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Industry Insight

Forestry and wood processing



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INDUSTRY INSIGHT
Education

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Summary

This report focuses on New Zealand's forestry sector which is concerned with the sustainable management of commercially grown softwood forests, the harvesting of these forests at maturity and the processing of harvested logs into primary products, ranging from sawn timber and wood panels (veneers, particleboard and fibreboard) to pulp and paper.

The sector is important to New Zealand – logs are our 3rd biggest export earner. It's a big employer, especially in deprived rural areas, where commercial plantation forests are typically found and employment prospects are often limited. Direct contributions to New Zealand GDP are, however, less impressive, with a steady decline being evident when expressed in percentage terms.

The sector is complex. The days of having a vertically integrated industry where forest owners manage their own forests, harvest them and process them, are long gone. A growing realisation that plantation forests are an attractive asset class for investment has helped to drive this change globally, as well as in New Zealand.

The forestry sector is characterised by a large number of investors who directly and/or indirectly acquire the rights to manage forests, either by owning the land on which forests sit or by leasing it from others, such as Māori, who have become significant owners of forestry land following the successful conclusion of Treaty of Waitangi settlements. Those that acquire the rights to manage land typically appoint a forestry manager to plan and coordinate forestry and logging operations using a range of contractors to undertake the work and transport logs, either to domestic mills for further processing, or to ports for export.

The number of logs produced in New Zealand has accelerated in recent years, while production of sawn timber has grown at a more measured pace. The production of particleboard, veneers, plywood, pulp and paper have all trended downwards, while fibreboard has seen marginal gains.

Most of the logs harvested in New Zealand are exported, with the vast majority going to China. The rapid pace of urbanisation and growth in disposable income levels in that country have been key drivers. So too, reduced import tariffs on logs and subsidies given to Chinese sawmillers by their Government.

It's a slightly different story for sawn timber. Although exports to China are significant, most of the sawn timber produced in New Zealand is destined for the local market. In recent years, demand has been driven by the rebuild in Christchurch and increased residential building activity in Auckland.

The decline in local production of wood pulp and paper mainly reflects the impact of technology, which has reduced demand for some types of paper such as newsprint and a selected range of writing papers. However, it's also increased demand for other types of paper. An acceleration in online shopping, for example, has driven demand for more packaging paper. Increases in population have also supported domestic demand for hygiene paper products, such as tissue paper.

A key feature of the New Zealand forestry sector is that it exports a large chunk of what it produces. This is particularly true for low value products such as logs, but less so for higher value processed wood products, such as sawn timber, wood panels and paper products. The opposite tends to be true for the world's largest forestry product producers. These countries, which produce far larger volumes than New Zealand, tend to have a higher export propensity for value added products.

The domestic wood processing industry argues that New Zealand should follow suit, and successive governments, mindful of the development and job creation possibilities in deprived rural regions, are publicly at least, sympathetic to this argument. However, this doesn't take into account the fact that New Zealand is a very small economy, it is geographically distant from key exports markets, and would have to compete against well-entrenched competitors if it were to shift its focus from logs to processed wood products. Given this, the most profitable segment for the industry to operate in is probably forestry rather than wood processing.

So for now, the focus is on logs. Chinese demand has driven up prices and global supply has tried to keep up

by harvesting more trees. In New Zealand, this has been good news for forestry owners, forestry managers and contractors, but not so for sawmillers and downstream processors, who find themselves competing for logs against heavily subsidised counterparts in China. Having been unfairly priced out of the market, local sawmillers argue that they are unable to secure the volumes required to reduce their unit costs of production, which means higher costs and a lack of overall competitiveness. This is despite the fact that some larger forest owners/managers are known to divert logs that would have been sent offshore to local sawmills at slightly below market price.

Furthermore, not all domestically harvested logs are suitable for sawmilling in New Zealand. Industry sources suggest that they are often too small, or do not fulfil stringent quality specifications and grading requirements that apply in New Zealand. By contrast, Chinese sawmillers are less fussy.

Skyrocketing prices for logs can have some negative consequences – not least of which is the temptation to harvest trees before they reach maturity. The industry hosts many small forestry owners who can be vulnerable to pressure from fly-by-night forestry managers looking to harvest forests before maturity when prices are high. This is particularly true in places like Northland, where over-harvesting has reached a point where the region is likely to experience a significant drop in harvest volumes over the course of the next decade.

The problem here, of course relates to the sustainability of forestry. A large swathe of forests in New Zealand are set to be harvested over the next 5 years or so as they reach maturity. The fear is that by cutting down less mature trees now to cash in on higher prices offered by the Chinese, harvesting may exceed tree growth and forestry could end up adding to New Zealand's carbon emissions in coming years potentially making it more difficult to reach New Zealand's target of being net zero carbon neutral by 2050. The current government's "One Billion Trees" planting programme is unlikely to fully offset this given the timeframes involved.

Another issue is the volatility of log prices due to changing global demand and a tendency for supply to over- and undershoot. When prices decline, harvesting activity tends to fall and this can have a significant impact on contractors, who are often small, cash flow dependent outfits, saddled with debt after having invested heavily in capital equipment when prices were high. Left for any period of time, these contractors will leave the industry when times are bad, with no guarantee that they will return when prices start to rise.

Paul Clark
Industry Economist



Outlook

The medium to long-term outlook for demand looks promising for log producers.

As the world's population expands, so too will the demand for logs. Growth will be driven by emerging markets, especially those that have large populations and rising income levels. Countries like India, Philippines, Indonesia and perhaps Brazil come to mind. Demand from India, in particular, is expected to grow strongly as that economy expands, following a similar, albeit delayed, trajectory to that of China.

That's not to say that there will be no further growth in demand from China. While population growth has slowed dramatically because of a strict adherence in the past to the "one-child" policy, and the pace of economic growth has ratcheted down, China's urbanisation drive still has some way to run. This is likely to mean that over the medium to long-term, residential building activity should continue to grow strongly, which is likely to be good news for New Zealand exports. A possible threat might come from Russia, which has dramatically increased its timber exports to China in recent years.

In recent years, forest owners have benefited from receiving carbon credits for their forest growth. But with harvesting activity set to rise as New Zealand's forests age, and demand for their logs increases, there is potential for deforestation to outweigh tree growth, which would add to the country's carbon emissions, potentially threatening the country's ability to achieve its emission targets. This could happen despite a renewed focus by government on forestry and its "One Billion Tree" programme.

However, the near-term outlook is less positive for log producers.

Residential building activity in China has begun to slow, with recent indicators suggesting that there has been a decline in completed dwellings. The implementation of recently announced and wide-ranging structural reforms in China, slower economic conditions overall and tighter credit conditions are likely to deepen this contraction, slowing demand for New Zealand exports.

Given that the slowdown in demand from China is unlikely to be offset by any significant increases in other markets,

it is reasonable to expect that global forestry product prices will fall from the current levels. The combination of lower demand and falling prices will not be good news for New Zealand's forestry sector, although an expected weakening of the New Zealand dollar offers up the possibility of some relief. Firming global economic activity is, however, likely to make things worse, driving up sea freight rates.

Under these conditions, forest owners and forestry managers are much more likely to limit their harvesting activities than they might have been in the past, which will mean lower revenues and falling investment returns. This will have negative consequences for contractors, particularly those involved in logging, a large number of whom will be heavily indebted because of prior investments made in capital equipment when times were good. They will need to pay this back, but without work, these cash flow dependent operators are unlikely to survive for any period of time and could well leave the industry.

Transport contractors are likely to be similarly affected, although they have an advantage in that they can service other industries. The problem for transport contractors is that they are likely to face stiff competition from companies already servicing these industries. Increased competition should drive domestic road freight rates lower.

Traders, who connect forestry owners to buyers, are also likely to feel the heat, as lower volumes effectively eat into lower commissions and reduce profitability. This will affect both larger and small traders alike, although most of the impact will be felt by those traders who operate on a transactional basis. Larger traders that have well developed relationships with forestry owners/managers (often working hand-in-hand with them) and sellers are likely to be better placed to withstand the downturn.

The near-term outlook for wood processors is more positive.

As demand from China starts to slow, forestry owners are likely to redirect more logs to local sawmills at lower prices. The extent to which sawmills will be able to absorb this increase will depend largely on domestic conditions and residential building activity levels. With the Christchurch

rebuild now winding down, the fortunes of the industry will become even more closely linked to what happens in Auckland, where building activity is expected to remain strong in the face of an acute housing shortage. This should be supported by a lift in homebuilding in other parts of the country, including Wellington and Otago. The possibility of more houses being built under Kiwibuild is unlikely to have a major impact, but could do so at the margin.

However, the medium to long-term outlook for wood processors is less rosy.

New Zealand's competitive advantage is in the production of logs. It can produce them quicker and cheaper than anybody else. However, it loses its competitive edge in downstream processing. Although Red Stag's super mill in Rotorua is an exception, downstream processing in New Zealand doesn't really have the economies of scale to be able to compete with large overseas producers. This competitive disadvantage is exaggerated by New Zealand's distance from key markets. Despite significant investment in some quarters, this is unlikely to change any time soon.

Introducing the industry

Defining the industry

This report focuses on the sustainable management of commercial softwood plantation forests in New Zealand and covers the operational activities associated with the planting, maintaining and harvesting of trees, as well as the transportation of logs to downstream wood processors.

It also focuses on wood processing industries concerned with producing sawn timber, veneer and plywood, as well as fibreboard and particleboard from logs that have been harvested from these plantation forests. The report also refers to the production of pulp, paper and paperboard products, ranging from newsprint to packaging materials and fine papers.

Finally, it discusses the significant contribution that commercially grown forests make to New Zealand's international commitments on climate change and its stated objective of being carbon neutral by 2050. Forest plantations act as a carbon 'sink', capturing carbon dioxide from the atmosphere and storing it in trees.

This report does not focus on the management of indigenous forests found in New Zealand, most of which is on conservation land owned by the Crown. Common species found include red beech, silver beech, rimu, tōtara and tawa. Only about a fifth of these forests are privately owned and only about a third of that is suitable for sustainable forestry activity. Actual harvesting activity on these plantations is tiny when compared to that which occurs on commercial plantations.

Nor does it focus on the secondary wood processing. This includes industries that use wood as components in other products. The most obvious example is the furniture industry, although the manufacture of furniture is a minor end use for New Zealand grown wood.

Spatial characteristics of forestry

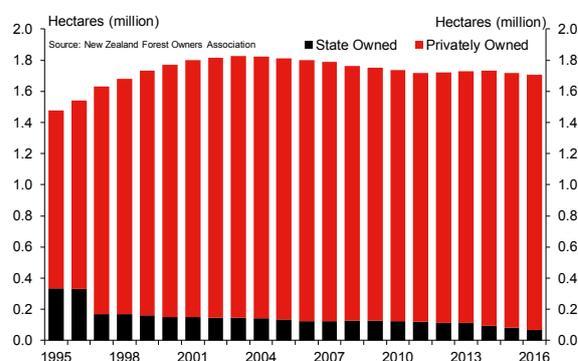
The area covered by softwood plantation forests in New Zealand shows a declining trend. Despite this, the volume of timber available for harvesting has increased over time.

National Coverage

Softwood plantation forests, where most commercial forestry activity takes place, cover about 1.7 million hectares of New Zealand. They are scattered across the country, with only a few areas of concentrated forest plantings.

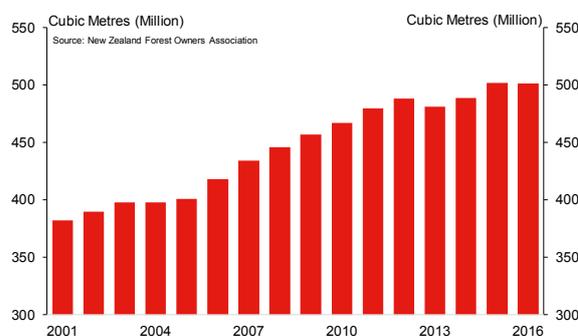
The area covered by these forests declined by just over 120,000 hectares between 2003 and 2017, with most of this decline coming from state owned forests. This follows a sustained period of restocking in the 1990s following a peak in export prices for logs in the early part of that decade.

Figure 1: Land area covered by softwood forests



Despite a decline in the overall area covered, the amount of wood standing in plantation forests has actually increased since 2001, growing by an average 1.8% per year. The estimated amount of wood standing in the forests was just over 503 million cubic metres as at April 2016, compared to 382 million cubic metres in 2001. The standing volume of timber per hectare in New Zealand has increased from 212 cubic metres in 2001 to 294 cubic metres in 2016. This reflects the adoption of forestry management practices that have supported productivity gains.

Figure 2: Standing volume in softwood forests



The area covered by privately owned forests has increased each year since 2011. This reflects the resolution of Treaty of Waitangi claims, which has resulted in the transfer of forestry land from the Crown to Māori

Species

Softwood radiata pine accounts for just over 1.5 million hectares of softwood plantation forests. Because of its climate and soil conditions, New Zealand is able to grow radiata pine faster than most other countries.

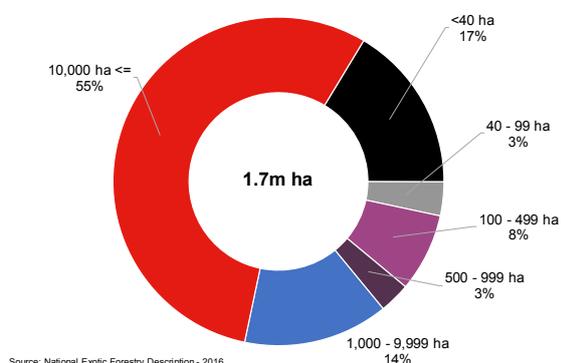
Douglas fir is the second most common tree species grown commercially in New Zealand, covering about 100,000 hectares of plantation forests. Cypress and other exotic softwoods, such as Redwoods, Larch and Cryptomeria, account for a further 33,000 hectares.

Hardwoods make up a very small proportion of commercially grown forests in New Zealand. Eucalyptus accounts for about 23,000 hectares, while other exotic hardwoods, such as Poplars, Acacias, Willow, Black Walnut and Oak, account for another 12,000 hectares.

