Review of Australian Forestry and Wood Products Education and Training Needs

Prepared for

Forest & Wood Products Australia

by

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Knowledge for a sustainable Australia

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Executive Summary

This report investigates the gaps and needs in the education and training for the Australian forest and wood products industry and follows from a select review of industry participants and education and training providers.

Forest and Wood Products Australia (FWPA) has received a number of requests for financial assistance for a range of education activities: from attracting new recruits to the industry to assisting with education and training at primary, secondary and tertiary levels. FWPA wishes to understand what activities are already underway in the sector and the priorities for training and education.

Vocational support aimed at attracting sufficient and appropriately trained individuals to the Australian forest and wood products industry has been an area of concern for many years.

A more recent issue is the steady decline in forestry graduates from Australian universities, particularly those with forest production skills. This decline has forced Australian forest organisations to recruit foresters from South Africa, New Zealand and elsewhere. Early university forestry training was supported by industry and particularly state government agencies and it initially started as a postgraduate degree. There is also a shortage of people with the technical skills to work in wood products processing and for people who understand timber engineering to assist designers and builders working with timber. These sectors also need support.

Over 100 different organisations and individuals were contacted in this review to assess the gaps and needs for education and training. The review was fairly evenly divided between growers and managers, processors, industry associations and education and training providers. The response rate was over 80%.

The review used a broad definition of education to ensure as many programs as possible were captured and this included community awareness. However the three sectors that define education and training in Australia are primary, secondary and tertiary, where the latter is split into Vocational Education and Training (VET) and University.

A common theme amongst respondents was the poor community image of the industry which has an apparent flow on effect of making the industry a less attractive career option. Careers in the forest industry can be very broad and there is a lack of community awareness of the industry's potential and the range of careers it offers. This isn't new and the industry has responded at various levels with programs to encourage recruits and assist the community to understand the benefits of working in and supporting the forest industry. However, many of these programs are now either unfunded or very low on funds.

To overcome these gaps and needs the following recommendations are made:

1. **Education and Training Advisory Committee** – it is recommended that FWPA establish an education and training advisory committee to work with the educators, national skills council, government agencies and various industry and related industry associations to ensure a consistent approach to the numerous education and training programs conducted by the forest and wood products industry. It can also work to

create alliances and gain leverage with groups such as the Primary Industries Education Foundation and the Primary Industry Centre for Science Education. FWPA has a peak, independent position in the industry and its non lobbying charter allows it to provide cohesion, co-ordination and objectivity to the needs of the industry.

2. **Australian Forest Industry Website** – to create greater industry awareness it is recommended that FWPA develop an Australian Forest Industry website. This website would provide a focal point for existing and new information to improve community awareness, promote career profiles for industry recruits and illustrate education and training opportunities. The site could also provide other pertinent information on the industry and links to other websites and organisations as appropriate. For example a link to the specialist recruitment website Seek.com could be established to widen the pool of prospective industry recruits and career changers.

3. **Primary Schools program** – there are over 6,400 primary schools in Australia and while many state government agencies and industry participants are involved in primary school programs it is extremely difficult for FWPA to have any cost effective national role. It is therefore recommended that FWPA support the existing industry programs where funds and resources permit and explore options within the primary schools curriculum for inclusion of forest related activities either on the internet or in association with government and the industry in forestry regions.

4. **Secondary Schools program** – There are over 1,400 secondary schools in Australia and nearly 1,300 combined primary and secondary schools which means that FWPA does not have the resources to have a physical presence in every school. Therefore a two stage approach is recommended. Firstly, for secondary schools in forestry regions FWPA should work with industry and ForestWorks to attract students from years 9 and above who are keen to develop work and trade skills for a career in their local area. Secondly, FWPA should develop an internet presence for students in years 11 and 12 who are considering tertiary training in the Forest and Wood Products industry. In addition to the online presence FWPA should investigate participation in and gaining exposure for forestry and wood products career opportunities through organisations as mentioned in the first recommendation.

5. **Tertiary Program** – recommendations for the tertiary sector are divided as follows:

    a. **Vocation –** Vocational education and training for forest growing, management, harvesting and processing is generally provided (but not necessarily in every region) but it needs industry support. Curriculum support for TAFE lecturers in building and the use of wood products will need to be maintained. There is a potential opportunity to develop specialist non degree programs through organisations such as the Gottstein Trust on wood science, processing and marketing for both new industry entrants and as refresher courses. It is recommended that FWPA liaise with ForestWorks to monitor this sector and maintain contact with the New Zealand organisation FITEC to ensure all sectors of the industry training needs are cost efficiently provided and industry is aware of the opportunities.

    b. **University** – University level training is considered in four sectors

        i. *Forestry – tree growing and management* - While there is an urgent need for more students there are opportunities to study for a forestry degree at both the undergraduate and postgraduate level. Without students these courses are in dire danger of closing. The Universities are seeking support from FWPA to increase the awareness of forestry career and education opportunities. In addition while student numbers are low they are seeking financial assistance to reduce the cost of tuition particularly travel and this should be considered by FWPA. The

Universities would also like industry support for vacation employment, contribution to scholarships and potentially an accelerated HECs repayment scheme for graduates who join the industry. A short term strategy should include industry working immediately with the Universities to communicate with science undergraduates to encourage them to consider a forestry or wood products degree and promote the wide career options in the forest industry.

ii. *Wood Products Processing and utilisation* – there is no dedicated University level training in wood products processing and the use of timber in building. The University of Tasmania is proposing a Graduate Certificate in Timber (Processing and Building) which is expected to commence in 2011. It is recommended that FWPA and industry initially support this course while it establishes itself.

iii. *Marketing* – many interviewees suggested that the industry is not marketing its products effectively against its competitors. There are no dedicated wood products marketing courses associated with the recognised forestry or proposed wood products courses. It recommended that FWPA continue to explore opportunities to address this gap on a national or international collaborative basis.

iv. *Post graduate* – FWPA and the Co-operative Research Centre for Forestry provide scholarship support for post graduate studies. The number of applicants has declined, in response to a lower undergraduate pool and the availability of competing scholarships. Post graduate investments should be targeted to addressing specific skills gaps as identified within the national Research, Development and Extension strategy.

c. **Mid-career** – FWPA has several programs aimed at mid-career development, which have not attracted much interest from potential applicants. The design and promotion of these programs needs to be reconsidered to better address the needs of the sector.

Table of Contents

Introduction

Forest and Wood Products Australia (FWPA) has received a number of requests for assistance with forestry and wood products education and training and to attract or promote the industry to new recruits. In response, FWPA has requested a review to determine what education activites are currently being offered and identify any gaps within the three main sectors of the industry namely forest development, harvesting and processing, and marketing (the industry).

FWPA currently provides significant funding (approximately $800,000 per annum) for a number of education initiatives across the forest and wood products value chain. FWPA's predecessor, Forest and Wood Products Research and Development Corporation, has funded for many years education activities with a Research and Development (R&D) focus via postgraduate scholarships, awards and prizes, an internship at the World Forestry Institute, the occasional participant in the Australian Rural Leadership Program and curriculum support for TAFE and various university programs. However, as an industry service company, FWPA now has a broader mandate to expand its role in the industry and this may include increased support for training and education.

Hence this report will assist FWPA to understand the nature of the current programs and various perspectives about the industry's education and training needs, allowing them to identify options for assistance.

This review of forestry education and training in Australia is particularly timely as the industry sets itself for a new decade where skills and efficiency will continue to drive competitiveness. In return education providers are responding to market-based funding challenges and generational change in student expectations.

The review used a broad definition of education to ensure as many programs as possible were captured and this included community awareness. However the three sectors that define education and training in Australia are; primary, secondary and tertiary where the latter is split into Vocational Education and Training (VET) and University.

The last 20 years has seen immense change in the Australian forest industry and until recently the structure of forestry education particularly at the University level has remained recognisable to what it provided in the 1970s and 1980s when most foresters in senior positions today were trained. Since the significant changes in the industry over the last 20-30 years include the:

- commercialization of the state forest agencies and their decline in prominence as plantation developers and researchers
- rapid establishment of hardwood plantations and their supply of export woodchips
- rise of softwood sawlogs and the decline of hardwood sawlogs from native forests
- widespread use of mechanised forest harvesting, particularly in native forests
- continual increase in the scale of softwood sawmilling
- shift to softwood sawn timber for house construction and the rise in the truss and wall frame industry
- increase in engineered wood and panel products
- consolidation in the wood products industry
- decline of CSIRO as the major forest research provider
- continuing negative perceptions of the industry by the urban community.

The forest development industry has been challenged by a lack of community awareness for what the industry is achieving in terms of environmental, economic and social development which has the impact of either confusing or even deterring new recruits to the industry.

