

Roundwood supply and demand to 2030

A sub-sector analysis August 2004



water & forestry

Department:
Water Affairs & Forestry
REPUBLIC OF SOUTH AFRICA

Roundwood supply and demand to 2030

August 2004

This report was prepared for the Water and Forestry Support Programme and the Department of Water Affairs and Forestry by LHA Management Consultants and submitted in August 2004. Its LHA reference is I814/2004. Funding was provided by the UK Department for International Development (DFID).

Disclaimer

Although the information presented in this document was presented in good faith and is believed to be correct, the Department of Water Affairs and Forestry makes no representations or warranties as to the completeness or accuracy of the information and makes no commitment to update or correct any information. Opinions expressed do not necessarily reflect the views of DWAF or DFID.

Department of Water Affairs and Forestry, Private Bag X313, Pretoria, 0001, South Africa

www.dwaf.gov.za

Contents

Executive summary	iii
I. Introduction	I
Background	I
Aims	I
Approach	I
Notes	I
2. The plantation resource and timber supply	2
The resource	2
Potential yield	3
3. Roundwood demand	6
Analysis of industry statistics	6
Total wood fibre demand	7
Supply and demand comparison	10
4. Demand forecast	11
Drivers of roundwood demand	11
Key economic indicators	12
Forecasts	12
Validity of the forecasting methodology and the results presented	14
5. Likely impacts of an undersupply situation	16
Import forest products	16
Import raw materials	16
Develop forestry sector	16
Tables	
Table 1: Plantation areas and current Mean annual increment (MAI)	2
Table 2: Estimated current potential yield from plantations	3
Table 3: Estimated actual average roundwood availability up to 2010	4
Table 4: Estimated actual average roundwood availability at 2030	4
Table 5: Commercial roundwood sales and transfers (2003)	6
Table 6: Estimated (smoothed) roundwood consumption (2003) ('000 m ³ /a)	7
Table 7: Fibre consumption	8
Table 8: Total lumber supply (2003/2004)	8
Table 9: End-use application for lumber (2003/2004)	8
Table 10: Supply and demand comparison (2003)	10
Table 11: Drivers of roundwood demand growth	11

Table 12: Key indicators for roundwood demand	12
Table 13: Roundwood demand forecast for Scenario I	13
Table 14: Additional plantation area required to meet demand by 2030	13
Table 15: Roundwood demand forecast	14
Table 16: Opportunity cost of no further afforestation for a 3% GDP growth scenario	16

Executive summary

The salient findings of this research report are:

- i) The South African commercial plantation resource (1 370 000ha) has the capacity to supply 22 million m³ of roundwood per annum. This is in balance with current demand, which is estimated at 22.3 million m³ per annum. In addition, a further 2 million m³ of wood fibre is sourced from wattle jungle and small woodlots on farms for charcoal production.
- ii) At the end of a 25-year forecast period, the current resource will be capable of supplying 23.6 million m³ roundwood per annum. This figure was determined after taking into account the removal of plantation areas from riparian zones and conversion to other land uses (in total 128 000ha will be removed) and increased plantation yields. This is only 7.2% higher than the current supply capacity.
- iii) Based on a moderate growth in Gross Domestic Product (GDP) of 3% per annum, assuming that exports will not increase above current levels and that the current wood chip export volume (5.5 million m³ p.a.) is redirected to local pulp mills, the demand by 2030 is estimated at 37.9 million m³ per annum.
- iv) Comparing the projected demand and the supply of roundwood, a shortfall of just over 14 million m³ per annum is forecast for 2030. Even if no forest products are exported (by 2030), the demand will outstrip supply by more than 10 million m³ per annum.
- v) Similar forecasts done previously (the latest in 1990, using the same methodology) show that there is a good correlation between GDP (and sub-sector) growth and timber demand – therefore the approach used is adequate for macro-economic and strategic decision-making.
- vi) To meet this expected demand, an additional 775 000ha will have to be afforested. This will bring the total commercial plantation area to just over 2 million hectares.
- vii) If additional plantings are not feasible other options to supply the future demand include:
 - Importation of final forest products.
 - Importation of logs and chips to be used as raw materials by local processors.
 - Development of plantation resources in surrounding SADC [Southern African Development Community] countries, especially in Mozambique, to supply raw materials to local processors.
- viii) The importation of final forest products would be very detrimental to the South African economy; 83 000 potential new jobs and R12.6 billion additional production value would be lost.
- ix) The importation of raw materials (logs, chips and so on) would be a better alternative as only potential jobs associated with additional forestry operations would be lost (33 000 jobs and a loss in value of output of R1.4 billion for the economy). However, it is unlikely that large-scale imports of raw materials would be feasible. This needs further investigation.
- x) It is recommended that serious consideration be given to the expansion of the plantation resource in South Africa and in surrounding countries as this would maximise economic development, job creation and wealth generation.

Introduction

Background

The forest products industry in South Africa has been a major contributor to growth of the economy, both in terms of planting and primary processing of wood and in terms of associated downstream activities. There is concern that the current plantation resource (approximately 1.37 million hectares) will not be sufficient to meet future roundwood requirements. Future production of roundwood will be curtailed by a number of factors, including:

- large tracts of plantation areas are currently temporarily unplanted
- an estimated 73 000ha of current plantation areas will be removed from production and converted to other land uses
- during the last 2–3 years, plantation fires destroyed large plantation areas (\pm 40 000ha)
- Forest Stewardship Council (FSC) requirements and the forestry industry's self regulatory procedures regarding wetland and riparian zone delineation could lead to the removal of a further 50 000–60 000ha from riparian zones
- losses in plantation areas caused by pests and diseases, especially the *Sirex* woodwasp, which could mainly affect pine sawlog plantations.

