.6
Railway sleeper	45.1 m^3	1.3 m^3/ m^3	56.4
Woodchips	0.4 t	1.7 m^3/t	0.7
Wood Furniture	0.7 units		0.1
Total			**130.0**
Log	26.2 m^3	**Total wood import:**	**156.0**

Source: Jaakko Pöyry Consulting

China's total wood consumption of 280 million m^3 roughly broke down into 153 million m^3 of roundwood used in local production and 118 million m^3 of wood equivalent consumption in consumer markets of imported final forest products.

The consumption figure of 280 million m^3 does not include fuelwood and harvest residuals, nor does it exclude exports of forest products. The wood equivalent used for producing exported final products is presented in Table 1-4. The total exported forest products in wood equivalent terms are estimated to be 29 million m^3.

The total wood products consumed in China considered up to this point are calculated at about 252 million m^3, assuming 27 million m^3 is consumed by foreign countries via exports. This leaves China with a self-sufficiency level of domestic wood available for domestic consumption at 67%.

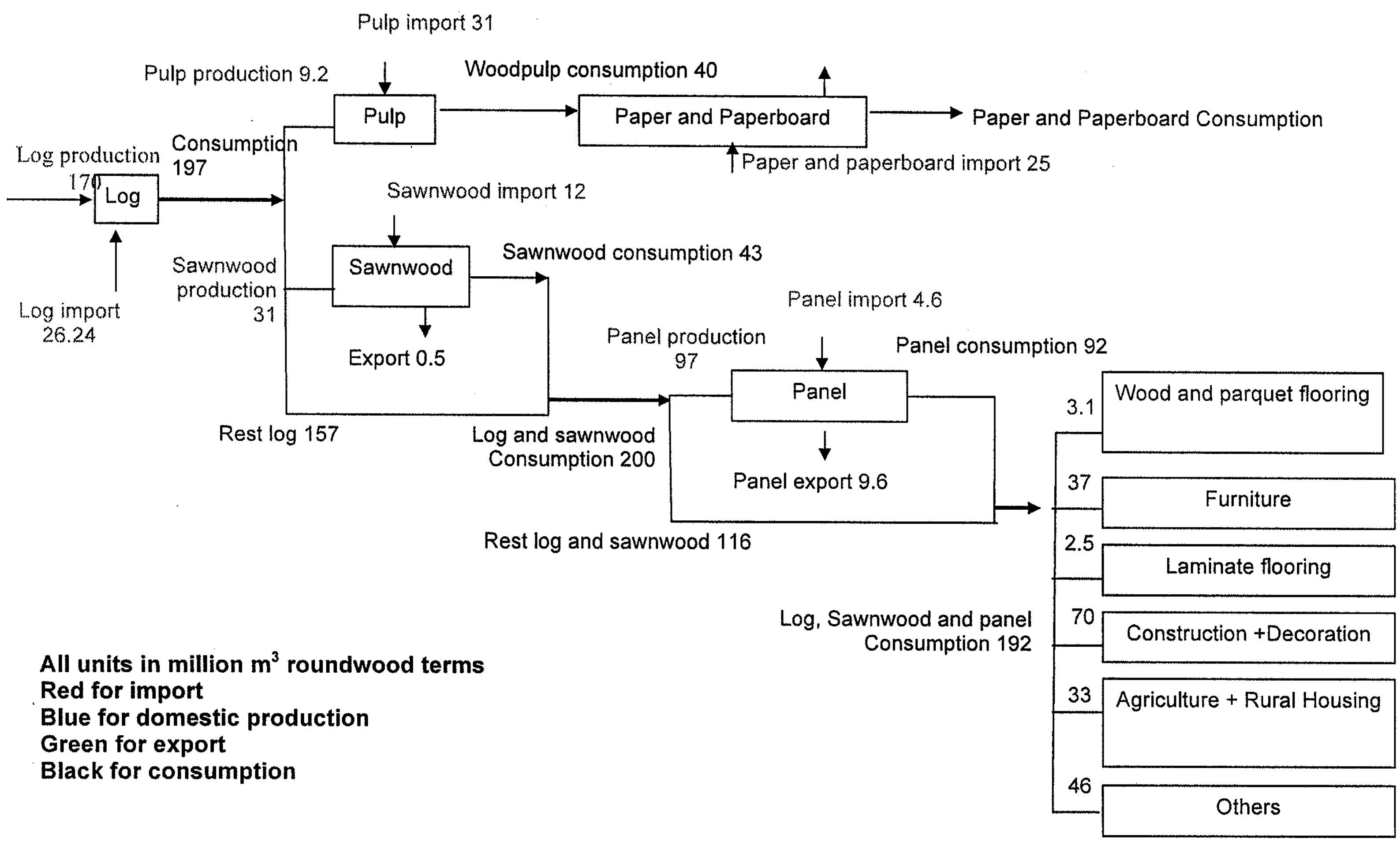
Table 1-4:
Exports of Major Wood Products in 2004

End Use	Import Volume million	Unit Wood Consumption m^3/unit	Wood Equivalent million m^3
Paper	1.5 t	3.5 m^3/t	4.7
Fibreboard (MDF)	0.5 m^3	1.7 m^3/ m^3	0.8
Particleboard	0.1 m^3	1.7 m^3/ m^3	0.2
Plywood	4.3 m^3	2 m^3/ m^3	8.6
Woodchips	1 t	1.7 m^3/t	1.6
Wood Furniture	129 units		9.3
Glue Lumber	1 m^3	1.7 m^3/ m^3	1.7
Wood Door	9 t		0.5
Laminated flooring	2.2 m^2		0.04
3/multiply parquet	15 m^2		0.5
Solid wood flooring	4.4 m^2		0.1
Sawnwood	0.2 m^3		0.5
Total			**29.0**

Source: Jaakko Pöyry Consulting

The flow chart in Figure 1-7 provides a summary of roundwood consumption and imported and exported wood equivalent consumption in China. All production and consumption units presented in Figure 1-7 are in terms of million m^3 of roundwood.

Figure 1-7:
Industrial Roundwood Flow Chart in China



Source: Jaakko Pöyry Consulting

2 OVERVIEW OF FOREST PRODUCTS INDUSTRIES IN CHINA

2.1 Pulp and Paper Industry

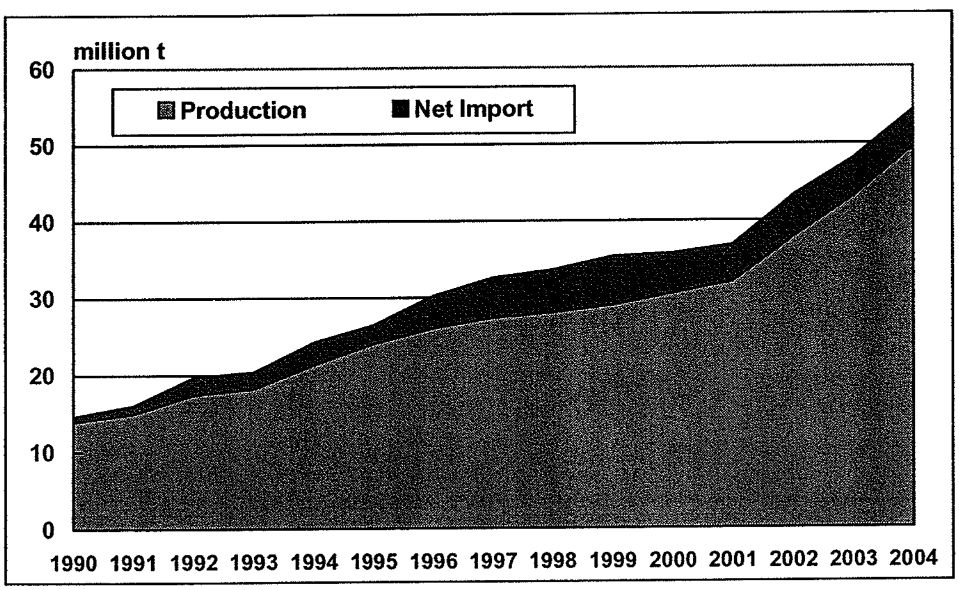
China's paper industry has seen fast development with the country consuming over 45 million tons of total papermaking fibres in 2004. Woodpulp consumption reached 9.7 million tons, consisting of 7.3 million tons of imports and 2.4 million tons of domestic production.

China's paper and pulp industry has grown dramatically over the past two decades becoming the world's second largest paper and paperboard market and producer after the USA. The increased use of paper in China is predominantly due to strong increases in the consumption of packaging paper and board, and information paper and tissue. Today, China is still a net importer of paper and paperboard despite growing domestic production capacity (Figure 2-1).

The rapid development of paper production in China has contributed to strong consumption of papermaking fibre, however woodpulp has shared a small percentage in whole fibre furnish. Figure 2-2 shows the fibre furnish composition during the period from 1990 to 2004 in China.

Today, woodpulp accounts for 22% of total fibre, increasing from less than 15% during the 1990s. However, the proportion of woodpulp produced locally decreased from 10% in 1990s to 5.6% in 2004. This suggests that the Chinese paper industry relies more heavily on imported woodpulp than previously.

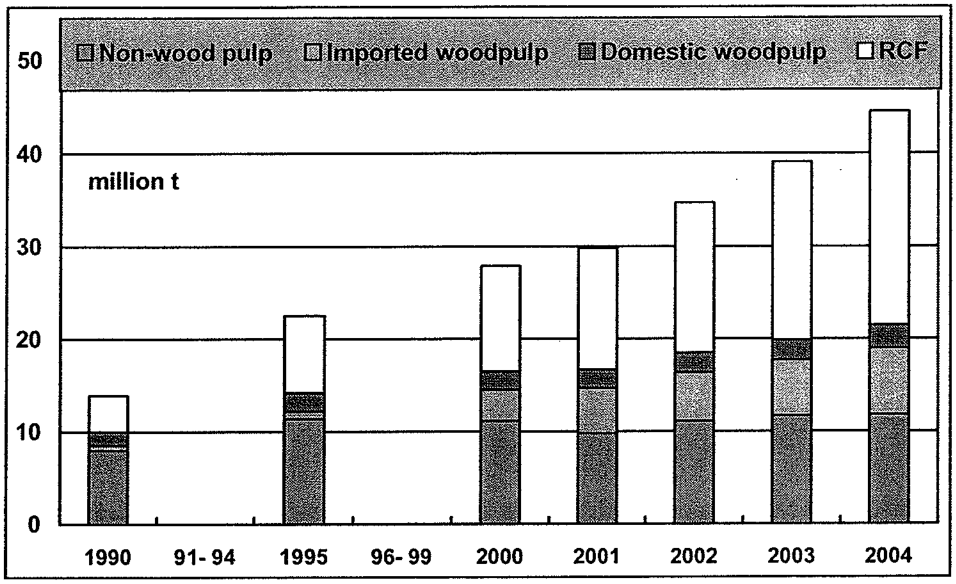
Figure 2-1:
Production and Net Import of Paper and Paperboard in China



Source: China Paper Association

In 2004, 52% of the fibre furnish was recycled paper and 26% was non-wood. This substitution of recycled paper for woodpulp and non-wood pulp occurred most rapidly after 2000.

Figure 2-2:
China Pulp Consumption: 1990-2004

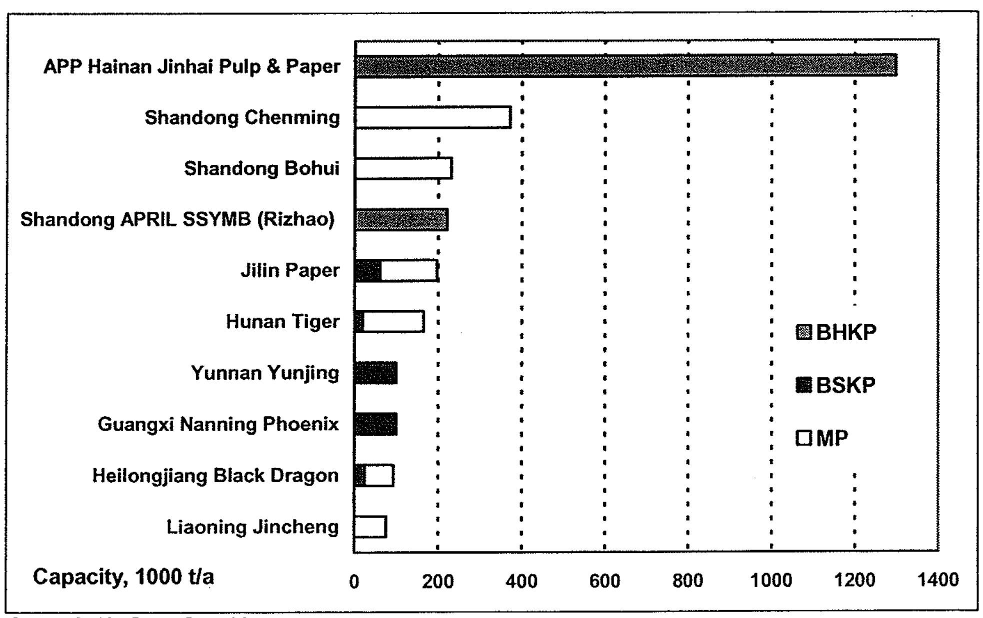


Source: Jaakko Pöyry Consulting and the China Paper Association

China is the leading consumer of imported woodpulp in the world. So far, Chinese paper mills have relied heavily on imports as there has been limited domestic market pulp supply. As a result, imported woodpulp accounts for over 75% of the total woodpulp consumed in China.

The total capacity of woodpulp in China is over 3.5 million tons, comprising both integrated and non-integrated mills. The top ten producers account for over 80% of the total production capacity in China (Figure 2-3).

Figure 2-3:
Top Ten Woodpulp Producers in China



Source: Jaakko Pöyry Consulting

APP Hainan Jinhai Pulp & Paper is the largest single pulp line in the world, with a designed annual capacity of 1 million tons. Started in 2003, the construction was completed in 2004. Jinhai has produced chemical pulp since November, 2004 and commercial production in May 2005. Jinhai's current capacity exceeds 1 million tons, and could reach 1.3 million tons by producing 3000 t/day from the supply of mainly eucalyptus and acacia obtained both locally and imported.

Shandong Chenming has three mechanical pulp lines: one 50 000 t/a line in Wuhan, Hubei, one 70 000 t/a APMP line and a newly installed 250 000 t/a BCTMP line in Shouguang, Shandong. Domestic poplar is used as raw material but in the long-term Chenming plans to use eucalyptus imported from South Asia and other countries as a backup supplement. Shandong Bohui commenced mechanical pulp production in February, 2005. The new pulp line has a capacity of 230 000 t/a, and currently uses 100% local poplar though not yet from their own plantation. The mill plans to use imported eucalyptus chips from South America and Oceania when local supply is short.

Located in Rizhao, Shandong, APRIL SSYMB produces over 200 000 t/a BHKP, and sells half of it to the markets. Relatively bigger in capacity, Jilin Paper has had its production closed down for the past 1-2 years because of financial and other problems. The mill has one 50 000 t/a BCTMP line and an 85 000 t/a APMP line. The APMP line has not been completely installed yet although it was moved into the site some years ago.

Hunan Tiger installed a new APMP line of 100 000 t/a in 2003. In addition to its existing capacity of 45 000 t/a, Tiger's total APMP capacity now amounts to 145 000 t/a. Nanning Pheonix and Yunan Yunjing are the leading BSKP producers in China. Limited by the local softwood resource, Nanning Pheonix will occasionally also produce some BHKP at a ratio of about 20% of its production. Guangxi Heda, located in Hezhou of Guangxi province, produces about 70 000 ton/annum of market BHKP as a non-integrated pulpmill. The market reach of Heda's pulp extends mainly to Guangdong, Guangxi, Jiangsu and Zhejiang.

A number of woodpulp projects are planned in China (Table 2-1). The total planned capacity is 5.7 million tons, while chemical woodpulp is about 2.3 million tons with three large projects. The remaining projects are all mechanical wood pulp with a total capacity expansion of 3.4 million tons.

Most of these new mechanical pulpmills will have a capacity over 100 000 t/a. This is relatively big in terms of mechanical pulp capacity. As a result, by 2007 the additional BCTMP capacity will be near 900 million tons. These will be mainly located in Henan, Shandong and Jiangxi. The new projects are primarily for integrated production and will be built on the existing paper mill sites, while Ruifeng and Longfeng in Henan will initially produce market pulp, and plan to add integrated paper production in the future.

It is unlikely that China will achieve the full additional 5.7 million tons of woodpulp capacity in the coming decade, as some plans will not get financing, or secure the wood supply and others will change their plans based on market developments. Overall, domestic demand for woodpulp is increasing and will stimulate strong investment in the pulp sector regardless of what companies undertake the required expansions.

