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Opportunities and Issues for tawa timber: a product-market review



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Summary

Purpose

A significant tawa timber resource is found on private lands, including that held by Māori organisations, and a reasonable proportion of this already has MPI approved plans and permits. Yet very little is currently being harvested

This review summarises an industry perspectives on:

- Opportunities for tawa timber in terms of products and markets
- Issues that constrain locating tawa timber products in the market place

Methods

Evidence used in this review was based upon: interviews of industry representatives; searches of the World Wide Web; and, assessment of relevant literature

Opportunities

There has been an increasing global and domestic demand for hard wood timber products since the Global Financial Crisis and this improves the market opportunity for tawa timber

Increased prices for imported special purpose timbers because of exchange rate adjustments, greater construction demand in the Northern Hemisphere and reduced timber availability will also improve the position of indigenous timbers

The potential annual tawa timber production (logs) is around 14 000 m³ yr⁻¹ and is only eclipsed by the southern beeches as an indigenous hardwood timber resource. It is of sufficient size to support a moderate-sized domestic industry

Light coloured flooring was identified as a key product that could be enhanced to compete with existing imports. Engineered, wide board flooring is suggested as a key option

Tawa timber does have some distinctive properties and values that could support the production of high-value specialist products. While these properties and values could lead to distinguishing possibilities these are poorly developed for tawa

There is a market opportunity for tawa timber through creating a rich story behind any product(s) – a forest restoration story is viewed as compelling

Issues

Major sawn hardwood timber regions (Europe, the former Soviet Republics and North America) remain net exporters

Financial investors represent a growing share of the world's industrial timber supply and have changed the way in which the forest industry operates by not harvesting and processing timber in weak markets

While a significant tawa resource is potentially available improved data is needed on regional and local resource availability, growth, and variability in log quality and wood properties

It is proving difficult to competitively place tawa timber products in the existing market place. A positive trajectory is constrained by the recent loss of infrastructure and skills around harvesting, sawing and drying tawa timber. This impinges on the supply of quality logs and timber

Although there is currently good demand for wide boards in flooring from such a light coloured timber there is also the likelihood that wide boards and light timber may not remain in vogue in the longer term and this must be planned for

There is a need for considerable research on tawa timber processing and the manufacture of anticipated products. This includes how to overcome stability issues with the timber and how to use coloured flooring oils

One important issue to resolve is what type of business model(s) could meet the market demand for various kinds of products and how widely a specific business should operate along the value-chain

It is proving difficult to competitively place existing tawa timber products in the market place and meet price points along the value-chain. One issue to address is costs of production and interviewees expressed challenges in the cost of compliance, small scale and fragmentation, and efficiency along the value-chain

There is a need to increase familiarity with tawa timber potentially through designers and architects and branding.

Concluding comment

While there is a negative sentiment around the viability of a tawa industry in some quarters this review suggests there is also positive signals and opportunities for developing distinctive and competitive tawa timber products

1. Purpose

At a global scale the production and trade in many timber products has increased strongly in recent times (www.unece.org/fileadmin/DAM/timber/publications/2015-FPAMR.pdf). Similarly, there has been a marked increase in special-purpose timber products being imported into New Zealand. In contrast, the domestic production of indigenous and special-purpose timbers has declined. New Zealand does retain a potential wealth-creation opportunity through the sustainable management of a proportion of its 1.3 million ha of privately-owned indigenous forests. An industry based on this resource could satisfy both export and domestic demand for high-value timber products and provide revenue for forest owners.

Of all the New Zealand hardwood species, it is southern beech and tawa that have a timber resource of sufficient size to support moderate-sized industries. Understanding the opportunities for, and constraints on, the development of a vibrant industry requires:

- An appreciation of the size, distribution and quality of the resource
- Forest management systems that produce quality timber and meet environmental outcomes
- Recognising which products are desirable and how these can be used to enhance the qualities of the timber
- Marketing the timber products in the right place and in the right way.

These four value-chain components do not operate in isolation. For example, markets for high-value timber products expect management systems that will meet sustainability requirements. In addition, the benefits created must be shared along the value-chain.

The Ministry for Primary Industry's Sustainable Farming Fund previously supported a project titled "Expanding the Economic Viability for Sustainably Managed Indigenous Beech Forests". The purpose of that project (2007 to 2010) was to identify marketing problems for southern beeches and to provide recommendations for improving decision-making across the industry (Donnelly 2011). That project concluded that the market potential of southern beeches could be improved by using them to replace timber imports that are not sustainably managed. Such markets could be enhanced through promotional activities. In addition, the southern beech project considered there is a potential for timber exports to places where similar timbers are utilised.

Subsequently the Sustainable Farming Fund has also supported a similar project on tawa. That project is titled "Expanding economic viability for sustainably managed tawa forests". To date, the first two subprojects have been completed:

- Summarise the properties and past and present uses of tawa timber using published and unpublished sources (Smale 2013)
- Identify where the tawa resource is located, who owns it, and its current availability (Wiser et. al. 2013)

This product-market review completes the third subproject by summarising relevant industry perspectives and has two goals:

- Identifying opportunities for tawa timber where the opportunities are around understanding what products and markets are suitable and desirable
- Understanding what issues constrain competitively locating tawa timber products in the market place

The products, markets and issues are all influenced by the full range of value-chain components. The results of this subproject will be used to inform a fourth subproject around developing a product-market strategy for tawa timber.