Aims

In view of the above, LHA was requested to prepare an analysis of the current and future supply and demand situation in respect of roundwood. In addition, the study aims to spell out the implications and impact of any future shortfalls in timber supply and to suggest possible solutions to minimise these impacts.

Approach

Due to time and budget constraints a top-down analysis was requested based on currently available published information and a few key interviews with industry respondents. This research included an analysis of the following sources:

- Crickmay and Associates. *Supply and demand study of softwood sawlog and sawn timber.*
- Forestry Economics Services (FES). *Commercial timber resources and roundwood processing in South Africa.*
- Pulp and Paper International. *Dealing with the international pulp and paper industry.*
- South African Pulp and Paper Industry. *Statistical data produced by the Paper Manufacturers Association of South Africa.*
- South African Reserve Bank statistics.
- Statistics South Africa statistics.
- Various LHA research studies covering charcoal, sawmilling, pulp and paper, panel products, poles and plantation yields.

Interviews were conducted with key industry players as well as Forestry South Africa (FSA) and FES. It is believed that the data is sufficiently accurate for strategic planning and policy decision-making purposes.

Notes

In this report the term roundwood is used as a collective term for all wood fibre-based products sold/ transferred from plantations and woodlots. Roundwood therefore includes sawlogs, pulpwood, poles, mining timber, raw materials for charcoal production and so on.

2 The plantation resource and timber supply

The resource

Table 1 presents the current estimated official commercial plantation resource in terms of hectares and management purpose. An estimated 1 370 000ha are currently under commercial plantations. For each major forestry region and different product categories, the plantation areas and estimated mean annual increment (MAI) are provided.

MAI expressed in m³/ha/a is an indication of the productivity of a specific plantation site. It gives the average annual volume of timber produced per hectare, calculated over the normal production cycle. For instance, if the average MAI is 15 m³/ha/a and the trees are grown for a period of 25 years before clearfelling, the total output should be 25 years × 15 m³/ha/a = 375m³ of timber per hectare. This output,

Table 1: Plantation areas and current Mean annual increment (MAI)

Region	Sawlogs				Pulpwood, mining timber, poles and other					
	Pine		Eucalyptus		Pine		Eucalyptus		Wattle and other	
	Area ('000ha)	MAI (m ³ /ha/a)	Area ('000ha)	MAI (m ³ /ha/a)	Area ('000ha)	MAI (m ³ /ha/a)	Area ('000ha)	MAI (m ³ /ha/a)	Area ('000ha)	MAI (m ³ /ha/a)
Northern regions										
Limpopo	25	14.5	8	17.0	-	-	30	20.0	1	12.0
Mpumalanga North	139	15.5	10	17.0	35	14.4	72	17.0	-	-
Mpumalanga South	68	15.0	6	16.0	89	17.0	115	20.0	20	12.0
Middle regions										
KwaZulu-Natal Zululand/ Maputaland	19	12.2	1	13.0	11	14.0	108	26.0	12	12.0
KZN North	11	14.0	-	-	7	14.0	44	21.0	24	12.0
KZN Midlands	20	15.0	-	-	45	16.0	76	22.0	48	12.0
KZN South	26	15.0	-	-	24	18.0	55	22.0	12	12.0
Southern regions										
Eastern Cape	78	13.0	-	-	33	14.0	16	15.0	3	12.0
Southern Cape	61	9.0	1	12	-	-	-	-	1	10.0
Western Cape	16	9.0	-	-	-	-	-	-	-	-
Total/weighted average	463	13.6	26	16.5	244	15.9	516	21.3	121	12.0

Source: Plantation areas: Commercial timber resources and roundwood processing in South Africa, 2002/2003

Mean annual increment

KwaZulu-Natal

in the case of sawlog production, includes first, second and sometimes third thinnings, depending on the silvicultural regime. First thinnings would normally not be suitable as sawlogs, and are generally sold as pulpwood.

It is therefore clear that not all of the output of 375m³ per hectare in the above example would be available as sawlogs. Industry experts estimate the sawlog yield to be about 85% of the total potential utilisable yield in the case of pine sawlog rotations.

The MAI figures presented in Table 1 are all utilisable yield figures, that is, these represent the volume of usable fibre that would be produced per hectare per year. In the case of sawlogs, as indicated above, this MAI figure should be reduced by about 15% to calculate utilisable sawlog yields; the rest being small wood, pulpwood, firewood and so on. The MAI figures presented in Table 1 were calculated based on inputs obtained from the sources listed below. A high degree of correlation exists between inputs obtained from the sources consulted:

- Global Forest Products
- Komatiland Forests
- Transvaal Wattle Co-op
- Mondi
- Sappi
- NCT Forest Co-operative Ltd.
- Singisi Forest Products
- Forestry Economics Services
- extensive LHA research on DWAF and Safcol plantations
- forestry consultants in selected regions.

Potential yield

In theory the long-term sustainable annual yield from plantation resources could be calculated by multiplying the hectares planted by the utilisable MAI. This represents the potential yield from the plantations and does not take into account factors such as unplanted areas, age class distributions, fire damage, diseases, drought and so on. In the short to medium term, skewed age class distributions could have a significant impact on plantation output, which could vary significantly from the averages calculated on a theoretical basis.