Education providers are market driven and respond to student demand for courses. To keep courses viable universities have to respond with course offerings that attract students and therefore forestry courses have to cover the range from forest preservation to wood production. Depending on the degree of specialisation undergraduate courses with less than 20 students in any year group are probably unviable. Current enrolments in forestry undergraduate courses in Australia are less than this, and thus places them in danger of losing specialist teaching capacity and or closing particularly as the trend in university undergraduate degrees is away from specialised courses.

Numerous education, training and awareness programs have been initiated by the industry and some have been successful. However, due to the changes that have occurred over the last 20 years many of these programs have either closed or are limited in their spread and/or funding. Correspondingly there have also been significant changes in higher education with an increase in the courses offered and students must contribute financially to the cost of their education which makes them more discriminating.

Industry is reporting a shortage of skilled staff such as qualified foresters and timber engineers, operators for a range of specialised harvesting and production equipment and tradespeople such as saw doctors and wood machinists. ForestWorks Ltd (ForestWorks) the national industry skills council for the forest industry produces an Industry Skill Scan each year which identifies the areas where skill needs are high.

The fact that the industry is employing from overseas, in particular South Africa and New Zealand, demonstrates the shortage of Australian trained foresters and wood processing staff.

Therefore this project forms part of the important work to identify what education and training programs are, or have been, in place within the Australian industry and to gain feedback from industry on what they believe is required. This information will assist FWPA to identify the gaps and decide what assistance is appropriate.

An important consideration will be the timeframe for these programs as a student who becomes interested in the forest industry in primary school will not enter the workforce for at least another 6 or possibly 10 years if they proceed to University. Short and longer term strategies will be needed.

This project has reviewed most education and training and community awareness programs for the forest industry in all states of Australia. In addition to Australia, New Zealand and British Columbia were reviewed to understand how they approach similar challenges.

The basis of the research included the following types of organisations:

- Australian Universities and Registered Training Organisations (RTO's) including TAFE colleges and industry training providers.
- State and national forest agencies and industry associations
- Federal and State government department sponsored programs
- Trusts and Associations - i.e. Gottstein, IFA scholarships etc.
- A selection of neighbour industries such as Agriculture

Over 100 survey forms were sent to various sectors of the industry from growers to processors and also included various industry associations and education and training providers. Responses were received from over 80% of those contacted either by completing the survey form or by providing commentary on the issues pertinent to their organisation.

The following report outlines the background, objective and scope for the review and the methodology that was undertaken. Importantly, as this project was investigative, the survey was conversational rather than a quantifiable survey. However the overall results are neither surprising to experienced industry observers nor are they difficult to comprehend.

Background

In simple terms the industry in this review extends from those who grow wood to those who process and use it. According to ForestWorks Ltd (ForestWorks) data from 3,500 surveys in the industry between 2002 and 2004 there are approximately 120,000 employees in the forest industry sectors (Forestworks, 2009). The break up is shown below in Table 1:

Table 1: Estimated employment in the forest-growing and wood product industry sector, 2006

Sector	Number of Employees
Forest Growing and Management	7,348
Timber Harvesting and Haulage	8,973
Sawmilling and timber processing	19,081
Timber product manufacturing	37,800
Wood Panel and Board Production	5,635
Pulp and Paper Manufacturing	11,024
Timber Merchandising	22,134
Support service internal to industry	5,445
Support service external to industry	2,745
Total	120,184

(Source: Forestworks, 2009)

There is a tendency when reviewing forestry and wood products manufacturing education and training to focus on the tertiary university sector and in particular forestry. While this is important as these people will end up having management roles that will define the growth of the industry they are only a small portion of demand. If the current membership of the Institute of Foresters is a guide then foresters represent only 1% of the workforce. The largest sector by far as shown in Table 1 is the Timber Product Manufacturing.

Broad Categories of Education

Forest industry education programs can be considered in three broad categories, although it is recognised that there is an overlap between all three:

- Community awareness and engagement,
- Competency or VET based training (which includes vocational and mid-career education and training under the Vocational Education and Training National Training Framework) – the development of skills once a person has employment
- Knowledge based education (primary, secondary and tertiary - university) - which is knowledge provided to a person to assist them to gain employment.

Community Awareness and Engagement
Community awareness can be considered a form of education as it informs the community of the activities the industry undertakes and reinforces the value of the industry to the community. A potential by-product of this process is the attraction of recruits to work in the industry. Cebon and McCrae (2009) in a review of the Gottstein Trust fellowships suggested that lack of awareness was contributing to a low level of applicants.

A broad range of community engagement programs have been developed both at the national and state level. Many of these programs contain elements of industry promotion, community engagement and knowledge-based education particularly at primary and secondary schools. Improving the image of the industry within the community creates a platform for social and political licence to operate and should also assist in attracting new recruits.

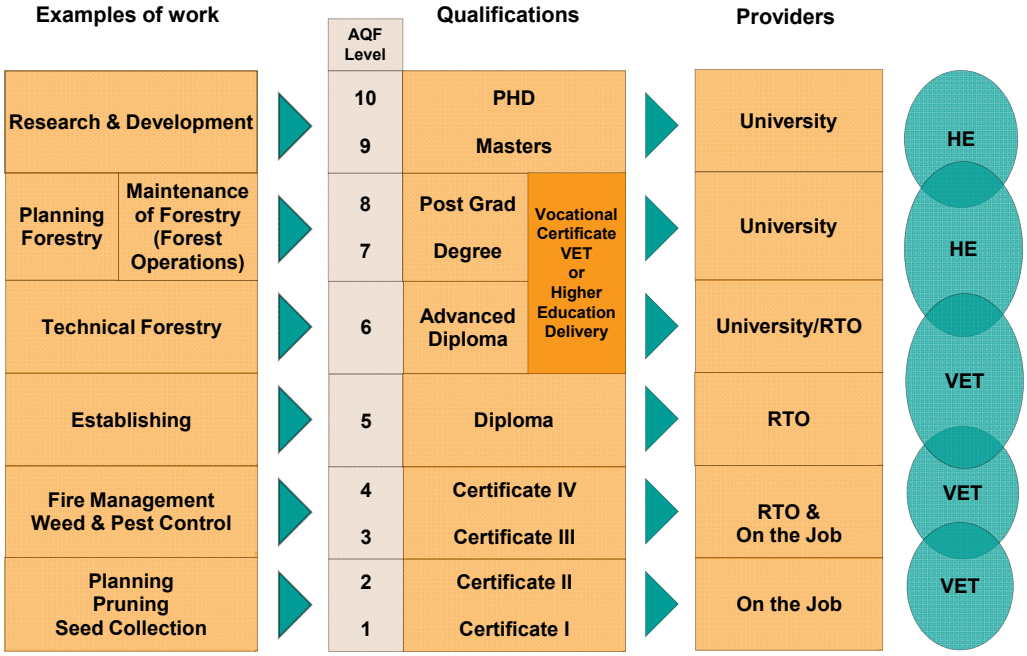
Competency or VET based training
Competency based training is provided at vocational training institutes and on-site by Registered Training Organisations (RTO's). ForestWorks assists industry to set the skill standards and qualifications for this sector and ensures that all training programs in the VET sector for the industry are funded at a state level. ForestWorks then works with RTO's to assist them to meet the training needs of the industry. RTO's are funded for each enrolled individual in a program and most enrolments are provided by people employed in the industry or are just starting in the industry. Their level of funding and their capacity to deliver to the industry is directly linked to the number of enrolments that they can encourage enterprises and individuals to make.

The greatest level of demand on a per employee basis is for VET training which may involve courses that run for a number days or weeks or an integrated course of study and practical work over a number of years such as a traineeship or an apprenticeship. There are around 5000 enrolments in VET qualification training each year. (National Centre for Vocational and Education Research and ForestWorks, 2009)

Knowledge based education
Knowledge based education programs range from primary and secondary school teaching materials and presentations through to tertiary undergraduate and post-graduate courses. There are currently five universities providing forestry based education but none dedicated to wood products processing or timber engineering.

The levels of formal education and training needed within the forestry and wood products sector are outlined in the ForestWorks diagram in Figure 1. This illustrates examples of the types of work and associated education needed for various levels of the tree growing and management sector. Other examples could be provided from other sectors of the forestry and wood products supply chain such as truck drivers, forklift operators, saw doctors and electricians. The right hand column illustrates the inevitable overlap between the tertiary sectors of VET and HE (Higher Education) or university sector.

Figure 1 **Levels of education and training within the forestry growing and management sector**



Note: Some Universities have external RTO arms and therefore can deliver some VET qualifications and receive VET funding.