2. Methodology

While the focus of information gathering was for tawa timber the report by necessity investigated some wider aspects of the hardwood timber industry – including some other indigenous timbers and where informative from a global perspective. Three sources of information were used to address the two goals of this report:

- Perspectives from industry representatives. This was done by phone interviews. Those interviewed were selected because they had an overview of timber markets and products or do/could use tawa for specific products. Those selected represented the various sectors operating along the value-chain (Appendix 1) and were identified through current networks and the World Wide Web. There was a bias in that a few of the individuals approached were not available. An outline of the scope of the interview questions is listed in Appendix 2, although the details were tailored for each interviewee.
- World Wide Web search. Google Chrome was used, via the internet, to search the World Wide Web. The Google Chrome application retrieves information identified by a Uniform Resource Identifier (URI/URL) that may represent a web page, image, video or other piece of content. The application can also access information provided by web servers in private networks or files in file systems. These searches were made using relevant words and phrases (e.g., hardwood timber consumption for global information; tawa timber for local timber merchants).
- Literature review. An array of books, popular articles, magazines and reports known to contain information relevant to tawa timber were reviewed as a basis for this report. In addition, peer-reviewed articles in online journals and books were searched for on the World Wide Web using Google Scholar.

3. What are the opportunities for tawa timber?

3.1 Products

Today tawa is only eclipsed by the southern beeches as an indigenous hardwood resource. The total area of unfettered land having a merchantable tawa timber component has been estimated as 343 200 ha. When this area is adjusted for what are currently considered practical constraints the realistic area is more likely around 100 000 ha (Wiser et al. 2013). This adjustment is necessary because, for example, where tawa is present many forest stands have low merchantable volumes and relatively few have high volumes (Wiser et al. 2013). Griffiths and Wotton (2012) have estimated potential annual tawa timber production, taking account of further regulatory constraints, as being around 14 000 m³ yr⁻¹. Currently MPI has approved plans and permits nationally for around 4 400 m³ yr⁻¹ (archive.mpi.govt.nz/forestry/forestry-in-nz/indigenous-forestry).

Tawa has always been a speciality timber, sought after for a few specific uses, but never produced in great volume (Clifton 1994). The specific uses have not remained fixed through time. Long bird spears were manufactured by Māori in pre-European times because of the distinctive property of tawa that allows it to split into long, straight shafts of timber. Butter churns and other items for the dairy industry were produced in colonial times – in part because of the odourless property of tawa timber. Subsequently tawa timber was used for flooring, turned handles and furniture products and was more governed by availability than distinctive properties. By the 1990s the biggest single use was for short-fibred pulp for fine writing and printing papers.

The scale of the resource sets the size of the opportunity through its influence on what level of production is possible and what types of products might be produced. The potential scale of production of hardwood timbers in New Zealand is often considered too small for export markets because the distribution networks of overseas retailers is often too large. The opportunity in export is then for very distinctive products being sold into very selective markets. For example, swamp kauri is distinctive because it can be marketed as the oldest workable wood in the world and also that there is only a relatively small amount left. The massive size of products (e.g., table tops) is also used in marketing (www.riva1920.it/en/kauri-briccole-cedro/kauri-5-5/).

Currently such distinctive export opportunities have not been identified for tawa timber and at present it seems likely the potential market for products will be more germane and domestic. Whatever the products or markets, ultimately, it is the value of the finished product that determines the value of intermediate products and eventually the value of timber to the forest owner.

Most suggestions by industry representatives for increasing the output of tawa timber products do not orientate around distinctive properties but rather a more strategic approach to competing with existing imported products. This is relevant to the domestic market. Examples included:

- Light coloured flooring. There is a demand for wide-board flooring but it is argued by flooring specialists that this needs new technology. Currently light coloured oak is imported for wide-board flooring and boards can be up to 170 mm wide. A key question is whether you can produce wide boards from tawa timber? However, tawa timber has high tangential shrinkage and is not considered very stable when dried (Clifton 1994). As a consequence it is important to take care when storing dry timber and controlling the moisture content when fixing positions. One option is to produce wide engineered boards – but there are many little explored challenges here.
- High quality veneer. There is an opportunity for increased tawa veneer for use in interior panels and furniture. This is currently offered by several manufacturers. The challenge is obtaining trees of good enough quality and accessible to support an enlarged industry.
- Solid timber bench tops. For example, laminated solid wood bench tops which have finishes that are both attractive and serviceable.
- Turning blocks. There may be a product opportunity for wood that has developed some black lines through limited exposure to fungal attack. Such use of the wood can be viewed as part of a product mix from tawa timber.

Tawa timber does have some distinctive properties (e.g., odourless, excellent turning across the grain, splits straight, flecking in the grain that gives a 3D figure, black fungal streaking in the light coloured timber) that might support high-value specialist products. For example, silver beech is already used in skewers because of its odourless and straight splitting timber properties (<http://www.starwood.co.nz/sustainability.html>), these properties are shared with tawa timber. Odourless and tasteless timbers have long found a place in food storage and packaging – an opportunity exists here for high-value, nature orientated food products. Because of these properties, such timbers are used elsewhere in markets for baby orientated products such as cots.

Flecking in the grain gives a figure suitable for musical instruments, such as ukuleles, and timber merchants and woodworkers consider there is a demand for such an excellent turning timber with a level of fungal streaking.

3.2 Markets and Demand

3.2.1 Relevant Global Trends

Markets for forest product have improved in the major timber regions of the world since the 2008 global recession. There is an upward trend in housing and construction, and increasing consumption of wood products (www.unece.org/fileadmin/DAM/timber/publications/2015-FPAMR.pdf). Some production, consumption and trade examples relevant to this review are given below as well some examples of the changing global context for timber production.

