Balsa Industry, PNG: Market analysis and strategic development
Disclaimer

This report was prepared by Stephen Midgley as part of Project FST/2009/106 “Improving the Papua New Guinea balsa value chain to enhance smallholder livelihoods” financed by the Australian Centre for International Agricultural Research (ACIAR) and managed by the Australian National University.

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Citation:
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Abbreviations.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACIAR</td>
<td>Australian Centre for International Agricultural Research</td>
</tr>
<tr>
<td>CoC</td>
<td>Chain of Custody</td>
</tr>
<tr>
<td>CPL</td>
<td>Coconut Products Limited</td>
</tr>
<tr>
<td>CVD</td>
<td>Countervailing Duty</td>
</tr>
<tr>
<td>GW</td>
<td>Giga watt</td>
</tr>
<tr>
<td>FOB</td>
<td>Freight on Board</td>
</tr>
<tr>
<td>ENB</td>
<td>East New Britain Province, Papua New Guinea</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>FEU</td>
<td>Forty-Foot Container Equivalent Unit</td>
</tr>
<tr>
<td>FSC</td>
<td>Forest Stewardship Council</td>
</tr>
<tr>
<td>GWEC</td>
<td>Global Wind Energy Council</td>
</tr>
<tr>
<td>HS</td>
<td>The international Harmonized System (HS) of product codes</td>
</tr>
<tr>
<td>MDF</td>
<td>Medium Density Fibreboard</td>
</tr>
<tr>
<td>NANDINA</td>
<td>Common Nomenclature of the Andean Community Member Countries - the Andean Trade</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>PEFC</td>
<td>The Programme for the Endorsement of Forest Certification</td>
</tr>
<tr>
<td>PET</td>
<td>Polyethylene terephthalate</td>
</tr>
<tr>
<td>PNG</td>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>PNGFA</td>
<td>Papua New Guinea Forest Authority</td>
</tr>
<tr>
<td>PVC</td>
<td>Polyvinyl chloride</td>
</tr>
<tr>
<td>RWE</td>
<td>Round Wood Equivalent</td>
</tr>
<tr>
<td>SPL.CVD</td>
<td>Special Countervailing Duty</td>
</tr>
<tr>
<td>USD</td>
<td>United States dollar</td>
</tr>
</tbody>
</table>
Summary
As part of the ACIAR Project FST/2009/106 “Improving the Papua New Guinea balsa value chain to enhance smallholder livelihoods”, this report addresses the research question: “what is the global outlook for balsa products, and what are the best options for strengthening the medium to long term global market position of the PNG balsa industry?”

The major conclusion from this study is that the outlook for the global balsa sector is positive with the growing and processing industries being modern, robust, and expanding. Since 2008, global plantation areas have increased from an estimated 25 000 ha to an estimated 60 000 ha in 2014; production of balsa has increased and, since 2008, global exports from producing countries have increased from 155 000 m$^3$ worth an estimated USD71M to 213 000 m$^3$ worth USD123M in 2014. Within this global context, Ecuador contributed 90%, PNG 9% and other countries 1%.

Underpinning this positive outlook is the ongoing strengthening of the wind energy sector which will continue to be the prime driver for expansion for the medium term. The promise of such expansion has resulted in serious investments by major global corporations in new world-class processing facilities and corporate mergers and acquisitions. An over-exposure to the wind energy sector also offers a risk should there be major policy changes towards investment in renewable sources of energy.

Whilst the balsa industry in PNG can be pleased to have maintained (or marginally expanded) its market share over the past 5 years, growers and processors cannot afford to become complacent as there are growers and processors in other parts of the world (Indonesia, Brazil, Colombia and others) who are seeking expanded presence in the global markets and who may to encroach upon PNG’s market share.

Opportunities
Within this vibrant context of the global balsa markets, there are opportunities.

PNG can maintain its a dominant trading position with India and the promise of its expanded markets.

The introduction of “industrial grade” of end grain balsa panels is exciting and this potentially adds a new series of cost-competitive applications together with a more efficient utilisation of the planted resource through use of a range of wood grades.

Challenges
Among the challenges are:

Product quality control. Maintenance and expansion of PNG’s position within the global market place will depend upon the industry offering a secure supply of balsa of high and uniform quality. High among the issues identified by secondary processors is the need to control the moisture content of balsa blocks.

Access to trade data and industry updates to enable strategic planning: Data relating to global trade in balsa are incomplete and unreliable and require considerable interpretation. To enable effective strategic planning, further examination of available data is warranted.

The maintenance of functional networks across a diverse array of growers and primary processors across the supply chain is an important consideration in a market environment where they are remote to major clients.

Managing growing, processing and freight costs: The operating costs of growing, harvesting and processing balsa in PNG must remain competitive with other global producers. High freight costs from PNG to markets in Asia and elsewhere remain a serious limitation to the competitiveness of balsa from ENB.
**Competition and opportunity from polymers**: Manufacturers of polymers believe that they can be prompt, responsive and reliable and provide higher quality, uniform products than balsa with less delamination and variation and a longer operational life. It is important to recognise the emergence of hybrid technologies which combine the best features of polymers and of balsa offering expanded opportunities for balsa producers.

**The maintenance of balsa’s cost competitiveness within the core composites markets.** The costs of polymers (PVC, PET and others) have been coming down and technical standards are improving and the balsa sector must respond to this through ongoing efficiencies.

**Security of supply.** It is important that large industries supporting the wind energy sector are given confidence in having access to adequate supplies of high quality material. Reliability as a supplier is a critical consideration for large industries such as wind blade manufacturers.

**Some plantations lack commercial links.** The literature and Web-based reports suggest that there are many “orphaned” balsa plantations – plantations established in isolated areas without access to processing facilities or links to markets. The importance of strong links across the value chain, between growers, processors and markets, is obvious and trees without markets make no commercial sense. Success in the balsa sector is strongly dependent upon healthy engagement across the supply chain.

**Recommendations.**

Data relating to global trade in balsa are incomplete and unreliable and require considerable interpretation. Ongoing examination of available data is warranted to enable PNG growers and processors to plan strategically and prepare for emerging global trends.

PNGFA should be encouraged to update the available records it has on balsa exports so that these data can be used to underpin strategic planning by the private sector.

India plans to host the conference, Renewable Energy India, 23 – 25 September 2015 at the India Expo Centre, Greater Noida (http://www.ubmindia.in/renewable_energy/home) and balsa exporters from PNG might consider attending.

Given the expansion of the rail sector in Australia and internationally, and the use of balsa panels in carriage ceilings (by Bombardier, for example), a Project team should visit Bombardier’s Dandenong manufacturing plant to discuss balsa use with their engineers.
1. Introduction.
This report attempts to address the research question: “what is the global outlook for balsa products, and what are the best options for strengthening the medium to long term global market position of the PNG balsa industry?” and seeks to assess changes and progress in the global markets and trade for balsa wood. It uses the assessment undertaken in 2009 (Midgley et al, 2010) as a baseline for the assessment. The underlying rationale being that there is little point in encouraging smallholders and other balsa growers and processors in East New Britain Province of Papua New Guinea unless there is a robust demand and reliable global markets for balsa products.

2. Methodology.
Then study relied upon a combination of extensive use of trade databases (Table 1) including two commissioned studies for balsa trade data for India and China, company websites, timber industry interest groups, e-mails and face-to-face interviews with industry stakeholders and researchers.

<table>
<thead>
<tr>
<th>Database/Information source</th>
<th>Global Segment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zepol Corporation (<a href="http://www.zepol.com">www.zepol.com</a>)</td>
<td>USA</td>
<td>Complimentary access granted to interrogate for balsa HTS Code. Use standard assumptions to convert shipment weights (kg) into cubic metres</td>
</tr>
<tr>
<td>ITTO</td>
<td>USA and North America only</td>
<td>Suspect that data is drawn from the same source as Zepol Corporation. Data is patchy from month to month.</td>
</tr>
<tr>
<td>Global Trade Atlas via GTIS (<a href="https://www.gtis.com/gta">https://www.gtis.com/gta</a>)</td>
<td>All</td>
<td>Only good for 6 digit HS code which incorporates a range of other species. Complimentary access granted October, 2014. Circumstances prevented access at that time. Access has lapsed. Will use the USA Zepol data to work out relationships between 6 and 10-digit codes</td>
</tr>
<tr>
<td>The Directorate General of Commercial Intelligence and Statistics (DGCI&amp;S), Kolkata, Ministry of Commerce, Government of India (<a href="http://www.dgciskol.gov.in">http://www.dgciskol.gov.in</a>).</td>
<td>India</td>
<td>The official organization for collection, compilation and dissemination of India’s Trade Statistics and Commercial Information. Access by subscription. Successfully used previously for access to teak data. No records found for HS codes 44072200 or 440722. Letter written to DGCI&amp;S 29 March, 2015. No response</td>
</tr>
<tr>
<td>InfoDrive, India: Export Import Business Intelligence. <a href="http://www.infodriveindia.com">http://www.infodriveindia.com</a></td>
<td>India</td>
<td>Data available under 17 HS codes. Paid USD1579</td>
</tr>
<tr>
<td>PNGFA</td>
<td>All</td>
<td>Limited to PNG exports and only current to 2011. PNGFA has been asked</td>
</tr>
</tbody>
</table>
3. The changing corporate landscape since 2010.

The corporate landscape within the balsa sector has changed dramatically since the first study leading to the publication of ACIAR’s Technical Report 73 in 2010. There have been strong consolidations, takeovers and mergers within the balsa and composites sectors. There are fewer, but larger, major companies with substantial global reach and these have vertically integrated business systems from growing balsa through to sophisticated final products. There appears to have been success for companies which have advanced processing along the value chain and produced more sophisticated, advanced products.

Among the larger companies with strong interests in balsa are:

3.1. 3A Composites (BALTEK® and BANOVA®).

3A Composites is the world’s largest grower of balsa and processor/marketer of balsa products and contributes a substantial proportion (some estimates suggest in excess of 60%) to the primary global trade in balsa through its balsa products BALTEK® and BANOVA®. Over 70% of US balsa imports over the past 6 years have been through 3A Composites (Appendix 1). The company now has a special significance in PNG following its proposed acquisition in 2015 of PNG Balsa for a low, double-digit US million dollars amount (Schweiter Technologies, 2015).