Plantation Size

About 55% of the forestry plantations in New Zealand are more than 10,000 hectares in size, while a further 14% are between 1,000 and 10,000 hectares. Another 11% of forestry plantations are between 100 and 1,000 hectares, while a remaining 20% are between one and 100 hectare in size (the vast majority of which are less than 40 hectares). Over the coming decade up to 30% of wood available for harvest in New Zealand is expected to come from forests that are less than 1,000 hectares in size.

Figure 3: Plantation size – area of coverage



About 13,500 small forest owners in New Zealand each own less than 40 hectares of forest land

Regional Coverage

About a third of commercially grown plantation forests are located in the Central North Island, with the rest being scattered across the country. 12% are found in Otago/Southland, while Northland accounts for about 11%, followed by the Nelson/Marlborough region (10%), the East Coast of the North Island (9%), Southern North Island (9%), Hawke's Bay (8%), Canterbury (6%) and the West Coast of the South Island (2%).

Most of these regions are characterised as having large forestry plantations. This is particularly so in the West Coast of the South Island and the Central North Island, where almost 80% and 73%, respectively, of plantations are over 10,000 hectares in size. Exceptions to this can be found in the Southern North Island and Canterbury regions, where a relatively large proportion of forests are less than 40 hectares in size. Most of these are owned by farmers and owners of lifestyle blocks.

Table 1: Regional coverage by size of softwood forests - 2016

Region	<40 ha	40 - 99 ha	100 - 499 ha	500 - 999 ha	1,000 - 9,999 ha	10,000+ ha
Northland	19.1%	3.9%	7.3%	5.1%	19.9%	44.8%
Central North Island	10.1%	1.2%	3.4%	1.9%	10.8%	72.6%
East Coast	10.8%	1.6%	7.1%	3.1%	24.0%	53.4%
Hawkes Bay	16.4%	2.5%	5.8%	2.7%	9.2%	63.5%
Southern North Island	28.1%	7.8%	19.0%	5.5%	14.5%	25.1%
Nelson & Marlborough	14.8%	6.3%	11.6%	2.9%	15.2%	49.1%
West Coast	8.9%	1.3%	1.9%	2.0%	6.3%	79.6%
Canterbury	33.7%	5.0%	13.4%	2.2%	12.2%	33.5%
Otago & Southland	21.0%	4.3%	8.0%	3.2%	15.2%	48.4%

Source: National Exotic Forest Description - 2016, Westpac

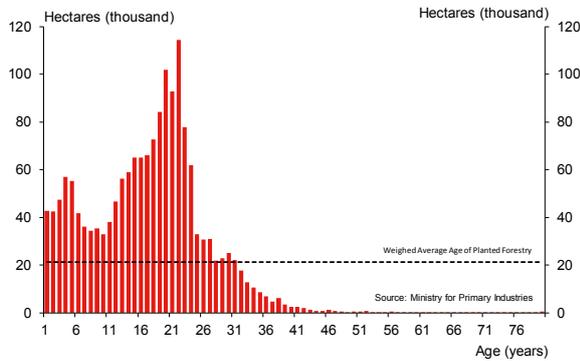
Planting & harvesting activities of forests

A comparison of replanting, planting and harvesting estimates suggests that some forest land in New Zealand has been converted to other uses over the past decade. Most of this will have been land converted to dairy, which has benefited from elevated commodity prices.

Age profile

The average age of trees in commercial plantation forests in New Zealand, weighted by area of coverage, was 17.1 years as at March 2016. About 75% of trees were 22 years of age or younger, while 90% were less than 29 years of age. Given that radiata pine in New Zealand is typically harvested at about 28 years (although this can vary from between 25 to 35 years), this age profile suggests that a large number of trees will have to be harvested over the next 5 to 10 years.

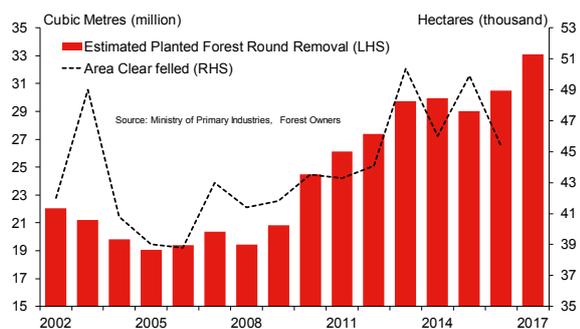
Figure 4: Average age - softwood forests



Harvesting

The estimated volume of roundwood removed from plantation forests was about 33.1 million cubic metres for the year ending December 2017 – an increase of 7.3% over the previous year. The word "roundwood" simply refers to solid wood that is in a round state or in log form. Harvest volumes have grown strongly since 2009, largely because of an acceleration in demand from China. Estimates of area cleared by harvesting activity show a similar trend.

Figure 5: Harvesting - softwood forests

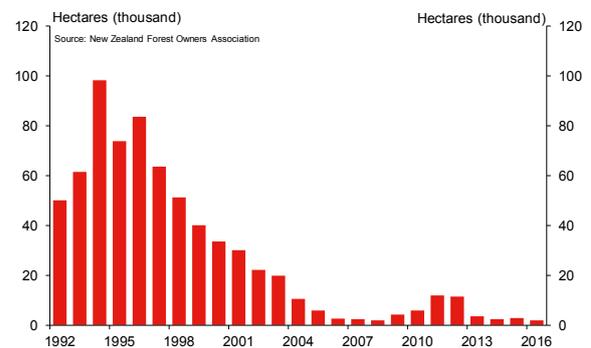


At maturity, harvested wood will have developed the structural characteristics; i.e. density, strength and stiffness that make it suitable for downstream processing.

New plantings

New plantings, which refer to additional areas where trees have not been previously planted, have fallen dramatically since the mid-1990s. After peaking at just over 98,000 hectares in 1994, only 2,000 additional hectares were newly planted in the year ending March 2016. For much of the last decade, the additional area being planted has averaged about 4,000 hectares per year. There are a range of factors that have contributed to this reluctance to undertake new plantings. These include the length of time it takes for investment in forestry to provide returns, the likelihood of additional investment being required for supporting infrastructure (mostly roads), comparative returns on different land uses, and the possibility that central and local government policy could adversely affect investment returns at any time.

Figure 6: New Plantings – softwood forests

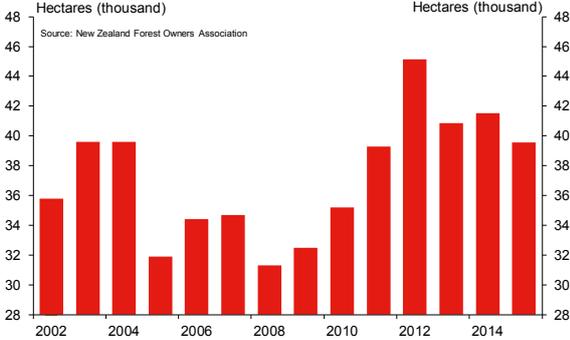


Replanting (restocking)

In New Zealand, most harvested or clear felled areas are replanted with new trees. Replanting, typically referred to as restocking, varies from year to year. Similar to new plantings, the area restocked in New Zealand dipped in

the mid-2000s, before improving slightly thereafter. Since 2013, the size of area being restocked has fallen slightly. Decisions on restocking are largely driven by issues such as the consistency of projected production, sustainability of the forestry resources and expected returns on investment. Higher returns from other types of land use, such as dairying, have also contributed to a drop in restocking levels.

Figure 7: Restocking – softwood forests



Less planting activity has been undertaken because the returns on investment take too long time to come to fruition. Raising the new planting rate is likely to require government incentives, possibly within an emission trading scheme as well as public-private partnerships.

Flow of forestry products

Softwood plantation forests in New Zealand produce roundwood logs. Just under 60% of these are exported, with the remainder being used by the domestic wood processing industry. Most sawn timber and wood panel products manufactured in New Zealand are consumed locally, while the majority of pulp and paper produced domestically is exported. New Zealand also imports a significant volume of wood panel and paper products.

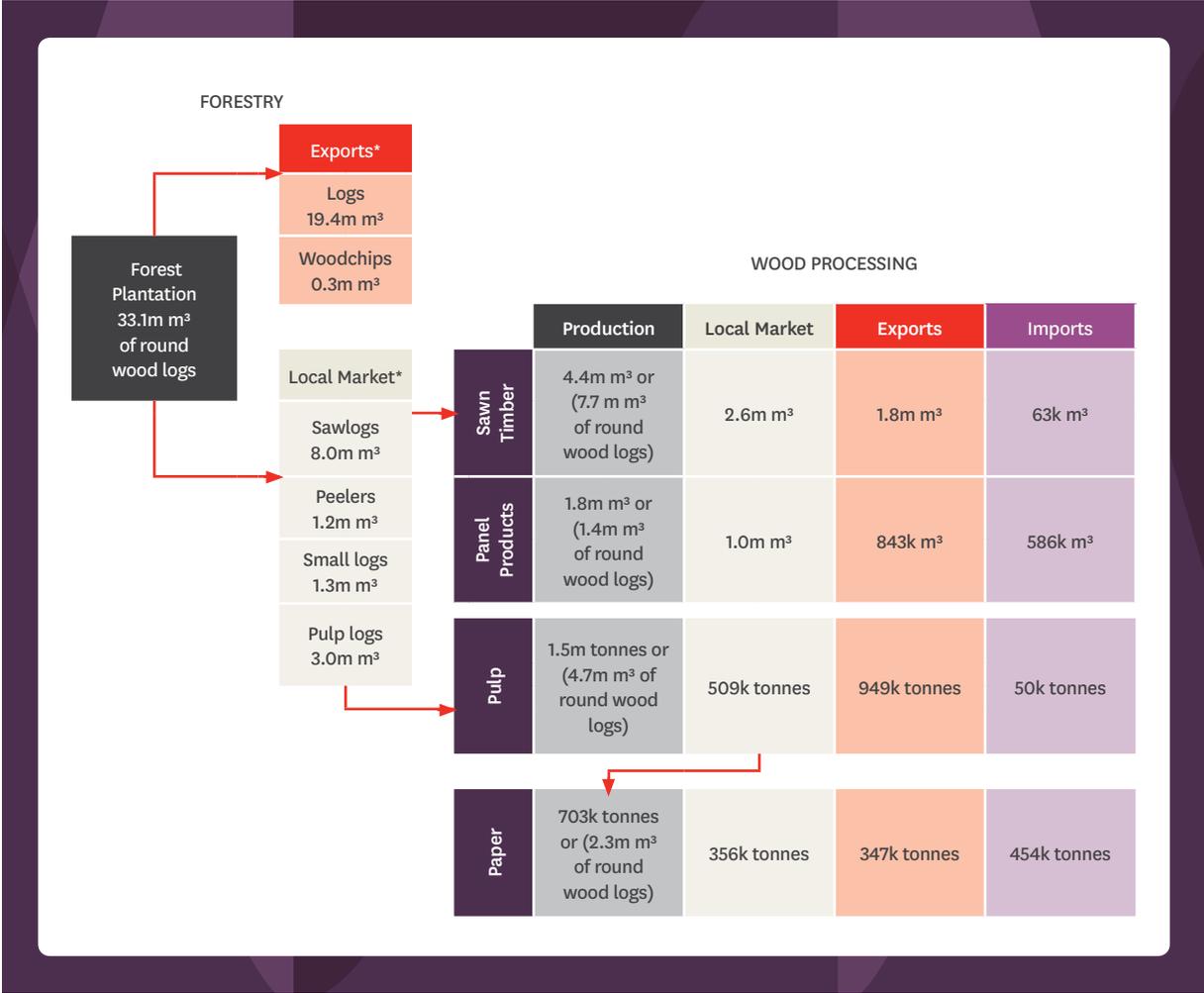
Forest products, including downstream wood products, are New Zealand’s 3rd largest goods export category after dairy and meat

When a tree is felled it is cut into several logs. The bottom 6 metres of the tree is cut and sold as a high value log, normally destined for sawmilling and then further

processing. It can be pruned or unpruned. A pruned log, which has been subject to a pruning regime during the lifetime of the tree, will generally attract a higher price. The next 12 – 15 metres of the tree is cut into structural or industrial grade logs, depending on the characteristics of the wood. The top part of the tree is generally sold as a pulp log and is used to produce pulp. Pulp logs are of relatively low value, being small in diameter and/or not straight enough for sawmilling. Pulp is wood that has been reduced through a mechanical or chemical treatment process and is used to manufacture a range of paper products.

Sawn timber is wood cut from high value logs into different shapes and sizes by sawmillers. It includes products such as solid timber beams and rectangular timber sections.

Figure 8: Forestry production, domestic consumption and trade



Wood panel products, which are produced in sheet form, include fibreboard, which is made from compressed wood fibres, plywood, which is manufactured from thin layers of wood veneer that have been glued together, and particleboard, which is a reconstituted product made from wood particles, wood chips, and/or wood flakes or strands.

About 33.1 million cubic metres of roundwood logs were harvested from commercial softwood plantations in 2017 – an increase of 50% since 2008. An estimated 4,000 forest owners harvest each year.

Exports of logs and woodchips

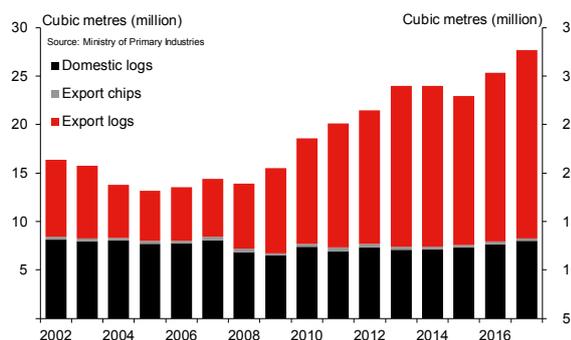
New Zealand exports almost 60% of the roundwood logs it harvests in raw form to offshore markets. It also exports a small volume of wood chips.

Table 2: Exports: Roundwood Removals - 2017

Product	Volume (million M ³)	Volume (APC)	Value (\$bn)	Value (APC)
Saw logs	19.4	11.1	3.0	19.8
Woodchips*	0.3	-6.0	0.1	-9.2
Roundwood removals			3.1	19.1

Note: * include both softwood and hardwood chips
Source: Ministry of Primary Industries

Figure 9: Log production in New Zealand



Logs accounted for 19.4 million cubic metres of the 19.7 million cubic metres of primary forestry products exported offshore in 2017 – an increase of 11.1% over the previous year. Earnings generated from these logs were in the region of \$3.0bn. A further 284,000 cubic metres of softwood and hardwood chips (amounting to about 309,000 metric tons) were also exported, generating about \$59m in earnings during the year.