Sawn hardwood timber production in Europe, the former Soviet Republics and North America increased by 5.8% in 2014, to 39.1 million m³. Production had increased in the former Soviet Republic and North America in 2013, but declined in Europe.

The downturn in sawn hardwood imports in Europe, the former Soviet Republics and North America in 2012 and 2013 ended in 2014 when imports increased by 7.7%, to 6.7 million m³. These regions exported 11.4 million m³ of sawn hardwood in 2014, up by 15.2% over 2013. So that these major sawn hardwood timber regions remain net exporters (Table 1).

Table 1. Sawn hardwood timber production, trade and apparent consumption in three major timber regions of the world (millions m³) in 2014. (Modified from www.unece.org/fileadmin/DAM/timber/publications/2015-FPAMR.pdf)

	Europe	North America	Former Soviet Republics
Production	13.4	22.5	3.2
Imports	4.9	1.8	0.1
Exports	5.5	4.5	1.0
Apparent consumption	12.8	19.7	2.5

China continued to dominate the global sawn hardwood trade in 2014 as internally the country largely produces plantation softwoods. Its sawn hardwood timber imports were 4.5 million m³ in 2014 and its share of total global trade value increased from 33% to 39%. There were signs of a slowdown in the growth of demand in China towards the end of 2014 and in early 2015.

The value of global furniture production was estimated at \$480 billion in 2014, an increase of almost 10% compared with 2013. The global economic recovery led by the USA is fuelling construction demand, which, in turn, is the major driver of increased furniture consumption. Furniture manufacturing is increasingly taking place inside Europe and North America because the benefits of

producing furniture in lower-cost countries is declining (www.unece.org/fileadmin/DAM/timber/publications/2015-FPAMR.pdf).

Oak now accounts for more than 70% of wood flooring manufactured in Europe; the share of tropical woods continues to decline, and other temperate species account for only a small share of production. The “rustic” look and wide planks remain very popular in hardwood flooring. European oak prices rose in 2014. In addition to strong overall demand, this was driven by price hikes for competing American white oak.

Changing policies, legislation and emerging trade agreements dynamically influence the use of wood and forest resource management. Several international trade agreements (e.g., Trans-Pacific Partnership) will attempt to open up trade in goods and services, boosting investment flows, and promoting closer links across a range of economic policy and regulatory issues. Just how this may influence the trade and price of forest products is up for conjecture but an intent is to tackle trade-related environmental issues such as illegal logging. This puts an emphasis on legal and regulatory requirements within countries and maybe less so third party certification. .

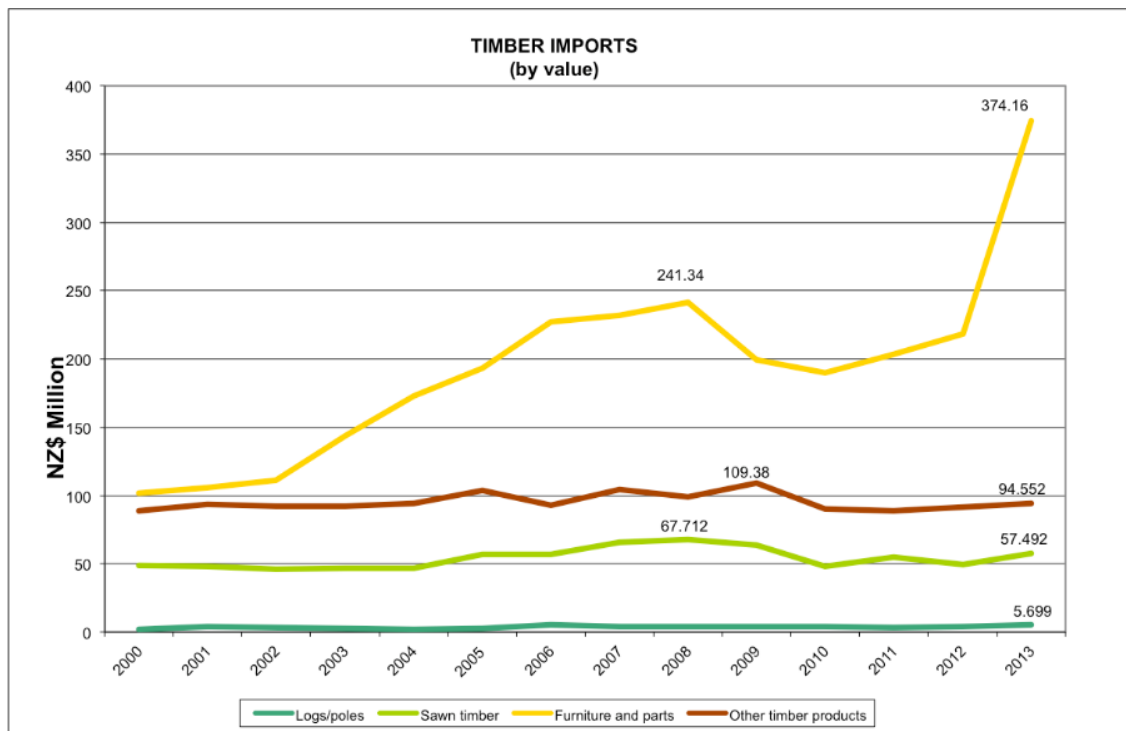
As of May 2015, the area of certified forest worldwide was about 439 million ha, which is 10.9% of the global forest area. The major certification schemes, the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) have areas of 183.3 million ha and 263.2 million ha respectively certified against their standards (includes an estimated 7.5 million ha under both schemes). This was an increase of 6.2 million ha (1.4%) over the previous 12 months, although the increase is tapering off with about 10 million ha less being added than in the preceding 12-month period. The percentage of forested area certified (in 2015) varies markedly among regions of the world being 65.2%, 35.4%, 7.5%, 6.5%, 2.2%, 1.8% and 1.0% for Western Europe, North America, Former Soviet Republics, Oceania, Asia, Latin America and Africa respectively.