3A Composites has one of the longest and strongest pedigrees in the global balsa sector.

- In 1940, it began as Baltek and was based upon the planted (and some natural) balsa resource in Ecuador.
- In 2003, Baltek was purchased by Alcan and became Alcan Baltek, part of Alcan Composites.
- In 2007, Alcan was taken over in a friendly bid by Rio Tinto.
- In 2009, Alcan Composites was purchased by Schweiter Technologies and became known as 3A Composites.

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<table>
<thead>
<tr>
<th>Sources of Information on Global Balsa Trade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panjiva: <a href="https://panjiva.com/Baltek-inc/27851246">https://panjiva.com/Baltek-inc/27851246</a></td>
<td>All A market intelligence company which offers access to trade data for most countries and for many companies (including those involved in balsa)</td>
</tr>
<tr>
<td>BALSABWEB Group via LinkedIn. <a href="https://www.linkedin.com/grp/home?gid=4101255">https://www.linkedin.com/grp/home?gid=4101255</a></td>
<td>All A network for consumers and manufacturers involved with balsa. Modest data availability</td>
</tr>
<tr>
<td>Fordaq: <a href="http://www.fordaq.com">http://www.fordaq.com</a></td>
<td>All Traces offers for balsa sales and indicative prices for the lower end of the value chain. Good for minor producers</td>
</tr>
<tr>
<td>Miscellaneous timber industry and company websites (3A Composites, Gurit, DIAB)</td>
<td>All Searches undertaken</td>
</tr>
</tbody>
</table>

Table 1. Sources of information on global balsa trade.
Throughout these various corporate structures, 3A Composites has been characterised by a corporate commitment to innovation and to associated corporate secrecy. An example of innovation has been its recent range of flexible balsa veneers, sold under the BANOVA® brand.

Schweiter Technologies is a global technology group listed on the Swiss Stock Exchange in Zurich. Within this corporate family, 3A Composites is one of two Divisions, and is a major global leader in composite panels and core materials for sandwich constructions. Other companies, belonging to the Schweiter Technologies AG Group include:

- 3A Composites (China) Ltd. Shanghai, China
- 3A Composites do Brasil Ltda. Cuiabá, MG, Brasil
- 3A Composites Germany GmbH
- 3A Composites GmbH Germany
- 3A Composites Holding AG Switzerland
- 3A Composites Holding Germany GmbH
- 3A Composites Holding Inc. USA
- 3A Composites India Pte. Ltd. Mumbai, India
- 3A Composites International AG Switzerland
- 3A Composites PNG Ltd. Port Moresby, Papua New Guinea
- 3A Composites USA Inc. USA
- 3A Technology & Management AG Switzerland
- Airex AG Switzerland
- Alucobond (Far East) Pte. Ltd. Singapore
- Alucobond Asia Pacific Management, (Shanghai) Ltd. China
- Alucobond Composites (Jiangsu) Ltd. Changzhou, China
- Balmanta S.A. Guayaquil, Ecuador
- Baltek Inc. USA
- Banova Innovaciones en Balsa S.A. Quevedo, Ecuador
- Foamalite Ltd. Ireland
- Giudici S.r.l. Italy
- Nerwal SA, Switzerland
- Plantaciones de Balsa Plantabal S.A. Guayaquil, Ecuador
- Reforestaciones e Industrias Reforei S.A. Santo Domingo, Ecuador
- SSM (Zhongshan) Ltd.Zhongshan, China
- SSM Schärer Schweiter Mettler AG Switzerland
- SSM Vertriebs AG Switzerland

At the end of 2014, 3A Composites owned some 9,298 ha of land in Ecuador, of which 6054 hectares was planted to balsa and produced 51,262 m$^3$ green rough sawn balsa lumber annually (Schweiter Technologies, 2015).

3A Composites has certified its plantations and processing facilities through FSC. 3A Composites remains the only supplier of FSC-certified balsa and believes that evidence of sustainable plantation management and corporate responsibility along the entire value chain are important for longer-term business and marketing.

As a corporate strategy, 3A Composites integrates itself both forward and backward through the balsa value chain, from seed through harvest and processing to saleable semifinished product. It promotes the acceptance of sandwich solutions in new applications and controls production of balsa raw materials, harvesting and processing.

3A Composites has expressed a strong corporate faith in balsa with its proposed acquisition of PNG Balsa and investment in the most modern balsa wood processing plant in the world in Ecuador. It is expected that this will consolidate their position in existing markets and develop new products and applications.
Markets of major focus for 3A Composites and its balsa business are the architecture/construction, marine, transportation and wind power markets. A major influence has been the recovery in the wind power industry and wind power remains their strongest market segment where their earlier strategy of focusing primarily on PET and balsa as core materials proved to be correct. The Chinese wind power market is recovering and, in future, it is to be expected that up to 50% of all wind turbines will be manufactured in Asia (Schweiter Technologies, 2015). The company has formed strong commercial partnerships with wind turbine manufacturer Ming Yang, China’s leading producer. Using AIREX foams (PET-based) and BALTEK cores, Ming Yang can produce blades up to 70 metres long. An over-exposure to the wind energy sector by 3A and other companies, offers both opportunities and risks should there be major policy changes towards investment in renewable sources of energy.

3.2 Gurit (Balsaflex™)

Gurit Holdings AG, is listed on the Swiss Stock Exchange and specialises in the development and manufacture of advanced composite materials, related technologies and select finished parts and components. The comprehensive product range comprises fiber reinforced prepregs, structural core products (man-made materials and balsa wood), gel coats, adhesives, resins and consumables. The global Group has production sites and offices in Switzerland, Germany, Hungary Italy, Spain, the UK, Canada, the USA, Brazil, Ecuador, Australia, New Zealand, India and China. In 2013, the Gurit Group recorded annual sales of USD350M of which USD267M were derived from the Composites part of the business.

The balsa component of Gurit’s business was established as a family company by Xavier Bonet in 1989 with the name of Balseurop S.L. and its main business activity was manufacturing airplane kits made of balsa wood. The manufacture of end-grain balsa panels trademarked Balsaflex™, an end-grain balsa wood core for target markets in the wind energy and marine sectors commenced in Ecuador in 2002 and the company now has an output processing capacity of 54 000 m³ per year making it the world’s second largest producer of end-grain balsa. The Balsaflex operations are certified by Lloyd’s Register Quality Assurance to the Quality Management System Standard ISO 9001.

In 2011, Balseurop was purchased by Gurit Holding AG, and in 2013 Balseurop was renamed Gurit Balsa S.L. which maintained its headquarters in Spain and its balsa production in Ecuador.

Like 3A Composites, Gurit has recognised the China market as central to corporate expansion. In 2007, Gurit inaugurated its new purpose-built production facility in China at Wuqing, Tianjin. In 2012, Gurit and Sino Composites of China signed a long-term agreement under which Gurit supplies high-quality Balseurop balsa core materials for the Chinese market. Sino-Composite, headquartered in Beijing, is a leading distributor of composite materials and core material kits for the wind energy industry and other composites markets in China.

3.3 DIAB (ProBalsa).

DIAB is Swedish and privately owned and, since 2009, Ratos has been the principal owner. It has a strong global presence and has its sales organization in the United Arab Emirates, a regional office for Asia Pacific in Singapore and production capacity in Kunshan, China to meet demand from the wind industry and manufactures in Chennai, India.

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2 www.gurit.com
3 http://www.balseurop.com/en
4 http://balseurop.com/esp.html
5 http://www.sino-composites.com/index.asp
6 http://www.diabgroup.com
DIAB produces 4 ProBalsa grades at its advanced processing facilities in Ecuador. The balsa logs and squared slabs are procured locally from suppliers who meet specifications (but who are not certified) and who cooperate with the company on replanting programs. The range of Probalsa end-grain products are used in a wide range of wind energy, marine and transport applications. This company is actively promoting its Divinycell range of products and views balsa as a cheap entry point into the world of sandwich composites.

The DIAB Australia office is now at Coomera on the Gold Coast in Queensland and ATL Composites (also on the Gold Coast\(^7\)) now distributes DIAB’s Probalsa range of products. In 2009, ATL dealt with the Baltek range of balsa panels.

DIAB took pride in helping develop the world’s largest wind turbine blade as part of a project to develop a 7MW offshore wind turbine with a 171.2m diameter rotor. DIAB supplied its ProBalsa150 and Divinycell H80 core materials for the 83.5m long wind turbine blade, the world’s largest to date.

### 3.4 3M’s Engineered Products and Solutions Department (3M™ Balsa Panels)

In 2011, Nida-Core, based in Florida, became part of 3M’s Engineered Products and Solutions Department (based in Minnesota) delivering products such as composite resins and industrial fastenings. Nida-Core was established in 1988 and focused on the structural composites core materials field, manufacturing and distributing light, strong, durable, engineered products, to more than 50 countries, for applications such as in wind blades, boats, solar panels, trucks, cars, buildings, skis, sporting accessories, planes, soil stabilization, buses, storage tanks, and swimming-pools. Nida-Core (and 3M) process balsa in both Ecuador and the USA. The acquisition enabled Nida-Core to gain access to 3M’s global network. 3M™ Balsa Panels have strengthened 3M’s composite and engineered materials portfolio.

### 3.5 Smaller companies.

#### 3.5.1 Fadelma Cia. Ltda. (Flexokore)

Fadelma\(^8\) commenced balsa production in 1958 selling model grade balsa to Germany. In 1973 Fadelma offered a wider range of products such as air model sheets and balsa blocks and, in 1980, commenced production the core material, rigid and flexible end grain balsa panels, under the Flexokore™ trademark (see Flexokore™ Balsa Products\(^9\)). Fadelma’s plant production has an output capacity of 18,000 m\(^3\) per year and their manufactured products have been certified by Lloyds of London Register and Germancher Lloyd. The company has distributors in the EU, China, North, Central and South America. Fadelma manages over 300 ha of their own plantations.

#### 3.5.2 Lumberind SA.

Lumberind SA\(^10\) located in Guayaquil, Ecuador, is a company dedicated to the processing and export of balsa. It was established in 1996 to provide premium quality balsa and supplies clients in the USA, Germany, Argentina, Japan and China. Lumberind’s production capacity was not revealed.