Table 2-1:
Planned Woodpulp Capacity in China, 1000 t

Company	Location	Capacity	Grades	Start-up
Ark Forestry	Chongqing	500	BSKP	planned
APRIL SSYMB	Rizhou Shandong	1000	BHKP	2007
Stora Enso	Nanning Guangxi	750	BHKP	planned
APP JinGui	Qinzhou Guangxi	1500	BHKP	planned
Nanning Phoennix	Guangxi	50	BSKP	2006
Xinxiang Xinya	Henan	100	hw.APMP	2005
Jiaozuo Ruifeng	Henan	150	hw.APMP	2005
Meili	Ningxia	100	hw.APMP	2005
Puyang Longfeng	Henan	100	hw.APMP	2005
ChenmingNanchang	Jiangxi	190	sw.BCTMP	2005
Huatai	Shandong	100	hw.BCTMP	2005
Jincheng	Liaoning	70	hw.APMP	2006
Jilin	Jilin	85	hw.APMP	2007
Sun	Shandong	300	hw.BCTMP/APMP	2007
Huatai	Shandong	300	APMP	2008
Hengxing	Henan	200	hw.APMP	-2010
Gold East	Jiangsu	200	BCTMP	-2010
Linqing Yinhe	Shandong	100	hw.APMP	planned
Tralin	Shandong	200	hw.APMP	planned
Tralin	Shandong	50	hw.APMP	planned
Shandong Rizhao	Shandong	300	BCTMP	planned
Ark Forestry	Chongqing	100	hw.APMP	planned
Hanzhong Baister	Shaanxi	100	hw.APMP	planned
Tiger	Hunan	200	hw.APMP	planned
APP Guangxi	Guangxi	460	hw.BCTMP	planned
Total		**6200**		

Source: Jaakko Pöyry Consulting

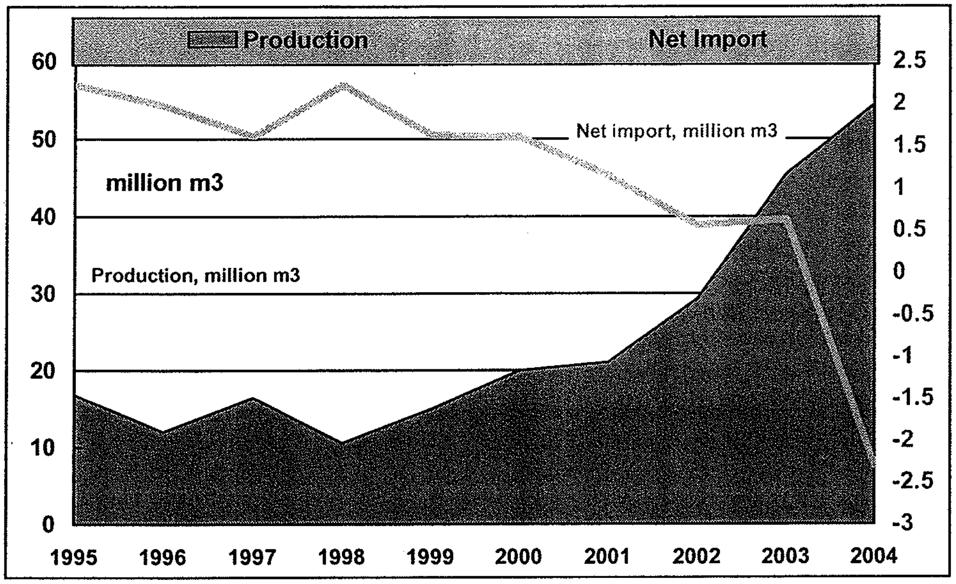
2.2 Panel Industry

Only a few years after becoming the largest producer and consumer in the Asia-Pacific region in the late 1990s, today China is the largest panel producer and the second largest consumer in the world. The Chinese panel sector has developed rapidly following a similar trend to the paper industry. The period of strongest growth has occurred since 2001 with an average annual growth rate of 38%. The industry is forecast to continue growing steadily.

China's total panel production reached 54.5 million m^3 in 2004, while panel consumption was 52.1 million m^3. In 2004, for the first time China became a net exporter of panel (Figure 2-4). Panel consumption in China has shown similar trends to panel production.

Different statistical methods have partly contributed to fluctuations in production figures before 1999. Fortunately, Chinese statistics have been improving, thus the figures published by the *State Forestry Administration* and *Chinese Society of Forestry* in recent years are well accepted by the Chinese panel industry, and used by foreign investors as well.

Figure 2-4:
Wood Based Panel Production and Net Imports in China: 1995-2004



Source: the State Forestry Administration and World Trade Atlas

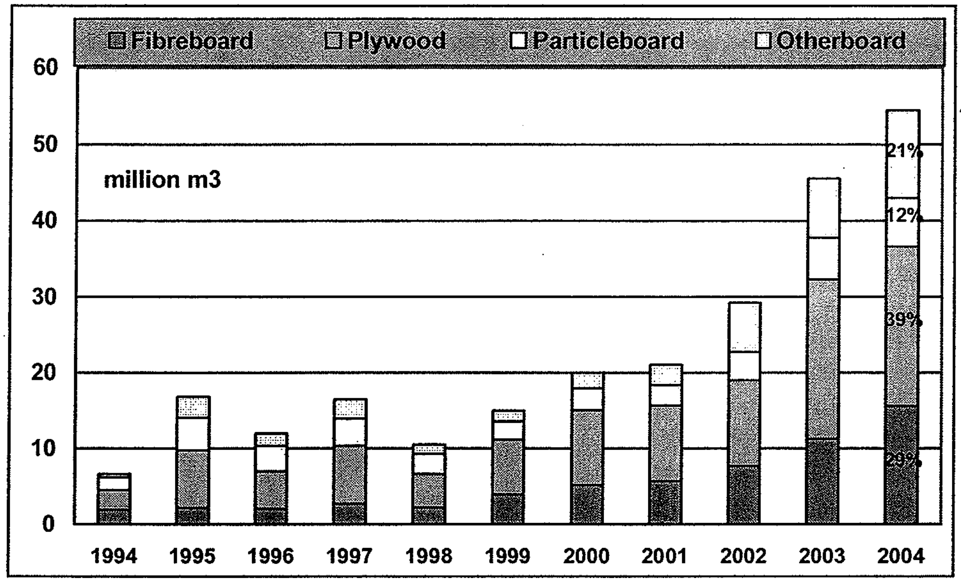
In the Chinese market conditions, panels consist mainly of plywood, particleboard, and fibreboard (MDF and HDF), as well as blockboard and others. Panel production is broken down by grades as shown in Figure 2-5. Plywood has been a leading grade of panels, although its share has decreased and fallen to its historical lowest point again (39%) from a production peak (50%) in 2000. Unfortunately, particleboard's share has decreased from about 25% in the late 1990s to 12% in 2004. Fibreboard (MDF) production has steadily increased, accounting for 29% of total panel production.

Most significantly, other board (mainly blockboard) production has increased its share from 10% in the late 1990s to 21% in 2004, largely due to the advantages of low quality raw material required in the core and high profits being achieved in the business.

During the 1990s, the Government's investment in the forestry industry was mainly focused in the panel industry. Foreign capital, advanced technology, and modern equipment have also contributed to the increased production capacity and new products, such as MDF. As the technology and materials for surfacing improved, panel end-uses increased dramatically in the 1990s.

On average, production of all grades has increased greatly since 1999, and shows no indication of slowing down. Given the solid wood shortages, panel has provided a much-needed alternative for consumer-products producers, such as the furniture industry. It is hoped that China will increase panel use and emphasize value-added production to save solid wood.

Figure 2-5:
Panel Production by Grades in China: 1995-2004



Source: the State Forestry Administration.

Fibreboard (MDF)

In 2004, fibreboard (MDF) production reached 15.6 million m^3 (of which MDF was 14.7 million m^3), an eightfold increase from 1.9 million m^3 in 1994. Fibreboard (MDF) capacity in China is presented in Table 2-2, by province. By the end of 2004, there were 18.7 million m^3/a of MDF/HDF capacity installed, while about 2.8 million m^3/a are under construction.

Based on the above production and capacity in 2004, the average operation rate of fibreboard (MDF) plants in China is calculated at 83%. The rate implies that the fibreboard (MDF) industry has relatively high production efficiency.

The eastern and southern regions are the most important MDF/HDF production areas, where the major markets of Shanghai and Guangdong are located. China East is the largest fibreboard (MDF) producing region, with a total capacity over 9 million m^3, followed by China South, with a total capacity over 3.4 million m^3.

Within a very short period, Shandong became the largest fibreboard (MDF) supplying province, with a far larger capacity than any other provinces. Shandong is not a forest resource province, but has been able to develop so fast due in part to the recent strong development of local fast-growing plantations in Shandong and Henan. These poplar plantations provide a ready source of raw materials for fibreboard (MDF) production. For example, Heze and Linyi in southwest Shandong near Henan province are well-known for producing panel and other related forest products. Another important reason is that Shandong is a large international shipping centre with 4 large harbour cities – Qingdao, Yantai, Rizhao and Weihai where seven wood ports are located.

By the end of 2004, Guangxi's fibreboard (MDF) capacity reached 1.7 million m^3, the third largest producing province. Detailed fibreboard (MDF) industry development in Guangxi will be further discussed later when presenting Guangxi's forest products industries.

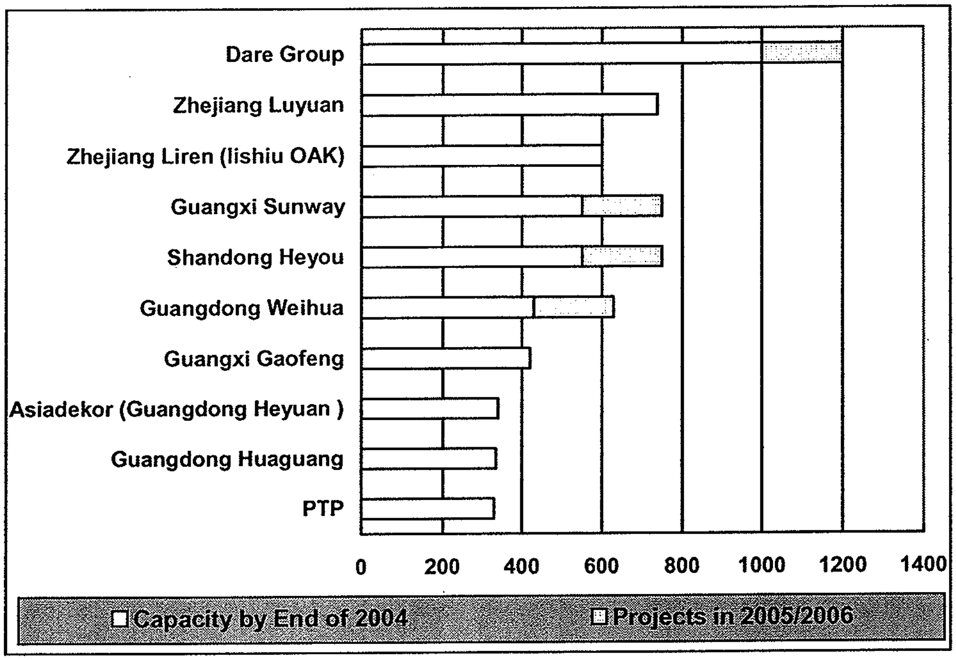
Table 2-2:
Fibreboard (MDF) Capacity by Region

Region	Province	Capacity by end of 2004		Under Construction	
		Line No.	Capacity	Line No.	Capacity
Northeast	Heilongjiang	12	482	1	80
	Jilin	13	405		
	Liaoning	15	410		
	Subtotal	***40***	***1297***	***1***	***80***
North	Beijing	1	120		
	Tianjin	1	15		
	Hebei	35	1408	4	180
	Shanxi	2	75	1	50
	InnerMongolia	10	268		
	Subtotal	***49***	***1886***	***5***	***230***
East	Shandong	96	3675	10	610
	Shanghai	4	255		
	Jiangsu	31	1395	5	280
	Zhejiang	28	1330		
	Anhui	20	900	4	310
	Fujian	17	760	2	120
	Jiangxi	16	720	1	180
	Subtotal	***212***	***9035***	***22***	***1500***
Central	Henan	23	640		
	Hunan	13	410		
	Hubei	14	712	3	230
	Subtotal	***50***	***1762***	***3***	***230***
South	Guangdong	38	1928	2	90
	Guangxi	28	1650	4	480
	Hainan	4	140		
	Subtotal	***70***	***3403***	***6***	***400***
Southwest	Sichuan	9	325	3	240
	Chongqing	3	95		
	Yunnan	14	455		
	Guizhou	3	55		
	Tibet				
	Subtotal	***29***	***930***	***3***	***240***
Northwest	Shaanxi	4	90	11	35
	Gansu	2	35		
	Ningxia				
	Qinghai				
	Xinjiang	9	229		
	Subtotal	***15***	***354***	***1***	***135***
Total		**465**	**21817**	**41**	**2985**

Source: China National Forest Product Industry Association and Jaakko Pöyry Consulting

The Chinese fibreboard (MDF) sector is very modern within the panel industry. There were near 20 companies which have fibreboard (MDF) capacity larger than 100 000 m^3 in 2004. By the end of 2005, there will be over 20 companies with a capacity larger than 100 000 m^3/a. Dare Group, mainly located in Jiangsu, is the largest fibreboard (MDF) producer in China. Guangxi Sunway is the fourth largest supplier, following Dare Group, Luyuan and Liren in Zhejiang (Figure 2-6).

Figure 2-6:
Top Ten Fibreboard (MDF) Producers in China, 1000 m^3



Source: Jaakko Pöyry Consulting

End-users of fibreboard (MDF) in China are mainly manufacturers of furniture and laminated flooring. Fibreboard (MDF) consumption has been growing rapidly. The main demand drivers include strong economic growth, improving living standards and lifestyle changes, expansion of the furniture and interior decoration industries and developments in the construction industry.

Particleboard

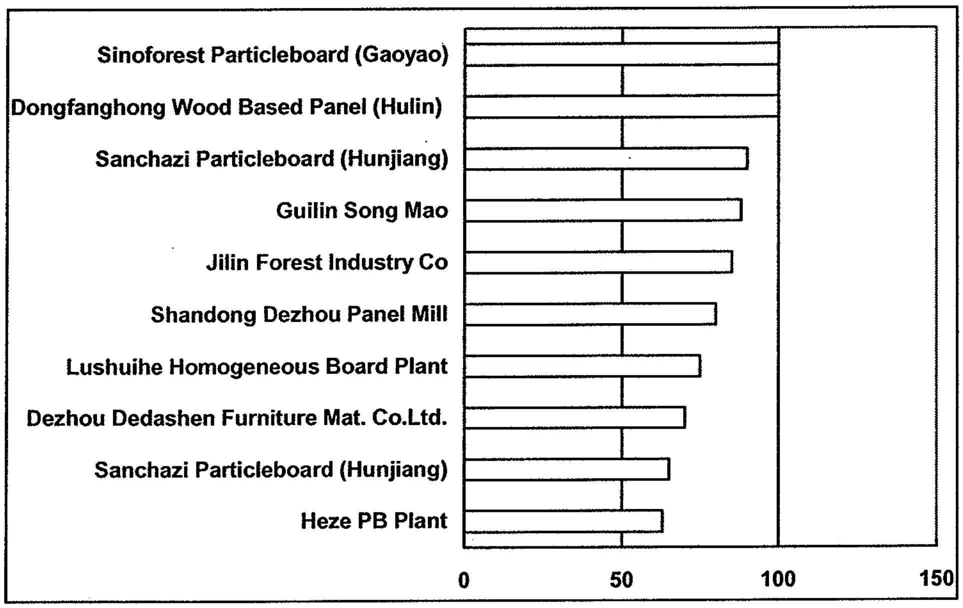
In 1998, China's production of particleboard decreased by 26% due partly to the Asian crisis and related economic downturn in China, and strong competition from newly developed MDF. The downward trend continued until 1999.

China's particleboard industry did not show a strong recovery until 2001. In 2004, production reached a record high of 6.4 million m^3 increasing from 2.7 million m^3 in 2001. The total consumption in 2004 was 7 million m^3. There are two main reasons behind the strong recovery. Firstly, particleboard has lower production costs than fibreboard, while its finished properties are very similar to MDF. Secondly, as new machinery has been installed and MDF know-how developed during recent years, particleboard quality has improved.

There are about over 800 particleboard manufacturers with a total capacity of 9 million m^3 in China. Particleboard production operates at a national average level of about 71% of its capacity. In fact, the particleboard sector in China is still very fragmented with many small manufacturers. There were only two machines with a line capacity larger than 100 000 m^3/a, while over 30 lines had an annual capacity higher than 50 000 m^3 by the end of 2004. Jilin Forest Industrial Group has an aggregated capacity at over 300 000 m^3/a, located in four places in Jilin (Figure 2-7).

However, Dare's largest particleboard machine located in Sanming, Fujian is now undergoing trials and will start production very soon. Fujian Furen's 200 000 m^3 particleboard project is under construction. Asia Dekor (Huizhou) plans to install 200 000 m^3/a particleboard lines in Gangdong. Robin group plans to invest in a 400 000 m^3/a particleboard plant in Yichun Jiangxi. In addition, Hebei Zhengding Yingang, Shandong Luli, Xinjiang Saifeiya and Shanxi Yuncheng plan to install 100 000 – 200 000 m^3/a particleboard lines.