Financial investors now hold close to 24 million ha of forest worldwide, at an estimated value of close to \$100 billion. They represent a growing share of the world’s industrial timber supply. Financial investors have changed the way in which the forest industry operates. Forest industries in the USA no longer control their raw-material sources and the same is happening in other parts of the world. Financial investors have high targets for returns on forests and reduce the tendency of some integrated companies to continue harvesting and processing timber, even in weak markets.

3.2.2 Domestic Opportunities

The domestic production of special purpose timber, including that from indigenous species, is very small in New Zealand and so, therefore, is the export of special purpose timber. This is not so for the domestic consumption of special purpose timber and so, therefore, the demand driven import of such timbers. The total value of solid timber imports has grown from \$88.7 million, \$284.0 million and \$531.9 million in 1993, 2003 and 2013 respectively (Figure 1). It is the value of imported furniture and parts that is responsible for this growth and they are currently worth more than twice that of all other timber import categories.

Figure 1. Value of timber imports into New Zealand between 2000 and 2013 by various categories (from May 2015).



The level of imports over the last decade flags the enduring internal demand there is for special purpose timbers. A considerable component of the imported timber is of hardwood species, including that of sawn timber. One consideration is the level to which domestically grown indigenous hardwood timbers could substitute for imported timbers. This is particularly challenging when imported timbers such as light coloured oaks can be imported at much lower prices than what tawa timber is produced for domestically. Lower prices for some of these imported timbers from the Northern Hemisphere appears to be the result of scale – which New Zealand industries will find difficult to achieve.

However, several factors are/may lead to price increases for imported special purpose timbers in the medium term. These include:

- Currency exchange rates have come off recent historical highs. The New Zealand dollar Trade Weighted Index has declined 13% since the start of 2015. Global uncertainty, low export prices and a lower outlook for domestic interest rates mean that the New Zealand dollar is assumed to depreciate further (www.rbnz.govt.nz/monetary_policy/monetary_policy_statement/2015/mpssep15.pdf). The exchange rate lows that have occurred over the last 15 years, for our major trading partners, are well below present levels.
- In the USA the financial crises led to a marked decrease in building, this caused some timber mills to close and also an increase in exports. However, there is now a recovery in house construction in the USA and it is expected there will be increased local demand and prices for timber. This could reduce their net exporter position. This is particularly relevant to the USA where there is a high timber component in houses.

- Reduced availability. Supply will be less assured and create the opportunity for alternative and domestic sources.

As a consequence of these factors we might expect an ongoing increase in the price of imported timber. One timber merchant commented that some light coloured oak timber users in New Zealand have experienced a 50% increase in price over the last two years. To some degree having an internal supply of a quality hardwood timber would remove the exchange and supply risks by having timber/product in country. As a consequence, the outlook for hardwood timber import substitution is more positive than it has been in recent years.

There is also the issue of substitution among timber produced from other indigenous tree species. Just after the passing of the 1993 Amendments to the Forests Act log volumes delivered to the mill were approximately 135 000 m³ yr⁻¹, 60 000 m³ yr⁻¹ and 10 000 m³ yr⁻¹ for softwoods (largely rimu), southern beech and other hardwoods (largely tawa) respectively (Miller 2006). Ten years later the volumes of softwoods and beech were similar, at about 18 000 m³ yr⁻¹, with very little other hardwoods milled. There has been a view that a rising price for softwoods, particularly rimu, in response to dwindling supplies would cause the consumer and the industry to substitute the more abundant southern beech timber for softwood timber (Donnelly 2011). This substitution has been slow, in the face of imports, and today the production of sawn timber from southern beech is 46% higher than that from softwoods, whereas tawa timber production has dwindled (Table 2). Donnelly (2011) considered the low rate of substitution has been governed by the slow rate of recovery in the international hardwood industry following the 2008 financial crisis.

Table 2. Production of indigenous forest rough sawn timber for all species, year ended 31 March 2015, except for tawa with year ending June 2015 using additional data supplied by Alan Griffiths, MPI. (Downloaded and modified from mpi.govt.nz/news-and-resources/statistics-and-forecasting/forestry/)

	Total (m ³)
Major softwoods	
Rimu and miro	2 236
Matai	798
Kauri	764
Total major softwoods	3 799
Minor softwoods	
Kahikatea	167
Other softwoods	403
Total minor softwoods	570
Total softwoods	4 369
Major hardwoods	
Beech	6 208
Total major hardwoods	6 208
Minor hardwoods	
Hinau	1
Tawa	14
Other hardwood	157
Total minor hardwoods	171
Total hardwoods	6 379
Total - all indigenous species	10 748

An aspect critical to creating a market opportunity for tawa timber could be to create a rich story behind any products. KPMG (2013) suggested that the indigenous forestry industry needed to change the market forces and that this would also require a marketing and branding investment. One architect interviewed suggested this might be achieved by taking on a creative, artistic world view that is lateral and has the potential to reframe the rationale for an enterprise. The case where softwoods have been historically logged from a forest, that also contained tawa, and that this tawa has then become dominant as a consequence, could provide a rich story about restoring forests (Allen and Doherty 2005).