Source: ForestWorks 2009

Tertiary Education – University

Forestry

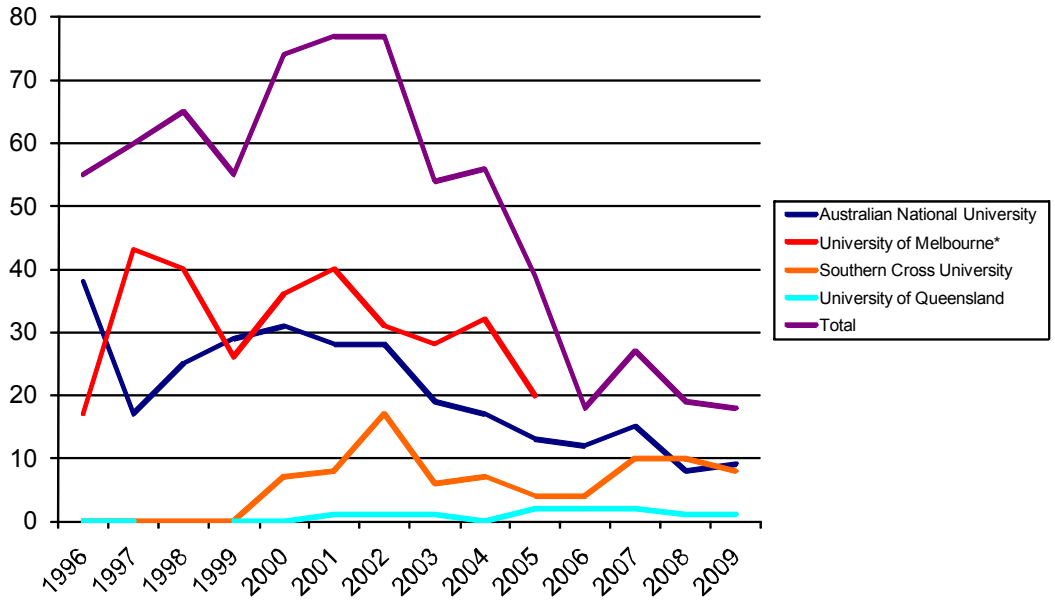
At the University level there are a number of problems. Firstly the declining numbers of forestry graduates which was defined by Searle and Bryant where they stated that the number of students graduating in Australia is about 30 annually and declining. Interestingly they also concluded that the premise that university students reject studying forestry and avoid the profession because of adverse community perceptions is not strongly supported (Searle and Bryant, 2009). This trend was also noted by Pratley et al (2010) where they state that forestry undergraduate pass degree completions declined by more than 50% between 1994 and 2007. The graduates are estimated to meet half the level of demand. This trend is illustrated in Figure 2 below and is not confined to the forest industry as agriculture is also suffering from a similar trend (Pratley and Copeland, 2008).

Industry has responded to the lack of graduates by recruiting from overseas particularly from New Zealand and South Africa.

The average number of forestry graduates from the University of Melbourne was around 10 to 20 in the 1980s rising to about 40 in the mid 1990s and falling away in recent years to 8 to 10. (Weston 2009). The picture is not too dissimilar at the Australian National University (ANU) where forestry survives by being embedded with other courses

Please note in Figure 2 below that data was not available for forestry bachelor graduates at University of Melbourne post 2005. From 2008 the majority of forestry students at the University of Melbourne have been enrolled in the Master of Forest and Ecosystem Science and enrolments for this degree were 24 in 2008 and 17 in 2009 which the University is pleased about for a new offering and appears to support their decision.

Figure 2: University Forestry Graduates 1996-2009



(Source: NAFI/A3P 2006, and Universities2010.)

ANU Professor Peter Kanowski suggested in an interview that forestry undergraduate numbers would need to be at least 50 to be an attractive proposition to run and maintain a separate course. Associate Professor Greg Nolan from the University of Tasmania suggests that undergraduate numbers need to be even higher around 300 to 400 in a 4 year course to support a specialist teaching staff of 10 to 12. When considering a science undergraduate contributes about $20,000 per annum in combined funding from the Federal Government and themselves it is not difficult to appreciate why 20 undergraduates cannot support a large specialist teaching staff.

Universities are now market driven and even if undergraduate numbers doubled they would not be significant or enticing when compared to say the Commerce Department at the University of Melbourne which has undergraduate numbers in the thousands. In support of change Ferguson (2007, unpublished) suggests that the traditional methods of teaching small groups of students in face to face lectures and afternoon practical sessions are not only inefficient and ineffective for the modern era but they are also expensive. A new approach is needed.

In defining a forestry course Weston (2009) argues that forestry is not a good word for promoting forestry education to prospective students. He believes that it is too broad and does not inspire interest or convey the broader relevance of forest disciplines to society. Bull (2007) suggests an unpleasant reality, that students may perceive forestry to be a dumb, sunset industry rather than a smart innovative one. Although to the contrary Searle and Bryant (2009) suggest that when professional foresters communicated with potential students this had a positive influence on student degree choice. They added that work experience in resource management and personal acquaintance with forestry professionals also had a strong influence on the degree choice of students. These findings suggest that increasing industry communication and interaction with students may provide positive results fairly quickly.

A common industry perception is that the increase in university level environmental degrees and the various attacks by anti forest industry groups have taken a toll on attracting university enrolments in forestry as well as employees in the industry in general.

Part of the problem may be due to the difficulty of defining the role of a forester. Prof Rod Keenan (2010 pers comm) suggested that the definition of forestry is not well understood by students or the community at large. Spurr and Arnold (1971) in Vanclay (2007) provided a very good definition 40 years ago but it amounts to over 400 words, suggesting defining forestry is not a simple task. Vanclay suggests the hallmark of a forester is that they:

- "*manage ecosystems characterized by trees, and*
- *manage these systems at the landscape scale, for the long term and for many services and several products*
- *manage the services that are regarded as common property by many interested stakeholders, and*
- *manage interconnected ecological, economic and social aspects of these systems*"

There is no easy definition of forestry due to the breadth of work foresters are required to undertake which can range from conservation to intensive commercial log production.

Weston (2009) suggests that the Master of Forest Ecosystem Science should emphasize the environmental issues that are facing society and promote four themes based on Climate Change, Water, Fire and Landscape restoration. These themes are understandable but they are unlikely to attract financial support from the production end of the industry unless it is part of an agreed strategy to actively attract students to the course and then into the industry.

Wood products

A second problem of tertiary university education is that there is no university level course in timber processing and/or construction. Roberts (2006) stated that the supply of undergraduates trained in wood processing particularly sawmilling, wood based panels and wood remanufacturing is well below demand. His research suggests that industry would employ over 30 graduates per year rising to over 50 per year within 5 years, if they were available. Given the number of employees in this sector of the industry it is understandable that more focus and support is required. Industry has traditionally solved this problem by sponsoring its engineers through formal broad based education and then providing more specialised timber training in house.

A workshop sponsored by the Australian National University and A3P in 2004 recorded that industry associations and companies were aware of a pressing skills shortage in wood processing in many sectors and regions and were engaged in discussions on how to resolve it. They noted that the successful Canadian Advanced Wood Processing centre (CAWP) and the New Zealand Radi centre (now incorporated in the Wairaki Institute) models were built around recognition by industry of higher education needs, and by the subsequent development of a partnership – between industry, government and tertiary institutions However they also noted that current tertiary activities in Australia were uncoordinated across the industry sectors (with some exceptions), and there was a gap in terms of an undergraduate program in wood products manufacturing such as that offered by the University of British Columbia.

Industry associations such as the NSW Timber Development Association and Wood Products Victoria are also actively working with end users who need specific advice on timber properties and standards to ensure that they are comfortable using timber in their construction projects. These organisations receive supporting funds from the FWPA and are also involved in providing curriculum support for TAFE and university level architecture, design and construction and engineering courses. Without this advice end users are likely to switch to competing products like steel and cement which have less complex construction properties.

The University of Tasmania has responded to this gap in education and developed a course based on industry research and interaction and intend offering a Graduate Certificate in Timber (Processing and Building) in 2011. FWPA has been approached to fund the development of the course curriculum.

Tertiary - Vocational Education and Training (VET)

Vocational Education and Training (VET) is often overlooked, however it is extremely important as between 50 and 60% of students never attend University (Ferguson,2007 unpublished and Boyd 2009 pers comm.) and these students fill the labour and technical roles required in forest development through to maintaining efficient processing and effective marketing and retail systems. Funding of the VET sector is provided by the Federal and State governments and delivered via State Training Authorities via a network of Registered Training Organisations (RTO), of which TAFE is a large part. The level of funding provided to RTOs for each student varies between states (Duggan, 2009 pers comm). Funding levels do not take into account the level of investment in expensive training equipment, high trainer to student ratios or low level of student numbers and this presents a significant issue for the viability for training providers specialising in the industry's skills. (ForestWorks 2010 Industry Environmental Skills Scan).