Figure 2-7:
Top Ten Particleboard Producers in China, 1000 m^3



Source: Jaakko Pöyry Consulting

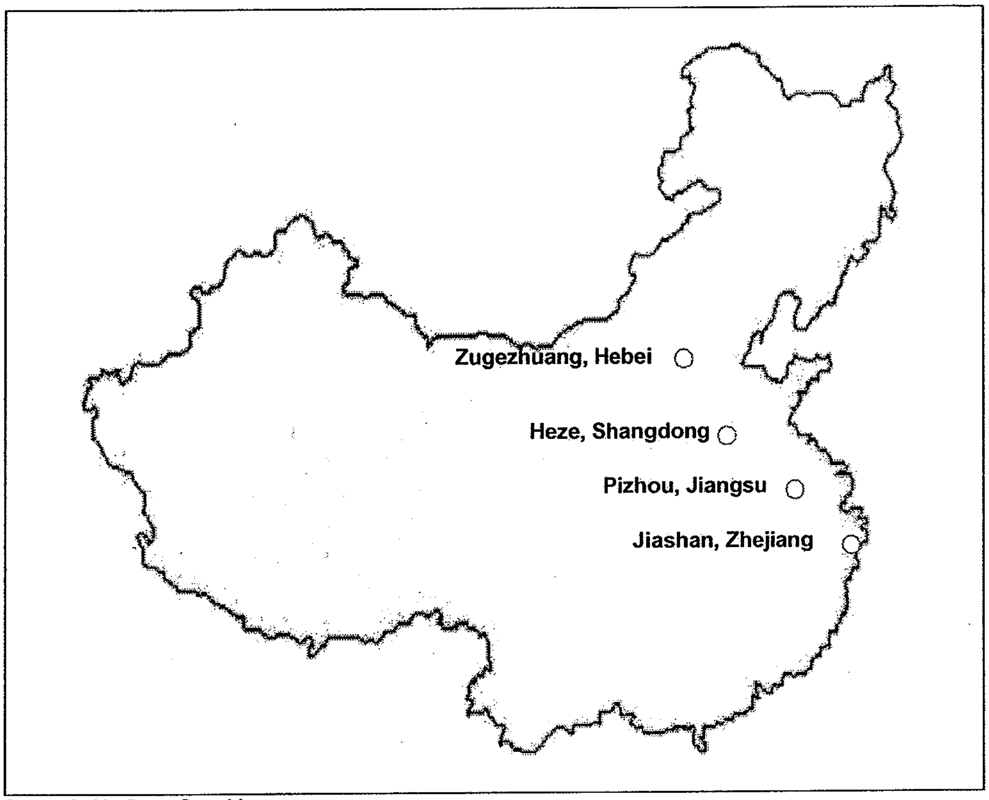
Particleboard is primarily used in the production of furniture, particularly kitchen and office furniture. To date, particleboard applications in construction end-uses have been limited because of the current dominance of plywood. However, some particleboard is used in partitions and sheathing applications where it provides a cost effective solution.

Plywood

Plywood production is estimated at over 21 million m^3 in 2004, excluding veneer. During the period from 1994 to 2004 production increased at an average annual rate of 37%. Although this rapid increase was chiefly driven by strong economical growth that translated to strong market demand, availability of fast-growing poplars in the late 1990s and the elimination of a log import tariff in 1999 were the most influential factors. Local availability of fibre allows farmers to produce plywood at a low cost.

As a result, within a few years, four plywood production bases have appeared including (1) Liyi in Shandong, (2) Jiasan in Zhejiang, (3) Pizhou in Jiangsu, and (4) Zougezhuang in Hebei (Figure 2-8).

Figure 2-8:
Location of Four Plywood Production Bases in China



Source: Jaakko Pöyry Consulting

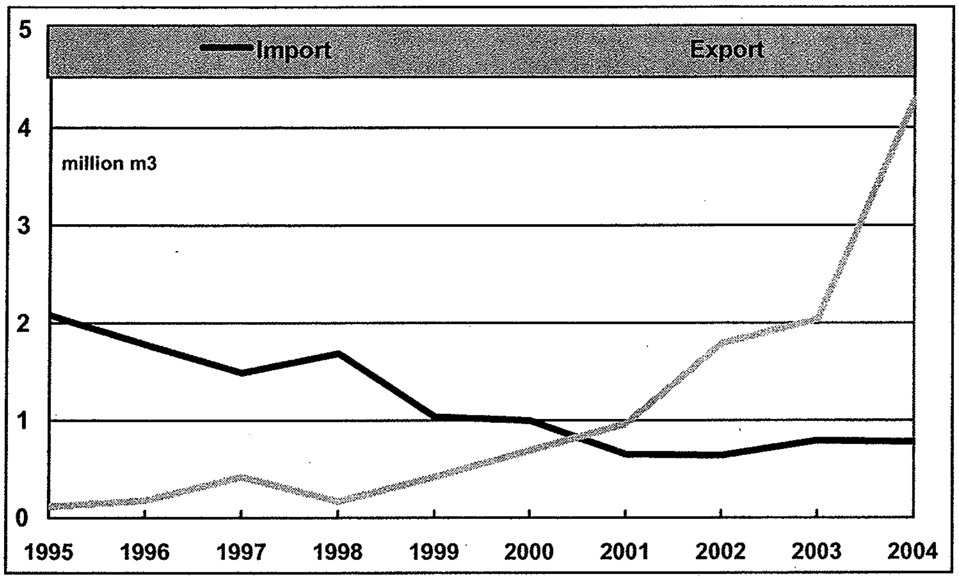
In each of the four areas, there are thousands of plywood plants and related wood product manufacturers engaged in different parts of a plywood value chain. It appears that Chinese farmers temporally solved the problem of an inability to invest in plant of a modern scale by separating production processes into peeling, coring, and pressing, as well as finished products. So far, the Chinese model created by farmers has successfully competed in the current market conditions.

In Pizhou, there are about 2600 plywood manufacturers. Plywood production was about 5 million m^3 in 2004, according to the Pizhou local government. Sales in the plywood sector in 2004 reached RMB7.5 billion, of which 45% was for exported products. Italian poplar is key raw material for plywood production in Pizhou.

There are over 1000 plywood plants in Zuogezhuang. Plywood production surpassed one million m^3 in 2002. Sales by the plywood industry in the same year were RMB3 billion in Zuogezhuang, with an export value at USD10 million. Zuogezhuang has the largest panel market in the Beijing region. Jiashan is an example so called "zero resource". Local total plywood capacity is estimated to be 3.5 million m^3/a, increased from zero in the late 1980s. There are 520 wood-related enterprises today, with a sale value of RMB9.4 billion. Currently, Jiashan is not only a base for plywood production but also for value added products, including furniture, decorated board, and construction mode board.

Export markets have been another strong factor affecting the rapid increase in plywood production. China had been a large plywood importer until 2001 but has become a net exporter of plywood over the last 10 years, although still importing less than one million m^3 (0.8) for specific niche applications (Figure 2-9). As a leading exporting country, China exported 4.3 million m^3 of plywood in 2004, accounting for 20% of local production.

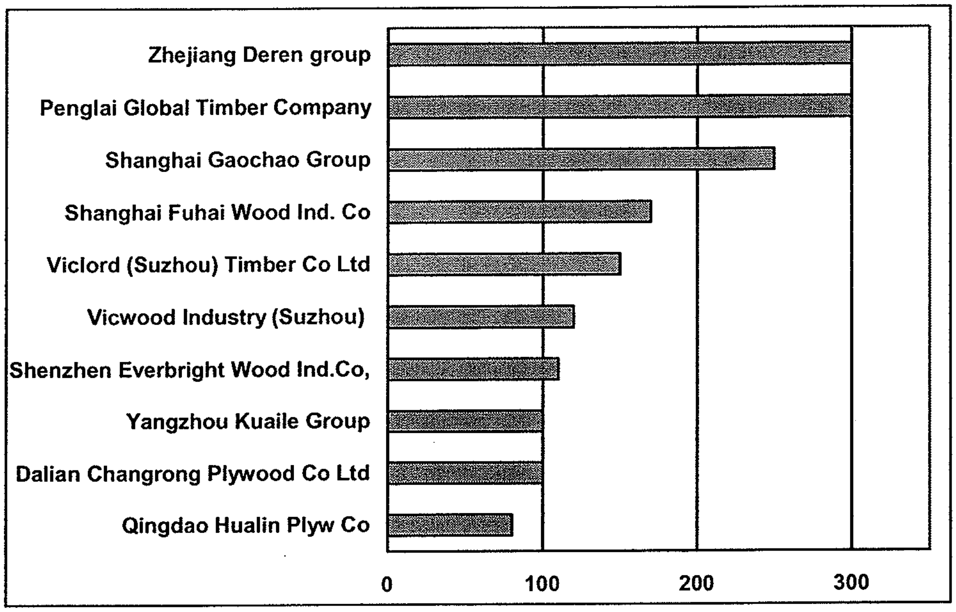
Figure 2-9:
Change of Plywood Imports and Exports in China



Source: World Trade Atlas

The leading producers of plywood are listed in Figure 2-10. Deren, founded in 1985 and today No.73 of the 500 largest companies in China, is a leading player.

Figure 2-10:
Top Ten Plywood Producers in China, 1000 m^3



Source: Jaakko Pöyry Consulting

Plywood is mainly used in the interior decoration and furniture segments. The major uses in interior decoration are for wall linings, door skins and doorframe overlay. Demand for these applications has been increasing. However, in recent years there has been a trend towards substituting plywood with reconstituted panels and blockboard when used for interior applications. More than 50% of all the plywood consumed is less than 6 mm thick. Uses in the construction segment, such as mode board, are expanding due to strong growth in the construction industry overall.

Other Board

Blockboard accounted for 77% of the other board in 2004. Blockboard production was 8.8 million m^3, while other board production was 11.5 million m^3. Blockboard is not suitable for outdoor use because the glues used are interior glues. Blockboard is used to make shelves, doors, panelling and partitions.

Dare Global

Dare was established in1978 and is owned by Dare Technology Group Co., Ltd. (formerly Dare Group) (29.58%), Danyang Jinggong (15%), Danyang Dianjin (11.6%), Shanghai Aotu Color Print (8.6%), and Public (35%). Dare entered the MDF business in 2002. It has six production lines in Jiangsu, Anhui, Jiangxi, Shandong and Guangdong with total annual capacity of over 1 million m^3 in 2004. Its total assets are around RMB3.5 billion. In 2003, its turnover was about RMB1.6 billion and MDF turnover about RMB45 million.

Dare recently built a 200 000 m^3 capacity HDF mill near Maoming, Guangdong. In addition, Dare has ordered a new particleboard plant with annual capacity of

640 000 m^3 from Siemperlkamp. Construction in Sanming, Fujian started in June 2005 and the plant is China's biggest and most modern particleboard plant.

The Jiangsu Dare Group has invested RMB250 million to establish poplar plantation bases in Zhenjiang City and Danyang City of Jiangsu.

Over the next 5 years, the group plans to invest more than RMB5 billion in 133 000 ha of plantations; a manufacturing centre with annual capacity of 3 million m^3 of wood panels, 50 million m^2 of laminate flooring and 8 million m^2 of solid wood parquet flooring. It plans to produce and to export USD300 million worth of furniture, establish its own brands and set up a global sales network and its own R&D centre. Dare aims to become the market leader in China.

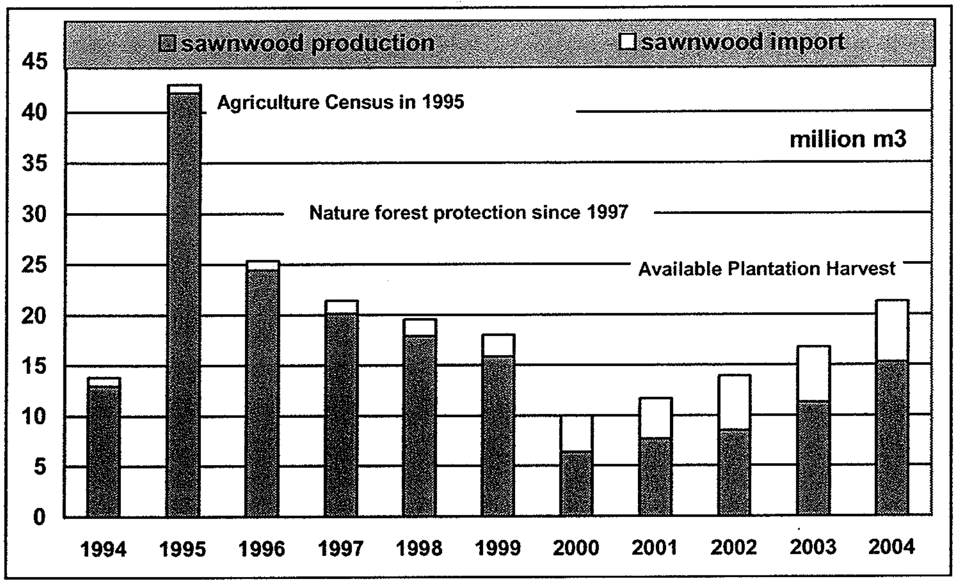
2.3 Sawmilling Industry

China's sawmilling industry has undergone transitions since 1998 caused by efforts to protect national forests and an increased awareness of environmental problems in the country. The impact of the Natural Forest Protection Program's logging ban has been realized. China faces significant shortages in domestically produced sawlogs, and relies heavily on imported sawlogs for the production of domestic sawn timber.

Small to medium sized producers continue to dominate the sawn timber industry. There are a vast number of non-industrialised workshop operations across China. More recently, as log importing has increased, many individuals operating simple saw and carriage sawnwood businesses have located around major log import ports such as Suifenghe, Heilongjiang, Zhangjiagang, Jiangsu, and Jiaxing Zhejiang.

Such a fragmented sector makes it difficult to get accurate data on sawnwood supply and demand in China. Domestic sawnwood production data has been regularly collected under the State Forestry Administration. The historical development of sawnwood production is presented in Figure 2-11.

Figure 2-11:
China Sawnwood Production and Consumption: 1994-2004



Source: State Forestry Administration and World Trade Atlas.

Prior to 1995, the statistics included only the enterprises at and above the township level. Annual production level was relatively stable and ranged from 11-15 million m^3 for an extended period from 1975 to 1994.

Why did sawnwood production suddenly reach an outstanding level of 42 million m^3 in 1995? According to the State Forestry Administration, 1995 production was from the third national census of industrial enterprises. For that year the statistics were expanded to include village-run and private firms with annual sales exceeding 1 million yuan. It is common for statistics to be higher in a census year than in normal years in China. However, the 1995 production figure suggests that sawnwood production data has been very conservatively collected.

The total sawnwood production capacity in China is estimated at around 30 million m^3/a, spreading over several-thousand registered sawmills nationwide. In addition, it is understood there are several thousand unregistered mills that total over 10 million m^3/a of sawnwood capacity.

Due to the logging ban started in 1997, sawnwood production decreased by 2.3 million m^3 in 1998 followed by 2 million m^3 in 1999 and a 9.5 million m^3 decrease in 2000. After 2001, the production recovered partially because of the availability of plantations.

In 2004, the State Forestry Administration estimated that China produced 15.3 million m^3 sawnwood. Thus the consumption was at least 21 million m^3 of sawnwood, a 27% increase over the previous year.

Over the next decade it is anticipated that domestic production will continue to remain relatively flat while consumption will increase further.

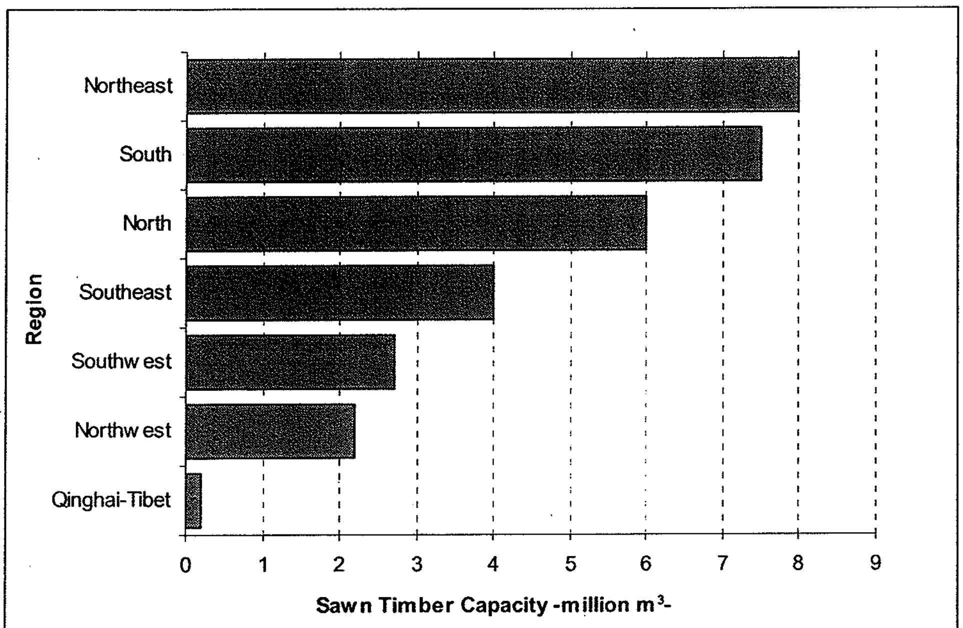
There are approximately 1 000 state-owned sawmills with a production capacity of over 10 000 m^3/a, and of these about 150 mills (mostly in the northeast) have a capacity of more than 50 000 m^3/a.

Two-thirds of these state-owned mills were built before 1970 and were designed for processing large sawlogs with diameters greater than 40 cm. However, the available log size has fallen considerably and this has caused these mills to become very inefficient, with most operating unprofitably. Moreover, the pattern of demand has changed dramatically since these sawmills were established. Demand for hardwood lumber has increased while that for softwood has decreased. This is a result of the primary end-use shifting from construction to interior decoration and furniture. This change has compounded the difficulties of the large scale state-owned sawmills.

Private sawmills are proving effective at diversifying and gaining competitive advantages that include flexible management, market orientation and lower labour costs. In addition, many private sawmills have tended to make profits by acquiring low-priced raw materials (illegally harvested logs), on which taxes and duties have not been paid.

The sawn timber capacity in northeast China (i.e. Heilongjiang, Jilin and Liaoning) has declined in recent years but it remains the largest timber producing area in China as presented in Figure 2-12.

Figure 2-12:
China's Regional Sawnwood Capacity



Source: Jaakko Pöyry Consulting

The existing forest resource is comparatively rich in the northeast and the region also has good access to Russian logs. The main sawnwood capacity in the north is located in Shandong and Hebei. As these provinces do not have sufficient sawlog resources, logs are transported from other domestic regions or imported from Russia.

Recently the capacity in southern China has increased significantly and collectively managed forests and plantations are gradually becoming major sources of sawlogs.