Since 2008, the volume of logs exported has grown by a whopping 190%. This is mainly because of the growth in demand from China. Almost 12.7 million cubic metres or 70% of softwood logs harvested in New Zealand were exported to China in the year ending June 2017, compared to 1.4 million cubic metres in 2008. Not surprisingly, earnings generated from exporting logs to China have also risen sharply, from \$131m in 2008 to \$1.9bn for the year ending June 2017. This increase has largely driven by strong demand from China's subsidised wood processing sector, looking to supply its domestic construction sector with the wood products that it needs. A lowering of import tariffs on logs and a clampdown on logging activity, following an extended period of unsustainable harvesting in China, has also supported this trend. Industry sources have suggested that logs from New Zealand are mostly processed into timber products that are used to build dwellings.

Figure 10: Export of logs by destination country

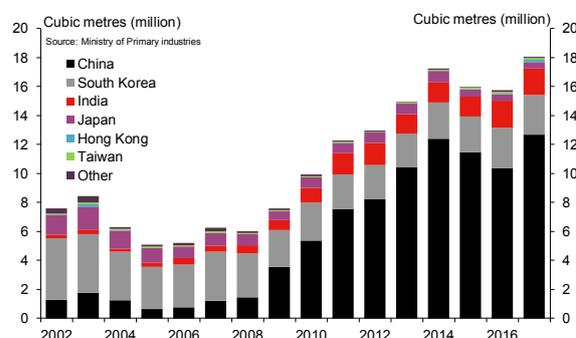
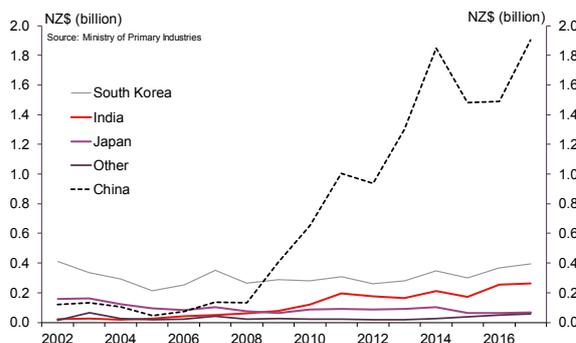


Figure 11: Export Earnings from logs



Other major export destinations pale into comparison with China. South Korea, which prior to 2009 had been the biggest export destination for New Zealand softwood logs, accounted for only 2.5 million cubic metres (or 13% of log exports) in 2017, down from 3.8 million cubic metres in 2003. Despite this decline, higher log prices have meant that the value of exports to South Korea have grown from \$305m to \$372m over the same period. New Zealand exported only 510,000 cubic metres of softwood logs to Japan in 2017, down from the 1.4 million cubic metres exported to that country in 2003. Export earnings from Japan fell from \$131m to \$84m over the same period. India, by contrast, has grown its imports of logs from

New Zealand, from 0.3 million cubic metres in 2003 to 1.6 million cubic metres in 2017 – an increase of 539% over the period. The value of exports to India has risen from \$20m to \$262m over the same period

Industry sources have suggested that India is set to become an increasingly important destination for export logs from New Zealand.

Domestic processing of wood products

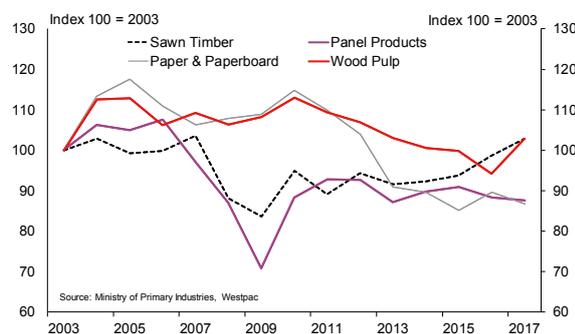
New Zealand processes just over 40% of the roundwood logs it harvests into a range of wood products.

Processing plants are typically located close to the supply of wood and other important infrastructure, such as ports, because it is expensive to transport logs and timber over long distances.

Contracted harvesting crews will typically grade logs according to their various characteristics (density, strength and stiffness) at time of harvest. When purchasing logs, sawmills will specify the grade of log that they wish to purchase, depending on what the end use might be.

Logs destined for further processing in New Zealand accounted for 13.3 million cubic metres (or about 41%) of the roundwood harvested from plantation forests in 2017 – an increase of 1.6% over 2016. Of this, saw logs accounted for 8.0 million cubic metres (60%), peeler logs, 1.2 million cubic metres (9%), small logs/poles, 1.3 million cubic metres (10%) and pulp logs, 3.0 million cubic metres (21%).

Figure 12: Domestic processing of logs



The volume of logs available for domestic processing has grown over the years, but the pace of growth has been slow, especially when compared to exports. Between 2008 and 2017, the volume of logs destined for local processing increased by just 6.3%. Most of this was due to an increase in the supply of saw logs, which grew by 15.6% over the period, and for small poles, which grew by 6.0%. By contrast, the number of pulp logs processed locally

contracted by 10.4% over the period, while the volume of peeler logs fell by 2.1%.

Sawn timber is the main product produced by the downstream wood processing industry in New Zealand. Domestic sawmills produced 4.4 million cubic metres of sawn timber in 2017 - an increase of 18.1% since 2009. This is despite a significant reduction in the number of sawmills operating in New Zealand. Greater levels of automation, more economies of scale resulting in increased production efficiencies, and better profit margins are likely to have supported output growth.

Logs destined for sawmilling are the best quality logs. Industry sources have indicated that export logs are not necessarily the best quality logs.

By contrast, the volume of paper and paper products manufactured locally fell from 930,000 tonnes in 2010 to 703,000 tonnes in 2017 – a decrease of 24%. Lower newsprint volumes accounted for most of this decline. Norske Skog Tasman, a wholly owned subsidiary of Norske Skogindustrier ASA, the world's largest producer of newsprint, and the only one in New Zealand, announced in 2012 that it intended cutting production because of declining global and regional demand. Local production has, however, been supplemented by an increase in imported paper and paper products, mostly hygiene products, such as tissue and toilet paper, which rose from 412,000 tonnes in 2010 to 454,000 tonnes in 2017.

Similarly, the volume of pulp manufactured locally fell from 1.6 million tonnes in 2002 to 1.5 million tonnes of 2017 – a decrease of 9.1%. This was largely due to reduced export volumes into Japan. Despite this decline, the amount of pulp produced locally picked up in 2017 when compared to 2016, rising by just over 9%.

The volume of wood panel products manufactured in New Zealand declined from 1.9 million cubic metres in 2011 to 1.8 million cubic metres in 2017. This decline reflects the impact of falling plywood, veneer and particleboard production, which more than offset increases in fibreboard volumes. The drop in the production of plywood and veneers has, however, been offset by a massive increase in imported plywood and veneers between 2011 and 2017, with most of this increase coming since 2015. The fall in domestic plywood production reflects an increasing inability to compete in domestic and international markets against product out of large scale processing plants in other countries. Imports of particleboard, which are relatively small, have shown little change since 2010, while there has been a notable decline in imports of fibreboard, albeit from a low level.

Production volumes have trended down for most wood processed products. The exception would seem to be sawn timber, although production levels are still lower than what they were in 2003

Exports of processed wood products

About 40% of sawn timber and wood panel products processed in New Zealand are exported annually. Roughly 62% of wood pulp produced locally is sent offshore, while paper exports account for about 50% of domestic paper production.

Table 3: Exports: Processed Wood – 2017

Product	Volume (million M ³)	Volume (APC)	Value (\$bn)	Value (APC)
Exports – Sawn timber	1.8	5.3	0.8	3.1
Export - Pulp**	0.9	1.9	0.7	19.0
Export - Paper** **	0.3	2.1	0.3	-3.8
Export - Panel products	0.8	-2.4	0.5	-7.0
Roundwood removals			2.3	

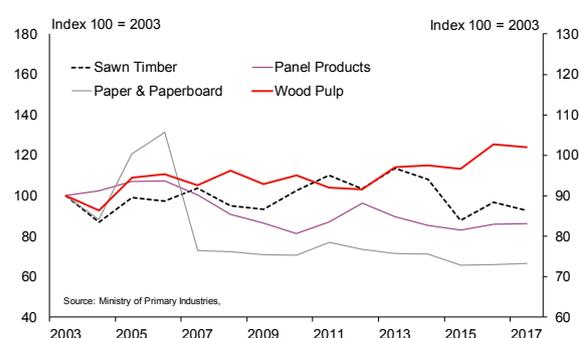
Note: *For the year ending June 2017, **Expressed in million tonnes
Source: Ministry of Primary Industries

About 1.8 million cubic metres of sawn timber produced locally was exported in 2017. This is slightly higher than the 1.6 million cubic metres exported in 2003. The remaining 2.6 million cubic metres was used domestically, primarily in residential and non-residential construction. Since peaking at 2.0 million cubic metres in 2013, sawn timber exports have fallen, and have effectively gone sideways in recent years as demand for raw logs from China has accelerated and domestic demand for sawn timber closer to home, notably in Auckland and Canterbury, has picked

up. Although volatile, growth in export earnings from sawn timber has been marginally positive in recent years, reaching \$837m in 2016, before increasing to \$863m in 2017.

China is the main export destination for sawn timber produced in New Zealand. It accounted for 25% of export volumes of sawn timber and generated \$149m in export earnings for New Zealand during 2017. However, it was not the largest source of export earnings. Despite only accounting for 12% of New Zealand's sawn timber exports by volume, exports to the USA generated NZ\$196m in earnings. The difference between export earnings generated from China and the USA is largely a function of different types of graded timber. Australia, which is New Zealand's third largest export destination for sawn timber, generated \$129m in export earnings in 2017.

Figure 13: Export volumes - processed wood



Pulp export volumes have been variable but have trended upwards over the last decade or so, growing by 40% between 2003 and 2017. They rose slightly in 2017 to 949,000 tonnes. A key reason for the increase in pulp exports over time relates to the structure of the domestic pulp and paper industry. Most of the big pulp producers in New Zealand are controlled by large foreign owned pulp and paper companies, and as such, are integrated into global supply chains. Although somewhat up and down, benchmark prices for pulp, such as Northern Bleached Softwood Kraft (NBSK), have also trended higher over this period, and this has helped to push up export earnings. In 2017, export earnings from pulp produced locally were \$746m (compared to \$627m in 2016).

Table 4: Ranking of export destinations by volume of processed wood product - 2017

Country	Sawn Timber	Pulp	Paper Products	Fibreboard	Plywood
China	1	1	2	3	-
Australia	3	2	1	11	1
Japan	12	3	20	1	2
USA	2	-	11	2	3
South Korea	5	5	5	10	-
Philippines	8	12	3	6	13
India	16	6	8	7	-

Source: Ministry of Primary Industries, Westpac

China is also the main export destination for pulp, accounting for 35% of export volumes in 2017, and generating \$240m in export earnings. Other major export destinations in 2017 were Australia, which accounted for 11% of export volumes, generating \$94m in earnings, Indonesia (10%; \$76m) and Japan (7%; \$44m).

Paper and paperboard product export volumes have trended lower over the past decade, falling 21% between 2008 and 2017. From 2007 they exclude exports of newsprint, estimates for which are no longer published because of confidentiality rules - Norske Skog Tasman is the only producer of newsprint in New Zealand. That said, paper and paperboard exports have edged slightly higher in recent years, and in 2017, 347,000 tonnes were exported. Revenues slipped slightly in 2017 to \$327m, mainly because of a slight pullback in newsprint prices during the first nine months of the year.

Australia is the main export destination for paper and paper products, accounting for 41% of export volumes while generating \$138m in export earnings for New Zealand for the year ending June 2017. Other major export destinations in 2017 were China, which accounted for 13% of export volumes, generating \$47m in earnings, Philippines (11%; \$29m) and Malaysia (7%; \$23m).

Despite spiking in 2012, exports of panel products have generally shown a declining trend, falling 13.8% between 2003 and 2017. For the year ending June 2017, just over 843,000 cubic metres of panel products were exported, generating revenues of \$476m. Most of this came from fibreboard, which accounted for 69% of export volumes, and 56% of export earnings. Veneer products were the second largest wood panel export by volume, accounting for 16% of the total, although this was not the case for export earnings. Plywood was the second largest wood panel export by value, generating about \$127m in revenue for the year ending June 2017.

Japan is the major export destination for fibreboard, accounting for almost 50% by volume and 55% by value. Other major export destinations in 2017 include the US, which accounted for 12% of export volumes, generating \$32m in export earnings, China (10%; \$23m) and Indonesia (9%; \$23m). About 32% of New Zealand's exports of veneer and particle board went either to the Philippines, generating export earnings of \$21m, Japan (21%, \$26m) and Australia (14%, \$11m). Australia was also the major destination for plywood products, accounting for 64% of export volume which generated just over \$100m in earnings. The only other notable export destination for plywood products was Japan (23%; \$20m).

The NZ forest owners strategic plan targets exports of \$12bn by 2022 – more than double the \$5.4bn generated in 2017. Given that exports of processed wood products are trending downward, it seems that industry is depending heavily on growth in log exports to achieve this target.

Forestry sector contribution to the economy

The contribution of the forestry sector to the New Zealand economy have shown a marked decline in recent years. This is due to changes in the forestry industry itself, as well as structural changes in the economy, evidenced by increasing contributions made by the services sector.

The forestry sector contributed about \$3.6bn to New Zealand’s GDP in 2016/17. Of this, forestry, which includes logging, contributed \$1.4bn, with the remaining \$2.2bn coming from downstream wood processing activity.

The value of output produced by the forestry sector less the cost of intermediate inputs rose by 16% between 2002 and 2016/17. At the same time, New Zealand’s economy expanded by about 48%, meaning that the contribution of the industry to the New Zealand economy fell from 2.1% to 1.7% over this period.

The decline in the contribution to the New Zealand economy can be attributed to the performance of the wood processing industry, which has experienced a significant consolidation over the last decade or so. An acceleration in the volume of raw logs being exported abroad and the performance of the New Zealand dollar are often cited as key reasons why a large number of operationally inefficient sawmills and wood processing plants have closed.

The contributions of the forestry sector to New Zealand’s GDP would have been a lot worse had it not been for the performance of the forestry and logging industry, which has benefitted greatly from the higher log exports.