The data presented in Table 1 is now used to calculate the current potential yield from the commercial plantation areas. In this calculation it has been assumed that all areas are fully planted and that efficient production regimes are being followed. The data in Table 2 therefore presents the potential yield that could be obtained (based on the MAIs given in Table 1) from the total commercial plantation area in South Africa.

In the case of pine sawlogs the total utilisable yields were reduced by 15% to cater for smallwood, pulpwood and so on that is produced as part of thinnings. Most of these lost volumes were added back to the pine pulpwood yields.

The total sustainable output, based on current plantation areas and assuming optimal silvicultural practices, is estimated at 22.8 million m³ p.a.

Short-term yield

The actual short-term yield available from plantations will be lower than indicated in Table 2 as a result of:

Table 2: Estimated current potential yield from plantations

Region	Sawlogs		Pulpwood, mining timber, poles and other			Total (‘000 m ³ /a)
	Pine (‘000 m ³ /a)	Eucalyptus (‘000 m ³ /a)	Pine (‘000 m ³ /a)	Eucalyptus (‘000 m ³ /a)	Wattle/Other (‘000 m ³ /a)	
Northern regions	3 005	380	2 370	4 140	250	10 145
Middle regions	915	13	1 510	6 610	1 150	10 198
Southern regions	1 450	12	660	240	50	2 412
Total/weighted average	5 370	405	4 540	10 990	1 450	22 755

- excessively unproductive areas which are temporarily unplanted (about 4% above the norm), especially in sawlog plantations
- productive areas destroyed by fire (estimated at 40 000ha).

In addition, areas will be withdrawn from commercial forestry for environmental, economic and FSC certification reasons. The impact of this has not been taken into account in the short-term forecast as these withdrawals will most probably be phased to coincide

Table 3: Estimated actual average roundwood availability up to 2010

Timber category	Volume ('000 m ³ /a)	Notes ¹⁾
Pine sawlogs	4 920	<ul style="list-style-type: none"> • 4% additional TUP • 15 000ha fire damage (estimated)
Eucalyptus sawlogs	405	<ul style="list-style-type: none"> • Little change expected
Pine pulpwood	4 300	<ul style="list-style-type: none"> • 15 000ha fire damage
Hardwood pulpwood	12 350	<ul style="list-style-type: none"> • 5 000ha fire damage
Total	21 975	

Sources: *Supply and demand study on softwood sawlog and sawn timber in South Africa, Crickmay & Associates (Pty) Ltd*
FSA and communications with larger plantation owners

with normal clearfelling; thus producing the normal yield over the short to medium term. Taking these factors into account, the estimated actual average

annual sustainable supply from plantations over the next five years is indicated in Table 3.

It should be noted that actual supply could vary from the averages given as a result of skewed age class distributions. The age class distribution of the plantation resource has not been taken into account and year-on-year supply volumes could therefore vary from the averages provided.

The estimated average annual availability of roundwood over the next five years is 22.0 million m³/annum, or about 3% below the potential yield.

Estimated longer-term yield (2030)

The estimated longer-term yield (after one full pine sawlog rotation) by 2030 is presented in Table 4.

In calculating the yield the following assumptions have been made:

- Overall MAIs are expected to increase by 15% for eucalyptus species and 10% for pines over the forecasting period. Industry spokespeople, however, indicated that the pine sawlog MAI increase should be reduced to 6% to allow for possible impact on future growth of the *Sirex* woodwasp. These increases in productivity will be a result of improved tree genetics, better site/species matching, and improvements in private

Table 4: Estimated actual average roundwood availability at 2030

Timber Category	Volume ('000 m ³ /a)	Notes ¹⁾
Pine sawlogs	4 620	<ul style="list-style-type: none"> • 73 000ha removed from production • 24 000ha for FSC certification, etc • Increase in yield 6 %
Eucalyptus sawlogs	445	<ul style="list-style-type: none"> • Increase in yield 10 %
Pine pulpwood	4 640	<ul style="list-style-type: none"> • 10 000ha for FSC certification, etc • Increase in yield 8 %
Hardwood pulpwood	13 900	<ul style="list-style-type: none"> • 21 000ha for FSC certification, etc • Increase in yield 15 %
Total	23 605	

Source: *Supply and demand study on softwood sawlog and sawn timber in South Africa; Crickmay & Associates (Pty) Ltd*
FSA and communications with larger plantation owners

sector management of recently privatised state forests.

- The excessive temporarily unplanted (TUP) areas will be planted and properly managed and all fire- damaged areas will be in productive use.
- Significant production areas will have been withdrawn from commercial forestry by 2030. The estimated areas are as follows:
- 73 000ha of sawlog plantations in Mpumalanga North (7 000ha), Zululand (9 000ha), Southern Cape (42 000ha) and Western Cape (15 000ha).
- 55 000ha to comply with FSC certification and environmental requirements; pine sawlog areas (24 000ha) and pulpwood (31 000ha).
- No additional plantings have been assumed – the forecast is therefore based on the current plantation resource, minus the withdrawn areas listed above. The total available plantation resource therefore becomes:

Current plantable area	1 370 000 ha
Areas removed from production	-73 000 ha
Areas removed due to FSC specifications and environmental reasons	55 000 ha

<p>Net commercial plantation area 1 242 000ha</p>
--

In summary the estimated annual yields from the current and future commercial plantation resources are:

Current potential yield	=	22.8 million m ³
Current/short term actual yield up to 2010	=	22.0 million m ³
Projected yield at 2030	=	23.6 million m ³

Pine sawlog production will be most affected by the planned withdrawal of land from commercial forestry. The forecast availability reduces to 4.6 million m³ per annum in 2030, which is 15% lower than current potential supply volumes. Overall, the picture is not encouraging, indicating that if no further afforestation takes place, supply of roundwood will increase only marginally (7%) above current levels. This is not sufficient to sustain future growth in the forest products industry.