The southeast, where Shanghai is located, has about 4 million m^3/a of sawn timber capacity. In addition, a considerable amount of sawn timber produced in other domestic regions and imported from other countries is also processed. In the southwest, the capacity in Yunnan province has increased notably by importing logs from neighbouring countries such as Myanmar.

China's main use for sawnwood is in the packaging and temporary construction segments. The Chinese government is currently undertaking initiatives that will result in housing and building increases of around 200 million m^2/a. Temporary construction mainly uses local softwood lumber for concrete formwork, scaffolding, floor underlay and other urban construction activities. In rural areas, lumber is often used as beams and rafters for buildings. Although China's use of timber in construction has been declining because of substitution for concrete and steel, it is still a major consumer of solid wood-based products.

The interior decoration, flooring and furniture segments account for around 47% of the total lumber consumed in China. Interior decoration includes products such as solid wood and 3-ply parquet flooring, doors, window frames and mouldings.

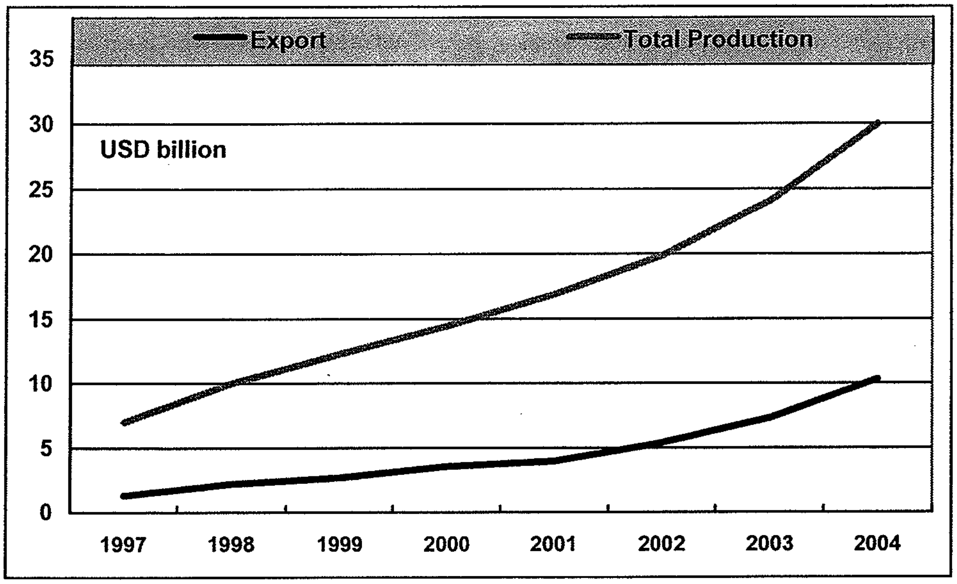
2.4 Furniture Industry

China was the largest furniture exporter in the world with a total export value of USD10.4 billion followed by Italy valued at USD8.97 billion in 2004. China has already commanded a 15% share of total international trade value of furniture in 2004, increasing from only 2.5% in 1994 as the eleventh largest exporter in the year.

Besides the large international market, China has a strong domestic market for furniture. As living standards continue to improve in China, the property market continues to open up and diversify. As a result, the demand for designer furnishing grows. Along with an interest in home decoration, there is a desire for better-quality furniture.

Furniture production and exports in China have been growing rapidly over the last decade (Figure 2-13). In 2000, China produced about USD14.5 billion of furniture, an increase of 15% compared to previous year. In 2001, the production value increased by another 16.5% to USD16.8 billion. In the following two years, China maintained 18% and 21% growth rates in furniture supply. In 2004, furniture production was valued at USD30 billion, increasing by 25% from 2003. During the period 2005 to 2010, Jaakko Pöyry Consulting forecasts growth to slow but remain strong at around 11% per annum.

Figure 2-13:
China Furniture Industry Production and Exports



Source: Chinese Furniture Association and Jaakko Pöyry Consulting

As a large consumer country, on average furniture consumption in the domestic market accounts for three-fourths of the total production, while the remainder goes to overseas markets. The total value of furniture exports has increased from USD1.3 billion in 1997 to USD10.4 billion in 2004.

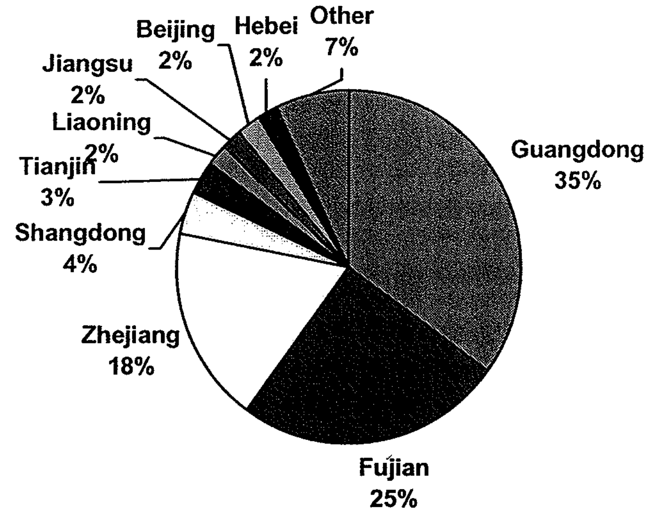
It is estimated that wooden furniture accounts for 80% of total production, while exported furniture consists of a lesser percentage of wooden furniture, at about 50%. Thus, the production value of wooden furniture was about USD24 billion in 2004, while exports of the same grade were valued at USD5 billion in 2004.

There are more than 50 000 small, medium, and large furniture manufacturing enterprises in China. Together these have nearly 5 million employees. There are around 3 000 large-scale companies. While there are many companies that are exclusively Chinese, there are a significant number of joint ventures involving both Chinese and foreign capital.

Furniture manufacture has developed in areas that have shown rapid economic growth such as the coastal areas of China, where the advantages of a large consumer market and a good infrastructure are available. Furniture manufacturing activity is also significant in the province of Guangdong (in the cities Guangzhou and Shenzhen), and in the area around Shanghai. In terms of value, Zhejiang is the second largest furniture supplier in 2004.

Guangdong is by far the most important furniture production area with the highest contribution to exports (Figure 2-14). Other important areas for furniture exports are Shandong, Zhejiang and Jiangsu, where the majority of joint ventures constituted with capital from Taiwan and Singapore are located.

Figure 2-14:
China Furniture Production (unit) by Regions



Source: China Light Industry Information Centre

In the north, which is a base for exports to Japan, the provinces of Beijing, Tianjin and Heilongjiang are also important furniture exporters (Figure 2-15).

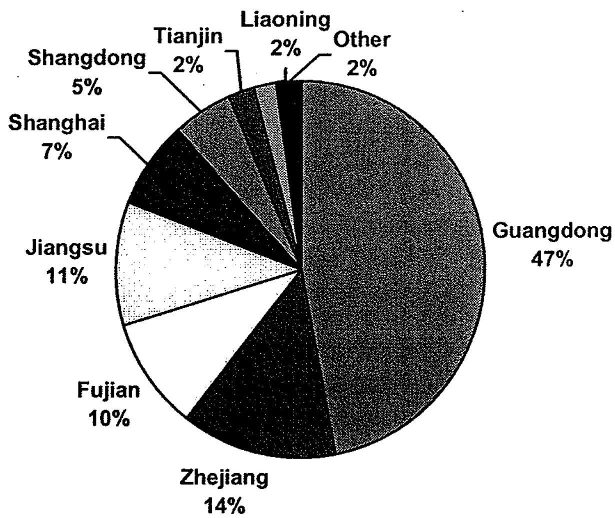
The furniture industry in China underwent considerable industrialisation during the 1990s, and this has underpinned the subsequent increases in exports. Technological developments in the industry have led to the production of a wide range of products and high-quality throughput. China's furniture industry has also benefited from an ever-growing number of joint ventures with overseas manufacturers, interested in low labour costs, the high export potential and an expanding domestic market.

The Guangdong area that specialises in ready-to-assemble and upholstered furniture, accounts for 50% of China's total furniture exports. These exports are mainly to the US. There are over 6000 furniture manufacturers in Guangdong, with about 1 million employees. In 2004, total furniture production was valued at over USD9 billion, while exports were as high as USD4.536 billion. There are 49 furniture plants with export values larger than USD10 million.

Eastern China (Shanghai, Zhejiang, Jiangsu, Fujian and Shandong) is the second most important furniture manufacturing area, with a export value of USD4.522 billion in 2004, just USD12 million lower than Guangdong. The strong catch-up has been driven by three major factors – relocation of the furniture industry from Pearl River Delta to Yangtze River Delta, strong development of foreign furniture investments in Shanghai, and the strong export ability of private companies. The region is the largest domestic furniture market.

The Beijing-Tianjin region is the third largest furniture manufacturing area although on a significantly smaller scale than Guangdong or Shanghai.

Figure 2-15:
China Furniture Export by Regions



Source: China Light Industry Information Centre

According to a survey on raw material uses in 41 furniture enterprises, including 4 large and 37 middle and small, panel accounted for about 47%, with logs and sawnwood accounting for 47%.

2.5 Construction and Decoration Industry

The construction industry is one of the most important economic engines, accounting for 7% of GDP in 2004 increasing from 4% -5% in the late 1980s and early 1990s and 6.6% in the late 1990s. The Chinese construction industry achieved a total value of about USD116 billion in 2004, an increase of 17% over the previous year (Figure 2-16).

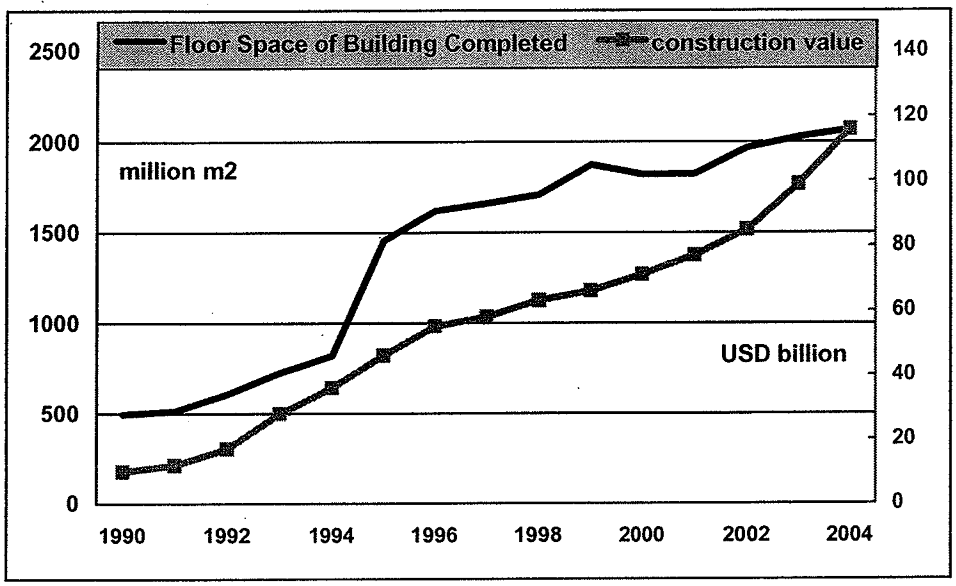
However, the annual floor space completed has not increased much since 1999. On average, annual floor space completed was 1.8 billion m^2 during the period from 1999 to 2001, and 2 billion m^2 after 2002.

It is estimated that newly constructed space in urban areas accounts for over 70% of the total, while the remainder is in rural areas. Of the 1.5 billion m^2 in urban areas, annual floor space completed for residential buildings is estimated to account for over 78% and the rest is commercial.

Today, per capita gross living space in cities is 25 m^2 and 27.9 m^2 in rural areas. As a result, low per capita living space will create strong potential for the construction industry in coming years.

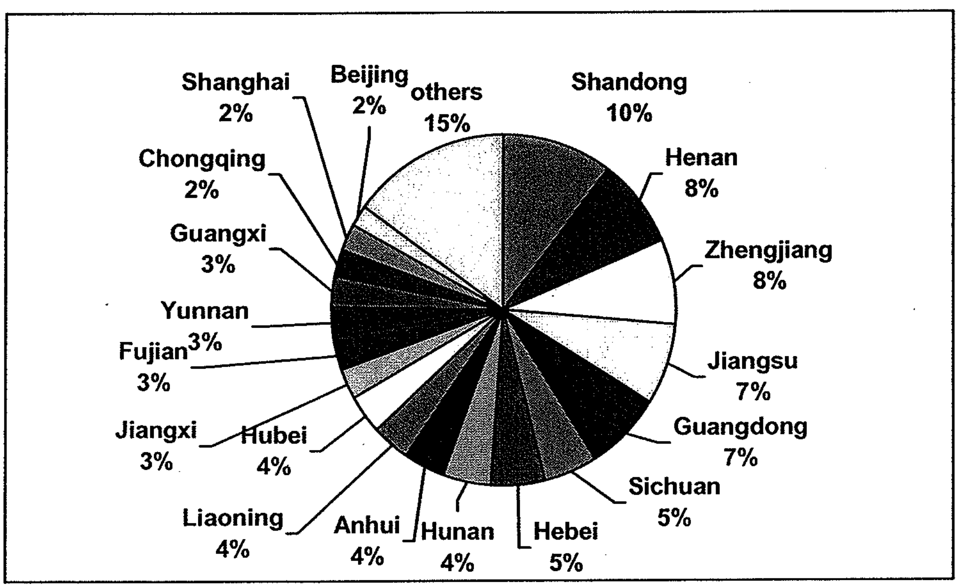
During the past ten years, the proportion of wood end-use in different areas has changed. Traditionally, the three leading end-users were construction, forest products and repairs, in that order. Due to a strong shortage in domestic wood supply, and moreover, encouragement of replacement by steel, aluminium, and engineering plastics, wood-use in construction has sharply decreased. For example, wood windows are largely replaced by plastic, while wood construction mode board is partly replaced by steel board and plywood board.

Figure 2-16:
Output Value of Construction and Floor Space Of Buildings Completed



Source: China Statistical Yearbook 2005 compiled by National Bureau of Statistics and Jaakko Pöyry Consulting

Figure 2-17:
Floor Space Completed in 2004 by Region



Source: China Statistical Yearbook 2005 compiled by National Bureau of Statistics

Chinese consumers prefer more unfurnished and undecorated apartments. This type of 'shell' building is defined as a structure without doors, ceiling coverage and floor coverage. Wood is not one of major raw materials used for constructing shell buildings, unlike in other countries, although there are some wood structure houses in rural areas, especially in the Northeast. Recently, in large cities like Shanghai and Beijing, new wood houses are just starting to appear. Unlike in other developed countries, panel is not used much for construction structure in China. It is estimated that less than 15% of panel is used in decoration and flooring in China.

The Shanghai, Guangdong and Beijing regions accounted for over 40% of total construction activity, calculated in terms of floor space, completed during 2004 (Figure 2-17).

Interior Decoration

Construction development indirectly accelerates wood consumption in the decoration sector. Interior decoration, especially of residential houses, has been one of the fastest growing panel consuming industries in China over the last ten years. The two leading wood products used in the interior are floors and doors.

Demand for flooring in China has been very strong and will grow further through 2008-2010 when China hosts the Olympic Games and World Expo. The associated construction activities will increase demand along with government efforts to increase average per capita living space and privatize home ownership.

Although there are no statistics available from any Chinese authority on the flooring market, its development can be summarized as follows:

- During the early 1990s, wood flooring consumption in China was estimated to be 40- 50 million m^2 annually with solid wood flooring as the main product.
- During 1992 - 1995, laminate flooring entered the market. In 1995, laminated flooring consumption in the whole of China was only 30 000-50 000 m^2. Since then, laminated flooring consumption has increased at the fast growth rate among all wooden flooring products.
- In the current market, finished wood flooring consists of laminated flooring, solid wood, and multi-ply parquet, as well bamboo flooring. In 2004, the total consumption of finished wood flooring is estimated to be 230 million m^2.

In 2004, total production of wood flooring reached 257 million m^2 (Figure 2-18). Laminate flooring took up 58% of whole wood flooring production in 2004, from nearly zero percent in 1995. Currently, there are about 500 laminate flooring producers in China, with a total capacity of more than 120 million m^2. Laminated flooring is popular in the Northern region and less developed areas of the republic.

Three or multi-ply parquet flooring is relatively new in China, with a very attractive growth rate. The popularity of this type of product is growing for several reasons:

- Severe competitive market conditions makes some plywood producers turn to more value-added products – multi-ply flooring, to increase their profit margin.

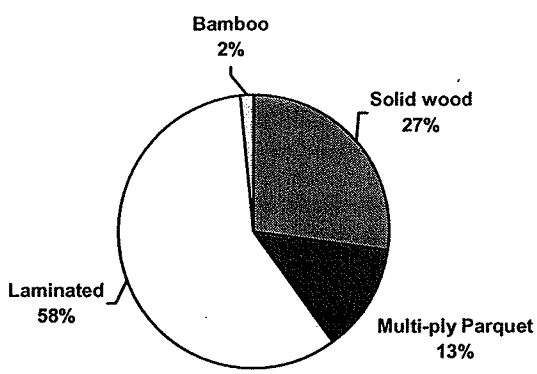
- Three-ply parquet has developed very fast in recent years, mainly driven by exports. As a result, wood parquet flooring has increased its production share for the last few years.

- In the Northern region, demand for heat-insulating flooring is high because of cold weather during winter.

- Due to its stability, multiply parquet products are also popular with people in coastal cities or areas with high-moisture content. Bamboo flooring also shares 2% of the total production.

In terms of wood fibre, solid wood flooring requires better quality wood. Although domestic supply has greatly decreased since 1998, imported roundwood and flooring wood have met the demand. Laminated flooring is made of HDF or MDF which is made of small diameter logs and residuals from harvests and forest products manufacturing. Three-ply parquet uses some imported wood and is mainly for export.