ForestWorks is one of eleven National Industry Skills Councils (ISCs) in Australia and also has a role in 4 states as a registered state based Industry and Training and Advisory Body (ITAB). The purpose of ISCs is to build partnerships between industry and government to assist the development of a more skilled workforce. ForestWorks is a not-for-profit learning and skill development organisation focusing on the forest, wood, paper and timber products industry. ForestWorks performs a range of industry-wide functions acting as the channel between industry, government and the Australian VET departments and they have worked hard to streamline the funding stream from the federal government to the states and ultimately to industry. ForestWorks' goal is to assist industry with their skills development objectives through national industry skills standards and qualifications and they regularly scan the industry for gaps in education and training needs. This information is reflected in reports to state and federal governments, the most significant being the Forest, Wood, Paper and Timber Products Industry Environmental Skills Scan produced each year by ForestWorks.

Since 2004 ForestWorks has established the Industry Skills and Employment Council that meets 3 times per year with the aim of providing a level of industry coordination. However to date this council has a focus on the VET sector rather than the university sector. Forestworks states that while attendance by industry associations and representatives has been reasonable, attendance by companies has been quite low suggesting they do not have the capacity to attend national forums to discuss skills related issues on a regular basis.

Correcting these skills shortages appears to be a challenge due to two factors, the first being the low demand the industry places upon the VET and university sectors via industry placements for education and training and secondly the potentially negative perceptions of the industry in the wider community. The industry will need to address these problems if it wants to attract high quality recruits to not only maintain the industry, but create a dynamic future for it.

Project Objective

To review the education programs that are currently being provided in the forest and wood products industry (the industry) in Australia and identify the gaps and needs in education both formal and informal. The review covers primary through to tertiary education, extending from forest resource establishment and management through to wood product processing and marketing. Some overseas experience was also investigated.

Scope

The review covered the three main sectors of the industry:

1. Tree growing and development of sustainable resources
2. Harvesting and Processing
3. Market Development

The level of education and training was divided as follows:

1. Primary School
2. Secondary School
3. Tertiary via the VET sector
4. Tertiary via the University sector

Mid Career education and training programs and community awareness programs for production forestry were also assessed. Over 100 forest and wood products industry entities were selected for the survey. Table 1 illustrates the breakdown by sector.

Table 1 Forestry Education and Training Review participants by sectors

Forest Industry Sector	Number
Growers and Managers	18
Processors	22
Industry Associations and support agencies	26
Research and Development	3
Education and Training Providers	24
Individuals	5
Overseas	5
Total	**103**

Methodology

The review was undertaken in a four stage process to capture and interpret information from the significant number of agencies providing various forms of forestry education. Then to understand their market position and where possible categorise providers in terms of human and financial resources to define the outcomes they are targeting.

Project outline

1. Background research was undertaken on who is providing what forestry education within Australia. To gain a broader perspective some overseas jurisdictions were also reviewed to assess the breadth and success of other forestry education programs. A list of organisations that were contacted is provided in Appendix 1.

2. Initial contact was made with various forestry education providers and industry representatives in Australia and overseas to ascertain what is being provided and to assess the need to fill the gaps.

3. An information request sheet was developed in conjunction with FWPA and sent to the identified organisations and this is provided in Appendix 2.

4. Interview results and questionnaire responses were compiled and conclusions were drawn based on:

    - Who is providing what, where and how in terms of forestry education
    - A gap analysis of what is and is not being provided
    - Key insights and trends from the various providers and associations.
    - What lessons, opportunities and challenges are being provided to the Australian forest sector?

Following dissemination of the survey forms in early December 2009 follow up contact was made with each organisation. This was undertaken for two reasons:

Firstly, the period leading up to Christmas is busy and completing a survey form irrespective of its importance will not be a high priority for members of the industry.

Secondly, the survey was also designed to discover what programs are being offered and it would have been impossible to design a form that would fit every organisation.

The outcome of this approach was that some respondents preferred to provide comments rather than complete the survey as provided and they also indicated other programs or initiatives that are or could make a contribution to forest industry education and training.

Results

Gap Analysis

Results of the survey have been analysed at a national and state level and by the various education levels that impact on the industry.

Community Awareness

A recurring theme amongst respondents was the need to effectively engage with the Australian community to enhance understanding of the forestry and wood products sector (ensuring a licence to operate) and to attract high quality recruits to work in the industry.

Over 80% of respondents commented either when questioned or voluntarily about the poor image of the industry within the community which they feel leads to low self esteem for those employed within the industry. It is therefore not unreasonable to expect that this has an impact on the number of people entering the industry at the trade level and the number of students electing to undertake forestry degrees at University. A number of industry professionals who trained during the 1970's commented that undertaking a forestry degree was an attractive alternative to law or medicine and as such recruits were of high calibre. A general comment not only in Australia but also in New Zealand and British Columbia was that the industry needs to dispel the image that it is "dirty, dark and dangerous" or "a job of last resort", but rather a modern, high tech industry with excellent environmental and career credentials.

There are a number of national programs that have tried to address this problem and positive comments were received on the FWPA's –"Wood - naturally better" campaign and a number

of other promising programs were found but most are now either low on funds or unfunded. Disappointingly, some persisting and out of date programs label the industry as old and tired.

Respondents suggest a more co-ordinated approach is needed.

In addition the separation of any program designed to improve the industry's social licence to operate with a program designed to attract new recruits will be important to ensure that the effectiveness of each can be measured.

While the forest industry operates differently in each state or region there are common elements and co-ordinating the core themes at a central location would be cost efficient and will ensure that the message is consistent. If desired, states or regions could then build on these core themes to suit their particular circumstances and fund them accordingly.

An example of an industry that has faced similar issues and come up with an appealing approach is the Minerals Council of Australia which provides a central website for careers in their industry at www.miningcareers.com.au. This has four main themes:

1. Skills in high demand – which shows a range of skills urgently needed by the industry
2. Working in mining – an overview of the industry, professional pathways and trades
3. Making a start – where to begin, education and training, upskilling & apprenticeships and traineeships, vacation work etc.
4. Start your journey here – a video of people describing how they entered the mining industry and what they like about it.

This website cost about $400,000 to develop from nothing and is now managed by a part time person for 2 days per week. It receives around 7,000 unique visits per month.

Another appealing website is the Certified Practicing Accountants which is located at www.cpaaustralia.com.au and has 8 main themes as follows:

1. Want to become a CPA?
2. CPA Program workshops and webinars
3. Global opportunities 2010 – setting your career on the right path
4. Skillsnet – online learning
5. Become a better leader – a career guidance system that has a self assessment tool to see where you are "at" with your career
6. Job search
7. Global Financial Crisis – relevant information
8. Presidents blog
9. Plus other information on conferences and seminars

A good example of a core website for the forest industry is Australian Forests (www.australianforests.org.au) which provides data on forest facts, managing forests, sustainability, forest industries and links to education. A second website developed by Plantations 2020 is Tree Dudes (www.treedudes.com.au) which provides a series of cameo appearances by people in the forest industry talking about why they joined the industry and the aspects they enjoy about their career. The joint National Association of Forest Industries and Australian Plantation Pulp and Paper Association DVD called "Reach for the Skies" followed a similar approach to Tree Dudes. All of these programs are now more or less unfunded but they could be easily amalgamated and updated to provide the basis for an industry-wide, coordinated website. ForestWorks also operates an industry wide website which contains a range of industry information apart from skills and training advice, such as sustainability information, careers, job advertisements and an events calendar. Much of the basic material for a good web site is readily available.

Another program loss for community education has been the demise of the Plantation Forestry Development Committees which assisted with the development of plantations on private land. The Master Tree Growers course which was funded through the Rural Industries Research & Development Corporation to provide advice to landowners on forest development and management may survive through a community not for profit group MTG Inc.

Primary and Secondary Schools

Many of the state forest agencies and some of the industrial companies had schools-based awareness, community and farm extension programs in the 1960's through to the 1980's. However with commercialization of the forest agencies and increasing budget pressure these programs have either been reduced or shifted to other government agencies such as the Department of Primary Industries (e.g. in New South Wales, Victoria and South Australia).

Given there are over 9,500 primary and secondary schools in Australia with 3.5 million students the task of running a schools program to every school is not insignificant (ABS, 2010). While it may be possible to concentrate a schools program around traditional forestry regions to assist the industry's image locally but this alone may not necessarily capture the best new recruits to the industry. Embedding forestry in the national curriculum may be an easier way of accessing students to assist them to understand the role forest management plays in sustainable management and the sequestration of carbon. In addition the capacity of wood for renewability and recycling and its low carbon emission profile is also appealing.

The National Forestry Education Awareness Network (NFEAN) was established in 1994 around the skills that were developed in each state to provide these services. Many of the staff providing these services were and are trained educators and have provided a valuable service to the industry - potentially with very little recognition for the role they have played. NFEAN worked towards a National Forest Education Framework that aimed to bring together forest education programs nationally, highlighting the sustainable management of Australia's multiple use forests and state by state forest education services. NFEAN was the main editorial provider for the Australian Forests website and also for the forestry sections of Ollies Island, which is a website illustrating the chains of sustainable production and consumption across all major industries in Australia. (http://www.olliesworld.com/island/aus).