3 Roundwood demand

Analysis of industry statistics

The most recent available published information on roundwood sales is for 2003. Data supplied by Forestry South Africa and the latest information contained in the 2002/2003 publication *Commercial timber resources and roundwood processing in South Africa* produced by FES are the best available national data sources for roundwood supply and consumption. In order to make data from these sources comparable, all figures were converted to cubic metre equivalents, using standard industry conversion ratios. Table 5 provides the latest statistics, which are based on roundwood sales. Both FSA and FES agree that roundwood sales are currently the best indicators of timber consumption.

Table 5: Commercial roundwood sales and transfers (2003)

Timber Category	2003 FSA ('000m ³)	2003 FES ('000m ³)	LHA estimate ('000m ³)
Pulpwood	15 700	12 349	15 400
Sawlogs	3 440	5 236	5 200
Mining timber	860	797	800
Poles	185	488	750
Other	210	336	100
Total	20 395	19 206	22 250

Although the total estimated roundwood sales from both sources are in the order of 20 million m³, there are significant discrepancies between FSA and FES regarding their sawlog and pulpwood figures. The possible reasons for this are discussed below.

Based on these figures and specific sectoral research data, LHA has provided its best estimate of current smoothed roundwood consumption. The reasoning behind the LHA set of figures is as follows:

1. *Pulpwood*: FSA is confident that its pulpwood figures are accurate as these are obtained from

a few large processors of pulpwood which are FSA members. FES probably undercounts as many smaller timber producers, for example, those participating in chip export schemes are not captured in the FES survey. The final LHA estimate is slightly lower than the FSA figure. FSA agrees that 2003 pulpwood sales could be higher than actual demand for the period.

2. *Sawlogs*: LHA has conducted in-depth research into the sawmilling sector for Mondi and other private sector clients. Based on this, the FES figure and Crickmay and Associates' most recent research into the sawmilling sector, we estimate the current sawlog demand to be 5.2 million m³ per annum. The FSA figure is too low. FSA agrees that it is under-counting sawlog production as the sawlog production of the MTO package, most small, medium and bush mills and the Amatola region are not covered in its audit. These categories alone account for an estimated 1.6 million m³ sawlog demand per year. If this is added to the FSA figure, it will be in line with the estimated sawlog demand of 5.2 million m³ p.a.
3. *Mining timber*: The mining timber figures seem to be in line and are supported by superficial research done by LHA. If anything, the figures could be conservative with an upper limit demand of as high as 1 million m³ per annum.
4. *Poles*: Both FSA and FES understate the pole consumption volumes. LHA has conducted specific research into this sector and obtained reliable figures from the Pole Treeters' Association, which supports a consumption level of 750 000m³ p.a. It is possible that some pole consumption figures could be included in FSA's and FES's 'other' category.
5. *Other*: This includes mainly matchwood and small amounts of roundwood sold to charcoal plants from commercial plantations. The bulk of the charcoal is, however, produced from non-

commercial resources. This will be discussed in more detail later.

On the basis of this, we estimate the current commercial roundwood demand to be 22.3 million m³ per annum.

Total wood fibre demand

Table 6 presents the total fibre demand from commercial plantations and other timber fibre resources such as invader bush, wattle jungle, small woodlots on farms and so on. Demand is broken down between softwood and hardwood and pulpwood consumption is presented in terms of its final use-sectors. These breakdowns are based on specific sector research undertaken by LHA on behalf of industry associations and large private sector companies and on FSA and FES data. In Table 6 we have also added the consumption of the charcoal production sector. This information is based on recent LHA research into the charcoal industry – research that has been sponsored by the Water and Forestry Support Programme.

Each of the final end-use sectors is briefly discussed below:

Pulp and paper production

The pulp and paper industry has a strong export focus and operates in an open and globalised market. Sappi, Mondi, Nampak and Kimberly-Clark are the major operators in the South African market. South Africa ranks 14th in the world in pulp production and is amongst the top 25 producers of paper and

board products. Only Mondi and Sappi take in virgin wood fibre to produce pulp and downstream paper and board products. Mondi has pulping plants at Merebank, Felixton, Richards Bay and Piet Retief and Sappi at Enstra, Ngodwana, Stanger, Tugela and Saiccor. Saiccor produces dissolving pulp. Current pulp production is estimated to be 2.5 million tons p.a. of which 800 000 tons (more than 30%) is exported. Paper and board production amounts to 2.4 million tons of which 700 000 tons or about 30% is exported. It is clear therefore that 30% of the overall production of this sector is exported.

Pulp and paper manufacturers use a range of fibre raw materials as input into the pulping and paper making processes. These are enumerated in Table 7.

South Africa ranks amongst the top industrialised countries in terms of its waste paper recovery rate, which is currently in excess of 40% of annual domestic paper and board consumption. Sappi's Stanger mill uses bagasse to produce bleached pulp. Chips are produced as a by-product in the sawmilling sector and an estimated 500 000 tons becomes available as chips to pulp and paper mills per annum.