Figure 2-18:
Wood Flooring Production in 2004



Source: The Wood Flooring Association of China National Forest Product Industry Association

Generally, wood flooring, especially laminated flooring, has a relatively short life, about 5-10 years in China. The repair and remodelling industry is forecast to grow rapidly, further supporting the future demand for interior decoration, although it is in the early stages of development.

China is an important exporter of wood flooring, with total exports of 22 million m^2 in 2004. This included 4.4 million m^2 of solid wood flooring and 15 million m^2 of multi-ply wood flooring. About 2.2 million m^2 of laminated flooring was also exported. The US is a leading importer of Chinese made solid wood flooring. In 2004, exported solid wood flooring from China accounted for 27% of the total solid wood flooring imports in the US.

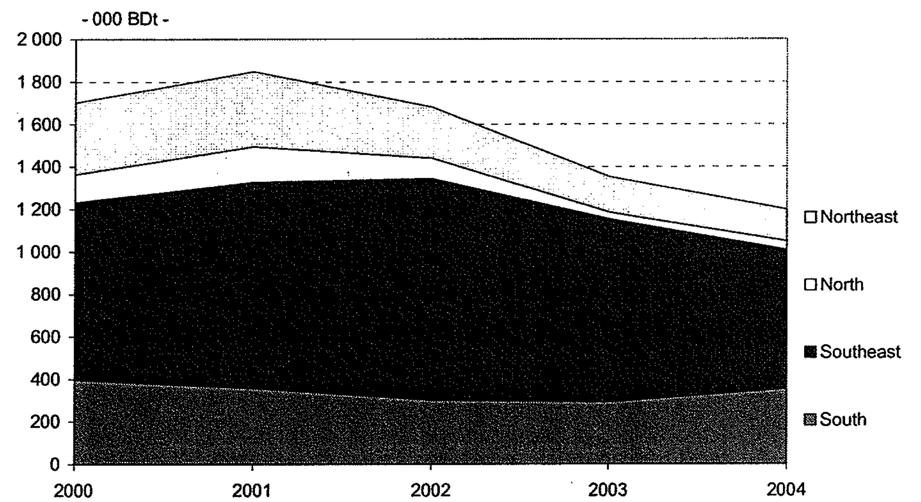
There are about 4800 flooring manufacturers in China, of which 600 are laminated flooring, 4 000 solid wood flooring, 100 three or multi-ply wood parquet flooring and 100 bamboo plants.

Soaring housing decoration trends support strong demand for wooden doors. In recent years, wooden doors have shown encouraging potential in the Chinese forest products markets, with consumption estimated at 100 million m^2, assuming that door area accounts for 10% of construction area and two-thirds of doors wooden.

2.6 Woodchip Export

Since the late 1980s, China has exported woodchips to international markets. In 2001, exported woodchips reached their highest level at over 1.8 million BDt. Since then, exports have fallen, reaching 0.98 million BDt by 2004. Major destinations are Japan, South Korea and Taiwan (Figure 2-19).

Figure 2-19:
China Hardwood Chip Trade Historical Development



Source: WTA Year-end May data

Due to strong development of eucalypt plantation since the early 1990s, China's southern regions, including Guangdong, Hainan and Guangxi, have become the leading exporters, replacing the northeast.

As it is likely that China will remain cost competitive in terms of hardwood chip exports to Japan, South Korea and Taiwan, the hardwood chip export industry in Southern China will provide growers and traders with the means to ensure the minimum domestic market price is set by export pricing parity. In 2004, exports from the three provinces accounted for 80% of the total exports.

China is currently a major hardwood chip exporter; however domestic demand for hardwood pulpwood is expected to grow with the planned expansion of its domestic pulpwood consuming industries. For example, APP Hainan Jinhai has a chemical pulp project of 1 million t/a. There will be some other planned woodpulp projects in the regions. Despite the significant supply potential of the domestic pulpwood resources, Jaakko Pöyry Consulting believes that the growing demand will not be fully met. As a consequence, China is expected to become a net importer of hardwood pulpwood during this decade. Even if all of the announced mill developments do not take place, regional fibre shortages are expected to increasingly occur.

Hardwood chip imports into China increased to about 52 000 ton in 2002 from less than 4000 ton in 2001. This was due to the APRIL (Shandong Rizhao) 220 000 tonne/a BHKP line commencing operation. That particular pulpmill's fibre requirements are based largely on imported woodchips. A further increase in imports to 280 000 BDt was recorded in 2003 and continued in 2004 as production through the APRIL (Shandong Rizhao) BHKP line increased.

Woodchip export ports in the region are located at Fangcheng, Beihai, Zhanjiang, Maoming and Yangjiang. Woodchip exports from these ports in 2004 are provided in Table 2-3.

Table 2-3:
Woodchip Exports from the Region in 2004

Woodchip Export Port	Woodchip Exports (thousand BDMT)		
	Japan	Taiwan	Total
Fangcheng	24	0	24
Beihai	38	0	38
Zhanjiang	326	215	541
Maoming	0	15	15
Total	388	230	618

Source: Jaakko Pöyry Consulting

Japan has traditionally been the biggest market for Chinese hardwood chip exports. In 2003, Japan took up 57%, followed by Taiwan and South Korea.

Australia was the dominant supplier of woodchips to China in 2003 with 91% of the total volume imported of 280 000 BDt.

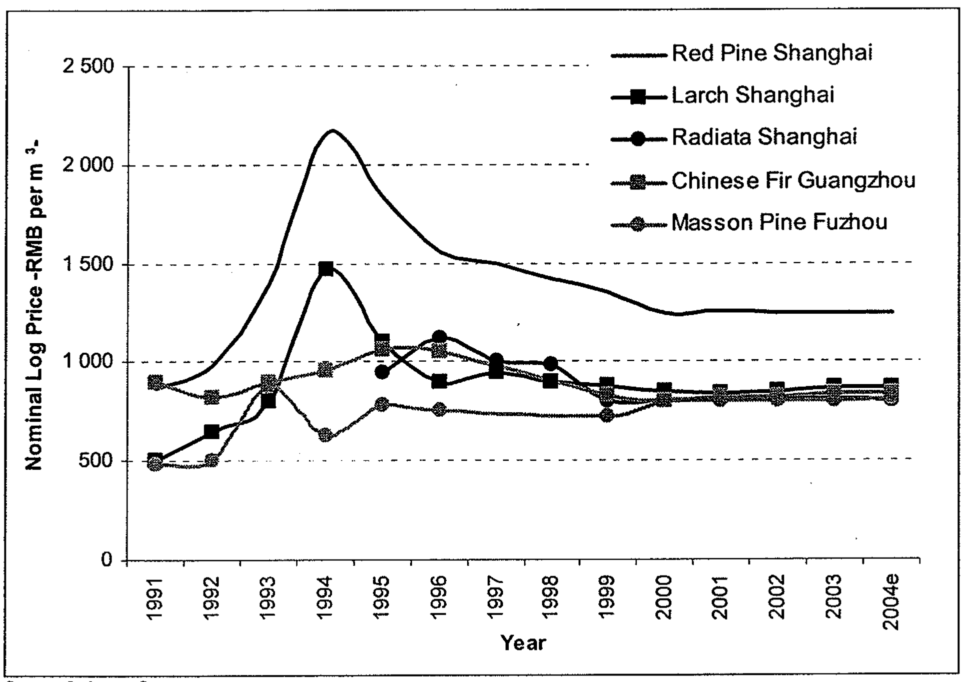
3 OVERVIEW OF FOREST PRODUCT PRICES IN CHINA

3.1 Roundwood Logs

Since about 1990, market forces have largely determined log prices in China, with prices varying according to regions, species and size. Log sales may be conducted by direct negotiation between seller and buyer, by selling from the forest to an agent who on-sells to the consumer, or through large central log markets.

Average log prices for official log markets in Shanghai, Guangzhou and Fuzhou for red pine, larch, Chinese fir and Masson pine, between 1991 and 2004 are shown in Figure 3-1 below. Masson Pine and slash pine are the mainstay of the softwood fibre resource in the southeast and southern regions. They have multiple uses, including mining timber, construction poles, sawn timber, plywood logs and pulp logs for pulp and paper, particleboard and fibreboard. Chinese fir generally receives a relatively high price due to its renowned durability as a traditional construction material.

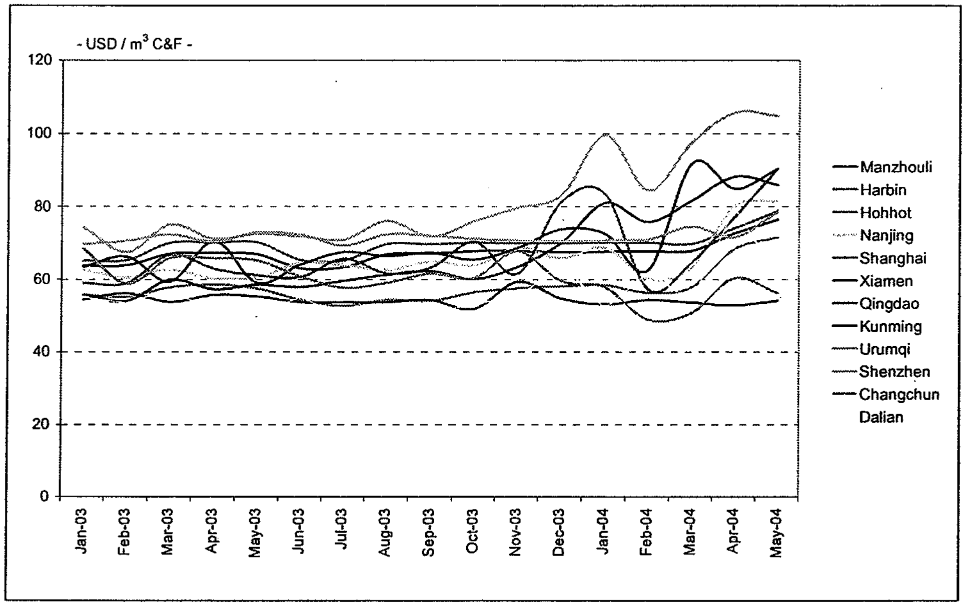
Figure 3-1:
Nominal Historical Log Prices in China



Source: Industry Contacts

Domestic log prices are broadly in line with imported sawlog prices once wharf and transport costs have been added to the C&F delivered price.

Figure 3-2:
Average Imported Softwood Sawlog Price by Location



Prices can be seen to be trending upwards especially in 2004.

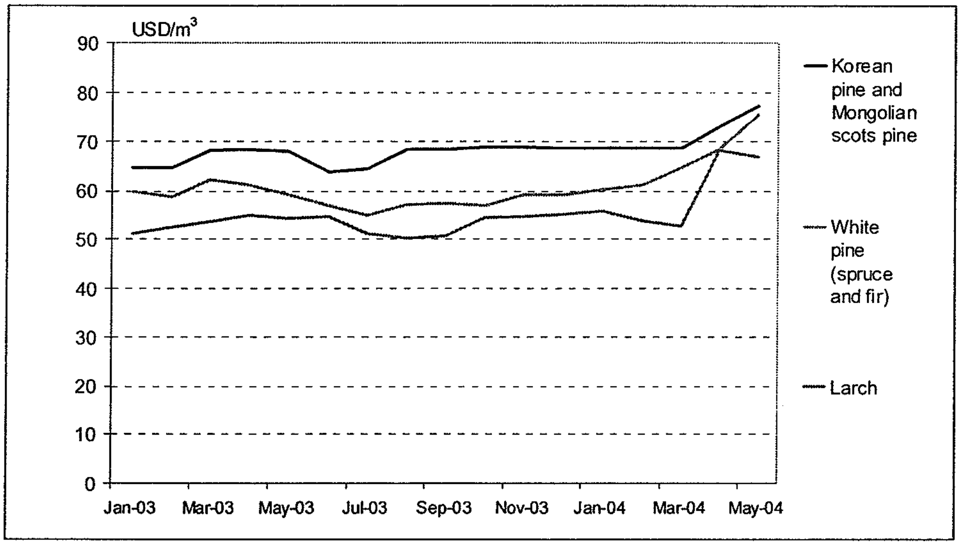
3.1.1 Russian Log Supply

After several years of significant growth, imports of Russian logs levelled off at around 14 to 15 million m^3 in 2002 and 2003. Estimates for 2004 indicate Russian log supply may have increased to 16.5 million m^3.

Log supply from Russia is primarily confined to the north, northeast and east of China. Land routes dominate log supply. The cost of transporting logs from the Russian border to the log processing centres means that it is not common for Russian logs to penetrate further south than Shanghai.

Russian softwood log prices have recently increased. This may be the result of a drop off in imports from New Zealand due to high freight rates.

Figure 3-3:
Russian Logs CNF Price Trends



In the long term, Russian log prices are expected to slowly trend upwards in response to increasing harvesting and transport costs as easily accessed logs become less available and operations move further from existing infrastructure.

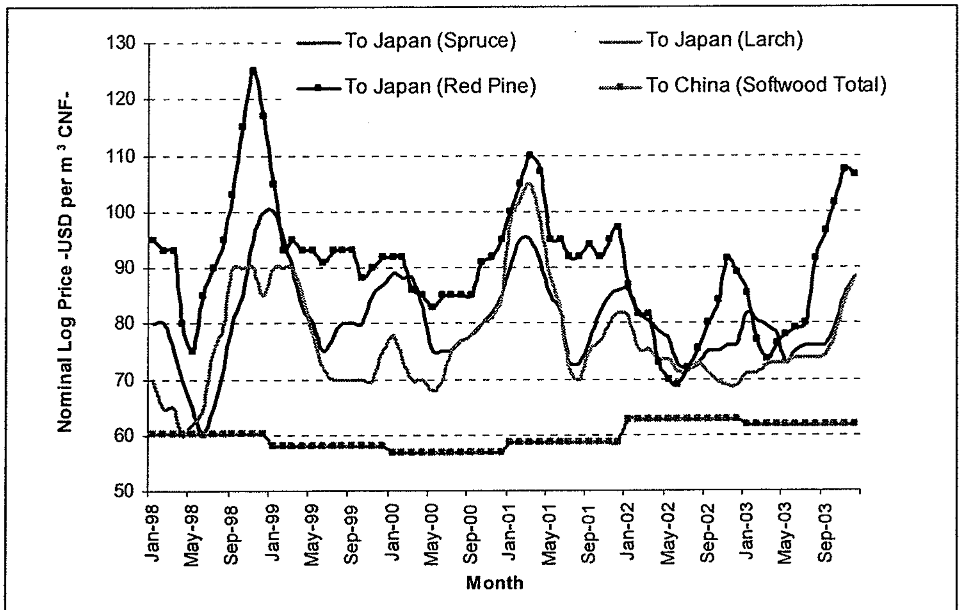
Russian Far East Softwood Logs

Figure 3-4 illustrates the softwood log export price trends from Russia to Japan and China, for the six-year period from January 1998 to December 2003.

The China price should be treated as indicative only. It is a yearly average price representing all of the softwood logs imported from Russia into China and is based on the China customs data. It does not reflect the changes in species-mix or grade-mix over the given period. In comparison, the Japan prices are species and grade specific, reported by Japanese trade journals on a monthly basis.

Figure 3-4 implies that the price from Russia to China has been relatively stable, with a slight rise from 2000 at USD57 per m^3 to 2003 at USD62 per m^3 delivered to the northern Chinese border. The price of Russian logs delivered in southern China will be considerably higher than those in northern China owing to the significant transport distance from northern to southern China.

Figure 3-4:
Softwood Log Export Price from Russia to Japan Port/Chinese Border

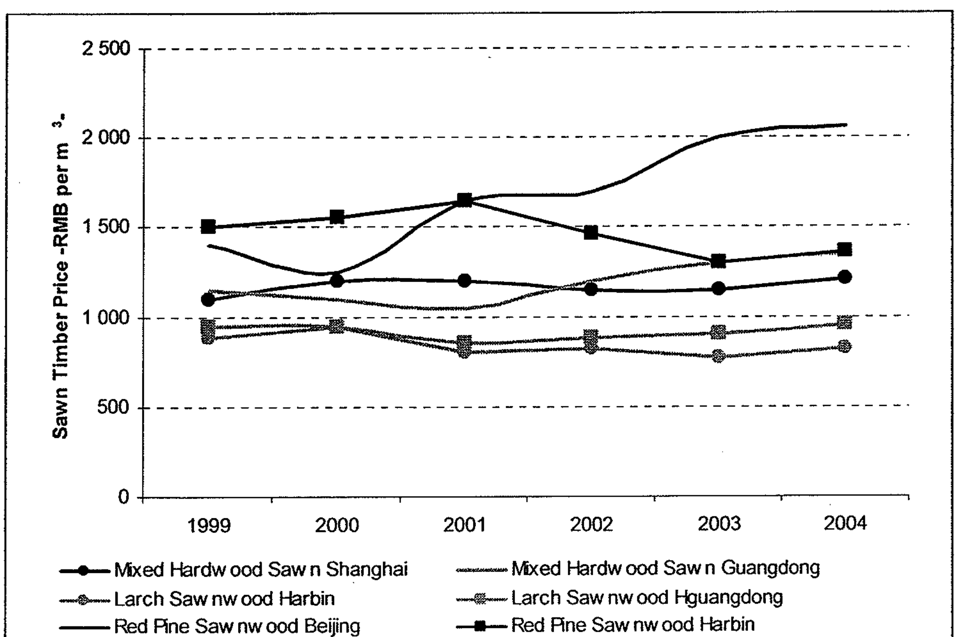


Source: Japanese trade journals (for Japan) and World Trade Atlas (for China)

3.2 Sawn Timber

Softwood sawn timber prices have remained relatively static in China since about 1999. Prices are forecast to remain stable in the near future, and with growth in demand, some form of real price increase may be possible. Figure 3-5 presents sawn timber prices in China for various regions.