Figure 14: Contribution to New Zealand’s GDP

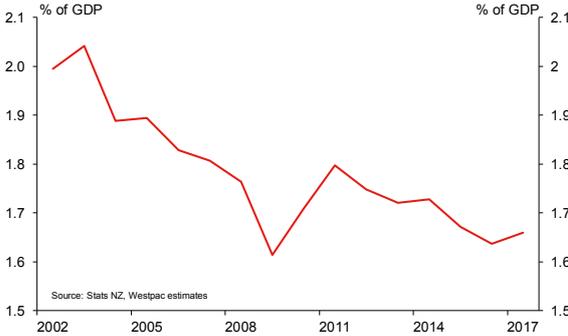
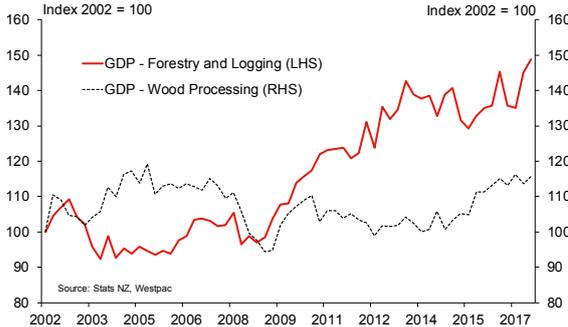


Figure 15: Relative forestry industry performance



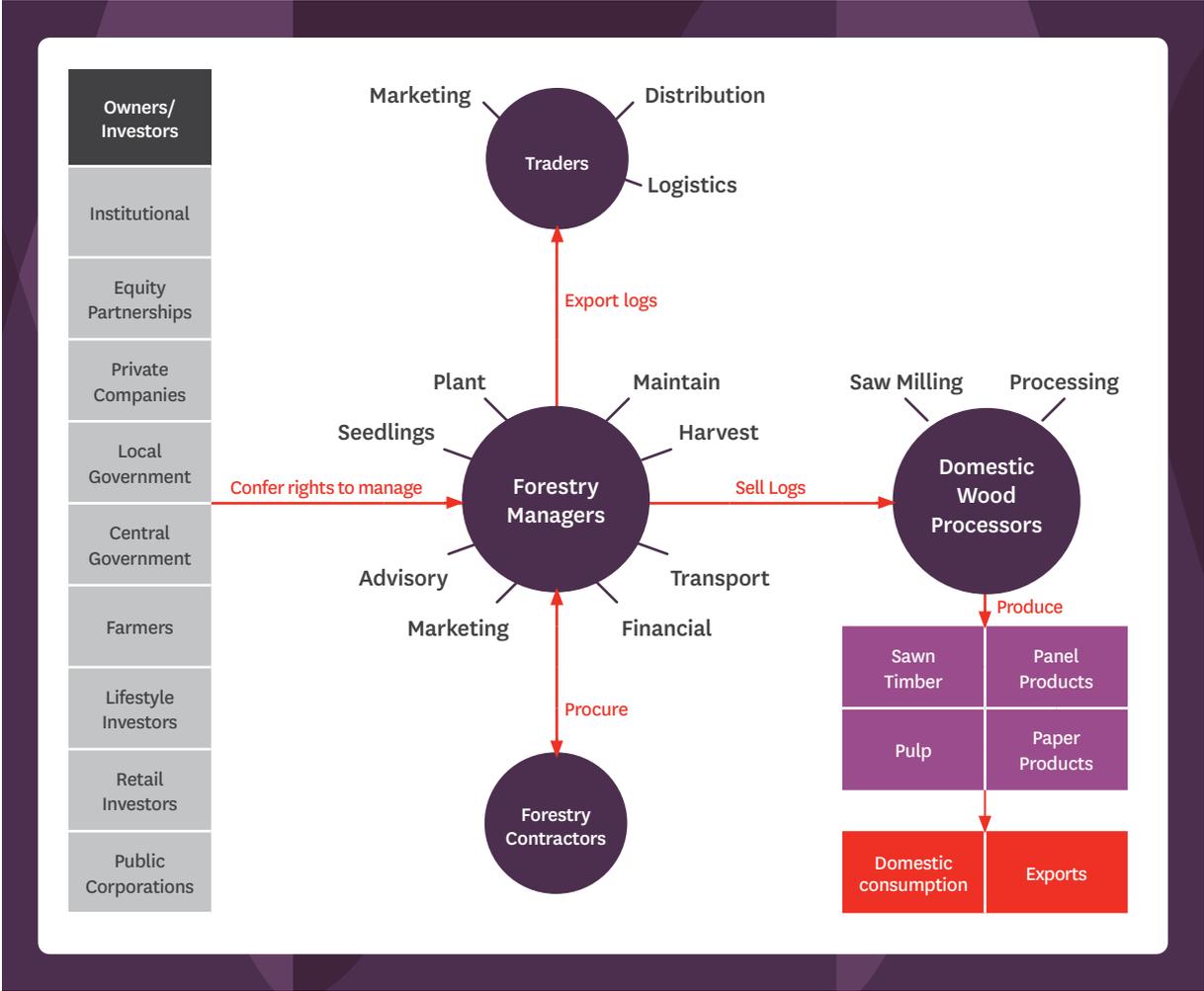
Forestry sector configuration

The forestry sector’s configuration reflects a complicated mix of ownership, investment and control structures. In simple terms, the industry is characterised by large number of investors who, through direct or indirect means, acquire the rights to manage plantation forests. They appoint forestry managers to manage the production of outputs from these forests, which are either destined for the export market or further downstream beneficiation within New Zealand.

Ownership of commercial forestry in New Zealand is dominated by the private sector, is international in nature, and has an increasing proportion of very small-scale forest growers.

Investors range from lifestyle block owners and farmers to central and local government, public corporations, private sector firms, and institutional as well as retail investors. They can invest directly in the rights to manage forests, either by purchasing and owning the land on which there are forests, or by leasing forestry land from others. They can also invest indirectly in forests through intermediaries, such as Real Estate Investment Trusts (REITs), which use shareholder funds to purchase the rights to manage forests, or through Timberland Investment Management Companies (TIMOs), which facilitate the purchase of rights to manage forests by large institutional investors, such as private equity, public and corporate pension and endowment funds.

Figure 16: Summarised forestry sector configuration Configuration

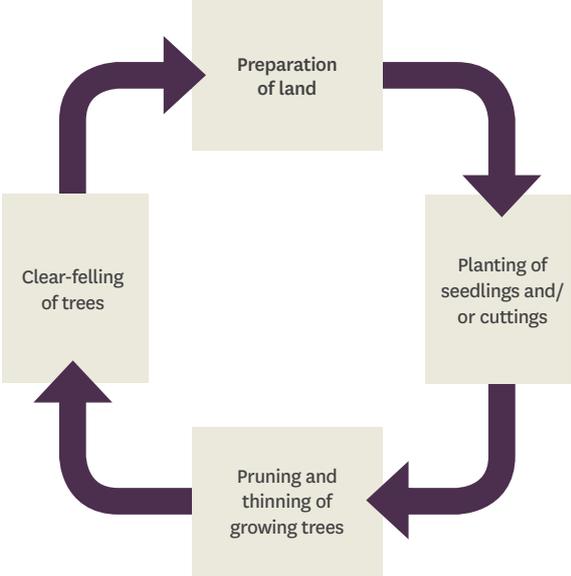


Māori are increasingly featuring in large-scale plantation forest ownership as land is handed back as part of Treaty of Waitangi settlements.

In the past, forestry owners used to manage the production of logs from their own forests. In some cases they still do. However, it is more common these days for forestry owners to employ a forestry manager. Forestry managers might have one client or many, depending on nature of the association they have with a forestry owner.

Forestry managers are involved in a range of planning and coordination of activities, both tactical and operational in nature. These cover the preparation of land, the planting of seedlings or cuttings, the growing of trees (including pruning and thinning), the felling or harvesting of trees at maturity and the transportation of harvested logs to market. Depending on how big they are, forestry managers may also provide a range of other consultancy, financial and marketing services to forest owners.

Figure 17: Forest life cycle



Forestry managers typically do not undertake the work themselves. Some still do, although this a throwback to the way things used to be done when the industry was more vertically integrated than it is today. It is common for activities such as the planting, maintenance, harvesting and transportation of logs to be undertaken by small forestry contracting crews that specialise in this type of work.

Once harvested, most logs are destined for the export market. Marketing and distribution are key activities, which can be undertaken in-house or, as is typically the case, outsourced to traders. These traders match what is produced by the forests with what their offshore customers require while making sure that what is being delivered meets agreed standards and timeframes. Some traders will purchase the logs from a forestry manager directly and market and distribute as they see fit, while others will take no ownership, and instead act as a broker between the forestry manager and offshore customer. There are also those that will purchase from forestry managers directly at the port wharf at an advertised price.

Some logs also go on for further processing within New Zealand. As indicated above, sawmilling, the manufacture of wood panel products (used in the construction activity), and the production of wood pulp and paper are key activities. Again, a limited degree of vertical integration is evident with some forestry managers being actively involved in these downstream activities.

Sector shape and levels of employment

There is only limited data available describing the degree of concentration that exists in the forestry sector.

Table 5: Estimated number of forestry owners, firms and employees - 2017

Sector	Firms		Employees	
	Number	3 year Trend	Number	3 year Trend
Forestry Owners	Between 14,000 and 15,000			
Forestry & Logging				
Forestry Managers	N/A		N/A	
Contractors				
• Silviculture	500	Flat	2,100	Higher
• Logging	650	Lower	3,750	Higher
Wood Processing				
Sawmilling	280	Lower	5,100	Higher
Structural Fittings	840	Lower	5,600	Higher
Plywood & Veneer	15	Flat	930	Flat
Particle & Fibreboard	24	Higher	980	Higher
Pulp, Paper & Paperboard	18	Flat	2,650	Higher
Converted Paper Products	75	Flat	2,650	Lower
Total	2,402		23,760	

Source: Stats NZ: Business Demography Statistics, Industry Sources

Data provided by the Forest Owners Association suggests that forestry management is dominated by a small group of large forestry managers, some of whom are foreign owned. They include Hancock Forest Management (a subsidiary of US based Hancock Natural Resources Group), Timberland Limited (which manages forest on behalf of Kaingaroa Timberlands), Rayonier New Zealand, Ernslaw One and New Zealand owned, PF Olsen.

The top 3 firms manage an area covering 28% of commercial softwood plantation forests. The top 10 firms ranked by area under management account for almost 52%, while the top 20 manage 73%. These firms either have a national footprint or are dominant in a specific region.

In addition to these large firms, industry sources suggest that there is a larger group of mid-sized forestry managers that provide a full range of management services to entities that own forests of between 100 to 1000 hectares. Although not dominant, they are more regionally focused than their larger counterparts.

Below these, there is much larger group of small forestry managers who offer a limited range of services to small forest owners of less than 100 hectares. Some of these provide a single service, such as harvesting, to the approximate 13,500 small forest owners that own less than 40 hectares. These smaller forestry managers are far more prone to leave the industry when market conditions deteriorate and enter it when circumstances improve.

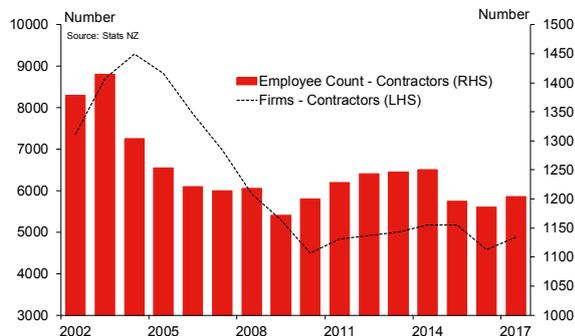
Industry sources suggest that some of these smaller forests managers are opportunistic and will pressure small forest owners to harvest before maturity when prices are high.

There is an estimated 3,723 entities that grow their own forests for commercial benefit. It's not clear whether these are owners or forestry managers. A large number of these operators also gather and sell products, such as pine cones, resin and mushrooms. They tend to be either sole proprietorships or partnerships, and typically have no employees.

There are about 1,150 contracting firms operating in the forestry sector. About 500 of these are involved in providing silviculture services, such as planting, pruning and thinning of trees. Another 650 contracting firms are involved in logging or harvesting activities. The average size of a

contracting firm is just under 6 workers. Industry sources have suggested that the vast majority of contracting crews consist of less than 5 people.

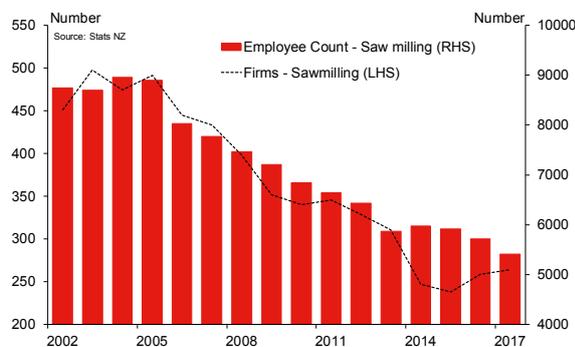
Figure 18: Contractors – firms & employees cycle



There are about 280 firms involved in the sawmilling industry in New Zealand. This excludes an additional 84 firms that are involved in re-sawing and dressing of sawn timber. Firms involved in sawmilling are likely to include a large number of small concerns that use portable saw mills. Collectively, these firms employ about 5,100 people.

In line with international trends, the number of firms and employees involved in sawmilling in New Zealand has steadily declined since 2002, with both falling by about 40% over the period. Of the firms that remain, the top 5 process between 75% and 80% of sawn timber in New Zealand, while the top 10 produce about 90%.

Figure 19: Contractors – firms & employees cycle



The increase in the number of logging contractors and employees operating in the industry in 2017 is directly related to the growth in offshore demand for logs.

However, while there have been closures, sawmilling firms have also invested heavily in new technology. Evolving customer preferences and a drive to reduce unit costs

of production have been major factors underpinning this investment. This has resulted in significant changes in the scale and scope of some sawmilling operations, with a number now incorporating best practice work organisation methods, revised factory layouts and new processing technologies. These changes have also resulted in a small increase in the number of people employed within the industry.