#### 3.5.3 EcoMadera

EcoMadera\(^11\) trades as Verdecanande, SA, and is based in Quito, Ecuador. Most of its revenues are generated from production of balsa wood blocks with their final markets being wind turbine blade manufacturers in North America, Europe, India, and China. EcoMadera’s current output production is roughly four 40 foot containers of balsa blocks per month (= approx. 200 m\(^3\)/month).

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\(^8\) [http://www.flexokore.com/about-us.htm](http://www.flexokore.com/about-us.htm)  
\(^9\) [http://www.flexokore.com/index.htm](http://www.flexokore.com/index.htm)  
Established in 2009, EcoMadera began production, and subsequently quadrupled its manufacturing facility and monthly production in 2010 and plans for further expansion in 2013. EcoMadera is establishing balsa plantations, both on their own land and through contracts with local families to plant on degraded farmlands. EcoMadera plans to establish 600 to 800 hectares of plantations over the next 5 years.

3.5.4 CoreLite Inc. (BALSASUD®)
CoreLite Inc\(^{12}\) markets end-grain balsa products from their factory in Florida, USA and from Balsasud SA in Ecuador. Balsasud SA has its own plantations and a modern processing facility which is among the largest producer of end-grain balsa wood core materials in Ecuador. The Balsasud S.A. facility in Ecuador is certified to FSC™ CoC standards by the Rainforest Alliance\(^{13}\). Applications for CoreLite’s panels include the Marine, Wind, Aerospace, Transport, Defence and Industrial sectors.

3.5.5 Sinokiko Balsawood Trading Limited (Sinokiko)
Sinokiko\(^{14}\) is based in Guangzhou, China but has its production facilities in Guayaquil, Ecuador. It markets solidwood balsa products globally for model ships and aircraft, surfboards, fishing gear, film and television props, military models, light wooden puzzle board, balsa wood souvenirs, and collectibles. The company markets Chinese branded balsa products globally.

3.5.6 Kerfkore Company (Balsakore)
The Kerfkore Company\(^{15}\) specialises in creating unique curved designs using a range of innovative products, including Balsakore. Bendable substrates and lightweight panels allow a shift from traditional designs, materials, and methods. The balsa wood used in Balsakore products is FSC certified and plantation grown in Ecuador. Balsakore is offered as a core material in the bendable architecture design products of Kerfkore, Timberflex and Flexboard\(^{16}\).

3.5.7 Cobalsa
Cobalsa Ltd\(^{17}\) is a Colombian-based company which specialises in solid wood balsa products such as laminated covering panels, geometric figures, sheets, square sticks, round sticks, balls and blocks.

4 The Manufacturing Sectors and Products.
Due to its low density, strength and versatility, balsa has a wide range of end uses (Midgley \textit{et al}, 2010). Among its attractive attributes are its high impact strength, good sound and thermal insulation, excellent fatigue resistance and a wide operating temperature range. For many industries, it has the added advantage of being competitive in price (compared with alternative core materials) and is the only core material from a natural, renewable resource.

Balsa is well known for its use for hobbies and crafts such as model boats and aeroplanes and models of buildings. Due to its buoyancy, it is used for surfboards and has been used historically for life rafts and life-belts. However, the global markets for balsa are dominated by the demand for end-grain panels which are used widely as cores for sandwich composite applications which comprise a low-density core material sandwiched between two high-modulus face skins to produce a lightweight panel with exceptional stiffness (Midgley \textit{et al}, 2010).

In preparing end-grain balsa panels, manufacturers place considerable importance on the density and uniformity of the panel. Most buyers have very strict specifications and, for example, will allow

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\(^{12}\) http://www.corelitecomposites.com
\(^{13}\) http://www.corelitecomposites.com/balsasud-core.html
\(^{14}\) http://www.balsa-wood.com
\(^{15}\) http://www.kerfkore.com
\(^{16}\) http://www.kerfkore.com/Balsakore.html
\(^{17}\) http://www.cobalsa.net/main2.htm
only a certain number of defects in an end-grain panel. Colour is important for some applications, with a pale straw to white colour preferred. Moisture content of panels is important for many high-end applications as high moisture contents can interfere with the curing of adhesives used when applying the outer skins to the sandwich composites. Delamination between the outer skin and the core can be a major cause of product failure.

The industries served by balsa can be segregated into several categories. These are

1. Marine
2. Road and Rail
3. Renewable Energy
4. Aerospace
5. Defence
6. Industrial and Construction
7. Hobbies and Crafts

Balsa wood performs very well in fire-critical applications. It does not offer much fuel, and it burns with a nontoxic white smoke. If the wood does come into contact with flame, a uniform char layer forms that protects unconsumed core material from the heat source. In contrast some competing core materials made from synthetic foams may produce fumes that contain toxic by-products. For these reasons, balsa is approved in most transit applications and as insulation for engine rooms and its use can attract reduced insurance premiums (Midgley et al, 2010).

4.1 Marine

Balsa plays an important role in the marine sector and is used in composite products for many marine segments such as recreational boats, performance and racing boats, super yachts, cruise liners and commercial and military vessels. Balsa core materials and sandwich construction are used in a wide range of applications across these segments with vastly different specifications: the technical requirements of a hull bottom vary greatly from those of superstructures or marine interiors. End-grain balsa is used in hulls, decks, bulkheads, superstructures, interiors, tooling and moulds and remains a popular standard core for many OEM boat builders. Many power boats, recreation craft and commercial vessels have components made from lightweight, balsa composites where strength, stiffness, durability and weather resistance are required; cockpit and salon tables, hatch covers, settee tops, non-structural partitions and bulkheads, and doors.

There are many options for different core materials for these applications. Cost-effective polymer foams such as polyurethane and PVC are compromised by their relatively poor fire, smoke and toxicity performance and other more suitable foams are more costly. Balsa wood is still widely used for marine applications as a good compromise between performance and cost (SAND.CORE, 2015)

A useful source of technical information is available at the European Commission’s SAND.CORE Project site (Coordination Action on Advanced Sandwich Structures in the Transportation Industry18).

SAND.CORE aims to foster the application of innovative sandwich structures in European transport systems, particularly in the maritime and rail sectors. This will be done by:

- collecting available information with regard to metallic, hybrid and composite lightweight structures
- conducting benchmark studies for dedicated application cases defined by the end users
- identifying knowledge gaps and research needs
- elaborating a best practice guide for sandwich design, manufacturing, assembly, approval and application.

4.2 Road and Rail

There is an ongoing technical challenge to increase the efficiency of land transport. Composites offer opportunities for weight-saving while maintaining rigidity and strength, and acoustic and thermal insulation as well as safety.

4.2.1 Road

The flooring of the cabins of popular makes of cars, trucks and buses have included balsa composites. Many modern trailer homes include sandwich composites that incorporate end-grain balsa, and some motion picture production trailers, where weight is an issue, use balsa panels. New flexible lightweight balsa veneers (such as the BANOVA® range) offer new options for interior fittings.

Floor and trunk panels for popular cars such as the Cadillac utilise balsa panels and the C6 Corvette utilised a unique balsa-wood-sandwich floor construction (Figure 1).

Figure 1. The C6 Corvette had a unique balsa sandwich composite floor

4.2.2 Rail

Modern mass rail transportation demands speed, efficiency, comfort and safety. Lighter train carriages help trains accelerate, move and brake and result in energy savings and reduce life cycle costs. Strength and durability contribute to lower maintenance cost over the whole life span of a train. Passenger comfort and safety demands excellent noise, thermal and pressure protection at high speeds. Fire resistance is a key safety requirement for railway applications and high fire, smoke and toxicity performance can be influenced through sandwich design incorporating balsa. These requirements offer opportunity for use of sandwich composites which use end-grain balsa panels. Balsa composites are being used in floor panels (the Bay Area Rapid Transit (BART) trains in San Francisco for example) and light-weight ceilings panels in compartment panels in many rail systems.

Large manufacturing companies, such as Koshii Maxelum19 make extensive use of balsa panels in carriage interiors. In its Transportation Division, Bombardier, which services the rail industry, seeks to “conserve energy, protect the environment and help to improve total train performance for operators and passengers”20 and uses balsa products. It is understood that end-grain balsa panels are being used as carriage ceilings at Bombardier’s Dandenong manufacturing plant; it would be advisable for a project team to visit and discuss these uses for balsa products.

4.3 Wind Energy

Balsa remains an important component of the blades for modern wind turbines and a booming wind turbine industry leads to a strong demand for high quality, end-grain balsa panels. All blade manufacturers use structural foam or balsa in their designs, and sometimes both. By volume, balsa

makes up approximately 40 per cent of the core material used in blade manufacture (The Crown Estate, 2011).

Global production of wind energy is expanding (Figure 2) and wind turbines are a familiar sight in many countries. Global investments in global wind energy are increasing and 2014 was a record year for the wind industry and annual installations exceeded 50 GW for the first time with markets growing by 44% over the depressed markets of 2013. Globally, the global wind sector saw investments rise 11% to a record USD 99.5bn in 2014, exceeding the USD80 billion invested for each of 2012 and 2013. The average annual growth rate for the wind industry over the last 10 years (2005-2014) has been almost 23% (GWEC, 2015).

By 2009, there were 150,000 wind turbines worldwide, amounting to capacity of 158 GW. By the end of 2014, this capacity had increased to 369.6 GW. The global wind industry set a new record for annual installations in 2014 when 51GW of new wind generating capacity was added.

The top five countries, China, the United States, Germany, Spain, and India account for 74% of global cumulative newly installed capacity. In 2009, China (13 GW) and the United States (10 GW) represented 61% of newly installed capacity worldwide (Figure 2). China was the largest overall market for wind energy in 2014 and has been so since 2009; GE Energy (U.S.) reports that China, with its USD13 billion wind industry is already the world’s largest wind turbine sales area, and is forecasted to grow from 25 GW installed in 2009 to 150 GW by 2020. China’s electricity demands are growing 12% per year.

In 2014, installations in Asia led global markets, with Europe reliably in the second spot, and North America a distant third (GWEC, 2015, Figure 3). Projected expansions of wind energy in other countries are also promising; Brazil will most likely double its total installed capacity in 2014, and again in 2015; the South African market is developing quickly; Canada had a record year in 2013 and will likely set a new one in 2014 (Global Wind Energy Council, 2014).
There are many manufacturers of wind blades globally and Table 2 offers a selection.