While NFEAN is currently in abeyance it could be re-activated. Current programs by state are shown in Table 2 and the full list of programs with web addresses are listed in Appendix 3.

Table 2 Community Based Education Programs

State	Program	Status
Queensland	Timber Queensland - Better Forests	Funding ends June 2010
New South Wales	NSW DPI – Landlearn	Funded in Primary Industry program
Victoria	DSE – Landlearn & Toolangi	Funding only for the visitors centre
Tasmania	Forest Education Foundation	Funding levels have diminished
South Australia	PIRSA – Forestry – Forestry Matters	Funded but limited to forestry regions
Western Australia	Forest Heritage Centre at Dwellingup	Funded

National - In 2008, the forest industry in conjunction with AusTimber 2008 put on the ForestWorks careers conference in Mt Gambier. This generated a lot of interest from school based career advisors from 77 schools and resulted in many requests to have the industry talk to school children at expos around the country. The industry is not equipped to meet this sort of demand, and Timber Communities Australia (TCA) made a large commitment over a year

attending many career expos across Australia. While this was an interesting exercise in getting the industry's message across to school children, lasting benefits are very hard to measure and the impact of this large and expensive activity is unknown (the cost of the conference was around $150,000). TCA CEO Jim Adams believes they are well suited to this community and career promotion role but lack the funds and promotional materials to fulfil it.

Queensland – Better Forests was developed by Timber Queensland and is a classroom teaching guide which targeted predominantly middle school years (level 4&5) but has been used for years 3 to 11. The aim of the program was to be interactive and fun and provided opportunities for students to learn about the timber industry. It was promoted on the web where teachers could request a resource pack. Requests had been running around 200 per month initially and then stabilised to about 30 to 40 per month before running out of material in late 2009. The content is now old and needs updating, particularly for Climate Change. Timber Queensland believes that it is important to have an education consultant to develop these programs which will cost about $100 000 per year and about $60 000 to maintain the website. They developed their own material as they wanted to differentiate themselves from the problems of native forests and woodchip exports and focus on plantations. A follow up survey indicated Better Forests was well received and an updated version would be desirable. However school leavers were not covered and Timber Queensland believes there is a need following experience from Career Expo's where the industry was found to have a poor environmental image.

New South Wales – Forests NSW and Landlearn

The Forests NSW schools program is promoted through an overarching departmental (Industry & Investment NSW of which Forests NSW is a part) schools education brand LandLearn NSW. Reference (http://www.landlearnnsw.org.au).

The Forests NSW schools education program is aligned with the NSW syllabus requirements and reflects Forests NSW corporate priorities. The program offers:

- an overview of forest management and forest ecology
- relevance to syllabus documents
- facilities for up to 90 students per day
- programs in the forest
- self-guided & guided activities for kindergarten to year 12 students
- rainforest excursions

Forests NSW offers excursions to secondary students aligned to Industrial Technology, Geography and Science syllabuses; however these are only offered at Cumberland and Strickland State Forests. Reference: (http://www.dpi.nsw.gov.au/forests/education)

LandLearn NSW is a web based tool developed by the NSW Department of Primary Industries, the NSW Farmers and the Royal Agricultural Society of NSW and is a state-wide school education web resource about primary industries (including forestry). It provides resources for educators and students, careers information and profiles and some interactive online games. The web site provides information on primary industries, production chains, sustainability and a maps and facts site.

Victoria- Landlearn and Toolangi Visitors Centre

The Victorian Landlearn program is a state-wide education programme supported by the Department of Primary Industries and provides a structure and support for schools to incorporate studies of sustainable agriculture and natural resource management into the curriculum in the context of:

- a holistic approach to environmental education for a sustainable future
- Victorian Essential Learning Standards
- Education priorities and guidelines, including "Educating for a Sustainable Future" – a National Environmental Education Statement for Australian Schools;
- Scientific research and the promotion of science in schools;
- Partnerships with related education programs.

Reference (http://www.landlearn.net.au/)

The "Farm Forestry Trees at work", which is out of date, incorporated tree management into the classroom, for example measuring tree height within mathematics. It was promoted but had limited resources and experience showed that only what was demonstrated was used.

The Department of Sustainability and Environment runs the forest visitors centre at Toolangi which is very popular and mostly provides information on forest growing and management, although some harvesting and sawmilling aspects are covered. They cater for primary and secondary schools and have links with TAFE and University, as well as a presentation facility to business groups such as Probus and tourists. One limitation is that it can only cater for the students that can afford the travel.

Tasmania - Forest Education Foundation
The Forest Education Foundation Incorporated (FEF) was formed in 1989 as a joint initiative between the forest industries and Forestry Tasmania. The prime objective of the FEF is:

"To encourage informed decisions about forest use within the community by promoting a sound understanding of forests and forestry processes and of the social, economic and environmental values of forests"

The FEF provides a range of teaching and learning resources and experiences to schools and the general public, broadly covering: forest ecology, forest management, products and processing, timber industry history, and the ways in which people value and interact with forest environments. Programs are delivered through the National Forest Learning Centre NFLC (a visitor centre for schools and the general public) in Hobart, which co-ordinates school visit programs, field trip programs, educational resources (print and web) and a variety of specialists programs. Reference (http://www.forest-education.com/).

Private Forests Tasmania also provides assistance to schools where possible.

Primary Industries and Resources South Australia (PIRSA) Forestry – Forestry Matters!
PIRSA Forestry helps the South Australian community appreciate the forest and forest products sector, including an understanding of its benefits and workforce opportunities. They also support a sustainable forest and forest products sector by addressing skills shortages**.** Their principal activities include:

- Expanding forestry education activities including support for schools using the 'Forestry matters' education resource;
- Improving community understanding of the workforce opportunities within the forest and forest products sector; and
- Developing initiatives with industry, government and educational institutions to address skills shortages.

'Forestry Matters' was developed in 2000 and is a comprehensive education resource designed to promote forest awareness from a South Australian perspective. It contains:

- Lesson plans and activities for Junior Primary, Primary and Middle Years;
- 16 forest information sheets covering contemporary forest issues, primarily on pine;
- A Forest Fun activity section;
- A forestry glossary, reference list and weblinks; and
- Photographs of forests and forestry in action.

PIRSA Forestry employs an Education Officer to support the implementation of forestry into school curricula and provides professional development opportunities, but they can only service schools near the main forestry regions of Mount Gambier and the Adelaide Hills. Reference: (http://www.pir.sa.gov.au/forestrymatters)

ForestrySA also has a primary and secondary schools program plus TAFE and the university sector. In addition they also provide services to correctional services (youth justice program). ForestrySA aims are to maintain a good corporate image in the community and improve their licence to operate, educate students on forestry and hopefully attract some to the industry.

Western Australia – The Forest Heritage Centre

The WA Forest Products Commission works with the Forest Heritage Centre at Dwellingup to give talks to secondary school groups on forest sustainability (part of the new curriculum) which appears to be gaining popularity. The centre is planning to expand this project in 2010 to include primary schools and, with a recent acquisition of training facilities in Dwellingup, they will also be able to offer longer field trips to schools and universities from further afield who require accommodation. Reference (http://www.forestheritagecentre.com.au)

British Columbia, Canada

The Council of Forest Industries in British Columbia, Canada, otherwise known by its acronym COFI, provided some interesting insights into forestry education and awareness for primary and secondary schools.

In 1998 Chris Lear, a High School teacher, was engaged to conduct a needs and feasibility assessment on forest education for schools across north-central British Columbia. Over 100 elementary and secondary educators and school administrators were interviewed and all encouraged the initiation of a new forest education program. However, the educators qualified their support with some important recommendations, such as:

1. Work with the teachers rather than in isolation of their needs and requirements;
2. Ensure what is developed will fit within the curriculum and is educationally sound;
3. Fund and support at least a three-year plan as program uncertainty leads to mistrust;
4. Start small and focus on the grade 5-7 levels first.

The assessment also indicated that if a program was to be developed it would have to be 100% industry funded.

The initial review found some teachers were using textbooks that were 10-20 years old and in the absence of adequate resources, teachers would gather information from wherever they could, which may be from anti-industry sources or they teach about another industry.

The initial program saw a need for students to learn about the variety of careers in natural resources so that they would, at the very least, consider careers in natural resources as an option. Two-day field camps were initiated for high school students and their teachers to give them the opportunity to participate in a range of forestry related career areas including

wildlife management, fish management, soils and ecology, forest health, road and forest block layout, silviculture, archaeology, first nations traditional land use, harvesting, etc.

In addition, another program exposed students and their teachers to the variety of trades, technical and managerial careers available in forest products processing and manufacturing. Using a two-day format, students tour a variety of local facilities (sawmills, pulpmills, OSB plants, pellet plants etc.) spending time with various professionals to learn firsthand about the careers.

The COFI program is about making connections for students from high school to college or university through to forest industry careers. The program is now 10 years old and covers about 200 schools which amounts to about 41,000 students in elementary and secondary level at both public and private schools. However the program has developed materials that have been disseminated throughout the province which is over 600,000 students.