Paper and board production consists of:

printing and writing paper	1 million tons p.a.
packaging paper and board	1,2 million tons p.a.
tissue	0.2 million ton p.a.

Sawmilling

The sawmilling sector is dominated by the following groups, who together account for more than 70% of sawn timber production:

Table 6: Estimated (smoothed) roundwood consumption (2003)('000 m³/a)

End-use application	Pine	Hardwood	Total
Pulp, paper and board	3 300	5 900	9 200
Chip exports	–	5 500	5 500
Sawmilling	4 800	400	5 200
Charcoal	–	2 000	2 000
Timber board products	200	500	700
Mining timber	–	800	800
Pole	350	400	750
Other	20	80	100
Total	8 670	15 580	24 250

- Global Forest Products
- Hans Merensky
- Safcol
- Yorkcor
- Steinhoff.

Table 7: Fibre consumption

Fibre category	'000 tons per annum
Roundwood (9.2 million m ³ p.a.) ¹⁾	7 700
Recycled waste paper	800
Sugar cane bagasse	200
Chips from sawmills	500
Total	9 200

Note: 1) Converted to tons for comparative purposes

Table 8: Total lumber supply (2003/2004)

Lumber supply	m ³ /a
Locally produced softwood lumber	2 250 000
Locally produced hardwood (eucalypts) lumber	180 000
Imported hardwood	200 000
Total lumber supply	2 630 000

Table 9: End-use application for lumber (2003/2004)

End-uses for lumber	Consumption ('000m ³ p.a.)	% of total
Building and construction materials (roof timbers, mouldings, flooring, shelving, doors, etc.)	1 310*	50
Industrial products (pallets, crates, cable drums, mining applications)	540	20
Consumer products (furniture, DIY, etc.)	630*	24
Lumber	150	6
Total	2 630	100

Note 2): Some manufactured goods, e.g. doors, knocked down furniture, shelving, etc are exported as final products. We estimate this on average uses 300 000m³ of lumber per annum. Recently, with the weak rand (2002/2003), exports increased dramatically but have since declined to the average level of 300 000m³ lumber equivalent.

There are an estimated 320 sawmills of which 240 (75%) are small mills each producing less than 10 000m³ of sawn timber per annum. These mills together produce about 25% of sawn timber in the country. The balance of medium and larger mills, that is, those taking in more than 20 000m³ of roundwood p.a. account for 25% of all mills and produce 75% of output. The sector produced an estimated 2.4 million m³ of lumber during 2003. In addition, an estimated 200 000m³ of exotic hardwood timber (meranti, oak and so on) is imported annually. This is mainly used for mouldings, furniture and flooring. A breakdown of total lumber supply is presented in Table 8.

The building (especially residential building) and construction market dominates the demand for lumber and lumber products. A breakdown of end-use application is presented in Table 9. On average an estimated 150 000 m³ or about 6% of total lumber supply is exported in unprocessed form. In addition, final value added products, produced from local lumber are exported (see note 2). It should be stressed that export volumes fluctuate depending on the exchange rate and we have presented smoothed averages covering the last number of years.

Charcoal

An estimated 205 000 tons of charcoal is produced per annum. The conversion ratio in charcoal manufacturing is roughly 10m³ of hardwood required to produce 1 ton of charcoal. On this basis the total estimated demand for hardwood raw materials is 2 million m³ p.a. The bulk of this is obtained from non-commercial plantation resources. The raw material is mainly wattle but some hard gums (*Paniculata* and *Cleoziana*) are also used as raw material. The bulk of the material is obtained from wattle jungle, clearing infested areas and so on – very little raw material is obtained from commercial plantations as the production viability depends on low fibre input cost.

The household charcoal market is about 120 000 tons p.a., where the product is mainly used for barbeques. Depending on the exchange rate, up to 40% of household charcoal is exported. The balance (85 000 tons) is used as a reduction agent

in non-ferrous metal processing. Silicon Smelters in Polokwane consumes more than 90% of the industrial charcoal produced.

The major producers of branded household charcoal are Suiderland Charaka Ltd (Piet Retief), E&C Charcoal (Pietermaritzburg), Braai & Barbeque International (Pretoria) and Mondi Black Gold (Richards Bay, KwaZulu-Natal). There are a range of small independent suppliers that produce for this market. The bulk of primary charcoal is produced by small-scale producers of which there are an estimated 160 active in South Africa. These small-scale producers provide unrefined charcoal to large industrial users and to the manufacturers of branded products for the barbeque market. A typical small-scale contractor produces 120 tons of charcoal per month and employs between 30 and 40 people.

Mining timber

The use of timber in underground support applications has declined dramatically over the last 20 years. Demand peaked at a level of approximately 3.4 million m³ in the mid-1980s. This has now reduced to an estimated consumption level of 800 000m³ p.a. Timber props and packs have largely been replaced by hydraulic and mechanical props and greater use of backfilling techniques. It is believed that the bulk of timber that was previously destined for the mining applications has now been redirected to the chip export market.

Chip exports

This market has seen significant growth since the early 1990s when total chip exports amounted to just over 1 million tons p.a. Chip exports currently amount to an estimated 4.2 million tons p.a. The bulk of the raw material is sourced from the KwaZulu-Natal Midlands, the northern regions and southern parts of Mpumalanga. SilvaCel, CTC and ShinCel are the dominant players in this market. A new plant with the capacity of 400 000 tons came on stream at Durban's port during 2004. This sector has grown into one of the most important users of commercial roundwood over the past 10 years.