Today, tawa is a lesser-known timber species and requires promotion in the market place. Donnelly (2011) considered that changing consumer attitudes towards southern beech was important to the overall viability of that industry.

The current opportunity in, and value of, finished products from tawa timber can be determined by the intrinsic properties of the timber itself (Wardle 2011) or a wider set of extrinsic values. Topical properties and values in terms of opportunity are:

- What colours are desirable? Recently there has been a trend toward lighter coloured woods. As Donnelly (2011) points out this would favour lighter coloured indigenous timbers such as tawa (Figure 2), as well as timber from second growth stands of silver beech and black beech. While light coloured oak timber is currently imported to support this trend in, for example, flooring, it does establish there is such an opportunity market. Tawa could provide a contrast with the darker red beech timber currently promoted for hardwood flooring in New Zealand.
- There needs to be a robust sustainability credentials around any timber products, particularly for indigenous tree species. While the legislative, regulatory and certification options are necessary and important the case can go beyond these. There are opportunities to establish a unique sustainability case (see discussion of a rich story above).
- Familiarity is important when people make choices about timber. Currently matai and rimu are indigenous softwood species that have this familiarity. People are most familiar with southern beech as an indigenous hardwood species, but this could be changed.
- The use of timbers in interior design ‘to help humanise” new large-scale commercial and government building complexes is one opportunity (Donnelly 2011). There are possibilities in the health system through connecting patients with nature and wellness. As such, hospital environment might benefit from a link to the natural environment.
- There is a place for timbers like tawa in special projects wanting to exhibit a New Zealand influence, particularly when linked to a natural or cultural heritage values. While these can often be for high-value uses (e.g., high-end designed interior finishing), such uses have high quality expectations and there is currently not a big or ongoing market.

Figure 2. The light coloured sapwood and heartwood of tawa turns to a creamy-brown colour on seasoning (Downloaded from www.nzwood.co.nz/learning-centre/tawa/)



4. What are the issues facing tawa timber?

4.1 Products

While a significant resource is potentially available for tawa timber products, the industry is in decline. MPI had approved plans and permits for an allowable tawa timber harvest of around 4 400 m³ yr⁻¹, yet in the year ending June 2015 only 28.3 m³ of tawa timber was harvested giving an annual rough sawn timber production of 14 m³ (Table 2). In part this may relate to the nature of the resource.

A plot based assessment of the countries forests (LUCAS plots) has recently provided strong national scale information on the size of the resource (Wiser et al. 2013). However, further information on several resource issues would support industry initiatives because this information can have important impacts on viability:

- Improve data on regional and local resource size and distribution (Griffiths and Wotton 2012). Where tawa is present in forests, most stands have low merchantable volumes and relatively few have large volumes (Wiser et al. 2013). This has strong implications for harvest networks and contrasts with the southern beeches which are distributed more pervasively in forests where found.
- Improve growth modelling. Most data on growth rates of tawa are for trees growing on volcanic substrates. A few observations suggest there is markedly faster tawa growth rates on some sedimentary substrates. A growth dataset more representative of the range of

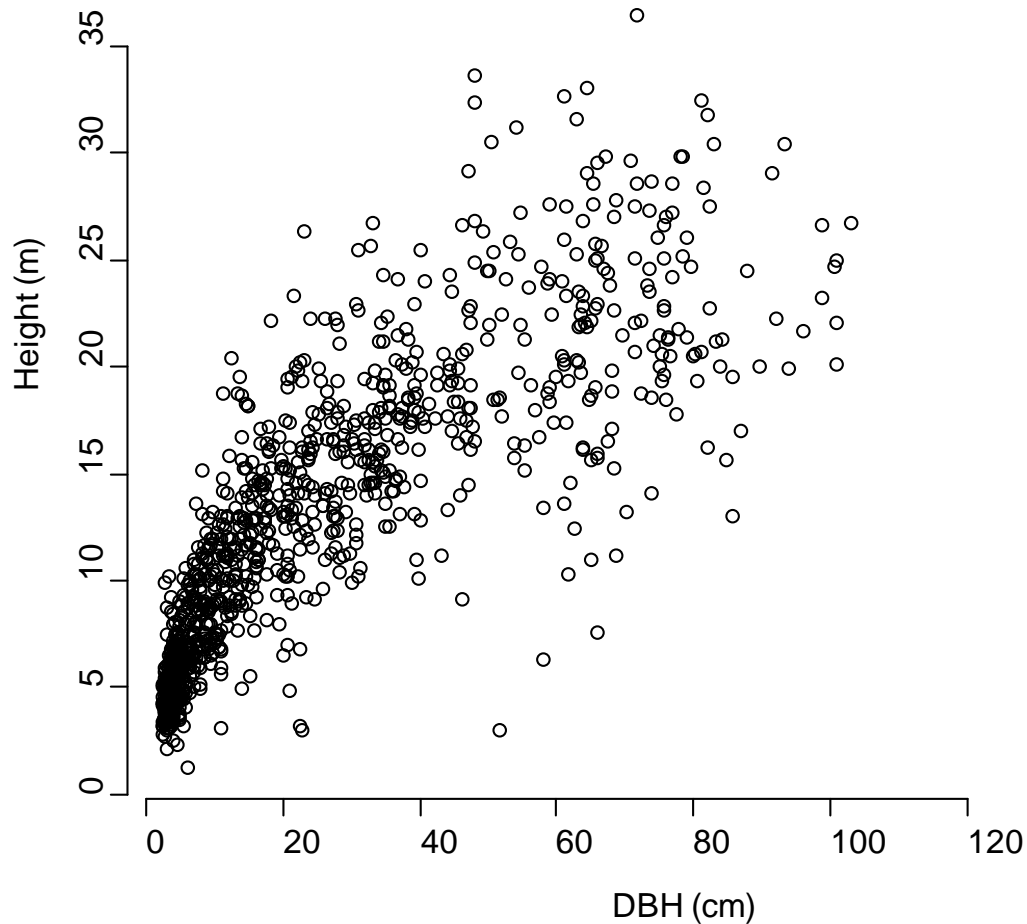
substrates occupied by tawa is needed for developing robust management plans outside the central North Island Volcanic Plateau (Smale et al. 2014).