A key success factor is that the program was designed and managed by a teacher who can "walk the talk" and knows the limitations and constraints within schools and what educators want and need. The initial cost of the program was approximately C270K and expanded to over C350K, but with the recent economic crisis it was reduced, but importantly industry continued to fund it at about C200K. In terms of people, COFI only employed 1.5 staff, as industry employed others when needed, at times up to another 6 part-time staff.

The above costs work out to about C4.8 per student for direct contact and C0.33 for indirect contact. If this is transposed to Australia and assume all things are equal it would require funding per student (1AUD=0.95C) of about AUD5.3 for direct contact and AUD0.35 indirect contact. At 3.5 million students this represents a cost of AUD18.5 million for direct contact and about AUD1.2 million for indirect contact. Both are significant investments.

Tertiary -Vocation

The processors who were surveyed were generally happy with the level of training for the majority of their requirements except for some of the unique skills that take a number of years to develop such as saw doctors and wood machinists. Many processors admitted that the majority of their training is on the job or undertaken in house. This is unfortunate as there are funds for staff to undertake certified training programs if they want to pursue them. The Truss and Frame sector is now under pressure to ensure all estimators and detailers are licensed. ForestWorks is working with this industry sector on a national program and qualifications for Frame and Truss Manufacturing. In addition there is also a gap in people technically trained to work in the wood processing sectors, merchants and retail industry.

Favourable comments were received from industry operators about the level of training provided by Timber Training Creswick, the Riverina TAFE which runs the Tumut training Centre and FITEC in Queensland. The Mt Gambier TAFE has just closed its saw doctor course. The Great Southern TAFE in Albany has also undertaken training up to a Diploma in Forest development and certificate II and III in forest harvesting, but has suffered from the downfall of two large companies in the region Timbercorp and Great Southern. In Tasmania the Forest Education Foundation works with ForestWorks and the local Education Departments Guaranteeing Futures program and the University Centre for Education to provide resources on forestry and careers related information. Forestry Tasmania is an RTO (Registered Training Organisation) in its own right and provides industry training mainly in forest growing and management.

A common theme from trainers in the VET sector was that it is getting increasingly difficult to fund courses as the funding is at a set level for all industries: it does not reflect the higher cost of training needed for the forest industry and is not indexed to inflation. In particular Timber Training Creswick mentioned that they cannot upgrade their processing equipment to current standards as they do not receive enough funding to cover capital expenditure on equipment replacement.

The NSW Timber Development Association and Wood Victoria are working with TAFE lecturers and some university lectures, although funded by FWPA, there is an ongoing challenge to ensure the availability of good and relevant timber information (standards, timber framing, etc) for the many lecturers is a constant battle.

ForestWorks have initiated a number of programmes to both attract new recruits to the industry and improve training and training opportunities for workers in the forest industry. Some examples of these programmes are as follows: (ref: http://www.forestworks.com.au):

- Indigenous participation in the NSW Forest and Forest Products Industry
- Moving women in forestry – improving opportunities for women
- Young forestry leaders program for years 9 and 10 in five Tasmanian High Schools
- Skills development and enhancement through flexible training and apprentice programs and an enterprise based productivity places program
- Stimulate training demand in thin markets in Victoria
- The development of a qualification structure for the Truss and Frame sector.

ForestWorks (2009) as part of its requirements as a national skills council undertakes regular environmental scans of the demand for skills within the industry. The following is an excerpt from their February 2009 update. While this survey was investigating what education and training is currently being provided, the ForestWorks gap analysis is instructive as it confirms the feedback from respondents on what is required (note some of the gaps require specialist training while others require more general training):

Forest growing and management

- forestry workers requiring development as foresters, cultivator (forestry), tree planter, nursery worker
- strategic communication skills, particularly community engagement
- inventory activities, including mapping and GPS approaches
- converting knowledge that traditional farmers have, to their increasing use of forestry as part of their multiple land use approaches
- knowledge of Indigenous forest management practices
- industry trainers and assessors

Harvesting and haulage

- fire salvage and fire management
- forest management
- cording and matting of log extraction tracks and log processing loading areas
- product care – log segregation and log marking to maximise inherent value of timber
- mechanical harvesting
- supervision and management training
- small business management with contractors.

Sawmilling and processing

- new timber drying techniques
- chemical use and handling

- new technology, particularly computer controlled equipment
- saw doctors and wood machinists

Timber product manufacturing

- estimating and detailing at a technical level
- computer applications related to 3D estimation software
- new and efficient timber processing technology knowledge
- chain of custody regulation.

Timber merchandising

- timber product knowledge and application

Wood panel and board production

- timber properties knowledge
- technically skilled operators who can use new technologies effectively

New Zealand – Forest Industry Training and Education Council (FITEC)

FITEC in New Zealand is the national forest industry training authority and it also has a careers function targeting secondary schools to encourage students to choose a career in forestry and the wood products industry. There are a number of reasons to focus on this level. Firstly, 60% of students do not go to university and secondly the image of the industry as "dirty dark and dangerous" is a problem. To address this FITEC has been instrumental in developing a proposal for a National Trade Academy for Land Based Primary Industries which includes Agriculture, Forestry and Horticulture.

The aim is to keep school leavers engaged in learning and training to ensure students have clear pathways post school and have a head start on training for vocational qualifications for a successful career in the primary industries. The proposal covers all secondary schools in New Zealand and aims to set national standards for the sector in teaching, learning and assessment.

FITEC believe working with the other primary industries presents a position of unity, consistency and strength to government which is better leverage than working individually.

Currently in New Zealand vocation and mid-career education is shared between industry training organisations (work place training through on-site industry assessors, and providers (regional polytechnics, private training enterprises)). Training of new entrants is covered through apprenticeships and traineeships. Some polytechnics run training programmes over one to two semesters on campus as well as an onsite component.

The big gap in education is for market development. Typically this is carried out by government organisations such as New Zealand Trade and Enterprise and industry associations where funds permit.

FITEC believes that working closely with Australia (and has had a number of visits and meetings with ForestWorks) to develop training and education can benefit both countries and potentially attract students from Asia. FITEC has an annual budget around NZ 13 million.

Tertiary - University

In 2004 there were six Universities providing forestry degrees at the undergraduate level as outlined in Table 3 (Kanowski, 2004).

Table 3 Universities offering undergraduate forestry degrees in 2004.

University	Bachelor Program name and duration in years
Edith Cowan University in Perth, WA	Environmental Studies (Sustainable Forestry), 3
Southern Cross University in Lismore, NSW	Applied Science (Forestry), 4
Australian National University in Canberra, ACT	Science (Forestry), 4
University of Melbourne in Melbourne, Vic	Forest Science, 3 +1
University of Queensland in Brisbane, Qld	Environmental Management (Tropical Forests),4 Applied Science (Tropical Forest Management),3
University of Tasmania in Hobart, Tas	Forest Science, 3 Forest Ecology, 4

Since this report was published, the University of Melbourne has shifted to the international model that is common in Europe and often referred to as the 'Bologna' model. This is based on a 3 year generalist undergraduate degree (but with special majors) followed by a 2 year masters degree which is usually more specialised and a three year Doctorate. The University of Melbourne is aiming to attract three types of recruits to its Master of Forest Ecosystem Science. Firstly students, who follow on from their undergraduate, secondly mature foresters who want upgrade their skills either to a full Masters or just take some masters level subjects and thirdly people who are looking to change their career to forestry. As mentioned in the Background section of this report the early enrolment numbers suggest that the University of Melbourne has been successful in attracting more students with this approach.

The ANU will cease its four year undergraduate forestry program in favour of a three yr undergraduate forestry degree which can then lead on to a one year Masters of Forestry. The University of Queensland is unlikely to continue and Edith Cowan is not currently offering their course but hope to in 2011. Southern Cross University will retain is undergraduate forestry degree which can also lead to a one year Masters of Forestry.

While each university has its own unique Masters degree the National Forestry Masters Program is an overarching structure that aims to provide some connection and leverage on the academic strengths of each university. Uniqueness in a competitive market has its advantages but it can be confusing for the industry that is looking for a fairly standard skill set.

The University of Tasmania Centre for Sustainable Architecture in Wood is proposing a Graduate Certificate in Timber (Processing and Building) for 2011 which will fill a big gap. However, Australia still has no tertiary course dedicated to forest products marketing.

The broad elements of a strategic framework for Australian forestry education are provided in Appendix 4 by ANU Prof Peter Kanowski. In brief he suggests universities are now market driven and the trend is away from specialised undergraduate courses. Even with substantial increases in enrolment numbers forestry undergraduate courses they are close to University thresholds and are therefore vulnerable to closure and loss of specialist staff. There is also no recognition within the university sector of the national interest case for forestry. Making the courses attractive and collaboration between universities, the industry and similar industries like agriculture will be required to maintain these courses in the future.