Most global sawmilling sectors have suffered closures and consolidation, but not on the scale experienced in New Zealand. Industry sources suggest further rationalisation is likely and by 2022, New Zealand might have fewer than 40 operating sawmills

The sawmills that remain are generally larger and more efficient, and as such are able to process much larger volumes than before – a key requirement for minimising unit costs of production. Red Stag’s “super-mill” in Rotorua, for example, the largest of its kind in the Southern hemisphere, currently has a processing capacity of over 650,000 cubic metres, which equates to about 15% of New Zealand’s production of sawn timber. Further expansions at this mill are expected to increase processing capacity to well over 700,000 cubic metres in the near future.

The number of firms involved in the manufacture of wooden structural fittings has fallen gradually over the past 10 years. In 2017, there were 840 firms producing structural fittings, down from 861 in the previous year. The number of people employed by these firms was 5,600, about 200 more than that employed in 2016.

The number of firms involved in producing plywood and veneer products is tiny by comparison. According to Stats NZ there were only 15 firms manufacturing these products in 2017, down from 30 in 2005. The number of people employed in this industry has also fallen, from 1,700 to 930 over the period. However, the average number of employees per firm has increased from 56 to 61, suggesting that the industry plays host to some relatively large firms.

The same can be said for the number of firms producing particleboard and fibreboard. According to Stats NZ, there were just 24 manufacturers in 2017, which is slightly more than there have been in the past. However, the number of people employed in this industry has dropped quite markedly, from 1,550 to 930, presumably because of greater automation in the industry. On average, each firm employs about 41 workers.

Similarly, there are a relatively small number of firms that manufacture pulp, paper and paperboard in New Zealand.

According to Stats NZ, that there are only 18 manufacturers operating in New Zealand, employing some 2,650 workers. Unlike most other wood processing industries, the number people employed in the industry has increased since 2010. The average number of employees per firm in this industry is considerably higher than that found in either the forestry industry or other wood processing industries. On average, each firm that manufactures pulp, paper and/or paperboard, employs about 150 people.

For the most part this reflects the sheer scale of operations – pulp and paper manufacturing plants are physically larger than other wood processing plants. New Zealand has 7 pulp and/or paper mills. Two of these, at Whakatane and Te Papapa, produce only paper. Two more, at Kariori, near Ohakune, and at Napier, produce only pulp. Other mills, such as those at Matauru and Kinleith, are integrated pulp and paper mills. There is also a newsprint mill in Tasman.

The forestry and wood processing industries in New Zealand directly employ about 24,000 New Zealanders, including 5,000 Māori.

Value chain model

A value chain describes the range of activities which are required to bring a product or service from conception, through the intermediary phases of production, and delivery to final consumers and disposal after use.

Figure 20: Simplified value chain mapping of the forestry and logging industry

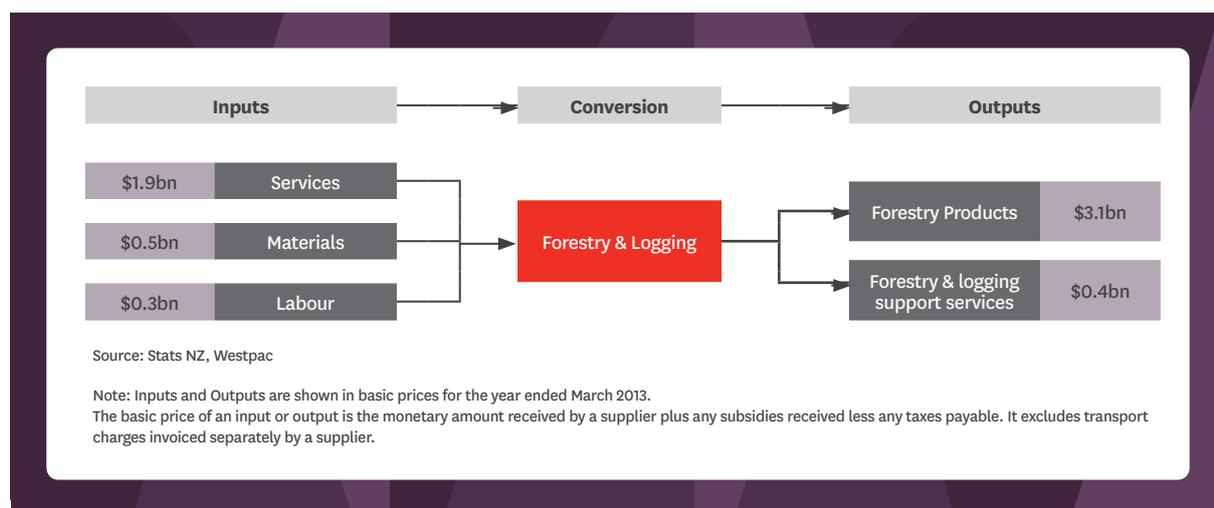


Figure 20 summarises the value of inputs and outputs produced by the forestry (and logging) industry using basic price data from Stats NZ 2013 Input-Output tables. Because they are expressed in basic price terms, they exclude taxes payable, any subsidies received and transport charges that are invoiced. The inputs used by the forestry and logging industry are materials, labour and services:

Services are those that are provided by the numerous small contracting firms that have little or no pricing power over forestry managers, some of whom, especially the smaller ones, operate as contractors anyway. In total, services cost the forestry and logging industry about \$1.9bn per year (expressed in basic prices as at March 2013). Of this, about \$0.8bn is for services to forestry and logging (comprised of contractors that provide land preparation, planting, silviculture and harvesting services). Road freight services cost the forestry and logging industry a further \$0.4bn, while civil engineering services, which are concerned with ensuring access to forestry land through the provision of roads, account for another \$0.1bn. Other major service costs include commercial property services (just over \$0.1bn) and supporting services for transport (just under \$0.1bn).

Materials are used by contractors to produce outputs; i.e. harvested logs. In total they cost the forestry (and logging) industry almost \$0.5bn. The key material input are the trees themselves, which are estimated to cost the industry about \$0.4bn (expressed in basic prices as at March 2013). The only other significant material used by the industry was fuel (almost entirely diesel), which cost the industry just under \$0.1bn.

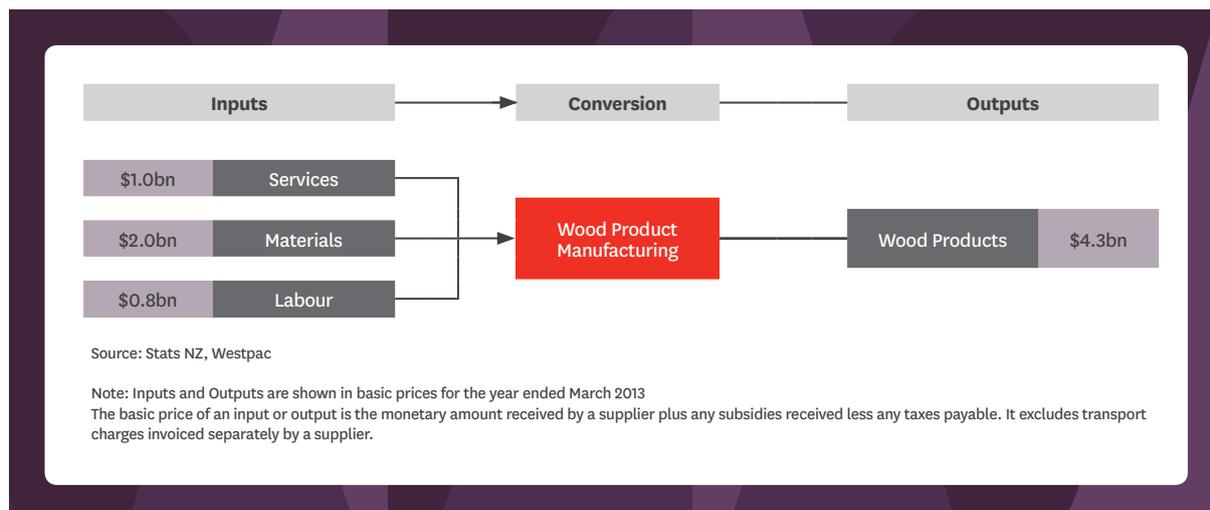
Table 6: Inputs into the forestry industry

Input	\$m (2013 Prices)
Services	
Support services to forestry & logging	807
Road transport freight services	421
Property leasing	124
Civil Engineering services	116
Supporting services for transport	82
Maintenance services	77
Management Consultancy services	76
Equipment hire and IP licensing services	55
Financial Intermediation & auxiliary services	38
Legal and accounting services	17
Materials	
Wood and non-wood forest products	397
Diesel	58
Other Petroleum products	8
Chemicals	6

Source: Stats NZ, Input-Output Tables
Note: Expressed in basic prices as at March 2013

Labour costs in this industry are relatively low, and cost the industry \$0.3bn. The industry is labour intensive and depends heavily on low and semi-skilled labour to carry out the physical work. There are no specific skills requirements to become a logging worker as they are typically gained

Figure 21: Simplified value chain mapping of the wood processing industry



on the job. However, other activities undertaken within the forestry sector, such as scientific research and development and sustainable forestry management, have a much higher skills requirement. A government audit of the sector in 2017 highlighted widespread breaches of employment law in the industry, with some workers either being paid less than the minimum wage, or not being paid the correct holiday entitlements or the right public holiday pay.

Figure 21 summarises the value of inputs and outputs produced by producers of sawn timber and panel wood products using basic price data from Stats NZ 2013 Input-output tables.

The inputs used by sawmillers and panel wood manufacturers industry can also be categorised either as materials, labour or services.

In total, services costs the wood processing industry about \$1bn per year, with freight related services (transport – mostly road, cargo handling, and supporting transport services), costing almost \$0.3bn. Professional services, utilities and maintenance related services cost the industry about \$0.2bn, while spending on financial and business services cost in the region of \$0.1bn a year.

Materials cost the wood processing industry about \$2bn per year, of which harvested wood accounted for about \$1.4bn. Other major cost items include chemicals, which amounted to about \$0.3bn a year, and steel products which cost the industry about \$0.1bn.

Labour costs associated with wood processing are higher than in the forestry and logging industry, costing the industry about \$0.8bn a year. This is mainly because of the higher skills content needed for working with woodworking machinery. Wood processing workers set up and use woodworking machinery to cut logs into timber for building, furniture, paper and other products.

Figure 22 summarises the value of inputs and outputs produced by the pulp and paper manufacturing industry using basic price data from Stats NZ 2013 Input-Output tables.

Table 7: Inputs into the wood processing industry

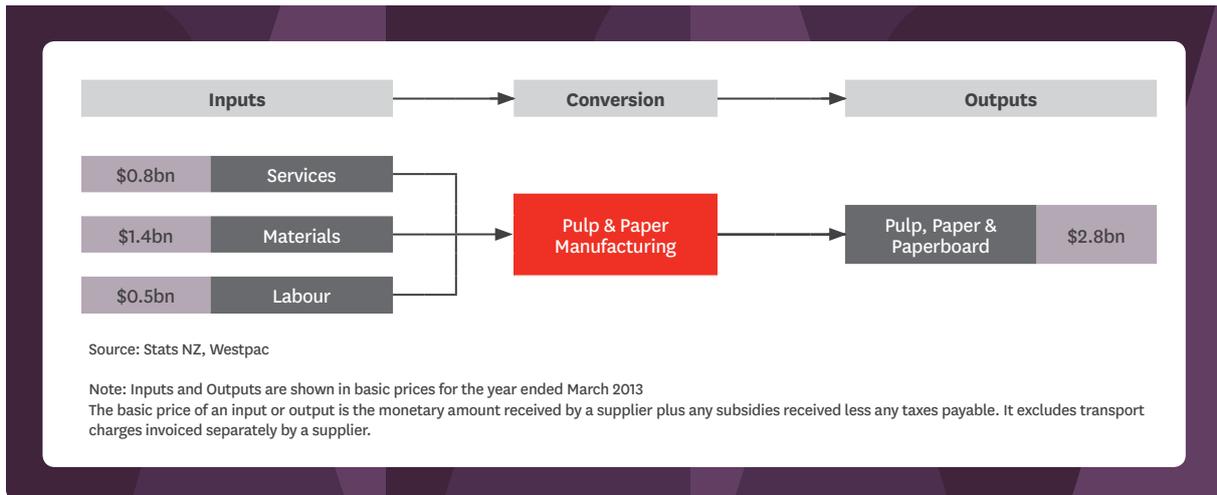
Input	\$m (2013 Prices)
Services	
Road transport freight services	186
Maintenance services	153
Utilities	128
Services incidental to manufacturing	69
Cargo handling	57
Other support & administrative services	48
Legal, accounting & marketing services	48
Other education services	41
Financial Intermediation & Insurance services	41
Equipment hire and IP licensing services	36
Property Leasing	33
Non Residential building construction	29
Supporting transport services	27
Management consultancy services	25
Materials	
Wood	790
Wood and non-wood forest products	548
Chemicals	281
Steel & metal products	113
Panel wood products	88
Equipment & machinery	43
Other wood products	30

Source: Stats NZ, Input-Output Tables
Note: Expressed in basic prices as at March 2013

Again, the inputs used by these manufacturers can be categorised either as materials, labour or services:

Services used by pulp and paper manufacturers cost the industry about \$0.8bn per year (expressed in basic prices as at March 2013), with utilities (mostly electricity) accounting for \$0.3bn, and freight related services

Figure 22: Simplified value chain mapping of the pulp and paper manufacturing industry



(transport – mostly road, warehousing and storage) another \$0.2bn. Financial and business services, and professional services, cost the industry about \$0.1bn each.

Materials used by pulp and paper manufacturers cost the industry \$1.4bn per year. About \$1bn of this was for wood, pulp, and recycled paper products already manufactured but still requiring further processing. Chemical products cost the industry another \$0.2bn, while steel products and machinery and equipment made up the remaining \$0.2bn.

Labour costs associated with pulp and paper manufacturing cost the industry about \$0.5bn a year. This industry is more capital intensive than either the forestry or wood processing industries and requires more skilled workers. As a result, median salaries tend to be higher.