Figure 3-5:
Nominal Sawn Timber Prices in China



Source: Industry Contacts

3.3 MDF and Particleboard

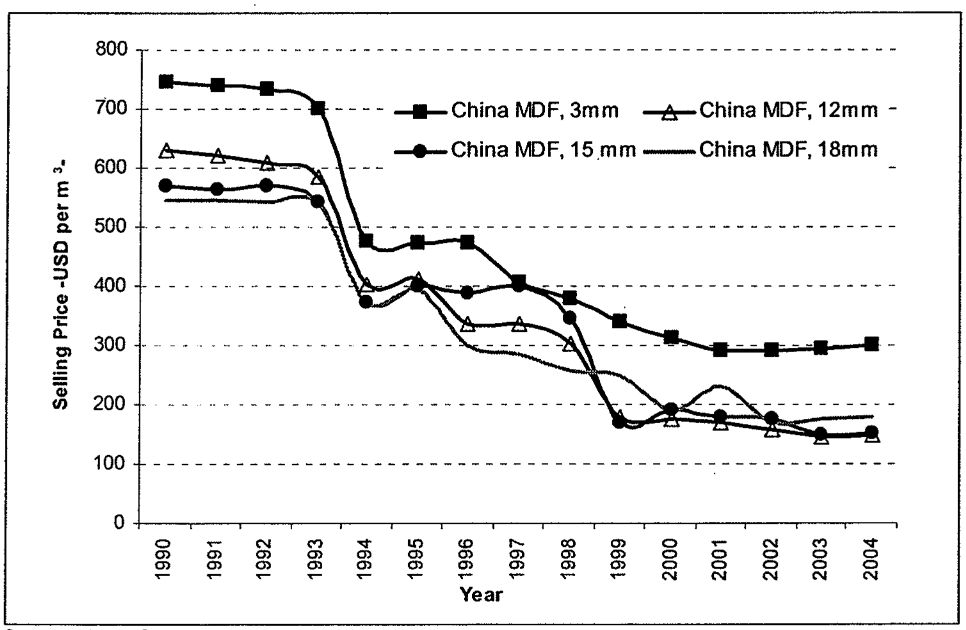
China's consumption of MDF is expected to increase strongly over the next decade. Demand from the Chinese furniture and construction sectors will be instrumental in driving consumption. This demand will be supported by a variety of factors such as economic growth, increasing incomes, rapid growth of urban population, housing privatisation policy, government policies to expand the average living space, favourable policies encouraging apartment purchase and an expanding furniture export market.

Chinese MDF demand will also grow through the development of new end uses and the use of more specialised MDF products. MDF prices are therefore expected to be sustained.

A positive demand outlook will require all of the currently installed capacity and the availability of imports (especially after WTO tariff reductions) to feed the projected demand. This scenario will result in improving prices, allowing for an increasing fibre cost, and increases in imports into the China market.

Particleboard is more price-competitive than MDF, giving it an advantage over MDF in a price-oriented market. Figure 3-6 shows both MDF and particleboard prices from 1995 to 2004. Prior to 1995, prices for MDF were set nationally. Since price controls were lifted, MDF prices have declined to be more representative of the cost of MDF production within China and are more inline with international MDF prices.

Figure 3-6:
Nominal MDF and Particleboard Prices in China



Source: Industry Contacts

Due to quality differences between regions, a wide range of particleboard prices exist in the market. Table 3-1 shows particleboard prices for different regions in China in 2003.

Table 3-1:
2003 Particleboard Market Prices in China, E1 and E2 Grades

Region	Particleboard Price (USD per m³)	
	Low	High
Shanghai	137	150
Guangdong	119	140
Beijing	120	140

Source: Industry Contacts

China's plywood production has seen significant increase but the industry's future is expected to be difficult. This is due to declining availability of large diameter, high quality peeler logs both domestically and externally outside of China.

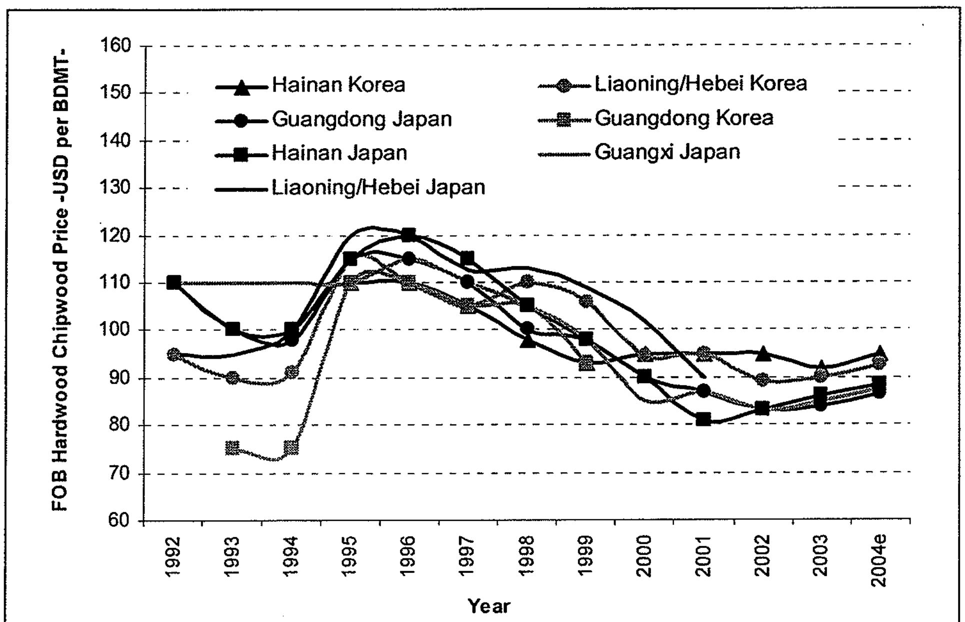
3.4 Forest Product Price Forecasts

Price forecasts are made using a combination of formal modelling techniques and informed judgement. Many factors affect prices, including the demand and supply balance, exchange rates, pulp prices, financial positions of buyers and sellers, price relativities between woodchips from different sources, and production costs.

3.4.1 Woodchip Price Trends

During the past 20-30 years, the trend in real pulp prices has been predominantly downward. Figure 3-7 illustrates China's FOB hardwood woodchip prices by province for the Japanese and Korean market destinations.

Figure 3-7:
Nominal FOB Hardwood Woodchip Prices by Province 1992 to 2004e



Source: Industry Contacts

Historical chipwood and sawlog price series show a 'price spike' around 1994/95. This spike was in response to perceptions in the US that large areas of old-growth forest were about to be protected for conservation purposes (e.g. protection of the spotted owl habitat), at a time when it was recognised that supply from SE Asia was diminishing due to historical over-cutting and proposed log export bans on tropical logs from major exporting countries. In addition inventory stocks had been allowed to reach very low levels in South Korea despite strong forward orders. The combined effect was a significant price spike felt through the Asia-Pacific region. When the predicted log supply shortages did not eventuate, prices quickly fell.

This historical price trend has been influenced by the following factors:

- Generally sufficient supply of main production inputs such as wood
- Technological developments - advances in material-saving technologies and production efficiencies
- The strength of the US dollar in the late 1990s and early 2000s
- Growing mill capacities
- Increasing economies of scale.

As a consequence, the supply curves for the industries using woodchips have flattened and shifted downward. The flattening supply curves support the view that further cost savings in production and distribution are becoming increasingly difficult to achieve, and that the decline in real prices is gradually levelling off.

Scenarios that assume no major discontinuities in economic growth and demand development, consistently developing input costs and constant technological development, suggest relatively steady price development for the long-term. On the other hand, a dramatic drop in demand due to weakening economic performance or substitution, would lead to serious downward pressure on prices, as marginal producers would be forced to exit the industry.

It is likely that the real woodchip price will be steady from 2004 onwards. The following price drivers support this view:

- Economic development
- Reconstituted wood panel demand development
- Pulp and paper demand development
- Technological development
- Further increases in pulpmill and panel mill size will lead to longer wood transport distances, thus offsetting some of the advantages of economies-of-scale
- Limited availability of large plantations, requiring part of the new supply to be based on wood delivered over long distances or into areas with high infrastructure costs.

Production investment waves following periods of good profitability have led to simultaneous above-average capacity increases or well below-average growth periods (or no growth due to closures). Unfortunately, these supply moves rarely match demand cycles in a harmonious way, rather the contrary. This mismatch accentuates pulp price cycles and increases price volatility.

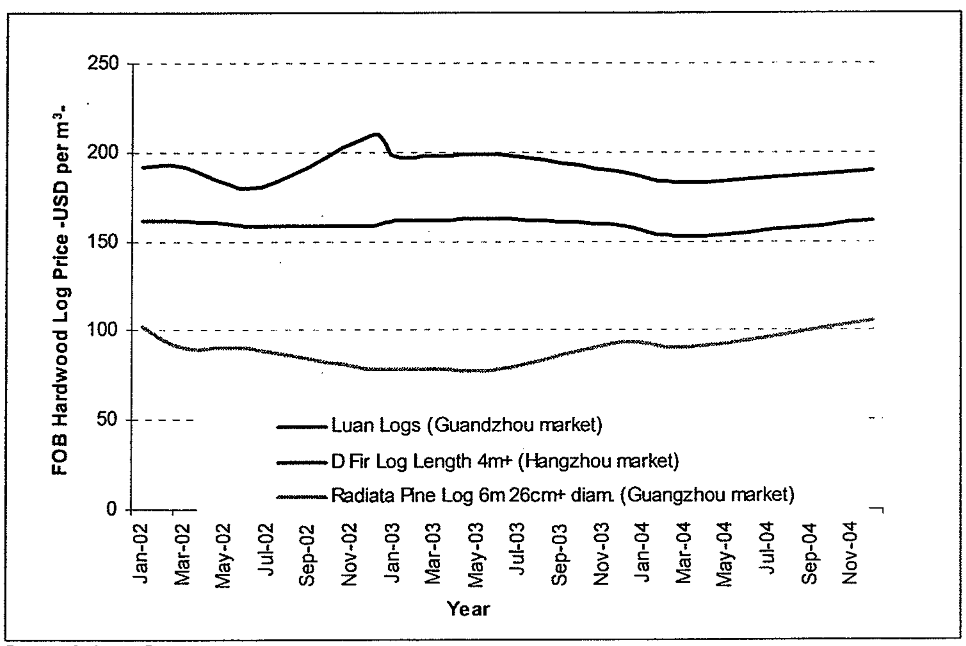
Inventories naturally play a major role. Unsold inventories can be considered as additional supply. Low consumer inventories in a weak market may not be enough to satisfy consumers' needs when orders pick up. Speculative purchases or sudden losses of production on the producers' side can change the supply/demand ratio very rapidly, and influence price movements. Exchange rate movements could have a significant impact on the projections. A weak dollar facilitates and enlarges dollar denominated price increases and reduces the rate of decline in weak market conditions. A strong dollar makes price increases smaller and more difficult to carry through, causing steeper price falls.

Based on a thorough analysis of the key factors outlined above, and other influential variables impacting pulpwood prices, Jaakko Pöyry Consulting forecasts that woodchip markets will remain steady in the short to medium term. This is supported by positive GDP forecasts and an increasing demand in China and other regional markets. The prognosis is that China's woodchip prices are likely to remain stable in the short to medium-term.

3.4.2 Sawlog Price Trends

Log prices in the key Asian markets of Japan, China and South Korea, follow similar trends. China's imported log prices have been steady, supported by strong demand. China has the potential for continued good demand in the future and log prices are expected to remain strong in this market. There is considerable optimism about this market with suggestions that volumes will continue to increase rapidly over the next few years. Some Russian logs are heading to China that had been destined for the ailing Japanese market. Hardwood log prices in China have been steady throughout 2002 to 2004, Figure 3-8.

Figure 3-8:
Nominal Hardwood Log Prices in Guangzhou and Hangzhou 2002 to 2004



Source: Industry Contacts

Against a backdrop of steady economic growth, Chinese hardwood and lumber prices are expected to remain stable over the next five years. Demand for high quality hardwood plantation logs and sawn timber for use in the furniture and interior decoration industries is expected to increase. During 2005, log prices are expected to be firm, some upward pressure. Over the next five years, it is expected that hardwood log prices in the region and in China will range from being stable to moderately increasing, due to the following factors:

- Positive economic growth will sustain construction activity and furniture manufacture for the domestic and export markets. China's average house size is expanding; hence lumber consumption in flooring is expected to grow. Interior decoration is another related segment that is expected to continue expanding in the future. Solid lumber demand will therefore sustain sawlog prices.

- Declining hardwood resources imply that prices will be maintained. However, increasing acceptance and use of softwood logs presents a possible threat to any significant price growth for hardwood logs.

- Technological developments in engineered and reconstituted wood products will mean that less costly and a reduced volume of wood material will be used. This may limit significant real price growth for solid wood lumber.

APPENDIX 3

WACC Analysis

UniServices

Auckland UniServices Limited

Our Ref: 11683.00

INVESTMENT APPRAISAL FOR FOREST INVESTMENT IN CHINA

AUCKLAND UNISERVICES LIMITED

a wholly owned company of

THE UNIVERSITY OF AUCKLAND

Prepared for:

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December 2005

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UniServices

Auckland UniServices Limited

Investment Appraisal for Forest Investment in China

A. Background

You have requested Auckland UniServices Limited ("Auckland UniServices" or "we") update our report of February 2005 and provide a US dollar denominated *estimate* of the cost of capital based on the application of the capital asset pricing model for a generic forest investment located in China.

B. Declaration, recipients of our report, use of our advice and restrictions on the use of this report

This report has been prepared for Jaakko Pöyry Consulting Ltd ("Jaakko Pöyry"). The report is written by Dr Alastair Marsden on behalf of Auckland UniServices and has been based on information available up to 16 December 2005. The cost of capital estimates applies as at that date.

Because of its special nature, our report may not be suited for any purpose other than as described in this report and as such, will be restricted for use by Jaakko Pöyry only. We understand, however, a copy of our report may be attached to a valuation report prepared by Jaakko Pöyry on behalf of its clients who have instructed Jaakko Pöyry to value forest assets located in China.

Our report is issued subject to the statement of independence, qualifications, declaration, disclaimer and restrictions on use as set out in Appendix 1.

C. Information Sources

In preparing this report we have relied on information received from:

- Data sourced from Bloomberg and the Ratings Agencies;
- Other articles (where referenced) and sources; and
- Discussions with yourself.

In accordance with the terms of our engagement letter we have not audited or independently verified any of the information sourced or provided to us.

D. Introduction to capital budgeting and cost of capital in developing markets:

An estimate of the cost of capital is critical to value any entity or investment project using discounted cash flow ("DCF") analysis.

Investments in developing markets are generally perceived to have higher risk compared to investments in countries with a stable political and economic environment. Risks of investing in developing markets include high inflation, capital controls, political instability, corruption, poor accounting and managerial controls, an uncertain legal framework and lack of protection of investor property rights.

The alternative conceptual approaches to recognise these "risks" using DCF analysis and to value an entity in a developing country are to:[1]

- Discount 'promised' cash flows at a cost of capital that includes a risk premium. Under this approach an increment is added to the cost of capital to recognise risk that is not explicitly modelled into the cashflow expectations; or
- Discount 'expected' cash flows based on probability-weighted scenarios, at a cost of capital. Under this approach certain specific country risks will likely result in a downward adjustment in cash flow expectations compared to the alternative approach of adding an increment to the cost of capital.

To recognise the higher perceived risk of investing in developing markets, common practice is to adopt the first approach and adjust the discount rate by adding a premium to the cost of capital that incorporates an increment for country-risk premium factors (see Keck at al (1998), Lessard (1996)).

James and Koller (2000) argue, however, that the better (alternative) approach to capital budgeting in markets is to recognise specific project or unique country risks in the expectations of cashflows. First, with increased global integration of capital markets investors can diversify away from many specific country risks such as expropriation and war. Such an approach is arguably more consistent with the assumptions of the global capital asset pricing model that we use later in this report to determine the cost of capital for developing markets. Second, many country risks maybe unique or idiosyncratic to that country and may not apply equally to all industries in that country. Third, use of the credit risk of the country to determine the cost of capital for an entity may be a poor proxy for the entity's risk.

We are not privy to the specific risks that Jaakko Pöyry proposes to model in the cashflows to value the China forest assets. However, the range of cost of capital estimates that we derive in this report incorporate varying levels of country risk premia.

E. Overview of different CAPM models to estimate the cost of equity for developing markets

E.1. Use of Capital Asset Pricing Model ("CAPM") in developing markets

The risks attributable to any investment can broadly be classified as:

- Systematic or non-diversifiable risk, e.g., world market risk, macro-economic risks associated with shocks to GNP, interest rates etc; and
- Non-systematic or unique projects risks. For developing markets these are often one-sided or asymmetric (and primarily of a 'downside nature'). These include political and country risks such as expropriation, war and uncertainty about government, economic or regulatory policies.

[1] See Chapter 19, Copeland, T., Koller, T. and J. Murrin, 2000.

Under the standard capital asset pricing model ("CAPM") risk is measured by the beta of a project or investment. Beta only captures systematic or non-diversifiable risk in the firm or project.