<table>
<thead>
<tr>
<th>GE Energy (U.S.)</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gamesa (Spain)</td>
<td>WINWinD (India)</td>
</tr>
<tr>
<td>Enercon (Germany)</td>
<td>Inox</td>
</tr>
<tr>
<td>Vestas</td>
<td>China</td>
</tr>
<tr>
<td>LM Wind Power (Denmark)</td>
<td>Xianjiang Goldwing (China)</td>
</tr>
<tr>
<td>Siemens</td>
<td>Ming Yang</td>
</tr>
<tr>
<td>REPower</td>
<td>Brasil.</td>
</tr>
<tr>
<td>Nordex</td>
<td>Tecsis: <a href="http://www.tecisis.com.br">www.tecisis.com.br</a></td>
</tr>
<tr>
<td>Ecotecnia</td>
<td>Wobben: <a href="http://www.wobben.com.br">www.wobben.com.br</a></td>
</tr>
<tr>
<td>Prokon Nord</td>
<td>Aeris: <a href="http://www.aerisenergy.com.br">www.aerisenergy.com.br</a></td>
</tr>
<tr>
<td>ScanWind</td>
<td>LM Wind Power: <a href="http://www.lmwindpower.com">www.lmwindpower.com</a></td>
</tr>
</tbody>
</table>

Table 2. A selection of wind blade manufacturers

In India, the industry expects a strong recovery and this is reflected in investments in manufacturing capacity. At the end of 2013, 19 existing manufacturers offered approximately 50 models of wind turbines and had a combined annual production capacity of over 10 GW. By the end of 2014, more than 20 wind turbine manufacturing and turbine supply companies were operating from India. Leading manufacturers like Suzlon, Wind World, and RRB Energy and players like Regen Powertech, Gamesa, Inox, Kenerys, GE, Siemens, Nupower, Sinovel and Garuda have set up wind turbine production or assembly facilities in India. China’s Ming Yang Wind Power Company has recently entered the Indian market in collaboration with Global Wind Power. Wind energy studies have also raised the need to consider replacement of blades after a 10 – 25 year lifespan. This is expected to cause a spike in demand for balsa within the next 10 years.

In examining the outlook for wind energy for 2015, the GWEC (2015) reports;

*Looking ahead, the picture is complex across various regions. 2015 is likely to be another good year: Europe’s framework legislation and its 2020 targets ensure a degree of stability; the US and Canada are both anticipating strong years; China is expected to continue strong; and emerging markets in Africa and Latin America are expected to continue to grow. It is*
Many observers regard the wind energy sector as the single largest defining influence on the global balsa market: strong activity in development of wind energy is reflected in the increased demand for end-grain balsa panels (Figure 4) and 3A Composites reports that wind power remains the strongest market segment for core materials (Schweiter Technologies, 2015). High demand can be expected from the EU, China and India, sentiments endorsed by other industry collaborators to this study.

Figure 4. Forecast composite material demand in Europe from off-shore wind farms to 2010. Source: BVG Associates.

Despite the role balsa has in wind blade manufacture, care must be exercised because balsa can be an extremely sensitive material and needs to be handled and stored in certain ways to avoid deterioration. There is a responsibility on processors to meet these large demands and assume responsibility for high quality products. Whilst acknowledging balsa’s excellent properties for wind blades, the Wind Energy team at the Danish Technical University (DTU) identified major challenges for balsa as:

- Cost competitiveness compared to other core materials (PVC, PET, cork, etc.)
- Control of moisture content
- Reliable high, uniform quality of the wood
- Security of supply (wind blade manufacturers would welcome a range of reliable suppliers)

4.4 Aerospace

Balsa core composites offer a broad suite of advantages to the aerospace sector through weight saving (enhancing fuel economy and enabling higher payloads), excellent mechanical characteristics, high insulation properties and easy processing. Several airlines and airframe manufacturers make wide use of end-grain balsa sandwich structures. Balsa composites have been used in a variety of ways in general aviation, in military aircraft and in commercial aircraft. Some of the most famous aircraft manufacturers such as Boeing and McDonnell Douglas have taken advantage of balsa’s high impact resistance and compressive properties as well as long service life at low cost and use balsa panels as floor panels, galley carts, interior partitions, cargo pallets, containers and general aviation (sports aircraft) parts. Suppliers to these companies such as the USA-based, Gill Corporation21 and General Veneer Manufacturing Co22 have developed specialty balsa panels to meet the needs of

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22 http://www.generalveneer.com/aircraft/linecard.html
aerospace manufacture; the Gill Corporation developed a cargo floor panel in response to freight carriers' requests for a more durable, impact resistant panel for use in areas subjected to high abuse.

Balsa core materials have been used in a small way in the Orbus Flying Eye Hospital (FEH)\(^{23}\) ( ), a fully equipped mobile teaching hospital within an aircraft which hosts an ophthalmic hospital and teaching facility.

4.5 Defence
Gaining information on military use is challenging and access to information is problematic due to commercial and security sensitivities. An ongoing review of military literature is being maintained in an attempt to gain insights into military applications for balsa products such as a standard core material in naval ship structures, and sandwich composites and balsa cores applied in surface ship deck structures, radar masts and boat hulls where they offer the advantage of increased radar transparency. It is understood that there remains a use in emergency and tactical shelters (including field hospitals) and the standard cargo pallet for defence air transport (108” x 88”) is made with a balsa core.

Innovative military applications for core composites and sandwich technologies are being developed by defence service companies such as Plasan\(^{24}\) and Gurit\(^{25}\). Composites are very versatile and offer advantages through combining strength and stiffness, with low weight. For the defence markets, laminates provide effective ballistic protection at a much lower weight than metallic armour materials. Composite armour is used in the production of military vehicles, land-based shelters, ships and aircraft. It can be used as a structural material or as secondary plate armour just for protection. The need to reduce the weight of armoured vehicles has led to a large volume of composites being used in this area. The extent of the role of balsa products in this market segment is unknown however, some industry players have estimated that defence applications could comprise some 30% of global balsa markets.

4.6 Industrial
Balsa-cored composites are widely used in ductwork insulation and cladding for industrial pipes, as insulation for cool stores, in tooling, storage tanks, impact limiters, concrete forms, fascia panels, skis, snowboards, wakeboards, table tennis bats, fishing floats and lightweight packaging material for fragile goods such as cigars and wine. Applications as decorative architectural features in construction (see notes on Yates Wood Product, Appendix 2) and bridge decking (see Colevo\(^{26}\), a subsidiary of 3A Composites )

Innovation has become the hallmark of successful companies which use balsa wood and the client base for balsa products is broadening (related to innovation and technology changes). One such innovation has been the development of an “industrial-grade” end grain balsa sheet now available through 3A Composites, sharing the observations made in 2009 (Midgley, 2010) that “……there is a body of opinion in the industry that see balsa’s logical place as a supplement to the particleboard and fibreboard industries and being used in furniture and construction applications. The alternative strategy suggested is to sell substantially greater volumes at lower prices.” This industrial-grade sheet has lower technical standards than high-end quality sheets used for most other applications (colour for example) however offers an opportunity to use balsa as a core in combination with MDF or particleboard and decorative veneers.

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\(^{23}\) [http://www.orbis.org/feh](http://www.orbis.org/feh)

\(^{24}\) [http://www.plasan-na.com](http://www.plasan-na.com)


\(^{26}\) [http://www.colevo.ch](http://www.colevo.ch)
5 Global balsa growers and processors
The scattered nature of the balsa plantation resource in growing countries and the smallholder production systems which are an integral part of production, make it challenging to provide accurate estimates of areas planted and volumes harvested.

5.1 Growing and processing countries
The dominant global producer of balsa is Ecuador, followed by Papua New Guinea, Brasil, Indonesia and then several smaller growers such as Costa Rica, Colombia, Peru, Venezuela and Mexico. Searches conducted during this study suggest that there are currently in excess of 60 100 ha (Table 3) of balsa plantations globally; a significant increase to the 25 000 ha global estate estimated in 2009 (Midgley et al, 2010). The literature and Web-based reports further suggest that there are many “orphaned” balsa plantations – these are plantations are in isolated areas without access to processing facilities or markets (ref comments on Brazil below).

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated Plantation Area (ha)</th>
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<tbody>
<tr>
<td>Ecuador</td>
<td>47 000</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>6 200</td>
</tr>
<tr>
<td>Brazil</td>
<td>3 700</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1 200</td>
</tr>
<tr>
<td>Others (Costa Rica, Panama, Colombia, Peru)</td>
<td>2 000</td>
</tr>
<tr>
<td>Ext Total</td>
<td>60 100</td>
</tr>
</tbody>
</table>

Table 3. Estimates of areas of planted balsa (ha).

5.1.1 Ecuador
It is challenging to establish the magnitude of the planted balsa estate in Ecuador. Official figures do not include the many smallholders involved with the industry. Ecuador exported some 28 200 tonnes of balsa in 2014 (Appendix 3. Ecuador Central Bank, 2015). Through making a series of assumptions:

- A mean density of 150 kg/m$^3$ for balsa products exported (across the 3 standard grades), some 186 666m$^3$ of balsa was exported that year;
- A recovery rate of 12% (standing volume to finished export volume) suggesting 1 555 550 m$^3$ RWE harvest volume;
- Mean yield of 200 m$^3$/ha and a rotation of 6 years,

It is concluded that the area of Ecuador’s productive plantation estate is about 47 000 ha. Aligned with this large resource, Ecuador has the world’s largest and most sophisticated primary processing facilities, supplying balsa products for secondary processing in over 50 client countries. The major processors listed in Section 3 all have major investments in Ecuador.

5.1.2 Papua New Guinea.
Updated figures on the export of balsa products from PNG have yet to be complied by the PNG Forest Authority (PNGFA). Earlier figures provided by the PNGFA indicated that 13 259 m$^3$ of balsa products were exported in 2008. Based on the assumptions that silviculture, production and processing yields in both Ecuador and PNG are similar, a productive plantation figure of 3 314 ha can be calculated for that year which is close to the estimated plantation estate at that time of 3500 ha (Midgley et al, 2010). Assuming that the PNG balsa estate is currently of the order of 6 200 ha
(Project estimates), and the above assumptions are credible, PNG’s estimated export volume for 2014 would be of the order of 24 800 m$^3$.