Table 8: Inputs into pulp and paper manufacture

Input	\$m (2013 Prices)
Services	
Utilities	348
Road transport freight services	135
Maintenance services	60
Management consultancy services	34
Other insurance services	33
Rail and Sea transport freight services	29
Equipment hire and IP licensing services	22
Postal & Courier services	19
Other support & administrative services	17
Legal and accounting services	16
Materials	
Wood and non-wood forest products	246
Pulp, paper & paperboard	568
Chemicals	164
Wood	162
Equipment & machinery	103
Steel & metal products	72

Source: Stats NZ, Input-Output Tables
Note: Expressed in basic prices as at March 2013

Legislative and regulatory environment

The forestry sector is subject to a number of Acts, some of which are specific to commercial forestry activity, while others have a broader remit. The sector is also home to a range of international, national and company best practice accords, agreements and standards that operate outside of legislation.

The forestry sector’s legislative and regulatory environment focuses on offshore investment in the sector, environmental damage limitation, health and safety issues, and certification/international standardisation.

Offshore Investment

Overseas Investment Act

On 14 December 2017, the New Zealand Government introduced a Bill to amend the existing Overseas Investment Act. The Bill has progressed through to Select Committee stage. The objective of the Bill is to “ensure that investments made by overseas persons in New Zealand will have genuine benefits for the country”.

From a forestry perspective, the key amendment relates to including the rights to manage forestry within a broader definition of “sensitive land”. By making this inclusion, the Bill facilitates greater scrutiny of investments made by forestry managers domiciled offshore, and the investors that they represent.

Proposed investments by overseas based forestry managers wanting to acquire significant forestry rights in New Zealand will be assessed against a number of criteria. One of these is likely to be whether such investments promote the downstream wood processing industry in rural New Zealand.

Expanding the downstream wood processing industry is seen as a way of extracting greater value from logs harvested from forestry with positive knock-on effects for export earnings and unemployment, especially in deprived rural regions. Not surprisingly this has been welcomed by wood processors.

However, foreign domiciled forestry managers will argue that having to meet additional investment criteria, effectively skews the competitive playing field towards local forestry managers who do not have to meet this requirement. This new requirement they contend, effectively raises the investment returns they need to achieve for their investors/shareholders, which could have a negative impact on future investment.

Environmental Damage Limitation

Resource Management Act

The New Zealand government’s policy approach to resource management is to establish legislative and economic frameworks that allow market driven investment decisions while minimising the adverse effects of land use activity on the physical environment.

Forestry activities in New Zealand are currently managed under the framework of the Resource Management Act (RMA) 1991. The purpose of the RMA is “to promote the sustainable management of natural and physical resources” by considering the effects that activities, such as forestry, might have on the environment now and in the future.

There are two separate processes under the RMA. The creation and adoption of regional and district plans, which set the rules for what requires consent, and the consent process itself, which can involve public scrutiny and consultation. Resource consent applications are required to set out how a consented activity will manage its environmental, cultural and social impacts, with decisions being informed by the extent to which they adhere to the rules set out in regional and district plans.

Table 9: RMA Implications for the forestry sector

RMA Issues	Implications for forestry	
	1st Order	2nd Order
<ul style="list-style-type: none"> – Re-litigation of issues in regional and district planning documents – Requirement to interpret variable planning rules and standards 	<ul style="list-style-type: none"> – Higher plan development, administrative and compliance costs for various parties, including costs associated with ongoing council/industry/stakeholder engagement – Uncertainty 	<ul style="list-style-type: none"> – Inefficiency – the cost to NZ when producing wood is greater than is necessary
<ul style="list-style-type: none"> – Inconsistent treatment between districts & regions 	<ul style="list-style-type: none"> – Operational costs for forestry companies (on-ground costs) are higher – Foreign investment is deterred 	<ul style="list-style-type: none"> – Investment uncertainty
<ul style="list-style-type: none"> – Varying regulations in some districts & regions 	<ul style="list-style-type: none"> – Uncertain environmental outcomes 	<ul style="list-style-type: none"> – Variable forestry practice

Source: NZIER & MWH, Westpac (Modified)

The RMA is often singled out by the forestry sector as a major frustration and, at times, a barrier to its development. Concerns range from the consultation process being costly and time consuming, to a lack of equitable treatment among land uses, with agriculture seemingly being favoured over forestry, and a failure to implement aspects of the RMA such as “polluter pays”.

However, the biggest concern for the industry has been the inconsistency in how the RMA has been applied by different local authorities. This has led to a number of problems, ranging from the ongoing re-litigation of issues already addressed to the inconsistent treatment of forestry operations that cross local government boundaries. In addition to increasing costs and operational complexities, inconsistencies in application has also created uncertainty as to whether resource consents will actually be obtained, potentially threatening investment in the sector.

National Environmental Standard for Plantation Forestry

To address some of the sector’s concerns relating to the RMA, the Ministry of Primary Industries, together with the Ministry for the Environment, in consultation with a broad range of stakeholders, developed the National Environmental Standard for Plantation Forests (NES-PF). These regulations came into force on 1 May 2018.

The NES-PF regulations establish the technical standards for eight core plantation forestry activities and sets out when an activity is permitted and when resource consent is required under the RMA. These activities include afforestation, pruning and thinning to waste, earthworks, river crossings, forestry quarrying, harvesting, mechanical land preparation and replanting. These standards are consistent in that they apply nationwide.

The NES-PF regulations generally prevail over regional and district plans that apply to commercial plantation forests. Regional and district plan rules cannot be more lenient than the regulations and they can only be more stringent in special circumstances where local conditions require a more restructured approach.

NES-PF regulations seem to address a number of issues relating to the inconsistent application of the RMA and also clarifies when resource consent is required. However, it is not clear whether the regulations address the concerns that the industry has about the time consuming and costly nature of the process itself.

The forestry sector has been active in developing and adopting Environmental Management Systems (EMS), Best Management Practices (BMPs) and Forestry Accords. Many forest companies in New Zealand have comprehensive BMP manuals and environmental policies in place to help minimise their impact on the environment.

Forests Act 1949 (amended in 1993)

The Forest Act 1949 has two main operational parts. Part 3B enables forest owners to establish permanent forest ‘sinks’ and earn tradeable carbon credits under certain conditions. These conditions require that the land must not have been under forest cover as at 31 December 1989; that the forest must be the result of direct human involvement, for example, through planting; and that forest owners’ rights and obligations are registered against land titles. Forest owners will be required to surrender carbon credits when trees are harvested.

Forestry Accord – 1991 (reaffirmed in 2007)

The New Zealand Forestry Accord was signed in August 1991 by representatives of commercial forestry owners as well as environmental and recreational groups. The agreement was renewed in 2007 with the addition of some new clauses.

Two main points were agreed in the Accord. The first was that, given their heritage value, existing indigenous forests were to be protected from any developments involving commercial softwood plantation forests. The second was that commercial softwood plantation forests were an essential source of perpetually renewable fibre and energy that offered an alternative to the depletion of indigenous forests.

The 2007 Accord updated the previous agreement to include support for climate change initiatives. It aims to prevent perverse outcomes, such as the loss of indigenous forests or greenhouse reserves in other indigenous eco-systems.

The original Accord of 1991 formed the basis for the Principles for Commercial Plantation Forest Management in New Zealand which were signed in 1995 by the same parties that had previously signed the Accord. The principles cover social, economic and ecological aspects of forest management.

Environmental Code of Practice for Plantation Forestry (2007)

The NZ Environmental Code of Practice for Plantation Forestry updates and expands on the New Zealand Forestry Code of Practice that was first published in 1990 and revised in 1993. The 2007 code of practice, which was developed by the New Zealand Forest Association and endorsed by the other major forestry and environmental organisations, is based around 18 “best environmental management practices” to help forestry managers minimise the adverse effects of their activities on the environment.

Health and Safety

Health and Safety at Work Act 2015

The Health and Safety at Work Act 2015 (HSWA) is New Zealand’s key work health and safety law. It applies to the forestry sector, although it is not specific to it. WorkSafe New Zealand is the regulator under the Act, although other agencies can be designated functions for certain sectors.

In the case of the forestry sector, the key agency is the Forestry Industry Safety Council (FISC), which is mandated to work with stakeholders from across the sector to help improve industry’s safety record. FISC was initiated following a 2014 Independent Forestry Safety review, which described the industry as New Zealand’s most dangerous to work in. The review at the time attributed the forestry sector’s comparatively poor safety record on a lack of leadership, a weak safety culture, lack of regulatory oversight, and a lack of meaningful worker participation in safety related matters.

Contractor and worker certification

Safetree, which is run by FISC, is an organisation that provides programmes and resources to help forestry managers, contractors and employees run safe forestry operations. Safetree’s programmes are based on the aforementioned review’s recommendations from 2014.

As part of this, Safetree introduced voluntary certification schemes for both contractors and workers. The contractor certification scheme provides the industry with a standardised assessment of a contractor’s ability to work. For contractors, the system provides the benchmark against which they can measure their own health and safety systems, while for forestry owners and managers, using certified contractors provides an assurance that their contractors are competent to undertake the work. However, it might also raise the costs of using these contractors which could lead to a two-tier contracting system of registered and unregistered contractors. For workers, the scheme is expected to result in improved health and safety and employment conditions, although it’s not clear how this is to be achieved.

The worker certification system assesses the ability of workers in the forestry industry to work in a safe and professional manner. Whether this will actively translate into safer working practices is unclear.

Approved Code of Practice for Safety and Health in Forest Operations (2012)

The Approved Code of Practice (ACOP) was developed by the Ministry of Business Innovation and Employment (MBIE) with industry representatives and other agencies. The Code of Practice is a statement of preferred work practices. It focuses on improving safety practices and reducing workplace accidents in the forestry industry.

The purpose of the ACOP is to provide a practical guidance to employers, contractors, employees, and all others engaged in work associated with forestry, on how they can meet their obligations under the HSWA (which supersedes the Health and Safety in Employment Act 1992) and it’s associated regulations.

A Court may consider ACOP when considering compliance with relevant sections of the HSWA. If an employer can show compliance with all the matters it covers, a Court may consider the employer has complied with the Act.

There are differing opinions on safety within the industry. Trade unions argue that not enough is being done, and the safety code of practice needs to be improved. Industry associations disagree, suggesting that it is not possible to cover every eventuality.

Certification

Forests Stewardship and Certification

About 1.2 million hectares of commercial plantation forests in New Zealand are certified by the Forest Stewardship Council (FSC). The Forest Stewardship Council (FSC) is an international organisation established in 1993 to promote the responsible management of the world’s forests. Certification means that forests are managed according to a set of environmental, social and economic standards and that they have been independently inspected and evaluated according to the FSC Principles and Criteria. The primary rationale for gaining FSC certification is to maximise international market access for New Zealand’s forest products, raise forestry practice standards, and demonstrate social and environmental responsibility.

About 500,000 hectares of FSC certified plantation forest in New Zealand have also been certified under the Programme for the Endorsement of Forest Certification (PEFC). PEFC, which is the world’s’ largest forest certification system, was founded in 1999 in response to the specific requirements

of small- and family forest owners. It is an international umbrella organisation providing independent assessment, endorsement and recognition of national forest certification systems. The PEFC endorsed certification system operating in New Zealand since 2015 is based on the New Zealand Standard for Sustainable Forest Management.

New Zealand has a long standing reputation for the quality of its forest management and wood manufacturing capability. The availability of PEFC certification will further enhance its reputation in export markets.

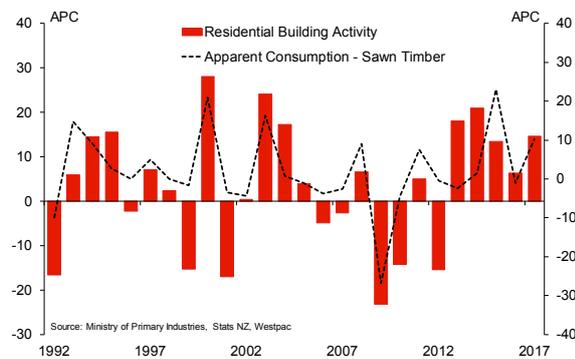
Factors shaping demand

When trying to understand the nature of competition in the forestry and primary wood processing industries, it is important to understand the factors that shape demand for the products that they produce, as well as the factors that affect the supply of these products.

Domestic demand side drivers

Domestic demand for wood products in New Zealand is largely driven by residential building activity. Although timber is also used in the construction of commercial, industrial and institutional buildings, cheaper or more durable alternatives, such as plastic or steel, are commonly used instead. As a result, residential building activity tends to have a much greater impact on industry revenue than other building construction markets.

Figure 23: Demand drivers – residential building



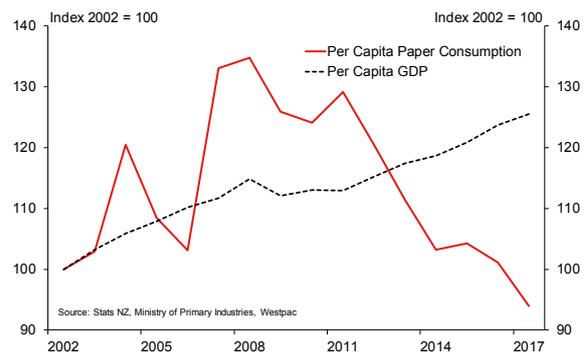
The development of higher strength structural wood products, that are more fire and earthquake resistant than traditional materials, are making it more feasible to construct wooden non-residential buildings. In 2017, plans were announced to build a 12 storey wooden office block in central Wellington. This will be the tallest wooden building in the world.

Sawn timber in New Zealand is commonly used to provide structural support in residential buildings, while veneers, plywood, fibreboard and particleboard have a number of different applications, from floorboards and cupboards, to

door frames and linings. In turn, residential building activity is a function of a number of cyclical and structural factors, ranging from fluctuating interest rates to house price movements and changes in population size. Rebuilding efforts following natural disasters, such as the Christchurch earthquake, are also a source of demand. A very small amount of wood from New Zealand's softwood plantation forests is used in the production of furniture or as a component in other products.

The housing construction boom in recent years, particularly in Auckland, coupled with re-construction efforts in Christchurch post-earthquake, has resulted in sawn timber being diverted from the export market to meet additional domestic demand.

Figure 24: Paper consumption vs economic growth



New Zealand uses about two-thirds of the wood pulp it produces to manufacture a range of paper and paper products, an increasing proportion of which are exported. New Zealand also imports more paper and paper products than it produces.