The raw material input consists of approximately 30:70 wattle and eucalypts and the industry was initially established to find outlets for large wattle plantations in the inland regions mentioned above. The devaluation in the rand has stimulated strong growth in the sector with the bulk of the chips being exported to Japan. It is believed that a proportion of the raw material intake of the chipping plants is obtained from non-commercial resources including small farmers, clearing of wattle jungle and infested areas.

Poles

The pole market consumes an estimated 750 000m³ p.a. The market is dominated by large companies such as Woodline, Thesens and Boland Wood Industries, which together supply more than 85% of the total demand. The market is highly competitive with cost pressures both from large customers and alternative pole types such as concrete and steel. The market is split into two segments, that is, treated poles (520 000m³), which are mainly used in transmission poles, telephone poles and as building poles. The balance (230 000m³) is sold in untreated form and is mainly used as building and fencing poles. The market has remained fairly static over the past decade as major pole applications, for example, telephone and transmission poles, have been penetrated by other technologies, for example, fibre optics and cell phones.

Timber board products

This sector uses predominantly hardwood in its production processes. The sector includes the manufacture of chip board, medium density fibre board, hard board and insulation board. The dominant manufacturers include Masonite, Bisonbord, Sonae Novoboard and Magna Board. Apart from roundwood, chips and waste timber products, for example, from furniture factories are blended with virgin roundwood into the production processes. The bulk of the output is used in furniture manufacturing followed by the building and construction industry. An estimated 20% of the production of this sector is exported.

Supply and demand comparison

Table 10 compares the current sustainable yield (supply) with the estimated current demand.

Overall, supply and demand is in balance. The figures, however, indicate an oversupply of pine pulpwood and a severe shortage of hardwood pulpwood.

The pine pulpwood production includes the NECF [North East Cape Forests] plantations, which up to now have not delivered products to the market. This resource could also be utilised for sawlog production. The sustainable yield is estimated to be 420 000m³ per annum. If this is deducted, the current oversupply of pine pulpwood reduces to 10 000m³ p.a.

The calculations show an apparent undersupply of 830 000 tons of hardwood pulpwood. We believe that the demand volume is reasonably accurate, which implies that the hardwood pulpwood shortfall from commercial plantations must be obtained from 'other' sources. Additional and other supply possibilities include:

- i) Informal supply from non-commercial plantation resources. This could be much more significant than what is generally believed. It is possible that informal supply could make up a substantial part of the timber intended for chip exports. The fact that almost 2 million m³ of hardwood is sourced annually from informal sources for charcoal

production tends to support this supposition.

- ii) Hardwood sales from 'unofficial' plantations. Industry respondents estimate the size of unauthorised afforestation to be well in excess of 100 000ha.
- iii) The official estimation of plantation areas could be conservative and it is possible that not all plantations are covered in the annual surveys.
- iv) The MAIs used in calculating yields could be underestimated. This is unlikely as MAI figures were obtained from a number of independent sources and tended to correlate well for specific regions.
- v) A significant amount of over-harvesting could be taking place to cater for short-term requirements. This is unlikely in the formal forestry sector as it is not sustainable in the long run.

The comparisons, however, show that the available plantation resource could supply only the current demand for timber fibre, with little room for further expansion. It is also a known fact that raw material for charcoal production is becoming scarcer and scarcer and a large user such as Silicon Smelters (located in Polokwane) is sourcing charcoal from as far afield as the Eastern Cape. They are providing significant incentives for small contractors to source hardwood timber and to produce unrefined charcoal. It is possible that charcoal producers will be 'forced' to obtain raw material from commercial plantations, which will put further pressure on the supply situation.

Table 10 Supply and demand comparison (2003)*

Timber or user category	Estimated actual availability (short-term) (‘000m ³ p.a.)	Current demand (‘000m ³ p.a.)	Surplus (+)/ Shortages (-) (‘000m ³ p.a.)
Sawlogs: Pine	4 920	4 800	+120
Eucalyptus	405	400	+5
Pulpwood I): Pine	4 300	3 870	+430
Hard	12 350	13 180	-830
Hardwood jungle (Charcoal)	2 000	2 000	-
Total	23 975	24 250	-275

* this includes all roundwood used for pulp, chip export, timber board products and 'other', but exclude raw material used for charcoal production.

4 Demand forecast

Drivers of roundwood demand

In order to make meaningful forecasts for roundwood demand it is essential that the end-use markets and the drivers of growth in those markets are well understood. A breakdown of the key drivers of growth for each end-use sector is provided in Table 11.

From the analysis it is clear that exports are a very important driver of demand for forest products, accounting for approximately 40% of primary roundwood consumption. The domestic market

therefore accounts for the balance of 60% and here the key drivers are residential building activity, household consumption expenditure and general manufacturing output. These indicators, in turn, are intrinsically linked to the performance of the South African economy, measured in terms of Gross Domestic Product (GDP).

In the forecast, conservative, average and optimistic scenarios in terms of domestic economic growth are used. Various assumptions regarding future exports can also be made and for this purpose a few scenarios are presented.