### 5.1.2.1 PNG Growers and Processors

There are many smallholder growers of balsa in East New Britain Province and several balsa processors who complete processing to various levels of sophistication and export balsa products. Current reports from growers and informants in ENB, suggest that the order books for most processors are full. Among these processors are

**PNG Balsa Ltd.** This company is the largest grower and processor in ENB and was established in 1997, changed structure in 2012, and has recently confirmed the acquisition of the company by Schweiter Technologies AG of Switzerland and will become a part of 3A Composites, the world’s largest grower and producer of balsa products. Their estate is FSC-certified and the whole processing facility has FSC CoC. Under existing restrictive FSC guidelines, closer commercial engagement with smallholder growers would compromise their certification processes.

**Coconut Products Limited (CPL)**. CPL is part of the larger WR Carpenter (PNG) Group which in turn is a member of the MBf Carpenter Group with many varied commercial interests and operations in PNG and the Pacific. It is the largest single owner of land in East New Britain and does not rely on outside suppliers or landowner agreements however the current brisk market for balsa might encourage them to accept logs and squared flitches from smallholders. Dealing with large numbers of smallholders makes it difficult to get definitive statements of legality for this material. CPL has recently developed a modern processing facility at their Ulaveo headquarters and has expanded export volumes of a range of panel products.

**GS Model Construction Ltd (GSMC)**. This balsa-based company has been operating in PNG since 1982 and in 1988 shifted its base to ENB. GSMC is primarily a balsa wood processing and exporting company. They currently operate two balsa wood mills in East New Britain – one at Keravat and one at Ulatawa. The company produces hobby-grade balsa panels and end-grain balsa blocks for export.

**Auszac**. The Australian-based Auszac has balsa plantation interests in both PNG and Indonesia with 4 dedicated Balsa production facilities, has on rotation approximately 1 million trees and employs 500-550 people. With its 800 ha of plantations, it is the largest producer of balsa wood products in Indonesia.

### 5.1.3 Australia

In Australia, several companies have global interests in balsa and have links with PNG.

The company **Balsacentral** markets Auszac balsa products from Indonesia and PNG and offers a comprehensive array of high quality, hobby products of sheets and blocks and a web-based service.

The **Artmil Balsa Co** in Melbourne is one of Australia’s oldest dealers in balsa for hobbies and models.

Several of Australia’s leading dealers in balsa materials are based in South East Queensland (Appendix 4).

- **The DIAB** Australian office is based on the Gold Coast and distributes its range of core composite products including its ProBalsa range, manufactured in Ecuador.

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27 Based upon assumptions of 6 200 ha estate, 6 year rotation, 200 m$^3$/ha yield at harvest and 12% mill recovery
29 [http://www.wrcbalsa.com/default.html](http://www.wrcbalsa.com/default.html)
• **ATL Composites** is a leading supplier of advanced composite materials and engineering, for the construction of high performance, lightweight structures for the marine, automotive, architectural, civil and industrial tooling markets. It formerly distributed Baltek products from 3A Composites but since late 2013, the company has had a partnership with DIAB Australia to supply and distribute its core materials including the DIAB ProBalsa range of products. These are marketed under the DUFLEX brand.

• **Gen-Eco** and its sister company **Ashden Trading** on the Gold Coast offer wholesale supply of FSC-certified balsa products, particularly “industrial-grade” end-grain sheets, balsa veneers and plywoods sourced through 3A Composites subsidiary, “Plantabal” in Ecuador (Appendix 4).

**Yates Wood Products** (Appendix 2), based in Ingleburn, NSW, is a supplier of panel products and sawn timber who manufacture customised panels using balsa as the core material to fabricate thick panels (25mm to 100mm in thickness) which weigh very little. The basic panel material is an “industrial-grade” balsa panel made by 3A Composites in Ecuador and supplied in Australia by Ashden Trading and marketed as “Balsalite”. Applications include:

- Doors (a balsa core with an MDF skin)
- Marine applications for doors, tables and other accessories in yachts.
- Decorative architectural designs
- Light weight Board Room tables

### 5.1.4 USA, Europe and China

As the world’s largest importer of balsa products, the USA has a rich array of secondary processing companies and facilities serving a wide range of marine, transport, aerospace, energy and defence industries. The wind sector in the USA is not as dominant as it is in Europe or China however the military sector is substantial but impossible to quantify owing to confidentiality and security factors. In the USA, companies such as Plasan ([http://plasansasa.com](http://plasansasa.com)) which provide “customized, lightweight survivability solutions for tactical combat vehicles, fixed- and rotary-winged aircraft, naval platforms, civilian armour vehicles, and personal protection.” manufacture and use composite materials in defence applications. Industry informants all agree of the substantial use of balsa in military applications and some have ventured to guess that up to 30% of global market might be devoted to defence purposes.

Europe is the largest investor in the global balsa sector through major corporations such as 3A Composites, DIAB and Gurit, and has taken a leading position in the design and technology underpinning efficient wind blades. European countries figure largely in global trade of balsa and have a range of sophisticated secondary processing facilities.

China’s dominant demand for wind energy has encouraged the establishment of a strong domestic manufacturing capacity and companies such as Ming Yang are now among the top 10 wind turbine manufacturers worldwide. The sophisticated secondary processing industries related to the wind energy sector have fostered a range of other industries which now use balsa.

### 5.1.5 South America

Web searches and trade databases suggest that smaller growers in several other countries such as Costa Rica, Colombia, Panama, Peru, Venezuela and Mexico grow, process and export balsa products to some limited degree.

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In **Colombia**, active groups are Cobalsa (discussed above) and Balco Ltd., Balsa de Colombia\(^{36}\). Both have plantations (not quantified) and produce kiln dried product to meet client needs. From **Peru**, there are occasional offers for sale of balsa blocks.

In Mato Grosso State, **Brasil**, the planted balsa wood area totals 3,700 hectares which is managed by 105 producers. In 2010, 20% of the total balsa wood plantation area was ready for harvest however, at that time, there was no processing capacity for balsa wood in the state and thus it was sold as roundwood. In 2010 “a Swiss Company... globally one of the largest distributors of balsa wood” inspected the resource with the view to secure resource for the wind energy sector (ITTO, 2010). By 2015, there were internet-based offers for a spot, one-off sale of 10 000 m\(^3\) air-dried, rough sawn, balsa lumber from Mato Grosso (Fordaq, 2015). Prices varied from USD180 - 225/m\(^3\) at site according to quality and dimensions. This sale was being promoted by ShareWood Switzerland AG, part of the ShareWood Group, a Swiss company which manages investments in “environmentally conscious fixed assets” and has a subsidiary ShareWood do Brasil Reflorestadora Ltda. in Brazil\(^{37}\). Sharewood’s core business is planting and marketing teak. Another posting on the Balsaweb site offered 40 000 6-year old trees for sale from Mato Grosso.

### 5.1.6 Indonesia

In **Indonesia**, smallholder wood production is a strong part of rural culture: it is estimated that there are some 3.1M ha of smallholdings and informal plantings of teak, mahogany, albizzia, acacia and other timber species in Indonesia (Perdana and Roshetko, 2015). Indonesia has a small balsa industry based in eastern Java which produces a range of products which are marketed globally including end-grain sheets, blockboard for doors, panels faced with decorative veneers and light boxes for packaging. One company firmly involved in the production, processing and export of balsa is Sibalsa\(^{38}\) which has its plantations and processing factory in East Java and markets products under the Encore brand. There are several small growers in Eastern Indonesia and scattered trees alongside roads and households which are harvested opportunistically for use in blockboard. In addition to its interests in East New Britain, the Australian-based company, Auszac has established a plantation base of over 800 ha in east Java and processes and exports high quality balsa to Australia.

In examining the web-based offers for balsa sales of trees, logs, rough-sawn air-dried lumber, and more advanced processed products, it is obvious that smallholder growers are frequently not connected to processors who may not well connected to global markets. Success in the balsa sector is strongly dependent upon healthy engagement across the supply chain.

### 5.2 Certification

3A Composites has taken the option of certifying 7554 ha of plantations managed by Plantaciones de Balsa, PLANTABAL S.A in Ecuador and considers that its FSC certification will provide some differentiation in the sophisticated markets they supply; particularly the environmentally sensitive wind energy market. There is a view that maintaining high standards of forest management provides value and offers a privileged position in the market.

In East New Britain, the PNG Balsa Company Ltd has made a commitment to the principles of the Forest Stewardship Council and their certification includes Forest Management (FSC-C125018 for 4607 ha of balsa plantations) as well as Chain of Custody (FSC-C 123469).

The global resource of balsa plantations is about 60 000 ha (see Section 5.2) of which 12 561 ha (or about 21%) is certified under FSC.

It is unsure of what other PNG growers and processors expect from certification and how appropriate certification is for an industry which involves many smallholder growers. Guaranteeing

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\(^{37}\) [http://www.sharewood.com](http://www.sharewood.com)

access to markets is a priority for the growers and processors and priorities to meet the needs of FLEG/T in Europe and the Lacey Act in the USA plus Australia’s Illegal Logging legislation might be a higher priority than certification. Meeting legal requirements would ensure ongoing, unfettered access to the world biggest balsa markets. If the aim is abide by these new legal instruments, there may be alternatives to FSC certification which are less expensive and complex – especially if smallholders are involved.

Some of PNG’s main balsa markets are non-discriminatory with regards to certification – China and India are fairly high on the list of balsa consumers and their domestic markets do not require certified balsa products, however both may wish to export products made from (or containing) imported balsa. China now has its own forestry standard aligned with PEFC and India is moving in a similar direction. Alignment with this standard would make sense for PNG growers and processors.

6 Trade and Global Markets

6.1 HS Codes used for trade in balsa products

Midgley et al (2010) highlighted the challenges experienced with extracting definitive trade data for balsa and, along with Oliver (2013), recognised the limitation of the timber trade data for balsa lies with the HS Codes providing little or no differentiation on the basis of species.