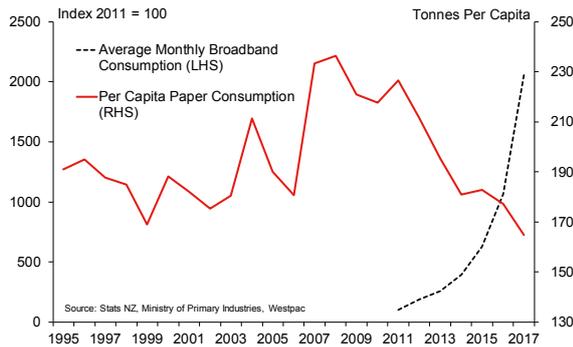
At the same time, the consumption of paper and paper products in New Zealand has declined. After peaking at just one million tonnes in 2008, the consumption of paper and

paper products in New Zealand has trended downwards, and in 2017 just on 787,000 tonnes were consumed locally.

On a per capita basis, the decline is even more apparent. In 2008, per capita consumption of paper and paper products was 238kg. By 2017, per capita consumption of paper in New Zealand had fallen to just 165kg, which are levels last seen in 1994.

A large part of this decline can be attributed to the impact of technology, which has reduced demand for some types of paper, while increasing demand for others.

Figure 25: Paper consumption vs technology



Demand for newsprint, for example, has been severely affected by the immediacy of the internet and its ability provide up-to-date news content. The consumption of graphic printing paper has also fallen, in part because of the long-awaited shift towards the paperless office. Demand for fine writing papers has also decreased, with emails and social media platforms providing a more immediate and convenient way of communicating.

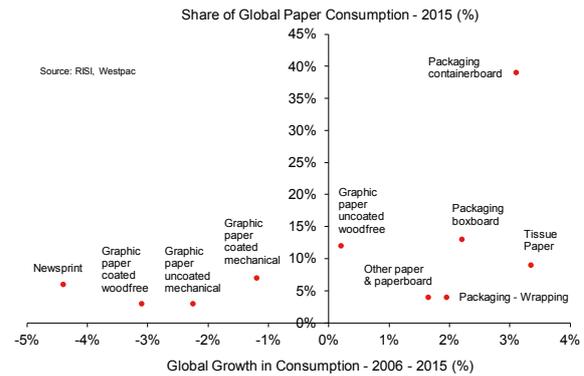
Advances in paper recycling technologies has resulted in higher recovery rates, which has reduced the need for pulp manufactured from pulp logs. Recycled matter now accounts for about 64% of the raw material inputs used to manufacture paper.

These disruptive developments, which are not unique to New Zealand, have helped to delink paper consumption from the traditional drivers of demand for paper products, such as economic growth and increasing income levels

However, technology hasn't been all bad for the consumption of paper. For example, the double-digit growth of online shopping in developed countries (including New Zealand) has strengthened demand for paper products used in packaging.

A growing and ageing population, rising urbanisation, coupled with increasing disposable income levels and greater expenditure on personal hygiene are key factors that have underpinned growth in international demand for a range of tissue paper and hygiene related paper products. In New Zealand, the market for such products is mature with the key factor driving demand being changing population demographics.

Figure 26: Global paper consumption growth vs market shares



External demand side drivers

Global demand for timber has been driven by increases in the size of the world's population, rising incomes, and new product developments that make wood an increasingly important raw material. Nowhere are these trends more prevalent than in Asia, with China demanding increasing volumes of logs and timber from countries like New Zealand.

China is the largest importer of wood in the world, mainly because domestic supply is unable to meet the demands of local processors. In part this reflects issues associated with the quality and the distribution of forestry resources in China. It also reflects the impact of wood harvesting quotas as well as preferential tariffs and subsidies that encourage Chinese sawmills to import logs at lower cost.

China's 13th 5-year plan indicates a 6.3% cut in the wood harvesting quota for the period 2016 to 2020. The plan expands an existing ban on commercial logging to include all of China's last remaining natural forests. While softwood logs do not directly substitute for these, some substitution is likely and this should support New Zealand exports into China.

According to Wood Markets, an international consultancy specialising in forestry products, China imported 33.7 million cubic metres of softwood logs in 2016 (up from 29.7 million cubic metres in 2006), over a third of which came from New Zealand. It also imported just over 21 million cubic metres of softwood timber, amounting to about US\$3.8bn. Estimates for 2017 show that Chinese softwood log imports hit record levels during the year, helped to some extent by a strong Chinese Yuan. Total log imports, both hardwood and softwood, increased to 55.4 million cubic metres in 2017, which suggests softwood log imports grew by about 36.8 million cubic metres.

China's position as the world's largest importer of wood in part reflects its rapid economic expansion (accompanied by rising household incomes). This has been facilitated by huge structural changes and far ranging reforms that have opened up the Chinese economy to market forces, sparking greater private sector involvement and massive investment. However, as the pace of the Chinese expansion has begun to slow in recent years, so too has demand for logs imported from New Zealand.

Figure 27: Chinese log imports from NZ vs GDP per capita

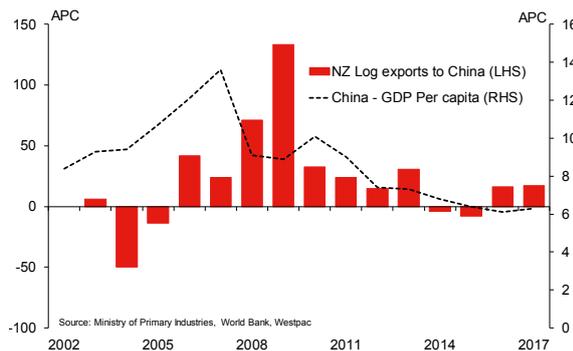
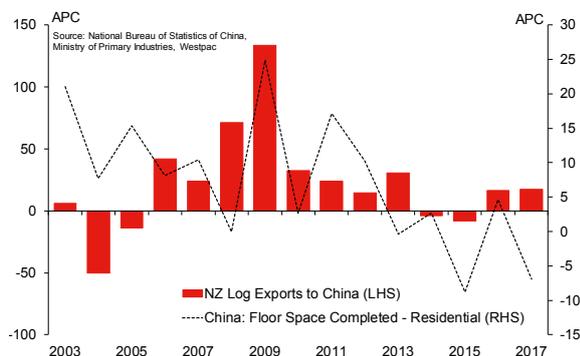


Figure 28: Chinese log imports from NZ vs residential floor space completed



It also reflects the growth in residential building activity in China, which has been driven by the economic expansion referred to above, and the large-scale internal migration of people from the rural areas to the cities. Approximately 58.5% of the China's population now live in urban areas, compared to 26.4% in 1990. By 2020, this is expected to reach 60% and about 300 million people are expected

to have moved from rural to urban areas between 2010 and 2025.

Residential building activity has also been supported by relatively easy access to finance (further helped by the rise of a "shadow banking" sector), corruption between banks and local authorities, a disregard for the environmental impacts associated construction activity, and little thought about land use impacts.

Changes to government policy, highlighted at China's 19th National Congress in late 2017, suggest a clampdown, with a stronger focus on reducing the financial risk and environmental impacts associated with wood processing and construction activity. This has already resulted in a large number of wood processors curtailing production and has begun to slow growth in domestic residential building activity. As a consequence, the pace of growth in New Zealand softwood log exports to China has begun to slow and this could continue for some time to come.

An extended slowdown in Chinese demand for softwood logs could be partially offset by an increase in demand from India. As the benefits of a fast growing economy in that country reach more and more people, it's likely that per capita consumption of forestry products in India will follow a similar trajectory as that of China.

The ability to withstand adverse natural disasters has also driven demand for some wood products. Demand for high strength engineered wood products, such as cross-laminated timber, which has the flexibility to withstand severe seismic events, has started to replace traditional structural materials, like concrete, in some applications. The revised China Building Code set to be introduced in August 2018 will include a number of radiata pine grades that can be used for structural purposes. This means that for the first time, engineers in China will be able to design buildings using NZ sawn timber, rather than just using New Zealand logs and wood products as an input in the construction process.

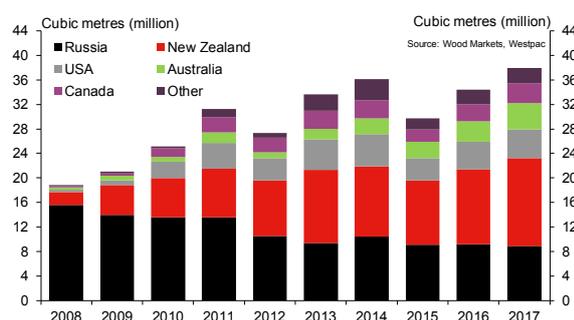
Factors shaping supply

When trying to understand the nature of competition in the forestry and primary wood processing industries, it is important to understand the factors that determine the supply of these products.

International Supply Comparisons

New Zealand is the biggest supplier of softwood logs into China, having rapidly increased its share of exports into China from just over 10% in 2002 to about 36% in 2017.

Figure 29: Softwood logs exports to China



At the same time, export volumes from Russia, historically the largest supplier of softwood logs to China, have shrunk from 83% to 24%. This is despite the fact that it has a massive forestry reserve and a geographic advantage of being a neighbour to China. It is also a big producer of logs in its own right, despite only harvesting about a third of its annual total allowable limit of about 700 million cubic metres (which still significantly more than the 33 million cubic metres New Zealand managed to harvest in 2017). It still exports about 90% of its softwood log production into China.

There are several reasons for Russia's relatively poor log export performance into China, including ongoing capacity constraints (shortages of logging equipment and skills, poor supporting infrastructure), logistical bottlenecks along the entire supply chain (from forests to the ports) and high transport costs (both rail and road). However, industry sources have suggested that these problems are not insurmountable.

It could also be that Russia has switched focus, preferring to concentrate on higher value sawn timber. The imposition of a log export tax and more recently, the devaluation of the Russian Ruble, has resulted in the creation of a higher margin sawmilling industry in Russia, which has led to a sharp increase in timber exports. Russia currently exports about 40% of its sawn timber production to China and this has been growing strongly in recent years. In 2017, it exported about 14.3 million cubic metres to China, an increase of 23% over the previous year.

Other countries, such as the US, Canada and Australia have also increased their softwood log exports into China, albeit

from a low base. So too, have those classified within "Other" (see figure 29), which includes some large Nordic producers (Finland and Sweden) and some in South America (Brazil). To a large extent, the factors driving these exports are much the same as those that apply to New Zealand, although there are also likely to be others that are country specific. For example, the increase in exports from the US and Canada to China might reflect the impact of a long running trade dispute between the US and Canada, which has culminated in the imposition of anti-dumping duties on Canadian sourced logs and other wood products (including newsprint) into the US.

Russia poses a growing threat to countries exporting into China. Although not competing head-on, the increase in timber exports from Russia to China could displace softwood log exports from New Zealand.

It's also worth noting that New Zealand tends to export more of its production than these countries. Compared to nine of the world's largest producers, it is ranked within the top five log exporters across all wood product categories. This is particularly the case for softwood logs, where it is ranked first. Canada, which has a larger forest resource, comes in second. Meanwhile, Russia, Australia and the USA, who are major producers in their own right, and significant exporters to China, have a relatively low export propensity, coming in seventh, ninth and tenth overall. Admittedly, they also export a relatively large proportion of their production, but only in some wood product categories. For example, Australia exhibits a comparatively high export propensity for woodchips and logs, but not for sawn timber and wood pulp.

What is also significant is that New Zealand exports a much higher proportion of low value products, such as softwood logs, than other countries. Conversely, it exhibits a comparatively low export propensity for higher value processed wood products. The opposite tends to be true for other countries. For example, almost 60% of New Zealand's production of softwood logs goes overseas. Most other countries struggle to make it into double digits – Russia being the only exception at about 10%.

Table 10: Rankings of the export propensity of major global wood product producers - 2016

Wood Product	NZ	Can.	Fin.	Ger.	Indo.	Swe.	Russ.	Bra.	Aus.	USA
Roundwood logs	1	6	7	4	9	8	2	10	3	5
Sawn timber	5	3	2	6	7	1	4	9	10	8
Woodchips & particles	4	9	8	7	1	10	5	3	2	6
Wood panels	4	2	1	3	5	6	7	8	9	10
Wood pulp	2	4	7	5	3	6	8	1	10	9
Paper & paperboard	5	3	2	4	6	1	8	9	7	10

Note 1: Can. refers to Canada, Fin. (Finland), Ger.(Germany), Indo.(Indonesia), Swe.(Sweden), Russ. (Russia), Bra.(Brazil), Aus. (Australia) and USA (United States)

Note 2: Ranked by exports of wood products as a percentage of total production

Source: Food and Agriculture Organisation (United Nations), Westpac

It's a different story for higher value processed wood products. New Zealand exports just over 50% of its paper and paperboard production. By comparison, Sweden produces more than ten times the amount of paper and paperboard that New Zealand does, and exports about 94% of it. Similarly, Finland produces about the same volume of wood panels as New Zealand, but exports 90% of this into the European Union. New Zealand, by comparison, exports less than 60% of its wood panels.

Improved building systems are using less wood and have less waste than systems used 20–30 years ago. Recycling technology has extended the life of wood products. For instance, recovered paper is now a major feedstock for the paper industry, and panelboards are being successfully reconstituted

New Zealand's tendency to focus on exporting logs rather than higher-value products reflects the fact that it is able to produce logs quicker and at lower cost than most other countries. This comparative advantage is, however, eroded further down the value chain. In part, this is because wood processors in New Zealand have historically focused on the needs of the small domestic market and so have never really developed the scale required to be competitive in international markets. Of course, there are exceptions to this. Wood processors in New Zealand are also disadvantaged by being geographically distant from key export markets, and would face strong competition against large well entrenched competitors if the sector was to shift focus from export logs to higher-value products. Given this, the most profitable segment for the industry to operate in is probably forestry rather than wood processing.

However, relying heavily logs and to a lesser extent, sawn

timber, is not without issue. Although they are subject to quality grading and come in different sizes, logs lack differentiation and thus are traded as commodities, with prices being driven by the changing imbalance between global supply (production and inventories) and demand. The same is true for sawn timber and wood pulp.

This means that forestry owners, sawmillers, and pulp and paper producers operating in New Zealand are all price takers. As such, their profitability is determined by their ability to manage their unit costs of production. The focus on reducing unit costs of production is likely to explain why wood processors in New Zealand continue to invest heavily in systems and technology that minimises waste (including higher log recoveries and increased recycling) and improves operating efficiencies.