Table 11: Drivers of roundwood demand growth

Sector	Exports		Demand drivers	Weight (%)
	% of output	Roundwood equivalent ('000m ³)		
Pulp and paper	30	2 760	Exports and rand exchange rate	30
			Printing/publishing (newsprint), copying and general office stationery	30
			General manufacturing (for packaging products)	40
Sawmilling	18	930	Exports and rand exchange rate	18
			Residential building sector – interest rates	47
			General manufacturing (pallets, etc.)	16
			Consumer expenditure	19
Charcoal	15	300	Exports and rand exchange rate	15
			Domestic consumer expenditure	45
			Silicon Smelters	40
Mining timber			Gold and platinum mining	100
Chip exports	100	5 500	World pulp demand and exchange rate	100
Poles			Building industry	70
			Agricultural output	30
Timber-based board	15	100	Exports and rand exchange rate	15
			Building sector	40
			Consumer expenditure (furniture, etc)	45
Total/average	40	9 590		

Table 12: Key indicators for roundwood demand

Sector	Real annual compounded growth 1990–2003 (% p.a.)	Possible future real growth (% p.a.)	
GDP	2.0	3.0	4.0
Household expenditure	3.9	5.0	6.0
Fixed investment in residential buildings	1.3	2.0	2.8
Manufacturing output	1.7	2.5	3.6

Source: South African Reserve Bank

Key economic indicators

The historic growth rates for the key economic indicators (or drivers of demand) are presented in Table 12. In order to present a longer-term trend, a thirteen-year period (1990–2003) has been selected.

Generally real growth has been low during the thirteen period under consideration. For purposes of the forecasting exercise it is suggested that three economic growth scenarios, expressed in terms of GDP be used, as follows:

- Conservative = 2% p.a.
- Average = 3% p.a.
- Optimistic = 4% p.a.

The anticipated growth rates of the key indicators, for each of the GDP growth scenarios are also presented in Table 12. For each scenario the timber demand is forecast for 2030 – the duration of one sawlog production cycle.

Forecasts

Scenario I: Exports remain static

This scenario assumes the following:

- Exports of wood-based products remain at current levels, that is, there is no growth.
- Key indicators are forecast to expand at the rates indicated in Table 12 for different economic growth scenarios.

In calculating the consumption levels for each sector for 2030, the weightings in Table 11 and growth rates of demand drivers in Table 12 were used to

determine overall demand growth for each end-use sector under different GDP scenarios. The results are presented in Table 13.

It is clear that the projected demand for all economic scenarios will significantly exceed the potential supply (23.6 million m³ p.a.) by 2030. The possibility of only supplying the local market, as presented in the middle column is, in our view, not practical or viable as exports are an integral part of large companies' total product portfolio and are essential for the viability of their operations. This especially applies to pulp and paper mills where large units need to be established to obtain economies of scale. It is also important from a national perspective to participate in export markets to earn foreign exchange, to expand local production capacity and thereby improving economic growth.

It is also unlikely that export levels will be maintained at current levels. If the rand weakens, exports could remain profitable business, which will be exploited by the forest products companies. On the other hand, if the rand continues to strengthen, exports will play a lesser role. In our view the most likely demand scenario for 2030 is to include exports at the current level but to exclude chip export volumes. When local demand starts outstripping supply, internal prices will rise and current chip exports will probably be diverted to the local pulp and paper mills. NCT in partnership with Södra Cell of Sweden is already considering this option.

Based on the assumption that the 5.5 million m³ of chip exports will be redirected to local pulp paper and board production, over the forecasting period, the most likely roundwood demand forecasts for 2030 for the three GDP scenarios are presented in Table 13. An estimate of the additional plantation hectares

that will be needed to cater for the demand by 2030, is also provided (Table 14). It should be stressed that these are conservative forecasts and probably represent the lowest future demand levels for the three growth scenarios.

Scenario 2: Exports increase

This scenario is most probably not achievable as overall demand will increase substantially above the levels shown in Table 13, leading to even higher shortfalls. However, if sufficient raw materials were available exports could probably be increased resulting in additional jobs and economic growth.

Conclusion

The potential demand for roundwood will by far outstrip supply by 2030. Severe shortages of

roundwood could be experienced from 2010 onwards – there are currently already indications of this. The options are:

- To plant considerably more trees – new afforestation required is given in Table 14.
- To import forest products to supplement local supply. The implications of this are discussed in Section 5.
- To establish new plantations in nearby SADC countries – Mozambique is ideally suited for this.
- To import raw materials, that is, logs and chips for local processing and value-adding. Countries with fast-growing plantations, for example, Chile and Brazil, could be considered as external supply sources. The economic viability of this will need investigation.

Table 13: Roundwood demand forecast for Scenario I

Sector/application	Current roundwood required to supply domestic demand ('000m ³ p.a.)	Roundwood required to supply domestic market by 2030 ('000m ³ p.a.)			Total demand in 2030 including exports at current level ('000m ³ p.a.)		
		2% GDP	3% GDP	4% GDP	2% GDP	3% GDP	4% GDP
Pulp and paper	6 440	13 220	16 730	21 700	15 980	19 490	24 460
Sawmilling	4 270	7 280	9 180	11 370	8 220	10 120	12 310
Poles	750	1 060	1 280	1 580	1 060	1 280	1 580
Mining timber*	800	800	800	800	800	800	800
Chip exports	0	0	0	0	5 500	5 500	5 500
Timber board products	600	1 280	1 620	2 040	1 370	1 710	2 130
Charcoal/other*	1 700	3 300	4 160	5 140	3 600	4 460	5 440
Total	14 560	26 940	33 770	42 630	36 530	43 360	52 220

* Mining timber consumption is expected to stabilise at current levels

** No growth in Silicon Smelters' demand has been assumed. Charcoal is added to the total demand level, as it will most probably consume outputs from commercial plantations by 2030

Table 14: Additional plantation area required to meet demand by 2030

Growth scenario	Forecast demand 2030 ('000m ³ p.a.)	Forecast supply 2030 ('000m ³ p.a.)	Shortfall ('000 m ³ p.a.)	Additional hectares required
GDP growth 2% p.a.	31 030	23 605	7 425	403 000
GDP growth 3% p.a.	37 860	23 605	14 255	775 000
GDP growth 4% p.a.	46 720	23 605	23 115	1 256 000

- Utilise current chips exports for local pulp and paper production. Market forces and future pricing levels will dictate developments in this sector.