Most countries define traded goods according to the international Harmonized System (HS) of product codes. Those countries using the system are committed to harmonizing this system at the 6-digit level and also have the option of sub-dividing codes further at the 8-digit or 10-digit level to provide more detailed information on individual timber species. There are sometimes significant flaws in data collection due to a lack of understanding, lack of time and resources at data collection points.

Generally, balsa does not have a specific code and is classified in a 6-figure category HS 440722 combined with other woods as “HS 440722 Wood of virola, imbuia and balsa, sawn or chipped, sliced or peeled, exceeding 6mm in thickness”.

Since 2007, the USA has combined a series of earlier HS codes for balsa into a single 10-figure category specifically for balsa “HS 4407220006 HW lumber balsa. Cubic meters balsa wood, sawn or chipped lengthwise, sliced or peeled, whether or not planed, sanded or end-jointed, of a thickness exceeding 6 mm”. At that time, official statistics for balsa exports from Ecuador commenced description under the 10-figure Product Number 44072200000 (that includes balsa, virola and imbuia woods) of the Andean Trade Community Standard Product Code System known as NANDINA. This confuses any official statistics from Ecuador although this study was again reassured that ‘Balsa is the main driver in the product number’ (Austrade, pers com).

Whilst the generic HS Code 440722 ‘Wood of virola, imbuia and balsa, sawn or chipped, sliced or peeled, exceeding 6mm in thickness’ is the primary HS Code used globally, it is unlikely that imbuia, as a sub-tropical species, would be exported from tropical balsa-producing countries such as Ecuador, Costa Rica, Colombia and Costa Rica where the species does not occur. In addition, imbuia and virola do not occur in countries outside South America such as Indonesia and PNG so trade data would not be confused with this HS Code in these countries.

In Indonesia a number of 10-figure HS codes are used for balsa:

- 4407.22.10.00: Balsa Block
- 4408.10.90.00; Sheets for veneering (including those obtained by slicing laminated wood), for plywood or for similar laminated wood and other wood, sawn lengthwise, sliced or peeled, whether or not planed, sanded, spliced or endjointed, of a thickness not exceeding 6mm
• 4409.10.00.00: Decorative Board
• 4412.94.00.00: Blockboard, laminboard and battenboard. Can be used for Laminated Board of balsa plus End Grain Balsa Block.

In India, the basic HS code for Indian imports remains 4407 22 00: Virola, Imbuia and balsa “wood sawn or chipped lengthwise, sliced or peeled whether or not planed, sanded or end-jointed, of a thickness exceeding 6mm”. However, in the course of this study, Indian Customs has used 17, 8-figure HS codes for balsa imports (44034990, 44071090, 44072200, 44072990, 44081090, 44083990, 44089090, 44092910, 44092990, 44123190, 44123930, 44129400, 44129990, 44187200, 44187900, 44189000, 44219090). Some of the HS codes for Indian imports did not register with the Ecuadorian NANDINA codes for exports. It is suspected that some of these codes are transcription errors or may be driven by the need to avoid high taxes on primary processed wood products. From infoDrive (India) HS Code 44072200 attracts the following taxes totalling 14%39 and has a Compulsory Compliance Requirement (CCR) “whether or not planed”:

  • Basic Duty: 10%
  • CVD: 0%
  • SPL.CVD: 4%

HS Code 44219090 attracts the following taxes totalling 26%40:

  • Basic Duty: 10%
  • CVD: 12%
  • SPL.CVD: 4%

For China, the global export/import market intelligence service, InfoDrive India41 analysed Chinese import data and concluded that only one 8-figure HS Code 44072200 for balsa (and Imbuia and Virola) HS code was used by Chinese customs and importers. This was confirmed by Wood Markets International (InfoDrive, India, Wood Markets pers. com).

In an attempt to segregate balsa from the other species in trade data, the US figures for the import of balsa were examined using the Zepol Corporation’s database42. The differences between the 10-digit HS Code 4407220006 (balsa only) and the broader 6-digit HS Code 440722 (which includes Virola, Imbuia and Balsa) were examined to offer an indication of the contribution of these other 2 species to US trade under the 6-digit HS Code 440722. The results (Table 4) suggest that almost all of the timber imported from balsa-producing countries (Ecuador, PNG, Indonesia, Costa Rica) under HS440722, is balsa and from Peru, Brasil, Colombia the main import would be Virola (it is unlikely that Imbuia, as a sub-tropical species, would be exported from, Costa Rica, Colombia and Costa Rica). In the absence of other reliable data, this provides a proportion to apply to estimates of the 6-digit HS Code 440722 to other countries.

41 http://www.infodriveIndia.com
6.2 An overview of global trade

The data presented below suggest that the total global export trade in balsa from producing countries in 2014 was estimated at USD123M in value and about 213,000 m$^3$ in volume of which Ecuador contributed 90%, PNG 9% and other countries 1%. The estimated value of the global balsa trade has increased from an estimated USD71M in 2008 to an estimated USD123M in 2014.

Assuming these data are credible, then PNG has a good deal to be pleased about because it has maintained (or marginally expanded) its market share over the past 5 years in a very competitive global market.

6.2.1 Exports from Ecuador

Ecuador remains the world’s largest producer and exporter of balsa products with 2014 exports totalling an estimated 184,245 m$^3$ valued at (FOB) USD109,828,000 to over 50 countries. From figures derived from the Ecuador Central Bank, under Andean Trade Code (NANDINA) 4407220000 (which includes Virola, Imbuia and Balsa, consistent with the global HS Code) (Appendix 3), the largest importers of balsa from Ecuador in 2014 were:

- **USA.** Comprised 33% of Ecuador’s export market and imported 60,424 m$^3$ of balsa valued at USD36M at an average unit value of USD610/m$^3$. The USA has been constantly the largest importer for the past 10 years.

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Table 4. Proportion of US balsa imports under 6-figure HS codes (Figures courtesy Zepol Corporation).

<table>
<thead>
<tr>
<th>Country</th>
<th>TOTAL 2007 - 2014</th>
<th>TOTAL 2007 - 2014</th>
<th>% Balsa under 6 figure code</th>
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<td><strong>309,442,811</strong></td>
<td><strong>88.0</strong></td>
</tr>
</tbody>
</table>

Assumes: Countries that do not grow Virola and Imbuia have negligible exports of these species.

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43 Comprising USD109M Ecuador, USD11M PNG and est USD3M from other producers.
44 Comprising estimates of 184,345 m$^3$ from Ecuador, 24,800 m$^3$ from PNG and 4,000 m$^3$ from other producers.
• **China**: Comprised 28% of Ecuador’s export market and imported 61,834 m$^3$ of balsa valued at USD30M at an average unit value of USD502/m$^3$. Exports to China have been steadily increasing.

• **EU**: Comprised 25% of Ecuador’s balsa exports. Imports for 2014 were 44,886 m$^3$ valued at USD25M at an average unit value of USD649/m$^3$.

• **India**: Comprised 1% of Ecuador’s export market and imported 1,553 m$^3$ of balsa valued at USD1M at an average unit value of USD714/m$^3$.

### 6.2.2 Exports from PNG

Unfortunately, PNGFA has not compiled records of balsa exports since 2011 (Appendix 5). Despite the global economic downturns of 2008 and 2009, PNG has managed to increase its exports both in terms of value and volume (Figure 5). Assuming that average unit values remained about constant between 2011 and 2014 (est. 1200 kina/m$^3$) and that PNG exports totalled 24,800 m$^3$ in 2014, PNG exports could be valued at an estimated 29.7M kina (est USD11M$^{45}$) for 2014.

![Figure 5. PNG exports of balsa products (m$^3$ and PNG Kina). Source Midgley et al, 2010 and PNGFA)](image)

Based upon 2011 data provided by the PNGFA, China remains the largest client, followed by India, United Kingdom and India (Figure 6).

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$^{45}$ Assumes a mean exchange rate for 2014 of USD 0.3683 = PGK1.00
6.2.3 Imports to China
As part of this study, a report was commissioned from the International Wood Markets Group\textsuperscript{46} in Vancouver who are specialists in the China timber trade (Appendix 6). Woodmarkets assembled datasets for Chinese imports (Quantity and Value) for the period 2008 – 2014 based upon China Customs records for the 8-figure HS Code 44072200 for balsa (which included imbuia and Virola). Prior to January 2014, imports were recorded in kilograms and they are now recorded in cubic metres. Of note from these data is:

- The steady rise in imports from PNG
- The volatility of the China market
- The emergence of China as a client for PNG

The steady decline in unit value of balsa imports over the 4-year period, 2011 - 2014 (from USD551 – USD508/m\textsuperscript{3}) suggests that China is purchasing less advanced processed balsa products from other secondary-processing countries and that is has its own capacity to produce these products domestically. China’s pre-eminent position in the global wind energy sector and significant numbers of manufacturers of wind blades suggests this as an explanation.

However, there is a significant variance between the 2014 data for balsa exported from Ecuador to China (USD30M at an average unit value of USD502/m\textsuperscript{3}, Ecuador Central Bank data) and the balsa imported to China from Ecuador (USD18M with an average unit value of USD748/m\textsuperscript{3}, China Customs data). The differences in these figures are significant and there may be several reasons for this. The first is the issue about the inclusion of the other species imbuia and virola in HS Code 44072200. Another is the possibility that imports of highly-processed, scrimbed sheets (for example) may be regarded under another HS Code for the purposes of import taxes in China and perhaps data under the 8 figure HS Code 44072200 are an under-representation. The Chinese data might not include imports via Hong Kong (or perhaps Taiwan). If China’s consumption continues to grow, these anomalies need to be clarified and further examination is warranted for this important emerging market.

6.2.4 Imports to the USA
The Zepol Corporation\textsuperscript{47} granted access to their database for the 10-figure balsa HS Code (specifically balsa) HS 4407220006 for imports to the USA. A standard assumption of 150kg/m\textsuperscript{3} was used to convert shipment weights (kg) into cubic metres. In 2014, the USA imported 72,919 m\textsuperscript{3} of balsa valued at USD37.6M and that almost all of this was sourced from Ecuador, by far the dominant supplier to the USA. PNG provided a very small part (but constant) part (<3%) over the past 7 years.