Supply side drivers

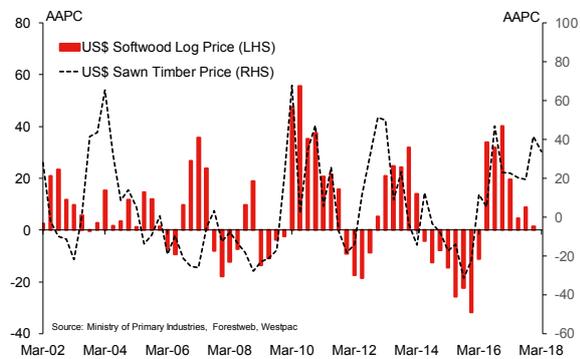
Forestry is an industry that can rapidly change supply. If prices ramp up because global demand exceeds supply, the forestry sector responds by cutting down more trees, sending the logs off to the export market or to local mills. Theory suggests prices will continue to increase, albeit at a slowing rate, until supply has closed the gap on demand and an equilibrium price is established.

In reality though, things are a little more dynamic. As global demand exceeds supply, the industry responds much along the lines suggested above. However, global demand for forestry products is not a constant and over time it will shift in response to changes in the drivers that underpin it. The supply of forestry products adjusts to these changes in demand, but its ability to do so is affected by many factors, some of which are structural, and some cyclical. These include being able to access the resources required (quantity and quality of materials, plant and equipment, technology, labour), the availability and cost of productive capacity (including transport infrastructure), and having access to markets (a function of geographic location and barriers to trade).

Supply is further impacted by the structural characteristics of value chains within and across countries, which result in un-coordinated increases in supply that can overshoot demand, thereby resulting in lower prices. The fragmented nature of the industry globally means that producers do not adjust production simultaneously to address this overshoot,

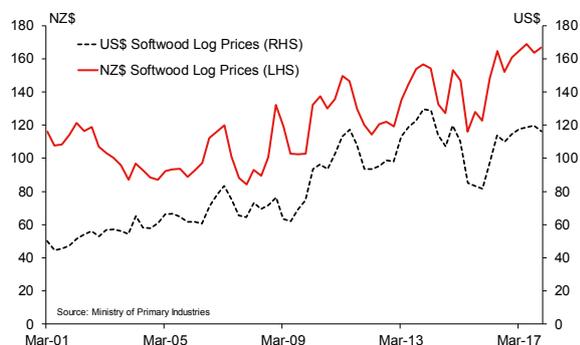
but rather wait under prices fall to the point where margins turn negative; i.e. where unit costs of production exceed unit revenues. At this point, it does not make sense to continue production and supply adjusts accordingly, albeit in an uncoordinated fashion

Figure 30: US\$ softwood log vs timber prices



The uncoordinated nature of global supply and how it reacts to changes in demand means that prices for softwood logs, sawn wood timber and pulp and paper are cyclical. Responses to changes in demand typically results in both an overshoot as well as an undershoot of the supply of forestry products, resulting in a boom and bust cycle.

Figure 31: NZ and US\$ softwood log prices



The impact of boom and bust cycles on the forestry industry in New Zealand are either exaggerated or cushioned by the performance of the New Zealand dollar. Ultimately for forestry owners, and downstream wood

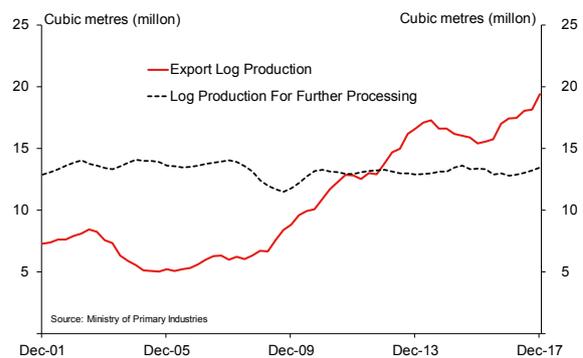
processors in New Zealand, it is the price they receive in local currency terms that count. This in turn depends on how well international log prices correlate to changes in the exchange rate; i.e. to what extent does the NZ\$/US\$ exchange rate as a hedge against US\$ softwood log prices.

Previous Westpac research showed that a fluctuating New Zealand dollar tended to increase revenue volatility for forestry owners rather decrease it.¹

As mentioned, changes in price can have significant repercussions for forestry owners and downstream wood producers. The rapid growth in demand from China for softwood logs has led to an increase in prices in recent years, which has been helped along by a sideways NZ dollar. New Zealand’s supply of logs for export to China has increased dramatically in response.

By necessity, this has meant more harvesting of forests and more logs being sent overseas. This includes forests owned by small forest owners, often not looking to replant, but who seek a one-off financial bonanza from an asset, which to them, is largely idle. Many of these forest owners have no forward planning, and are merely spot sellers. According to industry sources it is not unusual for small forestry owners, in particular, to be pressured into harvesting forest by less than scrupulous and opportunistic forestry managers looking to make a quick buck.

Figure 32: Export vs domestic log production

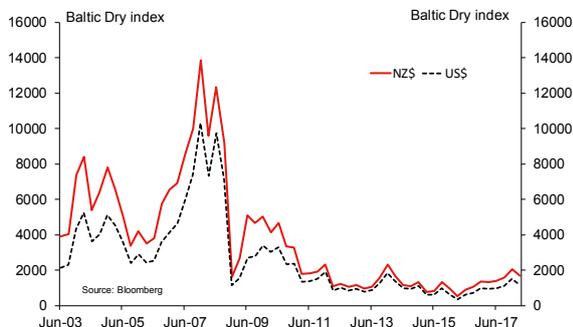


The pressure to harvest can have negative consequences, not least of which is the harvesting of trees before they reach maturity. Large forestry managers, who practice sustainable forestry management practices and are accredited as such through FSC and PEFC, will typically not harvest trees before they reach maturity, irrespective of prevailing log prices and the exchange rate. That doesn’t mean that they would not bring harvesting forward of mature trees if the correct market conditions presented themselves, but this would be carefully managed. However, this is not the case for all forestry managers, and there have been reports that immature trees have been harvested in order to take advantage of higher prevailing export prices. This is particularly true in Northland, which has been subject to over-harvesting, to the point now where the region is likely to experience a significant drop in harvest volumes within the next decade.

¹ Westpac Bulletin, “Buffet or Buffer, Does the exchange rate hinder or help commodity exporters?”, 2009

Increased harvesting has of course been good news for the large number of small contractors hired to undertake these activities as well as those that transport logs to the port. Contractors typically invest heavily in capital equipment and need to be busy to be able to pay back any monies owed. They are normally small outfits and tend to be cash flow dependent. That's fine during the boom times. However, when prices fall, harvesting activity typically slows, effectively reducing the amount of contracting work available, crimping cash flows and increasing financial difficulties. An industry source has suggested that at most, contractors will operate for a period of 6 months under such circumstance before going into liquidation. That said, it is also true that some of the larger forestry managers will contract out work to keep contractors busy during lean times. They do this to ensure that they have enough resource capacity when prices pick up again.

Figure 33: NZ & US\$ sea freight charges



Increased harvesting has also been good news for traders, who either buy logs directly for the purposes of on-selling, or make a commission acting as a broker between forestry owners in New Zealand and log purchasers situated offshore. Some traders post a spot price at which they are willing to buy at the port wharf. Irrespective of which mechanism applies, the cost of sea freight, which has been low for some time because of an excess supply of freight capacity, is a factor that determines the price received by the forestry owner and as such is an important consideration when exporting logs offshore

Shipping rates are starting to rise as the global economy picks up pace. Coupled with New Zealand dollar volatility, this could have impact on the profitability of local forestry and downstream processors.

However, high log prices haven't been particularly favourable for downstream wood processors in New Zealand, especially sawmillers that rely on a constant

volume of logs through their mills to keep capacity utilisation rates up and unit production costs down. Industry sources suggest that logs make up as much as 50% of production costs. As mentioned earlier, the volume of logs for sawmilling has grown only slightly over the past decade, while those for pulp and paper have shown a notable drop.

According to the sawmillers, the reason why volumes have grown only slightly is because they have been being priced out of the market by Chinese purchasers, desperate for logs to feed their increasingly sophisticated and large-scale sawmilling operations back home. Industry sources have suggested that these purchasers are not only willing to pay top prices for high quality saw logs, but they are also paying higher prices for logs of lesser quality, including pulp logs. Domestic processors are unable to compete at these prices, and so miss out.

The local industry has complained that this, in large part, is due to the fact that the Chinese government, in a bid to develop the sawmilling industry in China, has subsidised their sawmillers for a number of years and this has given them an unfair advantage over their New Zealand counterparts. Furthermore, they are not the only governments to do so, with others, such as those in major competing countries, Canada and Russia, also supporting their sawmilling industries. The industry argues that if left unattended, this could result in locally processed wood being replaced by imported products.

Proposed changes to the Overseas Investment Act are likely to encourage forestry managers to establish supply agreements with local sawmillers, which will enable them to upgrade and expand their domestic processing capabilities.

However, according to industry sources, this is only part of the story. The truth is that a lot of the logs being sent overseas are not suitable for sawmilling in New Zealand. They often do not have the correct dimensions - they are often too small, or do not fulfil stringent quality specifications and grading requirements that apply in New Zealand. It's also true that some of the large forest owners/managers actively divert logs that would ordinarily have been sent offshore to local sawmills at a price that is slightly lower than market prices. Large forest owners do this to ensure that they have still have a market to sell their logs into if export demand slows.

Forestry and climate change

The New Zealand Emissions Trading Scheme (ETS), introduced in 2008, is the Government's main policy response to climate change. The aim of the current Government is for New Zealand to achieve net zero carbon emissions by 2050.

New Zealand was the first country in the world to include forestry owners within an ETS. Forests are a natural carbon 'sink', which capture and store carbon dioxide from the atmosphere (often referred to as sequestration). A carbon 'sink' acts by offsetting the accumulation of carbon dioxide generated by other types of activities undertaken in the economy. However, when forests are harvested, stored carbon dioxide is gradually released back into the atmosphere as the wood decays. Under the ETS, the carbon stored is assumed to have been immediately released back into the atmosphere when harvested.

The forestry sector has been instrumental in New Zealand meeting its climate change commitments. The carbon dioxide stored in its forests has historically been more than enough to offset the gap between what New Zealand has emitted and its committed targets.

The New Zealand ETS is currently a closed domestic scheme based on emission units which have a New Zealand dollar cost associated with them. Emission units, referred to as New Zealand Units (NZUs), are allocated, earned, traded and/or surrendered under the ETS.

Participants, which come from a wide range of industries in New Zealand, are required to report on their carbon dioxide emissions and surrender NZUs for the carbon dioxide they emit. The forestry industry is required to surrender one NZU for each tonne of carbon dioxide it emits. Other ETS participants are subject to more a lenient surrender regime, although by the end of 2019, they too will be required to surrender one NZU for each tonne of carbon dioxide they emit. Despite being the largest single emitter of carbon dioxide into the atmosphere, agriculture remains outside of the ETS, although it is highly likely that this sector will be included in some form within the near future. Participants in the ETS can also earn NZUs if they sequester carbon dioxide from the atmosphere and can sell these to other participants at prices determined by the demand for and supply of NZUs.

Owners of forests established after 1989 are not compulsory participants in the ETS. If they choose to be part of the ETS, they are not allocated NZUs, but earn them by maintaining their existing forests, extending periods to harvest, increasing forest carbon density (growing trees) and by expanding the area for new plantings and re-plantings.

Owners of forests established before 1990 are not automatically included within the ETS, but become compulsory participants when forestry land they own, or part thereof, is deforested; i.e. converted to another land use, such as dairy. They are allocated NZUs on entry into the ETS to help offset the decrease in land value associated with reduced land-use flexibility, and are required to surrender a number of NZUs to Government equal to the full reduction in carbon arising from deforestation unless an equivalent forest is established of at least of equal size, either by planting or direct seeding. Owners of forests established before 1990 do not earn NZUs, nor are they liable to surrender NZUs, after harvesting, if they replant within 4 years.

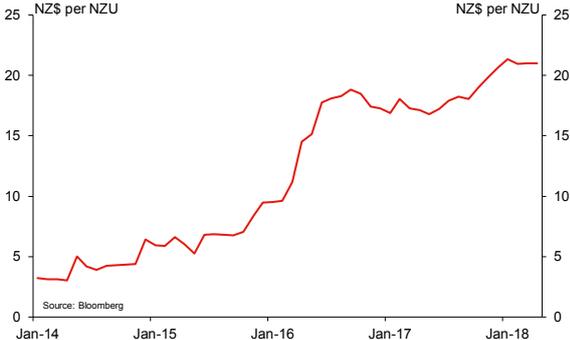
A minimal number of new plantings, rapid growth in roundwood removals and an increase deforestation in recent years suggests that prevailing NZU prices are not high enough to prevent deforestation, given the returns from alternative land uses.

Given the maturity profile of plantation forests in New Zealand, it is also likely that harvesting activity will increase dramatically over the next 5 to 10 years. This should be good news for forestry managers and contractors, and perhaps even for domestic wood processors, depending on what export demand there is for New Zealand logs. Because this harvesting will require forest owners to buy NZUs, the price of carbon in New Zealand could rise sharply, and this could make it more difficult to meet the government's target of being net carbon zero by 2050.

This is likely to be one of the reasons why New Zealand's new government is looking to plant a billion trees over a

ten year period. The "Billion Trees Planting" programme translates into 100 million trees a year, meaning 100,000 hectares of either newly planted or replanted forestry. The industry already plants about 50 million trees a year and it is expected that the remaining planting of 50 million trees will be undertaken through partnerships between the public and private sectors. Industry sources have suggested a large chunk of this will be on state owned farm land managed by Landcorp.

Figure 34: Price of New Zealand Units (NZUs)



The Government's "One Billion Trees" programme could also create change in primary sector land use, primarily through increased replanting rates and expanding the area for new plantings.

Furthermore, the inclusion of the agricultural sector in the ETS could have some big impacts on land use, which could result in greater afforestation, especially if the price of NZUs rise (and is not capped at the current level of \$25 per unit). This is especially so should domestic environmental policy further constrain cow numbers and the land area used for dairy farming in the future.

However, forestry land use decisions are not made in isolation, they are also influenced by the prices of other commodities. These prices will affect both the profitability of other competing land uses (or the relative profitability of forestry) and land values.

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