Validity of the forecasting methodology and the results presented

This forecast did not take into account factors such as:

- price elasticity
- prices and price trends of substitutes
- the impact of technological change

on future demand for wood-based products and roundwood. The likely impact of these factors is assessed below.

Price elasticity

It could be argued that under circumstances of scarce supply of roundwood, prices would increase, not only of roundwood but also of the total range of final wood-based products. This could lead to increased imports, possibly at higher costs, which could dampen demand for final products. Because of South Africa's open economy it is, however, unlikely that prices of imported products will increase to such an extent that overall demand will be affected significantly.

Prices of substitutes

There are many substitute products for paper, board and wood products in the end-use markets. Substitution in the packaging market, for instance, is a continuous phenomenon, because plastics and paper and board materials compete strongly with one another. Wooden floors have been replaced by ceramic tiles and carpets and wooden crates and boxes have largely been replaced by plastic crates and corrugated carton boxes.

Substitution, however, has been ongoing for many decades and is intrinsically part of historic growth trends. If the prices of wood based end-products increase dramatically, replacement by other materials could increase. With the current open and

unprotected trade regimes in place worldwide it is unlikely that prices of wood based end-products will increase to such an extent that large scale substitution will occur.

New technology

New technology could impact on the traditional end-use markets for wood-based products. Since the late 1980s it had been widely speculated and forecast that the demand for cut papers (general office papers, copying, desk top printing and so on) will decline strongly as we enter the so-called 'paperless' era. The market for cut papers (as predicted by historic LHA forecasts) has shown strong growth throughout the 1990s and also for the five years from 2000. Technology inroads into existing wood markets are largely countered by new wood product development in other market segments. Technological innovation has always been present in this sector and its effects are reflected in historic growth trends.

Validation of forecasting methodology

LHA has undertaken roundwood demand forecasts for FOA (currently Forestry South Africa) since the early 1980s. The last forecast in a series was done in 1990, using 1989 as base year for the forecasts. The results of the 1990 forecast are in Table 15:

Table 15: Roundwood demand forecast

Year	Roundwood demand (million m ³ p.a.) for GDP growth rate of:	
	2% p.a.	3% p.a.
1989 Base Year	17.8	17.8
1995	20.4	21.0
2000	22.7	23.8
2003	24.1	25.7
2004	24.6	26.4

The actual GDP growth rate for the period 1990–2004 was 1.9% per annum and the current demand

for 2003 (see Table 6) is estimated at 24.25 million m³, compared to the 24.1 million m³ per annum forecast in 1990.

There is a close correlation between the forecast demand (of 1990) and current demand, which could

be partly coincidental. However, the approach does provide a certain confidence that GDP growth, and derived sub-sector growth, is a good measure for timber demand – specifically for strategic and macro-economic decision-making.

5 Likely impacts of an undersupply situation

Import forest products

This scenario assumes that no further afforestation will take place in South Africa and that all additional requirements, over and above current consumption levels of forest products, will be imported. This scenario presents a huge opportunity cost for the South African economy in terms of job losses, contribution to GDP, taxes to government and so on.

It is clear that local production instead of imports of the additional future forest product demand could have significant benefits for the South African economy. An estimated 83 000 additional direct jobs and output of almost R12.6 billion would result from expanding the current plantation resource by 775 000ha to meet future demand.

Import raw materials

A second option is to import raw materials such as chips and sawlogs for local processing and value-adding. The impact of this scenario on potential employment and value creation will be much smaller. Only the benefits associated with forestry operations will not materialise, that is:

Employment	=	33 000
Value of output	=	R1.4 billion

The viability of such large-scale raw material imports is questionable – for instance, it is unlikely that sawlogs could be imported by inland sawmills profitably. This option, however, allows for considerable local value adding and associated benefits such as increased employment, and contribution to GDP.

Develop forestry sector

From an economic growth, employment and wealth creation perspective, expanding the forestry and forest products sector is by far the best option. This implies that a further 775 000ha are afforested, bringing the total commercial plantation area to:

Net plantation area after removals	=	1 242 000ha
Additional minimum afforestation for a 3% GDP growth scenario	=	775 000ha
Total commercial plantation area	=	2 017 000ha

The economic benefits of this include:

New direct jobs created	=	83 000
Additional value of output	=	R12.6 billion p.a.
Indirect jobs created (multiplier 4 x)	=	332 000

Table 16: Opportunity cost of no further afforestation for a 3% GDP growth scenario

Sector	Production foregone (units)	Direct employment lost (number)	Value of output lost for national economy (R'million p.a.)
Forestry	775 000ha	33 000	R1 400
Pulp, paper and board	2 400 000 tons	6 800	R7 200
Sawmilling: Lumber produced	2 600 000m ³	36 000	R3 600
Charcoal	250 000 tons	7 200	R360
Total	n/a	83 000	R12 560

Source: LHA baseline survey