\textsuperscript{46} https://www.woodmarkets.com
\textsuperscript{47} www.zepol.com
Zepol’s data also demonstrated the dominant position of 3A Composites in the US trade in balsa. Appendix 1 suggests that 70% of the value of balsa shipped to the USA over the past 8 years has come from Plantaciones des Balsa Plantabal in Ecuador, a fully owned subsidiary of 3A Composites. Total US imports over this 8 year period were USD259M and 3A contributions were USD181M.

6.2.5 Imports to India
Given difficulties experienced in extracting balsa data from the database of the Indian Directorate General of Commercial Intelligence and Statistics (DGCI&S) in Kolkata, a report on Indian imports of balsa was commissioned from InfoDrive, India (http://www.infodriveindia.com), a company which provides export/import intelligence from over of 80 countries. The data (Appendix 7) showed that some 17 HS codes had been used in recent years for the import of balsa products (this explained the challenges in utilising the DGCI&S database). The values of Indian imports (in USD) were reliable (as quoted on Customs declarations) however, volume figures were impossible to estimate as a varying range of units were used for import declarations; sets, pieces, boxes, square metres and kilograms. The data showed that:

- PNG has maintained a steady proportion of the Indian market
- The Indian market is volatile
- There is an emerging supply from countries other than Ecuador and PNG.

Although the Indian market is small compared to the USA, China and the EU, almost all industry stakeholders were of the opinion that Indian consumption would increase in line with its expanded wind energy sector. This suggests that it would be wise for the PNG industry to maintain and strengthen its ties with India.

6.2.6 Imports to the European Union.
Access and analysis of European imports of balsa proved to be difficult. The European Commission’s database Eurostat (http://ec.europa.eu/eurostat/help/new-eurostat-website) is challenging to use and takes imports to aggregated levels from which it was impossible to segregate balsa.

The EU has a significant presence in Ecuador’s balsa markets. Based on the data for Ecuador exports for 2014 (Ecuador Central Bank), the EU accounted for 25% of Ecuador’s exports totalling some 43,008 m$^3$ balsa products valued at USD27.9M at an average unit value of USD649/m$^3$. However the EU’s imports have fallen (as a proportion of Ecuador’s exports) from 39% in 2008 to the current 25%. Over this same period, unit values of balsa exported to the EU have increased 18% from USD552 to USD649 suggesting that a smaller volume of higher value products are being exported. The substantial European investment in modern processing facilities in Ecuador suggest that this is the case.

Oliver (2013) noted that EU imports of solid timber products from Ecuador had risen between 2009 and 2012, from 14 000 m$^3$ RWE to 20 000 m$^3$. Around 95% of import volume in 2012 consisted of sawnwood, identified under HS code 440722 “virola, imbuia, and balsa”. Oliver concluded that the majority of these imports were Balsa and that rising demand was being partly driven by Europe’s expanding wind farm industry.

The EU’s prominent role in international balsa trade suggests that further examination is warranted for this important and sophisticated market.

6.2.7 Key Questions.
In searching the data relating to global trade in balsa, no mention was found of Russia. The data and the literature suggest that large, powerful, industrial nations use balsa for a range of applications. This does not appear to be the case with Russia which may emerge as a potential market.
Similarly Japan appears to import modest quantities of balsa despite being the home for wind blade manufacturers such as Mitsubishi Heavy Industries. This may be because Japan’s industries import processed balsa such as scrimbed sheets from the USA or Europe and not directly from the main growing countries of PNG and Ecuador. It might also be a factor of using different HS Codes.

6.3 Adding Value to exports

A major shift since the 2009 study has been that a greater proportion of advanced processing is now being completed in growing countries (Ecuador, PNG and Indonesia) so the average unit value of shipments has increased whereas the volume may not have changed to the same degree. Average unit FOB prices for balsa exported from Ecuador rose from USD465/m$^3$ in 2007 to USD596/m$^3$ in 2014, an increase of 28%. It is believed that these increases are partly due to the increased level of sophistication of the processed exports. Considerable investments have been made to establish processing facilities to convert cheap, fast-grown logs into sophisticated products for world markets. None of the databases used in this study segregated traded balsa into blocks, end-grained panels, scrimbed panels, etc so the unit value quoted on Bills of Lading can vary enormously and must be treated with caution.

Market quotes for end-grain blocks obtained on the Web suggest prices of US $425-450/m$^3$ for core-block ex Ecuador and USD750/m$^3$ ex Coconut Products (WRC Balsa) from PNG. Prices quoted on the Web can be misleading in interpretation and may not be good indicators of market reality; “flexible panels” (ex . Shanghai) were quoted for the low range USD350 – 390/m$^3$ on the same websites suggesting that prices quoted on the Web may need clarification. It is clear that there are a great many levels of sophistication for balsa products, some requiring very detailed, expensive and time-consuming processing. For example, a Bill of Lading obtained for a 3A Composites shipment in 2014 from Ecuador to its sister company Baltek in the USA, suggested that average unit values in a shipment could be USD7166/m$^3$. There is clearly a good deal of sophisticated and expensive processing required to prepare products of these values. Misuse of quoted market prices for sophisticated processed products will lead to unrealistic expectations from value chain stakeholders.

7 Conclusions

The major conclusion from this study is that the outlook for the global balsa sector is positive with the growing and processing industries being modern, robust, well-entrenched and expanding. Since 2008, global plantation areas have increased from an estimated 25 000 ha to an estimated 55 000 ha in 2014; production of balsa has increased and, since 2008, global trade has increased from 155 000 m$^3$ worth an estimated USD71M to 208 000 m$^3$ worth USD123M in 2014.

This positive outlook is reinforced by serious investments by major global corporations in new world-class processing facilities and corporate mergers and acquisitions.

Wind energy will continue to be the prime driver for expansion for the medium term.

The introduction of an “industrial-grade” end-grain balsa panel by the world’s leading processor is exciting and potentially adds new series of cost-competitive applications. This new product may not require additional plantations but could more efficiently utilise the existing resource.

For the past 6 years, PNG has enjoyed a consistent and dominant part in Indian imports of balsa. It is important that PNG maintain and foster these relationships as Indian demand for balsa inevitably grows. India plans to host the conference, Renewable Energy India, 23 – 25 September 2015 at the India Expo Center, Greater Noida (http://www.ubmindia.in/renewable_energy/home) and balsa exporters from PNG might consider attending.

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48 [https://www.mhi-global.com/discover/earth/technology/wind_power.html](https://www.mhi-global.com/discover/earth/technology/wind_power.html)
The balsa industry in PNG can be pleased to have maintained (or marginally expanded) its market share over the past 5 years in a very competitive global market. This period included a period of flat global demand and considerable market stress. However the growers and processors cannot afford to become complacent. Balsa is straightforward to grow and relatively inexpensive to process. This study shows that there are growers and processors in other parts of the world (Indonesia, Brazil, Colombia and others) who are waiting to encroach upon PNG’s market share.

### 7.1 Challenges.

#### 7.1.1 Access to trade data and industry updates.

Data relating to global trade in balsa are incomplete and unreliable and require considerable interpretation. Further examination of available data is warranted to enable PNG growers and processors to prepare for emerging global trends. PNGFA should be encouraged to update the available records it has on balsa exports so that these data can be used to underpin strategic planning by the private sector.

The maintenance of functional networks across a diverse array of growers and primary processors, often shrouded with corporate secrecy and a myriad of end uses is challenging. Stakeholders in the balsa sector should endeavour to develop and maintain links across the supply chain with large companies such as 3A Composites, Gurit and DIAB plus develop links with suppliers and manufacturers such as ATL, Bombardier and Yates Wood Products. For example, given the expansion of the rail sector in Australia and internationally, and the use of balsa panels in carriage ceilings (by Bombardier, for example) it would be prudent for a project team to visit Bombardier’s Dandenong manufacturing plant to discuss balsa use with their engineers.

#### 7.1.2 Freight costs:

The Papua New Guinea balsa sector has worked hard to establish a solid 9 – 10% of the global market. There are growers in several other countries who would like to encroach upon this market share. The operating costs of growing, harvesting and processing balsa in PNG are high when compared with other producers and freight costs from PNG are a serious limitation to the competitiveness of balsa from ENB. In 2009, the cost for shipping an FEU (which would contain an estimated 50 m$^3$ balsa) from Rabaul to Shanghai was about USD4293. The typical cost of transport of an FEU from Ecuador to Shanghai was about USD2800 at that time (Midgley et al, 2100).

#### 7.1.3 Competition and complementarity with polymers

Industry sources have noted a trend towards complementing balsa with polymers in the wind energy sector and the emergence of hybrid technologies which combine the best features of polymers and balsa. The expanding wind market is expected increase the demand for balsa over the next 10 years. New entrants in the wind energy markets, such as China and India, are developing hybrid blades using both balsa and polymers, allowing them to enter the market quickly using existing proven designs. Manufacturers of polymers believe that polymers provide a responsive and reliable supply chain, providing higher quality, uniform products with less delamination and variation and a longer operational life.

There is an active effort within the military sector to replace balsa which is viewed as “old-fashioned”. In promoting its new suite of polymer foams, KaZak (2008) asserted that “A high performance affordable replacement for balsa in composite sandwich panel structures is needed”, and that “the U.S. Navy is looking for materials capable of replacing balsa in composite sandwich panels for topside structures in the next generation of ships.”

#### 7.1.4 The maintenance of balsa’s cost competitiveness within the core composites markets.

Related to the competition with polymers for the core composites markets are issues regarding cost competitiveness of balsa compared to other core materials (PVC, PET, cork, etc.). Costs of polymers
have been coming down and technical standards are rising (although the prices for some cutting edge polymers remain substantially higher than balsa) and the balsa sector must respond to this through ongoing efficiencies.

### 7.1.5 Quality Control.

Maintenance and expansion of PNG’s position within the global market place will depend upon the industry offering a secure supply of balsa of high and uniform quality. High among the issues identified by secondary processors is the need to control the moisture content of balsa blocks.

### 7.1.6 Security of Supply

It is important that large industries supporting the wind energy sector are given confidence in having access to adequate supplies of high quality material. Reliability as a supplier is a critical consideration for large industries such as wind blade manufacturers. The US Department of Energy recognised that “supply, price, and availability problems exist for balsa” and that unreliable supplies, or lack of supplies are challenges to wind blade and rotor manufacturing (US Department of Energy, 2009).