Summary

Table 4 below provides an overview of the programs and gaps in forestry education and training in Australia but excludes dedicated research such as the Co-operative Research Centres. While the table suggests that the industry education and training needs are well covered industry is not necessarily using them and some of these programs are winding down or are limited in scope.

Table 4 Current Australian community engagement, knowledge-based and competency-based education and training programs

Education	WA	SA	TAS	VIC	NSW	QLD	ACT	NT
Community	Australian Forests – (NAFI & NFEAN)							
	Wood – Naturally Better – (FWPA)							
	Treedudes – (Plantation 2020)							
	Master Tree Growers – JVAP RIRDC now MTG inc							
	Timbertrek – (NAFI)							
	Private Forestry Development Committees – funding has either ceased or will cease by June this year							
	ForestWorks – Industry Skills Council for the Forest Industry – VET and career programs in all states							
	Programs in other primary industries (e.g. agriculture)							
	Limited to the Forest Heritage Centre	PIRSA Forestry - Forestry matters ForestrySA	Forest Education Foundation – National Forest Learning Centre	DSE - LandLearn Forest Education Service (Toolangi)	Forests NSW – tours and Land learn NSW			
Primary School	Limited to the Forest Heritage Centre	PIRSA Forestry - Forestry matters ForestrySA	Forest Education Foundation – National Forest Learning Centre	DSE - LandLearn Forest Education Service (Toolangi)	LandLearn NSW Forests NSW	Timber Qld - Better Forests (upper primary)		
Secondary School	Limited to the Forest Heritage Centre	PIRSA Forestry - Forestry matters ForestrySA	Forest Education Foundation – National Forest Learning Centre	DSE - LandLearn Forest Education Service (Toolangi)	LandLearn NSW Forests NSW	Timber Qld - Better Forests (lower secondary)		
VET - tree growing	Cert II, III, IV and Diploma of Forest Growing and Management	PIRSA Forestry - Forestry matters Cert II, III, IV and Diploma of Forest Growing and Management	Forest Education Foundation & others Cert II, III, IV and Diploma of Forest Growing and Management	Cert II, III, IV and Diploma of Forest Growing and Management	Cert II, III, IV and Diploma of Forest Growing and Management	FPQ - Forester in training program Cert II, III, IV and Diploma of Forest Growing and Management		
VET - harvesting	Cert II, III in Harvesting & Haulage	Cert II, III in Harvesting & Haulage	Cert II, III in Harvesting & Haulage	Cert II, III in Harvesting & Haulage	Cert II, III in Harvesting & Haulage	Cert II, III in Harvesting & Haulage		

Education	WA	SA	TAS	VIC	NSW	QLD	ACT	NT
VET - processing		Cert II, III sawmilling & processing Cert III wood machining Cert III saw doctoring Cert II, III wood panels products Cert II, III timber manufact products Cert IV timber processing	Cert II, III sawmilling & processing Cert III wood machining Cert III saw doctoring Cert II, III wood panels products Cert II, III timber manufact products Cert IV timber processing	Cert II, III sawmilling & processing Cert III woodmachining Cert III sawdoctoring Cert II, III wood panels products Cert II, III timber manufact products Cert IV timber processing	Cert II, III sawmilling & processing Cert III woodmachining Cert III sawdoctoring Cert II, III wood panels products Cert II, III timber manufact products Cert IV timber processing	Cert II, III sawmilling & processing Cert III woodmachining Cert III sawdoctoring Cert II, III wood panels products Cert II, III timber manufact products Cert IV timber processing		
VET - marketing	Technical Resources Program – FWPA Cert II, III timber merchandising	Cert II, III timber merchandising/ Technical Resources Program - FWPA	Technical Resources Program – FWPA Cert II, III timber merchandising	Cert II, III timber merchandising/ Technical Resources Program - FWPA	Cert II, III timber merchandising/ Technical Resources Program - FWPA	Technical Resources Program – FWPA Cert II, III timber merchandising	Cert II, III timber merchandising	
University - tree growing	Bachelor of Environ Studies Sustainable Forestry (ECU) 2011	Bachelor of forest science & mgmt (SCU)	Bachelor of Forest Science & Ecology		Bachelor of forest science & mgmt (SCU)	Bachelor of Applied Sci & Envir Mgmt FPQ - Forester in training program	Bachelor of Science (Forestry) (ANU)	
		Master of Forestry SCU	Master of Forestry	Master of Forest Ecosystem Science	Masters of Forestry	Master of Natural Resource Studies	Masters of Forestry	
University - harvesting		Bachelor of forest sc & mgmt (SCU)			Bachelor of forest science & mgmt (SCU)		Bachelor of Science (Forestry) (ANU)	
University-processing		NSW TDA assistance to tertiary institutions	Grad Cert in timber (Processing& Building)	Wood Products Vic – assistance to tertiary institutions	NSW TDA – assistance to tertiary institutions	EWPA & NSWTDA assistance to tertiary institutions		
		NFMP/ Technical Resources Program - FWPA	NFMP/ Technical Resources Program - FWPA	NFMP/ Technical Resources Program - FWPA	NFMP/ Technical Resources Program - FWPA	NFMP/ Technical Resources Program - FWPA	NFMP/ Technical Resources Program - FWPA	
University - marketing								

Currently funded	Funding concluding in 2010	No current funding	Status or funding unknown

Discussion

Key Insights and Trends

The following section provides some of the key insights and trends provided by the industry respondents to the survey.

Overall

Common themes from respondents were:

- the lack of community awareness of what the industry does and its contribution to society;
- general ignorance and lack of access to career opportunities
- the poor image of the industry has impacted on both the number and quality of new recruits.
- limited education options beyond forest growing and management

While the summary of current education and training programmes in Table 4 suggests there are few gaps in forest education and training in Australia, many programmes are either winding down due to a lack of funding or are quite limited in their scope. It is also important to understand that the VET sector is characterised by funding being provided on an enrolment basis, so in theory all courses shown in Table 4 are funded, but if enrolments are not forthcoming, training stops and courses effectively become unfunded posing significant problems for the ongoing viability of RTO's.

There is a lack of co-ordination of projects at the national level suggesting inefficiency in the use of resources and inconsistencies in program objectives and/or messages. There is no single website that represents the majority of the industry or provides career information for a potential student or recruit. Given Universities are competing for students they will try to differentiate themselves from other providers to give themselves some additional attraction. Hence unless the industry wants to accredit forestry and wood processing degrees (e.g. like architecture and medicine) then it may be difficult to achieve any high level of co-ordination or consistency.

The regional nature of the industry makes education and training expensive and hard to consolidate in one location.

There appears to be a disconnection or misunderstanding between what the forest industry needs and what educators can efficiently provide. A connection is not necessary unless the education provider requires industry funding in which case industry will expect some level of direction or interaction on how its money is spent.

The broad nature and large number of forest and wood products industry organisations tends to disperse the energy and resources for education and training rather than consolidate and maximise it.

To assist with attracting new recruits the industry should capitalise as suggested by Weston et al (2009) on the community empathy for climate change and the role that forestry can play in land and water management and the role both forests and wood products can play in carbon sequestration.

Primary and Secondary Education

Forest education programs are not well co-ordinated nationally between the states and within government and industry and while the National Forest Education Awareness Network (NFEAN) had a charter of doing this they lack the funds to operate.

Covering all schools is not a simple task. According to the Australia Bureau of Statistics (ABS, 2010) in their latest Schools Australia review there are 9,500 schools in Australia educating 3.5 million students. The successful Austimber careers conference only covered 77 schools and cost approximately $150,000. A subsequent quote to extend this program suggested the cost would be between $500,000 to $800,000 per annum.

Experience suggests that industry needs trained educators to develop the teaching resources that schools will use and if time is not taken to demonstrate them they will not be used as there is a high level of competition within school curricula. If the industry wants to create a presence in schools it will need to provide resources that assist teachers to deliver their curriculum objectives and support them with demonstrations and updated material.

To gain student interest, the use of technology such as podcasts and simulators (e.g for machinery) rather than written material is preferred, as children and teenagers are better watchers and observers than readers of information.

It is critically important that forestry education programs are not perceived to be industry propaganda, as both teachers and students are wary of such material. However, teachers value being taken into forests and to processing facilities to learn about forestry and wood products processing and once the teachers are trained and comfortable with the industry they can become solid advocates. This could be a valuable investment in forestry regions where there is potential to recruit teenagers who are seeking a trade rather than a university education.

It is also beneficial to highlight to teachers the cross-curriculum applications for forestry as a topic (it can be used in almost all key learning areas, including maths, english, science, studies of society & environment, technology and more).

The problem of distance can be a constraint with some government schools suggesting the cost of bus fares for excursions to forests as being a problem.