- Understand variability in log quality. While tawa silviculture is considered challenging there are opportunities to use the natural variability in log quality of existing stands (Figure 3). For example, log form varies markedly with tree age and location, achieving its best form in tall forest (Wardle 2011). One aspect contributing to log quality is log length. We know from the LUCAS plots that tree height is hugely variable for a given diameter – particularly for large trees (Figure 4). We do not know how environmental factors relate to variation in tree height and, to some degree, standing merchantable volume. Knowing this would indicate where attention might be focussed for cost effective recovery of quality logs.
- Understand variability in wood properties. Variability and defects are a feature of trees that take hundreds of years to mature. Some of these features, such as black heart, could provide distinctive products from tawa timber. In the southern beeches geographic variation in wood properties have been demonstrated (Richardson et al. 2013).
- Suitability of log grading systems. There is a need to segregate, in part, trees based on relevant properties.

Figure 3. Te Urewera tawa forest showing the range in form of adjacent trees. While there is considerable variability in form within and among stands it is poorly known how this is controlled by stand-level and regional-level factors.



Figure 4. The relationship between diameter (DBH) and total height (Height) for 944 tawa trees on 179 plots measured on the LUCAS plots (measured 2002 to 2007). These plots provide a representative sample of tawa trees throughout New Zealand's indigenous forests (graph prepared by Tómas Easdale).



The need for a consistent supply of quality logs and timber was stressed by a number of industry participants interviewed. Some problems encountered include:

- A delay in supply was a common negative comment about tawa timber. One option to explore is where and when a more collective approach is desirable. Certainly the New Zealand Farm Forestry Association's Specialty Timber Market is a positive move in this direction.
- The light heartwood and the sapwood are liable to attack by *Anobium* and *Lyctus* wood borers, but these can be treated. However, such treatment costs money.
- One of the challenges is in treating sapstain for which a number of strategies have emerged. One experienced sawmiller suggested that milling the timber in winter, when the sugar content of the wood is low, and rapidly kiln drying the timber can overcome this problem. Others consider that winter harvest is too damaging to the soil.

A positive trajectory for tawa timber products is also constrained by infrastructure (KPMG 2013). There has been a major loss of infrastructure around harvesting, sawing and drying tawa timber, as

well as the skill base required for processing such timber. This limits our ability to extract the best value from tawa logs and provide a consistent graded product. KPMG (2013) also suggest options to explore that include kiln drying of green timber and the availability of heavy lift helicopters.

A higher quality out-turn from new infrastructure would improve the competitive positioning of tawa timber in relation to other specialty timbers. In addition, it would be useful to overcome existing fragmentation – as when sawing, treating and drying take place at different locations there are associated costs. Any infrastructure development must also be made at the appropriate scale.

Tawa has similar properties to some of those hardwood timbers currently being imported. One option is to manufacture products that compete with those imports. Although tawa is advocated as a competitor for imported flooring timber there are challenges. For example, when milling, to overcome tension in the wood, it has historically been cut in shorter lengths and also cut from the outside of the log by continually turning the log. In addition, because of stability issues the timber has been cut into narrow boards.

However, there is currently good demand for wide boards in flooring from such a light coloured timber. This presents an opportunity to produce engineered wide boards. However, producing engineered boards from tawa, that are wide and stable, has a number of complexities. Such boards need to be produced under carefully controlled conditions (like moisture) and it is very expensive to do this in New Zealand. The technology is cheaply available elsewhere (e.g., China, Vietnam, Indonesia) and is done for overseas species (oak and jarrah) that tawa might compete with.

While it is possible to use such manufacturing options for many timber species it is not currently possible for some indigenous tree species as covered under Section 67C of the Forests Act 1949 (www.legislation.govt.nz/act/public/1949/0019/latest/DLM255626.html). Notwithstanding this, suitably designed engineered floor board could overcome the width and stability issues for tawa timber. Engineered products do use glues that may not meet some sustainability requirements because of issues around disposal of material.

There is also the likelihood that wide boards and light timber may not remain in vogue in the longer term. As Donnelly (2011) wrote the French are famous for design periods with light coloured wood furniture and dark wood flooring followed by a succeeding period with light wood flooring and dark furniture. Today such trends manifest themselves widely in global markets. Staining of tawa timber needs further testing and offers an opportunity to broaden the market and also allows the timber to find a home in successive temporal fashions. End-users can be excited about having various options.

Much of this discussion is informed conjecture. There is a need for considerable research on tawa timber processing and the manufacture of anticipated products. This includes how to overcome stability issues with the timber and how to use coloured flooring oils. The staining options for some of the competitor timbers (oak) are already well known.