We summarize below a number of different CAPM based and other "cost of capital" models suggested in the academic literature to calculate the cost of capital for investments in developing markets.[2]

E.2. Global CAPM

Under the global CAPM the expected return on equity, R_{ei}, for the company is given by:

$$R_{ei} = R_{f\,Global} + \beta_{i\,Global} * (R_{M\,Global} - R_{f\,Global})$$

This assumes that markets are globally integrated and investors are holding a globally diversified portfolio. In this case, the relevant benchmarks are the global risk-free rate ($R_{f\,Global}$) and the return on the global market portfolio ($R_{M\,Global}$). The beta of local asset i ($\beta_{i\,Global}$) is measured against the global market portfolio. Country risk is not accounted for in this model since it is assumed to be diversifiable. The term ($R_{M\,Global} - R_{f\,Global}$) represents the global market risk premium.

E.3. Local CAPM

Under the local CAPM the expected return on equity, R_{ei}, for the company is given by:

$$R_{ei} = R_{f\,Local} + \beta_{i\,Local} * (R_{M\,Local} - R_{f\,Local})$$

When the global market assumptions are invalid, country risk becomes relevant. In particular, if markets are segmented, it may be appropriate to apply the local version of CAPM. In the local CAPM, the local risk-free rate ($R_{f\,Local}$) and return on the local market portfolio ($R_{M\,Local}$) are used as benchmarks, with the beta of asset i ($\beta_{i\,Local}$) measured against the local market portfolio. The local risk-free rate ($R_{f\,Local}$) would incorporate a default risk premium above some global risk-free rate benchmark.

E.4. Adjusted Hybrid CAPM

The adjusted hybrid CAPM is:

$$R_{ei} = R_{f\,Global} + R_{Country\,Risk} + \beta_{Local\,Global} * \beta_{i\,Global} * (R_{M\,Global} - R_{f\,Global}) * (1 - R^2)$$

where $R_{f\,Local} = R_{f\,Global} + R_{Country\,Risk}$

This hybrid version of the CAPM differs from the Global CAPM in two aspects.

[2] See Pereiro (2001) for an overview of some of the different cost of capital models that may be applied to emerging markets.

First, the country default risk premium ($R_{Country\ Risk}$) is added to the global risk-free rate. Second, the global risk premium of the project, ($\beta_{i\ Global}$ * ($R_{M\ Global} - R_{f\ Global}$)), is multiplied by the country beta ($\beta_{Local\ Global}$) and a factor of ($1 - R^2$). The country beta is simply the regression slope of the local market returns against the global market returns. The term R^2 is the amount of variance in the return of the local market that is explained by country risk (i.e. the coefficient of determination in the regression of local market returns against country risk). The purpose of the adjustment ($1 - R^2$) is to ensure that the inclusion of the country risk premium into the CAPM equation does not double count risk, if part of the country risk is already incorporated in the market risk premium.

E.5. Godfrey-Espinosa (1996) Model

Under this model the cost of equity capital for a developing market ($R_{e\ Country}$) is given by:

$$R_{e\ Country} = R_{f\ US} + R_{Country\ Risk} + (\sigma_{Local\ Equity} / \sigma_{US})*0.6*(R_{M\ US} - R_{f\ US})$$

The Godfrey-Espinosa (1996) Model provides a pragmatic approach to estimating the US dollar cost of equity in developing markets. $R_{f\ US}$ is the US risk free rate. The beta for a developing market is calculated by the ratio of its equity market volatility to the US market volatility ($\sigma_{Local\ Equity} / \sigma_{US}$). Implicitly this assumes a perfect correlation between the two markets (note that beta is defined as $\rho*(\sigma_{Local\ Equity} / \sigma_{US})$). Again, to avoid double counting of country risk, the developing market risk premium is assumed to be 60% of the US market risk premium (the later being $R_{M\ US} - R_{f\ US}$). The 60% level is an ad hoc estimate of the ($1 - R^2$) factor explained under the Adjusted Hybrid CAPM Model above.

The Godfrey-Espinosa Model can be refined to provide a US cost of equity for an individual project in a developing market, as suggested by Lessard (1996). The market risk premium, ($\sigma_{Local\ Equity} / \sigma_{US}$)*0.6*($R_{M\ US} - R_{f\ US}$), can be multiplied by the beta of a comparable home country project to arrive at the overall equity risk premium of the individual project.

The refined Godfrey-Espinosa model can be regarded as a special case of the more general Adjusted Hybrid CAPM.

E.6. Damodaran Models

Under Damodaran's (2003) model the expected return on equity, R_{ei}, for the company is given by:

$$R_{ei} = R_{f\ US} + \beta_{i\ US} * (R_{M\ US} - R_{f\ US}) + \text{Country risk premium}$$

Under this model we estimate the country equity risk premium[3] as the product of the *country default bond spread* ($R_{Country\ Risk}$) and the ratio of local equity market

[3] Damodaran (2003) suggests a number of ways to the estimate the country risk premium. This includes estimates based on (i) the *country bond default spread*; (ii) the product of the global market risk premium and the ratio of local equity market volatility and US (global) market volatility ($\sigma_{Local\ Equity}/\sigma_{US}$); and (iii) the product of the *country bond default spread* ($R_{Country\ Risk}$) and the ratio of local

volatility and country bond volatility ($\sigma_{Local\ Equity}/\sigma_{Country\ Bond}$). The $\beta_{i\ US}$ is the equity beta for an equivalent or comparable US based project.

For individual projects, the Damodaran country risk premium can be incorporated into the cost of equity in three different ways.

i) The same country risk premium is assumed for all projects in the country:

$$R_{ei} = R_{f\,US} + \beta_{i\,US} * (R_{M\,US} - R_{f\,US}) + (R_{Country\ Risk}) * (\sigma_{Local\ Equity}/\sigma_{Country\ Bond})$$

ii) The country equity risk premium is adjusted by the equity beta of the project:

$$R_{ei} = R_{f\,US} + \beta_{i\,US} * [R_{M\,US} - R_{f\,US} + (R_{Country\ Risk}) * (\sigma_{Local\ Equity}/\sigma_{Country\ Bond})]$$

iii) The country equity risk premium is adjusted by a 'lambda' coefficient that measures the individual project's exposure to country risk:

$$R_{ei} = R_{f\,US} + \beta_{i\,US} * (R_{M\,US} - R_{f\,US}) + \lambda_i * (R_{Country\ Risk}) * (\sigma_{Local\ Equity}/\sigma_{Country\ Bond})$$

E.7. Estrada Model

Estrada (2000) model

Under this model the cost of equity capital for an developing market ($R_{e\ Country}$) is given by

$$R_{e\ Country} = R_{f\ US} + DR_{Country} * (R_{M\ Global} - R_{f\ Global})$$

Estrada (2000) proposes that downside risk is a more pertinent risk measure for developing markets. The downside country risk measure ($DR_{Country}$) is calculated as the ratio of the local market semi-deviation to that of the global market.

The semi-deviation, ε, is defined with respect to the arithmetic mean return (R) of each market. For instance, the semi-deviation for the local market is defined as:

$$\varepsilon_{Local} = \sqrt{\sum_{i=1}^{T} \frac{(R_i - \bar{R}_{M\ Local})^2}{T}} \quad for\ all\ R_i < \bar{R}_{M\ Local}$$

Two factors can lead to a high downside risk measure for an developing market - when the distribution of local market returns has a fatter 'left-tail' than that of the global market, and/or when the distribution of local market returns is more skewed to the left relative to the global market.

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equity market volatility and country bond volatility ($\sigma_{Local\ Equity}/\sigma_{Country\ Bond}$). We use this third approach as method (ii) is similar to the Adjusted hybrid CAPM and the Godfrey-Espinosa models.

Estrada (2002) model

In a later paper Estrada (2002) proposes a further measure of downside risk where the cost of equity capital is measured as:

$R_{e\ Country} = R_{f\ US} + \beta_{i\ Downside}*(R_{M\ Global} - R_{f\ Global})$

Where:

$\beta_{i\ Downside} = \sum_{im} / \sum_{m}^{2}$

$\sum_{im}$ = downside covariance between the asset and the market.[4]

$\sum_{m}^{2}$ = market's downside variance of returns.

Estrada (2000, 2002) argues that the downside risk measure explains the cross-section of both market and industry sector returns in developing markets better than the traditional systematic risk (i.e. beta) measure. Unlike the Adjusted Hybrid CAPM, Godfrey-Espinosa and Damodaran models, the Estrada models also have the advantage that it does not depend on the country default risk premium or default spread. Both of the $R_{Country\ Risk}$ and $R_{Default\ Spread}$ measures could be volatile since they are influenced by short-term political or economic uncertainties.

For developing markets the downside risk measure is typically higher than the systematic risk measure under the Global CAPM. Therefore, the Estrada models provide a cost of capital estimate that generally falls between the Global and Local CAPM, given that costs of capital under the Local CAPM for developing markets are usually high. The Global CAPM is valid when all markets are fully integrated, while the Local CAPM is valid when markets are segregated. Hence the cost of capital estimate under the Estrada Models is generally consistent with the notion that developing markets are partially integrated, which is likely under current global markets conditions.[5]

[4] See Estrada (2002) for the more technical definition of this term.

[5] Akers and Staub (2003) also consider the assumption that timber assets are priced in a fully integrated global market is too strong.

F. Application of suggested approaches to estimate weighted average costs of capital for forestry projects in China.

The six models (and sub-models) discussed in the prior section above are used to estimate the cost of capital for the forestry sector in China.

F.1. Assumptions

Assumptions with respect to global risk parameters are presented in Table 1 below.

Table 1: Global risk parameters

	US	*Global*
Beta of US forestry firms ($\beta_{I\,US}$)	0.725	0.725
Risk-free rate - global ($R_{f\,Global}$)	4.60%	4.60%
Market risk premium	5.00%	5.00%
Market volatility (s)	15.0%	*not required*
Expected inflation	2.50%	*not required*

F.1.1. Parameter estimates in Table 1

Risk free rate

The average yield as at December 2005 on circa 8-year and 22-year long-term USD Government bonds (circa 4.6%[6]) is assumed to be a proxy for the global long-term risk free rate.

Market risk premium

The *MRP* can be estimated in a number of ways. These include simple historical averaging of the observed risk premium, forward-looking approaches, the methodology of Siegel (1992) and survey evidence.

In respect of historical averaging Dimson, Marsh and Staunton (2005, Table 11, p39) provide estimates of the historical arithmetic *MRP* for 17 developed countries over the period 1900 – 2004. The average historical *MRP* or market excess return relative to long-term bonds varies between 3.0% (Denmark) and 9.7% (Japan) with an average of 5.1%.[7]

Most forward-looking estimates of the *MRP* are lower than the historical estimates of the *MRP*. For example, Fama and French (2002) generate forward-looking estimates for the US standard market risk premium of 2.6%-4.3% over the period 1951-2000.

[6] Source: Bloomberg 16 December 2005. As at 16 December 2005 US Treasuries maturing 2027 were yielding circa 4.665% (semi-annual) and US Treasuries maturing 2013 were yielding around 4.456% (semi-annual). The average of these two rates is circa 4.6% (with annual compounding).

[7] The countries and historical arithmetic mean market risk premia estimates over the period 1900 – 2004 are Australia (7.8%), Belgium (4.2%), Canada (5.6%), Denmark (3.0%), France (5.8%), Germany (8.3%), Ireland (5.1%), Italy (7.7%), Japan (9.7%), Netherlands (5.8%), Norway (4.2%), South Africa (6.8%), Spain (4.1%), Sweden (7.3%), Switzerland (3.1%), United Kingdom (5.2%) and the United States (6.6%).

Similarly Claus and Thomas (2001) generate estimates of the *MRP* for a number of countries with a maximum of 3.0%.

Dimson, Marsh and Staunton (2005) also argue a downward adjustment to the measured historical *MRP* is justified if there has been a long-term change in capital market conditions and investors' required rates of return in the future are expected to be lower than in the past.[8] Dimson et al conclude a plausible estimate of the ex-ante arithmetic *MRP* measured relative to short-term bonds is around 5.0%. Relative to long term bonds the *MRP* would be circa 4.0%. However, Ibbotson and Chen (2003) argue based on a decomposition of historical equity returns into supply factors of inflation, earnings, dividends, the price to earnings ratio, dividend payout ratio, book value, return on equity and GDP that the forecast arithmetic *MRP* (relative to long-term bonds) is around 6.0% for the United States.[9] Lastly recent survey evidence by Welch (2001) reports an ex-ante *MRP* of 5.5% for the US.

In conclusion we assume the ex-ante US and global *MRP* to be 5.00%. While this is lower than historical estimates of the US market risk premium and the market risk premium for many developed countries, the assumption of full market integration under a global CAPM should lead to greater diversification of risk and hence lower the forward-looking market risk premium.

Global Beta

As already noted beta is a measure of the systematic risk of a firm (i.e., non-diversifiable risk or that part of the risk of an asset that cannot be diversified away). Beta is a relative risk measure and measures the sensitivity of returns on a stock relative to market returns (e.g., in response to macroeconomic shocks to GDP, interest rates, taxes etc.). The beta of the market is one.

Estimation of beta almost invariably involves an element of judgement.

Some empirically measured asset betas for US, Canadian, Australian and NZ companies in the building / forest and paper businesses are provided below.[10] The sample shows an "average" range of asset betas of 0.65 (OLS asset betas) and between 0.56 and 0.74 (Value line asset betas – US companies only).

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[8] Siegel (1992, 1999) argues that historical US estimates of the *MRP* have been biased upwards due to unexpectedly high inflation in the latter part of the 20th century.
[9] A review article by Mehra (2003) on the equity risk premium puzzle also concludes that the *MRP* is likely to be similar to what it has been in the past. The equity risk premium puzzle refers to the inability of standard economic models to explain why the *MRP* has been so high in many developed countries such as the United States.
[10] Data sourced from Damodaran (2005).

Market	Industry	Number of companies	Asset Beta (OLS)	Asset Beta (Value Line)
United States[11]	Paper/Forest Products	20	0.66	0.74
Australia / Canada / NZ	Building products	19	0.65	Not provided
Australia / Canada / NZ	Forestry	10	0.60	Not provided
Australia / Canada / NZ	Paper & Related Products	6	0.67	Not provided
Average across industries / market			**0.65**	**0.74**

Value line beta estimates sourced from the website of Damodaran (2005) for paper/ forest companies over the years 2000-2005 are as follows.

US Betas - Data from Value Line

Industry classification	*Year*	*Number of Firms*	*Average Equity Beta*	*Market D/E Ratio*	*Tax Rate*	*Unlevered Asset Beta*
Paper/Forest Products	2005	39	0.86	65.8%	14.2%	0.55
Paper/Forest Products	2004	40	0.86	65.5%	15.8%	0.56
Paper/Forest Products	2003	40	0.84	71.9%	47.1%	0.61
Paper/Forest Products	2002	44	0.84	72.2%	30.3%	0.56
Paper/Forest Products	2001	48	0.83	74.1%	27.0%	0.54
Paper/Forest Products	2000	48	0.78	61.1%	32.4%	0.55
	Average	**43**	**0.84**	**68%**	**28%**	**0.56**

A study by Akers and Staub (2003), however, reports higher asset beta estimates of between 0.67 and 0.76 for US timber assets measured relative to a global market portfolio.

The average of Damodaran's estimates for US firms and Akers and Staub's estimates is circa 0.60 to 0.70. Assuming an effective average US corporate tax rate of 30% for timber investments and an assumed debt to equity ratio of 15:85 for a forest entity, the equity beta is 0.67 to 0.79.[12] We assume an *equity* beta of 0.725 for forestry firms in applying the global CAPM.

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11 For US stocks, betas with less than zero were discarded from the sample.
12 Based on Damodaran's beta degearing formula.

US market volatility

Our estimate of the forward looking annualised US and global market volatility is 15.0%. This is based on the measured volatility of 15.7% for the Morgan Stanley (MSCI) US market monthly index from November 1995 to November 2005 and the volatility of MSCI All Countries Free Index of 14.6% over the same period. Cavaglia, Brightman and Aked (2000, Table 1) also report an estimate of the US market volatility equal to 15.3% for the period 1986 to 1999.

US inflation rate

The expected long-term US inflation rate is assumed to be 2.50%.[13] This rate is used to deflate the US nominal WACC to calculate the US real WACC.

[13] Based on the difference between the 10-Year Inflation-Indexed Treasury yield of circa 2.1% and a 10-Year Treasury Note Yield yielding circa 4.50% as reported by the Federal Reserve Bank of St Louis, December 2005.

Assumptions specific to the China market are summarised in Table 2.

Table 2: Parameters used for China	
Local Beta ($\beta_{i\ Local}$)	0.725
Global beta ($\beta_{i\ Global}$)	1.13
Sensitivity to country risk premium (λ_i)	1.2
Beta of country ($\beta_{Local\ Global}$)	0.11
Risk-free rate- local ($R_{f\ Local}$)	5.6%
Country bond default spread ($R_{Country\ Risk}$)	1.00%
Local market risk premium	8.77%
R-square of market return against country risk (R^2)	0.38
Market volatility ($\sigma_{Local\ Equity}$)	26.3%
Volatility of default spread ($\sigma_{Default\ Spread}$)	18%
Downside risk measure ($DR_{Country}$)	1.26
Downside risk measure (DR_{Forest})	1.11
Downside beta estimate	1.39
Corporate tax	33.00%
Debt margin	2.00%
Debt ratio	15.00%

F.1.2. Parameter estimates in Table 2

Local Beta ($\beta_{i\ Local}$)

The estimate of the local beta for China is 0.08. This estimate is obtained from regressing monthly returns (in USD over the period November 1995 to November 2005) on the Morgan Stanley Emerging Market forestry and paper products index against the Shanghai A Share Market index for China. This empirical estimate assumes that the forestry and paper products index is representative of individual indices in the Chinese market given the lack of data on individual indices.

A local beta estimate of 0.08 (i.e., the sensitivity of returns on a domestic share measured relative to domestic market returns) is very low. Most empirical beta estimates for monopoly companies measured relative to their domestic market like regulated electricity, gas and water utilities have asset betas of at least 0.25-0.45 (e.g. see Damodaran, 2005).