### 8 References.


InfoDrive India (2015). Commissioned report: India’s imports of balsa products (this study) [http://www.infodriveindia.com](http://www.infodriveindia.com)


8 Appendices.

Appendix 1: USA Imports. Data provided by the Zepol Corporation, USA.

Appendix 2. Notes from a visit to Yates Wood Products.

Appendix 3. Exports from Ecuador (Data provided by the Ecuador Central Bank).

Appendix 4. Notes from Discussions with Gen-Eco and other distributors in SE Queensland.

Appendix 5. Exports from PNG (Data provided by the PNG Forest Authority)

Appendix 6: Chinese Imports (Data provided by International Wood Markets).

Appendix 7. Indian Imports (Data provided by InfoDrive, India).
### Appendix 1: USA Imports

Data provided by the Zepol Corporation

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### US Imports of balsa: Top 25 shippers of balsa to the USA: 2004 – 2015

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<td>0</td>
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**TOTAL** | 0 | 0 | 0 | 1,252 | 769 | 9,205 | 33,500 | 12,652 | 14,962 | 8,100 | 881 | 81,321
Appendix 2. Notes from a visit to Yates Wood Products.

Salwood Asia Pacific Pty Ltd
- Services in Forestry
ABN : 15 108 926 656
35 Steinwedel St
Farrer, ACT 2607
Australia
Ph: 61 2 61615906
Fax: 61 2 61615905
E-mail: stephen.midgley@salwood.com

Notes from a visit to Yates Wood Products Pty Ltd, Ingleburn.

Visit and discussions 15 May, 2015, with:
Mr Col Jones
Panel Products Manager
Yates Wood Products Pty Ltd
12 Lancaster St
Ingleburn
NSW 2565
Ph: 02 96183499
Mobile: 0418 649 820
E-mail: cjones@yateswood.com.au
Web: www.yateswood.com.au

I made an appointment a week ago with Col and drove up from Canberra for the meeting over 2 hours. Col was very positive and helpful and keen to maintain contact with the ACIAR balsa team. SJM to send introductions (Done).

Yates has been dealing in balsa panels for about 4 years, offering them under a “Balsalite” brand and are very excited at the promise these offer and the variety of applications to which they are put. It is an expanding part of their business. Price does not appear to be a consideration

Products and Applications

- Doors (a big market). Most doors are 35 – 37 mm thick when finished. Typical core is 25 or 27.5 mm thick and then an MDF skin is applied.
- Marine applications for doors, tables and other accessories in yachts.
- Decorative architectural design – Qantas commissioned blades for a decorative roof
- Light weight Board Room tables

Their balsa panels are supplied by Ashden Trading in Queensland (a sister company of Gen-Eco and run by Tony George). See earlier, shared notes regarding conversations with Tony. The balsa is “industrial grade” end-grain panels, typically 120 kg/m³ density and is supplied by 3A Composites from their Ecuador operations. In the panels inspected, there was a lot of blue stain, knots and other defects. It is obvious that “industrial grade” does not have the same standards as those for panels for the wind blade sector. The panels are provided in a variety of dimensions and a variety of thicknesses (9, 25, 35, 40 mm and others are available):
Yates prefer the larger dimensions and see expanding markets for them.

9 mm thickness is popular for interior yacht applications – doors, tables, benches etc.

Col felt that the dimensional stability of the balsa as a core was superior to that of polystyrene.

A range of MDF and HDF skins are applied to the balsa cores; the thickness and properties (i.e. fire retardant) depends upon the end application. A variety of decorative sliced veneers (0.6mm) are used for luxury applications such as Board Room tables and yachts.

The manufacture of such large panels would use larger machinery than that seen in PNG.

The packaging of the “industrial-grade balsa sheets looks anonymous – no 3A or Baltek logos. They do not keep panels sealed in plastic – rather open to the air. The FSC logo proudly displayed; the license number C100270 indicates that the wood was sourced from Plantaciones de Balsa, PLANTABAL S.A in Guayaquil, ECUADOR (3A Composites main plantation resource)

About the only downside expressed during the whole meeting was the inability of balsa panels to hold a screw.

They have experienced no problem with delamination – the owner of the company reportedly soaked an end-grain panel in water for 2 weeks and noted no problems.

They use B-bond PVA as an adhesive. Cold pressed with 4 hour curing (depending upon the weather).

Photos.

Large dimension Balsa door cores: 2440 x 1200 x35

Composites for door cores: 27.5 mm end-grain balsa + 5mm MDF and 56 x 27.5 Hoop pine frame

Door composites: 25mm end-grain balsa +8 mm MDF + 0.6mm decorative hardwood sliced veneer
Composites for a Board Room Table: 25mm end-grain balsa core + 3mm MDF + 0.6mm decorative hardwood veneer

C100270 is the FSC licence for Plantaciones de Balsa, PLANTABAL S.A., 3A Composites company in Ecuador. BALTEK® SBC is 3A Composites brand for balsa wood core material with FSC® certification.
Col Jones of Yates Wood Products and door core balsa sheets

Balsa sheets imported from 3S in Ecuador via Ashden Trading. Note lack of usual Baltek Branding

Industrial Grade End Grain Balsa Sheet: Note presence of blue stain and minor imperfections

Balsalite Panel (from Yates website). Note colour variation.
### Appendix 3. Exports from Ecuador.

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This table shows the exports from Ecuador from the years 2007 to 2015, specifically focusing on the quantities, values, and unit values of different countries. The data is sourced from the Ecuador Central Bank.
Appendix 4. Notes from Discussions with Gen-Eco and other distributors in SE Queensland.

Salwood Asia Pacific Pty Ltd
- Services in Forestry
ABN : 15 108 926 656

35 Steinwedel St
Farrer, ACT 2607
Australia

Ph 61 2 61615906
Fax: 61 2 61615905
E-mail: stephen.midgley@salwood.com

Notes from telephone conversation with Tony George (tony@gen-eco.com.au), 11 May, 2015 plus Web-search.

Mr Tony George is Managing Director of Ashden Trading Pty. Ltd., a small, lumber, plywood, and millwork company founded in 2006 and based in Logan Village, Queensland and (between Brisbane and the Gold Coast). Very helpful and keen to maintain a dialogue.

Ashden Trading Pty Ltd
50-54 Culgoa Cres,
Logan Village, QLD
Phone: 07 5546 8531

Tony is also owner of Gen-Eco (http://www.gen-eco.com.au/about.html), established in 2013, and a sister company to Ashden Trading. Gen-Eco specialises in sourcing and supplying an extensive range of cleaner and greener wood products and panels, including:

- Eco-Certified and Formaldehyde Free Plywood
- Eco-Certified and Formaldehyde Free Balsa Products
- Eco-Certified Plywood Products
- Specialty MDF Products
- Eco-Certified Timber Products

Gen-Eco Environmental Wood Products supplies wood and panels products that are certified to be environmentally sustainable by either FSC or PEFC.

Tony’s background can be sourced on Linkedin (https://www.linkedin.com/in/tonygeorgegeneco) and a background to Gen-Eco can be found on their website at: http://www.gen-eco.com.au/about.html

Gen-Eco Environmental Wood Products
Unit 9 / 10 Burnside Road,
Ormeau, Qld
Phone: +61 7 3807 9308

Gen-Eco buys its balsa products from 3A Composites – currently from Ecuador but he expects to receive some PNG material now that 3A has finalised the purchase of PNG Balsa. They concentrate on a lower, and less-expensive “industrial grade” of balsa which is significantly cheaper than 3A’s top grades (selling for prices of about $500/m³ compared to the high grade material of 2–3000/m³ – prices are my estimates). The “industrial grade” of balsa includes a range of colours (i.e. heartwood) and includes the lighter categories of balsa (<120 kg/m³). Tony sees a range of specialist applications – board room tables, doors which require both security and lightness. We discussed the role of balsa as cladding for engine rooms and the possibility of a dialogue with insurance companies (Lloyds...
reportedly offers lower premiums if the cladding for boat engine rooms are made from balsa panels).

He has imported over 1100 cubic metres of balsa over the past 4 years.

Particularly excited about the new range of veneer products (Banova) now available from 3A Composites.

He looks forward to a dialogue with the Project team members at Swinburne, The University of Melbourne and ADFA.

Tony reports that ATL Composites (http://atlcomposites.com.au – also on the Gold Coast) formerly marketed all of 3A’s balsa products in Australia. ATL Composites is one of Australia’s larger epoxy formulators, and is a supplier of advanced composite materials and engineering, for the construction of high performance, lightweight structures for the marine, automotive, architectural, civil and industrial tooling market. They have a large interest in boat building on the Gold Coast

**ATL Composites**
12-14 Production Ave,
Molendinar.
QLD. 4214.
AUSTRALIA
Phone: +61 7 5563 1222

ATL distributes and manufactures for some of the world’s leading composite suppliers including The DIAB Group - Divinycell® structural foam and ProBalsa end grain balsa. ATL developed DuFLEX® Composite Panels in the early 1990’s, as a value added product range that would reduce boat construction time and optimise structural weight (see: http://duflex.com.au/duflex2/products/end_grain_balsa). Visit their website for specific marine projects which utilised balsa end grain panels.

18 months ago ATL Composites changed their relationship from 3A (with its Baltek and Banova range of balsa products) to DIAB (and its ProBalsa range of products) which also has its Australian representative office on the Gold Coast

**DIAB Australia Pty Ltd**
1/7 McPhail Road
Coomera
Queensland 4210
Australia
Tel: +61 (0) 7 5580 1921
E-mail: info@au.diabgroup.com
## Appendix 5. Exports from PNG
(Data courtesy PNG Forest Authority)

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| Total Value      | 914,257.00 | 1,003,489.00 | 1,168,339.00 | 1,825,246.00 | 2,841,603.00 | 3,375,979.00 | 4,279,341.00 | 3,170,983.00 | 5,020,485.00 | 8,342,781.86 |
| Price           | 346       | 267       | 311       | 339       | 285       | 262       | 323       | 340       | 323       | 509       |
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(Please note that the table is not fully visible in this representation.)
### Appendix 7. Indian Imports.

Source: InfoDrive, India (2015)

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