There are major challenges when placing tawa products in the market place if they are not based upon distinctive properties. For example, if the focus is instead a successful design it will not be long before a low-cost manufacturer copies a product and potentially usurps the market. When this takes place overseas it is difficult to avoid, and defending intellectual property is beyond the means of most New Zealand manufacturers. This supports the case to pursue iconic New Zealand products.

4.2 Markets and Demand

One important issue to resolve is what type of business model(s) could meet the market demand for various kinds of products. There are several options available depending on the focus of the business and some are given below that represent extremes that are not mutually exclusive:

- Innovative products. Such products can emerge from distinctive intrinsic properties or extrinsic values of the timber itself or the situation or processes used to manufacture those products. In this review we have flagged some potential distinctive properties and values but have not selected a specific product. Innovative products can be produced at a range of scales, depending on availability, with the demand and price for scarcity offsetting the advantages of economies of scale. Those that are scarce, and with a good story, may find export opportunities.
- Economies of scale. This is where up to a certain point enterprises obtain cost advantages because of the scale of the operation. There are various options here throughout the value-chain that include co-operatives to ensure continuity of timber supply to customers (Moore 2015). The development of an engineered, wide board tawa flooring product clearly fits a business where, to an appropriate level, there is economies of scale. There is the potential from such a product to substitute for imports. Another option to overcome issues associated with scale is by means of formal or informal aggregation through networks, clusters, or associations. For example, New Zealand Farm Forestry Association “New Zealand Specialty Timbers” website.
- Demand driven production. Large scale forestry financial investors have high targets for returns on forests and reduce the tendency of integrated companies to continue harvesting and processing timber in weak markets. This is often because the financial investor has a diverse portfolio and can seek returns at any point in time from different sectors. This model can be applied to the small forest owner who can produce various commodities (e.g., honey, firewood, wool) and only harvest timber for special projects when the price is right.
- Government subsidised development. This is something the New Zealand Government did for many years when developing the exotic forest industry. Current thinking is that this is not an efficient way of developing industries to stimulate regional development. The Government does currently support short-term projects that develop specific industry components. For example, the Ministry for Primary Industries Sustainable Farming Fund. However, indigenous forestry would benefit from long-term strategic support (e.g., procurement) from Government that is also flexible by nature.

Whatever the business model option(s) an enterprise selects, there also needs to be a decision as to how widely to operate along the value-chain and how to integrate this with other enterprises that fill any gaps. Industry representatives suggested that an enterprise with a forest resource should maximise how widely it operates along the value-chain provided that it is in a quality way (compare this with financial investor strategy outlined above). Extracting value is possible because the price to end-users might be ten times the saw mill entry price (KPMG 2013). To decide on positioning it is also important to know the demand and price points along the value-chain and how elastic prices are to changes in volume of anticipated timber products.

It is proving difficult to competitively place existing tawa timber products in the market place. In the flooring market, for example, American white oak cut in wide boards can be imported and sold at prices well below that of tawa flooring. This review has previously outlined some of the reasons for this and how these might be changing. If our indigenous timbers are too highly priced for the markets and products being manufactured we need to understand what is the cost of production and how this might they be contained. High prices for indigenous timbers, when compared to those from North America and Europe, potentially show we have high costs of production. Given the need

to meet price points cost reductions are desirable. Interviewees have suggested the reasons for the high costs of production include:

- Costs of compliance. Legislative, regulatory and certification requirements for indigenous forestry are more stringent than other forestry in New Zealand and elsewhere. While the emphasis on certification varies among New Zealand industry participants there is a tapering off in global interest in certification and marked global variation in its use.
- Small scale and fragmentation. An increased number of operators, and level of production, could benefit consistency and flexibility of supply. But a challenge is to maintain quality.
- Efficiency along the value-chain. There are many factors that affect efficiency and, for example, include thinking strategically about resource size, quality and distribution. This has strong implications for harvest networks.
- Having too many participants along the value-chain. Reducing the number of participants, while not reducing the value created, can contain costs of production.

There remains a negative perception of indigenous forestry in New Zealand and its hardwood timbers are marginalised. Yet we import large volumes of indigenous timbers from elsewhere. New Zealanders appear happy to use imported timbers for floors, walls, ceilings, joinery or cladding with little thought to their source. The transfer of a footprint overseas does not appear to be an issue for the consumer. There is an opportunity to highlight this transfer, and the strength of New Zealand environmental requirements, in the domestic markets for indigenous timbers. Ongoing implementation of sustainability and environmental requirements in international trade agreements may, or may not, have some bearing on establishing a level playing field.

Tawa is lesser known timber species and only in parts of the country, but these parts include major population centres (e.g., Auckland). There is a need to identify how to increase familiarity.

- Architects, designers and builders may be compelled to use tawa by surveying members of societies like the New Zealand Institute of Architects about timber use, presenting articles in newsletters, trade show displays and developing relationships and education programmes.
- There is an opportunity to rebrand tawa timber particularly for certain markets. This appears to have been a successful strategy for Southland silver beech when considering markets ofay with North American timbers. Branding must be carefully done to avoid any confusion.
- There needs to be a rich story around tawa timber whether it is promoted as new, high-value products or for more traditional uses that compete with existing products. Given the perceptions out there this story must be innovative and compelling so that it reframes the value placed on tawa timber. The story must be understandable by the audience.