In estimating the cost of capital for a Chinese forest entity we therefore assume a local equity beta of 0.725 (equal to the beta estimate under the global CAPM model).

Global beta ($\beta_{i\ Global}$)

The global equity beta of forest investments is assumed to be 1.13. This is estimated using the beta coefficient from regressing monthly returns in USD over the period November 1995 to November 2005 on the Morgan Stanley Emerging Market forestry and paper products index against the Morgan Stanley All Countries Free index. Again, we assume that the forestry and paper products index is representative of individual forest country indices given the lack of data.

Sensitivity to country risk premium (λ_i)

The term λ_i is the sensitivity of each project / company to country risk. (Damodaran, 2003). The average value of λ_i is one. Forestry companies that sell on the domestic market are likely to have greater exposure to country risk factors compared to manufacturing companies that export and sell their products on the international market.

However, recent evidence by Cavaglia, Brightman and Aked (2000) suggests that with increased worldwide market integration, industry risk factors are growing in relative importance to country risk factors. The study by Cavaglia, Brightman and Aked is, nevertheless, confined to developed markets. Evidence by Harvey (1995) finds returns in developing markets are still likely to be influenced by local (domestic) factors compared to market returns in more developed countries.

In this respect we understand the timber in the Chinese forest will be sold almost entirely into the domestic market (i.e., no exports) and with prices set domestically. Similarly costs to harvest and produce the timber are exposed to Chinese country risk. We therefore assume the value of λ_i for a forest company in a developing market of China is 1.2 (i.e., above average exposure to Chinese country risk).

Beta of country ($\beta_{Local\ Global}$)

The MSCI All Countries Free index over the period November 1995 to November 2005 is used as the global index to estimate the country beta (relative to the Shanghai A Share Market index for China) of 0.08.

This empirical beta estimate is low and should be treated with caution. However, Mishra and O'Brien (2003, Table 3) provide a similar estimate (average 0.14 over the period 1998 to 2000) for the global beta estimate of China.

We take an average of these two estimates and assume $\beta_{Local\ Global}$ equals 0.11.

Risk-free rate - local ($R_{f\ Local}$) and country bond default spread

In accordance with Damodaran (2003) the *country bond default spread* is estimated as the difference between USD denominated bonds issued by a foreign country and USD Treasury bonds of similar maturity.

The local risk free rate *($R_{f\ Local}$)* in USD also equals the global Risk-free rate *($R_{f\ Global}$)* plus the *country bond default spread.*

China risk free rates and bond spreads

The 'risk-free' rates are obtained from the average traded yields on long-term US dollar sovereign bonds issued by the Chinese Government observed as at 16 December 2005. Chinese bonds denominated in USD traded at yield spreads (premiums) of between circa 0.3% and 1.30% as follows: [14]

Bond maturity (yrs)	Yield (semi-annual)	Spread over similar term USD Treasury bonds
0.6 yrs	4.835%	0.54%
3.0 yrs	4.696%	0.33%
7.9 yrs	5.038%	0.62%
21.9 yrs	5.922%	1.30%

Current credit ratings for Chinese Long Term Foreign Currency effective November / December 2005 are as follows:

Rating agency	Long-term rating	Comment
Moodys	A2	Upper-medium grade and subject to low credit risk
Standards & Poor	A- (outlook positive)	Strong capacity to meet financial commitments
Fitch	A	High credit quality

Source: Moody's, Standard and Poors and Fitch Ratings websites.

For China we assume a *country bond default spread* (weighted towards longer term bonds) of circa 1.00%. Based on the USD Treasury risk free rate of 4.60%, the local risk free rate ($R_{f\,Local}$) is estimated at 5.60%.

Market volatility ($\sigma_{Local\ Equity}$) and Volatility of default spread ($\sigma_{Default\ Spread}$)

The Shanghai A share Market index for China over the period November 1995 to November 2005 for China is used to estimate the respective market volatility ($\sigma_{Local\ Equity}$). The empirical estimate is 26.3%.[15] We assume the ratio of the market volatility to the volatility of default spreads ($\sigma_{Default\ Spread}$) is 1.5.[16]

Local market risk premium

Damodaran (2003) offers an estimate of the local market risk premium for a developing country as:

MRP Local = MRP Global * $\sigma_{Local\ Equity} / \sigma_{Global}$

[14] Source Bloomberg, 16 December 2005.
[15] For the 1998-2000 years Mishra and O'Brien (2003, Table 4) report an average volatility estimate for the Chinese market of 20.4%
[16] See Damodaran (2002).

In accordance with our estimates for $\sigma_{Local\ Equity}$ (equal to 26.3% as noted above) and σ_{Global} as proxied by the US market (15.0%), the MRP local equals 5% * 26.3% / 15.0% = 8.77%. We assume this annualised local market risk premium for China.

Our estimate of the local MRP for China is less than Salomons and Grootveld's (2003) empirical estimate of the average historical market risk premium (12.7%) for a number of developing countries in Latin America, Africa, The Middle East and Eastern Europe.[17]

R-square of market return against country risk (R^2)

We assume the R-square estimate in the market risk-country risk relationship is 0.38. This is the average R-square estimate for a number of emerging Latin-American markets taken from Pereiro (2001, Table 13).

Downside risk measure ($DR_{Country}$)

The MSCI All Countries Free index over the period November 1995 to November 2005 is used as the global index to estimate the country betas of China. Together with the country indices for China, this global index is also used to compute the downside risk measures ($DR_{Country}$) using ratios of semi-deviations. Over this period the empirical downside risk measure equals 1.26 for China.[18]

Since the Estrada Model (2000) only provides a generic estimate for a country cost of capital, we modified our downside risk estimate by a factor of (2.02/2.30) in calculating the cost of equity capital. This adjustment is based on Estrada's (2001) estimate of the downside risk measure for the Forestry and Paper Products sector in developing markets of 2.02, and the average downside risk estimate for all sectors of 2.30.[19] We did not estimate the downside risk measure for the forestry sector within China directly due to the lack of country specific data.

Under the Estrada (2002) model we assume the country downside beta is 1.39 for China. This downside beta estimate with respect to the world market is drawn from Estrada (2002, Table 4).

Corporate tax rate

Based on information provided by Jaakko Pöyry and discussions with you we assume the corporate tax rate is 33% in China.

We note, however, that the presence of tax concessions in the Chinese market may lower the effective corporate tax rate. A lower effective corporate tax rate would

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[17] For China Salomons and Grootveld (2003) estimate a mean annualised MRP of 8.0% over the period 1993-2001. Miller and Zhang (2003) also estimate the average equity risk premium between 7.3% and 7.9% over the period 1997 to mid-2002 for the Chinese market. These historical estimates of the MRP for the Chinese market are, nevertheless, based on a relatively short time period. Our estimate of the local MRP for China uses the global MRP based on a longer time series.

[18] Estrada (2000, Exhibit 3) reports downside risk measures for China of 2.66 measured over the period 1988 - 1998. Our lower downside risk measure may reflect an increased "maturity" in the Chinese equity market.

[19] See Exhibit 3, Estrada (2001).

raise our post-tax WACC estimate. The forest value may still, however, be greater due to higher expected after-corporate tax cashflows.

The presence of "tax holidays" and tax losses that can be carried forward also potentially introduce considerable complexity into capital budgeting. A discussion of capital budgeting (and cost of capital) under time varying tax rates is outside the scope of this report.[20]

Debt margin and debt ratio

We do not have detailed information to accurately determine a debt margin for a forest project in the developing market of China. For the WACC calculated using the global CAPM we assume a debt margin of 2.0% over the US Government bond rate $(R_{f\,Global})$. For the WACC determined under all the other models we also assume a debt margin over the local risk free rate $(R_{f\,Local})$ of 2.0%.

To calculate the WACC we assume a debt to equity ratio of 0.15:0.85. Chen (2003) reports that Chinese companies have low levels of long-term debt compared to companies in more developed markets.

F.2. Economic data

You have requested us not to provide any commentary on the economic outlook or political developments in China. We understand this may be covered in a separate report prepared by Jaakko Pöyry. In Appendix II we graph the stock market performance for the Shanghai A market index in China and also the MSCI Emerging markets index for paper and forestry products.

[20] See Cheung and Marsden (2002) for a discussion of some of the complexities of capital budgeting in the presence of initial tax losses.

G. Results

The estimated cost of equity capital and weighted average cost of capital ("WACC") denominated in USD (both nominal and real) under each of the six models and sub-models are summarised in Table 3. These estimates are all *post-corporate* tax.

The adjusted hybrid CAPM produces the lowest real post-corporate tax WACC estimate of 3.3%. However this is based on an empirical estimate for the Chinese country beta of 0.11 and the resulting WACC is below the WACC under the Global CAPM (5.0%), that implicitly assumes fully integrated markets and low risk exposure for any given asset. Hence we place no weight on the WACC estimate under the adjusted hybrid CAPM model.

The real WACC estimate under the Local CAPM is 8.2%. The Local CAPM model implicitly assume segregated markets and hence a higher risk exposure for the same given asset.

The estimates under the Godfrey-Espinosa Models, Damodaran's models and Estrada's models lie between the cost of capital estimates assuming market segmentation and full market integration.

The average real post-corporate tax WACC for all models is 6.4%. Excluding the adjusted hybrid CAPM the average real post-corporate tax WACC is **6.7%.**

Table 3: Weighted Average Cost of Capital Estimates from 6 Different Models for Forestry Firms in China

	China		
Results (post-corporate tax)	***Re***	*WACC*	*WACC (real)*
1. Global CAPM	8.2%	7.7%	5.0%
2. Local CAPM	12.0%	10.9%	8.2%
3. Adjusted Hybrid CAPM	6.0%	5.9%	3.3%
4. Godfrey-Espinosa Model	10.9%	10.0%	7.3%
a. Refined Godfrey-Espinosa	9.4%	8.8%	6.1%
5. Damodaran Models			
a. Same risk premium	9.7%	9.0%	6.4%
b. Beta adjusted premium	9.3%	8.7%	6.0%
c. Lambda adjusted premium	10.0%	9.3%	6.6%
6. Estrada Models			
a. 2000 model	10.1%	9.4%	6.7%
b. 2002 model	11.6%	10.6%	7.9%
Average	**9.7%**	**9.0%**	**6.4%**
Average (excluding adjusted hybrid CAPM)	**10.1%**	**9.4%**	**6.7%**

H. Summary and determination of a pre-tax WACC

The range of the real after corporate tax WACC's based on the models in Table 3 are summarised in Table 4 below. As already discussed we exclude the estimate under the adjusted hybrid CAPM model.

Table 4: Summary of real post-tax cost of capital (WACC) estimates

Country	Lower bound estimate (including adjusted hybrid CAPM)	Average estimate (including adjusted hybrid CAPM)	Upper bound estimate (including adjusted hybrid CAPM)
China	5.0%	**6.7%**	8.2%

Conversion to a real pre-tax WACC

There is no easy or simple method to transform a nominal post-tax WACC to a real pre-tax WACC. In this respect formal modelling of the entity's cashflows is required to determine an "equivalent" pre-tax WACC.

However, to an approximation we assume:[21]

$$\text{Pre}-tax\ WACC = \frac{Post-tax\ WACC}{1-t_c}$$

Where t_c = corporate tax rate.

Based on this transformation our indicative estimate of the real pre-tax WACC (denominated in USD) is between 7.5% and 12.3% as follows:

Table 5: Summary of real pre-tax cost of capital (WACC) estimates

Country	Lower bound estimate (including adjusted hybrid CAPM)	Average estimate (including adjusted hybrid CAPM)	Upper bound estimate (including adjusted hybrid CAPM)
China	7.5%	**10.0%**	12.3%

[21] In the case of forests where the timber is not expected to be harvested until some relatively long time in the future, this transformation may, nevertheless, overstate the "equivalent" pre-tax WACC.

I. Size, liquidity and other premiums

In our determination of the cost of capital and WACC we have made no adjustment for factors such as size, control premiums, illiquidity premiums and other market frictions. We have discussed these factors in our prior reports to you.[22]

Making an ad-hoc adjustment to the "standard" CAPM model rate of return for size and liquidity measures is somewhat arbitrary. However, we understand from anecdotal evidence that many practitioners and forest valuers add an increment to the cost of capital to value small illiquid forests and/or where other significant market frictions may exist.

J. Comparison to our cost of capital estimate for a Chinese forest entity in our report of February 2005.

In our report of February 2005 we estimated the post-tax real WACC in USD for a forest entity in China would lie in a range between 5.1% and 8.3% and the "equivalent" pre-tax real WACC would be between 7.6% and 12.4%.

Our marginally lower cost of capital as at December 2005 arises due to a slight reduction in the local market risk premium and the estimate of the local market volatility. However this is offset by the assumption of a slightly more conservative debt to equity ratio (now 0.15:0.85 instead of 0.20:0.80). As already noted, most empirical evidence suggests Chinese companies have lower leverage than companies in more developed countries.

The marginally lower cost of capital estimate is consistent with a small improvement in the credit rating for long-term foreign currency debt as measured by Standards and Poors (from BBB+ to A-). The credit rating of Moodys and Fitch for Chinese long-term foreign currency debt has not, however, changed since January / February 2005.

K. Conclusion

In conclusion we consider a real post-corporate tax weighted average cost of capital (denominated in USD) for a China forest entity will be in the likely range of between 5.0% and 8.2%. The corresponding real pre-corporate tax weighted average cost of capital (denominated in USD) is between 7.5% and 12.3%.

Our cost of capital estimates are all denominated in USD.

To the extent that the Chinese market is still not fully integrated into domestic capital markets our view is that a cost of capital estimate towards the upper end of our range is more appropriate for a forest entity where all timber is sold domestically. For a

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[22] We would be happy to expand on this point more if required. For a discussion on liquidity premiums for forest investments see Akers and Staub (2003). Pereiro (2001) also reviews liquidity premiums, control premiums and other non-systematic risk factors in the context of emerging markets in Latin America. For more developed countries and other evidence on size and liquidity premiums see Banz (1981), Fama and French (1993, 1996), Ibbotson and Associates (2004), Malkiel and Xu (2000) and Amihud and Mendelson (1986).

post-tax real WACC this would suggest a range between **6.7%** and **8.2%.** The "equivalent" pre-tax real WACC would be between **10.0%** and **12.3%.**

To the extent that agency cost issues between the Chinese state, corporate insiders and outside investors limit the extent of financial globalization, use of a cost of capital at the upper end of our range would be warranted.[23]

Our assumptions are derived under the CAPM models only. We have noted the shortcomings of these models and recommend (to the extent such evidence is available) our estimates be compared to implied discount rates based on transactional evidence for actual forest sales in the Chinese market. We also note the Chinese legal, institutional and bankruptcy laws differ to Western capital markets. This may warrant an adjustment to the cashflow expectations from the forest if investors' property rights are not clearly defined.

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[23] See Stulz (2005).

Appendix I

This appendix forms part of and therefore should be read in conjunction with this valuation report and our engagement letter of November 2005.

Independence

Auckland UniServices do not have any interest in the outcome of this valuation. The fee proposed by Auckland UniServices in our engagement letter for the preparation of this report is solely time based which are charged at normal professional rates plus disbursements.

Qualifications

Auckland UniServices is the consulting arm of The University of Auckland.

Recipients of the report

The report has been prepared for Jaakko Pöyry Consulting Ltd ("Jaakko Pöyry") to assist in the valuation of forest assets located in the markets of China.

Because of its special nature, our report may not be suited for any purpose other than as described in this report and as such, will be restricted for use by Jaakko Pöyry only. We understand, however, a copy of our report may be attached to a valuation report prepared by Jaakko Pöyry on behalf of its clients who have instructed Jaakko Pöyry to value forest assets located in China.

Declaration

This report was prepared based on information available up to 16 December 2005. The findings and opinions contained in this report are expressed as at that date, and reflect our assessment of the information provided to us, as it existed at the date of this report.

This exercise is based upon information that has been supplied to us and described in this report. Much of the information forms the basis of future projections and estimates. As the achievement of any prediction is dependent on future events, the outcome of which cannot be assured, the actual results achieved may vary materially from forecast. In the circumstances, no warranty of accuracy or reliability is given.

In preparing our valuation we have received and relied upon the information received from Jaakko Pöyry and other sources. Therefore Auckland UniServices does not imply, and it should not be construed, that it has carried out any form of audit on the accounting or other records or information provided to us for the purposes of this report.

Auckland UniServices Ltd reserves the right, but will be under no obligation, to revise or amend our report and the opinions contained herein, if any additional information (which may or may not be in existence on the date of this report) subsequently comes to light.

Our liability in providing the services

We have agreed that in the event of any error or omission by us in performing any work under the terms of this letter, then our liability to you for any loss or damage of any type (including consequential loss) you may suffer directly or indirectly as a result of or in connection with our work (other than in the case of our gross negligence) will be limited to an amount of five times the fees charged by us for the work. We have agreed that this limitation of liability applies to us and all staff or persons employed by us in providing our services. This clause does not apply where our neglect giving rise to a claim is wilful or reckless.

In any event we will not be responsible or liable if information material to our task is withheld or concealed from us or wrongly represented to us.

It is a condition precedent to any liability of Auckland UniServices that any claim against Auckland UniServices must be made and notified to Auckland UniServices within two years of the date we complete the performance of the work specified in this agreement.

Use of our advice and restrictions on use of this report

Because of its special nature, our report may not be suited for any purpose other than as described in this report and as such, will be restricted for use by those Recipients only. We will not be liable for any loss or damage to any other party that may rely on our report. Additionally, we have no obligation to update our report or to revise the information contained therein because of events and transactions occurring subsequent to the date of the report.

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