5. Conclusions

Indigenous forestry, and in particular tawa timber production, has declined markedly over recent decades. In part this has been a deliberate choice by successive governments to replace indigenous timber with exotic plantation timber (Roche 1990). In addition, the cost of indigenous timber production has been further increased through specific regulatory and planning requirements. This has occurred recently in a time of unprecedented timber imports which are available at competitive prices. Clifton (1994) wrote the “writing is on the wall” for tawa timber and more recently a timber merchant concluded it is now too late to resuscitate an indigenous timber industry. However, this review suggests this stance is too strongly reactive to current market sentiments and is not being positive enough about creating a distinctive and competitive product to satisfy future demand. To be successful the future must be created in concert with developing new specialty timber markets.

6. References

- Allen, R.B.; Doherty, J.E. 2005. Restoring Tūhoe's Forests. *Indigena* (December): 13-15.
- Clifton, N.C. 1994. New Zealand timbers: the complete guide to exotic and indigenous woods. GP Publications Ltd, Wellington.
- Donnelly, R.H. 2011. Expanding economic viability for sustainably managed indigenous beech forests. Final Report for the Sustainable Farming Fund Project 05/048.
- Griffiths, A.; Wooton, M. 2012. Assessment of private indigenous forest land in NZ. Ministry for Primary Industries.
- KPMG. 2013. Indicative value analysis of New Zealand's privately owned indigenous forests. Report for Ministry for Primary Industries, Wellington.
- May, R. 2015. Update on timber imports. *Indigena* (May): 19-20.
- Miller, R. 2006. The Indigenous Forest Industry in New Zealand. Indigenous Forestry Unit, Ministry of Agriculture and Forestry, Christchurch.
- Moore, H. 2015. Options for economies of scale in small forests. *New Zealand Tree Grower* (May): 13-15.
- Roche, M. 1990. History of New Zealand Forestry. Wellington: GP Print Ltd
- Smale, M. 2013. The properties and uses of tawa. Landcare Research Contract Report for Tūhoe Tuawhenua Trust.
- Smale, M.C.; Richardson, S.J.; Hurst, J.M. 2014. Diameter growth rates of tawa (*Beilschmiedia tawa*) across the middle North Island, New Zealand-implications for sustainable forest management. *New Zealand Journal of Forestry Science* 44(1): 20.
- Richardson, S.J.; Allen, R.B.; Buxton, R.P.; Easdale, T.A.; Hurst, J.M.; Morse, C.W.; Smissen, R.D.; Peltzer, D.A. 2013. Intraspecific relationships among wood density, leaf structural traits and environment in four co-occurring species of *Nothofagus* in New Zealand. *Plos One* 8(3): e58878.
- Wardle, J.A. 2011. Wardle's Native Trees of New Zealand and their story. New Zealand Farm Forestry Association, Wellington.
- Wiser, S.K.; Easdale, T.; Cieraad, E. 2013. Review of the tawa timber resource. Landcare Research Contract Report for Tūhoe Tuawhenua Trust.

Appendix 1. List of Interviewees representing various sectors and organisations.

Organisation	Interviewee	Sector
NZ Institute of Architects	Teena Pennington	Association
NZ Farm Forestry Association	Dean Satchel	Association
Stulich Timbers Ltd	Antony Stulich	Timber
Everwood Furniture	Richard Parkinson	Furniture
Waitete Mill	Ramish Nahna	Timber
Jasmax	Jerome Partington	Architects
Timspec	Chris Wiffen	Timber
NZ Sustainable Forest Products	Jon Dronfeld	Veneer
Auckland University of Technology	Stephen Reay	Design and Sustainability
Treeworkx Wood	Graham Oliver	Wood workers
James Henry	Chris Northmore	Flooring
Paradise Furniture	David Fell	Furniture
Wilkie + Bruce Architects	Alec Bruce	Architect
Kings Woodworking Company	Peter King	Wood worker
MPI	Alan Griffiths	Regulatory

Appendix 2. Outline of questions for each interviewee

Introduction

- Explain project and subprojects
- Outline purpose and scope of interview

Interest

- How much and what interest do you, or your sector, have in tawa?
- Why – for what purposes and uses?

Products – opportunities

- What are the past, current and potential uses for tawa timber?
- What makes tawa particularly suitable for some of these uses?
- What factors have led to declines in past and current uses?

Products - issues

- What restricts tawa timber meeting past, current and potential uses?
- What changes would allow tawa to meet past, current and potential uses in the future?
- How do these changes relate to improving the value chain for tawa timber?
- Is there any evidence these changes are occurring – and what could be done?

Markets – opportunities

- Where were the past markets for tawa timber – and does that still exist for timber?
- What are the current markets for tawa timber – and could that be expanded?
- Where are the potential markets for tawa timber – and do these have a positive trajectory?

Markets – issues

- In a small fragmented industry what could be done to improve market access?
- Where are their knowledge gaps for improving timber production to gain market access?
- Are there new processes and products to improve tawa timber access in the market place?
- What would improve how tawa products are put into domestic and export markets?

Demand - opportunities

- Where is there global demand for hardwoods like tawa?
- What is the national demand for hardwoods like tawa?
- How is tawa viewed in the market place and how is that reflected in demand?
- Where does the competition lie for tawa in the market place?

Demand – issues

- To what degree is internal demand for various uses driven by substitution?
- Are the costs to produce higher than costs to import – prices itself out?
- Are public attitudes a constraint on tawa products – and if so could these be overcome?

Key players and networks

- Who are the main players/users/buyers of tawa from your/your sectors perspective?
- Who are the key people/organisations/firms?

Wrapping up

- Any other comments
- Next steps for this subprojects and project