The timing for a forestry education program could be good as it will fit with modern thinking on environmental education particularly sustainability. In the past environmental education was about saving or preserving the environment rather than living sustainably. Given the spread of schools in Australia and the cost of accessing them all on a face to face basis it may be timely and more cost efficient to work towards getting forestry embedded in the national curriculum or working with other primary industries to gain leverage from limited funding. Although for trade careers face to face programs could be effective within the forestry regions.

Vocational Education and Training (VET)

There is a lack of awareness of vocational careers in the forest industry and this could be due to its poor image or poor promotion. There is a perception by many in the industry that young people are not looking to forestry or the wood products industry for a career.

In addition industry is not a great supporter of formal training, preferring to train in-house rather than through an institution. ForestWorks suggests that over 90% of forest industry training is done in-house and unfortunately this approach diminishes the capacity of RTO's to deliver services to the industry.

Smaller businesses have trouble providing the same level of training as larger companies, particularly if the training is for a prolonged period away from the business.

Industry is generally comfortable with access to training for most of the skills they need except for some unique specialist skills that take some years to develop such as saw doctors and wood machinists.

Training providers, (RTO's) particularly TAFEs, are struggling with the level of funding they receive for training, and this varies by state (RTO's are funded via State Training Authorities). They are also finding it extremely difficult to upgrade to state of the art processing machines to train operators.

There is a real gap at the industry and market interface for people who know and understand wood in construction. This includes knowledge of timber and timber framing in the wholesale truss and wall frame, merchant and retail and general construction sectors.

The Truss and Wall Frame sector is undergoing extensive training to ensure its specifiers and detailers are licensed. ForestWorks is operating with this sector to assist them to achieve higher levels of training that may lead to a licensing approach.

The loss of technical expertise in the industry to educate builders, building surveyors, construction companies, specifiers and architects will leave the industry open to the loss of market share to competing products such as steel and cement. The problem affects both the vocational and university sectors and stems from a lack of demand from students to learn more about wood in construction.

Tertiary - University

With declining enrolment numbers for forestry undergraduate courses there is a tendency to consider providing education at one institution to concentrate resources. However this approach may not be effective as:

- students may not want to travel, preferring another degree closer to home;
- if the remaining institution loses interest, then the industry will lose its only education facility;
- enrolment numbers in forestry undergraduate degrees have never been large when compared to some other undergraduate courses which means it is unlikely that any institution would be enticed to commence forestry training;
- The current cost of education is not insignificant and this must be considered in an industry education and training strategy. A student will not only consider their HECS debt, but also the cost of living away from home if this is the only course option. The living away from home option may lose out to another degree;

The problem of declining enrolments needs to be considered within the context of the changes in higher education which has become increasingly market orientated, the high cost of delivering specialised undergraduate degrees and caused a shift towards more generalised undergraduate degrees. The Federal government support for post graduate research and the costs borne by students for their education all has an impact. The University of Melbourne illustrates this trend where they have shifted away from over 90 specialised undergraduate

degrees to around 6 broad disciplines (although there around 70 majors) which are more cost efficient to deliver and is in line with the international trend for undergraduate degrees. Specialisation is introduced at the postgraduate level. The number of staff and cost of delivering specialist undergraduate degrees has become prohibitive for courses with small enrolments and universities are attempting to combat this in a number ways including, combining courses to keep class sizes up and the use of technology to allow distance education.

Continual improvements in communications technology (such as video conferencing, webinars and internet products like Skype) present an opportunity to overcome the problem of distance and allow an institution to have students located widely across Australia.

The National Forestry Masters program provides an over arching format between the education providers and is aimed at a number of markets including undergraduates who want to specialise, mature age students from the industry who want to either refresh or improve their skills and/or qualifications and finally career changers who want to take up forestry as a new career.

The Bologna model as described in the previous section is an approach that is becoming more common as universities around the world try to achieve some consistency in how undergraduate and postgraduate courses are offered.

The undergraduate program is more likely to provide the university cohort experience that many young people look for and many in the industry fondly remember, but with undergraduates there has tended to be a higher industry dropout rate. There is a cohort experience at the post graduate level but given the group study time is generally less it is not normally as pronounced.

Current university courses appear to lean to the conservation aspects of forestry which is designed to attract students and once enrolled it appears they then warm to the commercial production aspects of the industry.

Expanding wood into courses such as engineering and architecture is extremely important. For instance the RMIT engineering class of 2009 have compulsory subjects on steel and concrete construction but timber construction is optional (Roberts, 2010). Associate Professor Greg Nolan from the University of Tasmania Centre for Sustainable Architecture in Wood commented on the difficulties of expanding course content:

- *"The content to be taught in a course is getting bigger, while semesters are getting shorter and classes bigger. It is not really possible to add more to a course, especially if there is not a staff member to champion the area.*

- *Education is moving away from lecturing to problem-based learning. That is, less is actually 'taught', but the skills to solve problems and acquire knowledge are developed. In the end, there is now too much to 'teach'. Students have to have the skills to find out what they need when they need it.*

- *A more productive strategy may be to provide resources that are useful in problem-based learning, and place less reliance on lecturing".*

In addition to the above there is no formal education program in wood products marketing in Australia or New Zealand.

Lessons, Opportunities and Challenges

National

Many interviewees believe that the industry has lost its social licence to operate over the last 30 years. They feel that this loss has depleted the industry and its associated education system and therefore will require significant and co-ordinated industry effort to re-build community interest and support. A further concern is if parents don't like an industry there is a reasonable chance they will dissuade or discourage their children from entering it.

There is a need to improve awareness of the forest industry to not only offset anti-industry sentiment, but also attract new recruits. While these are potentially two problems the answers are linked. Improving the community view of the industry is important but it will be a broad, slow and steady process. While attracting new recruits is more targeted and urgent it will be difficult achieve against a background of anti industry feeling.

Many of the current forest industry employment opportunities are advertised on industry websites such as Friday Offcuts, The Institute of Foresters of Australia and ForestWorks. These sites are generally only viewed by those in the industry. Expanding the reach for recruits outside the industry should be considered to widen the search pool. But potential recruits will only show interest if they consider the industry has a positive future, hence image is important. Developing an association with a specialist online employment agency such as Seek (www.seek.com.au) would widen the pool and potentially bring new people and experience to the industry.

Australia has a small population compared to its geographic size which means travel or managing distance is an important consideration for both promoting the industry and the delivery of education and training.

Using technology such as the internet represents a more cost efficient opportunity and there is increasing evidence that young people use this medium for much of their research.

To support this approach there is a wide range of information and previous experience that could assist with developing an Australia forest and forest products industry website.

Industries that have appealing websites to assist with industry recruitment are the Minerals Council and the Certified Practising Accountants. The Australian Water Association also has an appealing website for job seekers.

The forest industry has a long history of supporting students and/or institutions to deliver the education requirements they need, particularly forest growing, but will need to extend this to wood science for processing and to product knowledge and marketing.

Primary and Secondary Schools

Sustaining schools and community programs within business focused organisations is hard as benefits are long term and cannot be gained from short, one off activities.

Evidence from British Columbia over 10 years suggests that progress can be achieved and there are a number of very positive reasons to engage at this level. However Australia is a

large country and travel is expensive. So to expect the forest industry to cover 9,500 primary and secondary schools to promote the industry and provide personal career advice would be a significant investment. For example if an average of one school per day was visited over a 220 day working year, then 43 people would be needed to cover the program and as estimated previously this could cost anywhere from $1 million to $18million

Therefore unless a program is regionalised which means ignoring some areas the cost would be prohibitive.

The evidence is not all supportive of a schools program as the Minerals Council are not convinced a schools based program has had any long term positive impact on attitudes to their industry or significantly increased new recruits. They are now concentrating on the careers advisors and science teachers.

Skill shortages in other primary industries means there is competition for the attention of youth and if the forest industry is not active they will not get the best new recruits. Hence, contact in some form is required and it will be important whether it be via the internet or getting forestry embedded in the curriculum.

Vocational

The gaps in this sector are for the unique skills needed in the forest industry which include:

- Saw doctors and wood machinists
- Wood technicians who understand wood processing and remanufacturing and panels
- People who can be potentially licensed to work in the Truss and Wall frame sector
- People who understand timber framing
- People who know and understand wood properties and standards to assist in advising TAFE lecturers and builders and construction companies at the truss and frame, wholesale, merchants and retail level.
- People with wood marketing ability

The VET system appears to work by providing most requirements of the industry. However, it has some problems:

- it is state funded which makes the delivery of uniform national services difficult
- one state may fund a course to a certain sustainable level and another may not
- critical mass is very important and it may be too expensive to run a course in every state therefore requiring students to travel.
- funding the purchase of training equipment can be cost prohibitive as the VET structure does not allow for investment in state-of-the-art equipment with a high capital cost such as a wood moulder. Most of the funding is via enrolments and without them funding is not available and the capacity to deliver stops.

A view from some sectors of the industry is that VET training is highly government regulated rather than industry led. One industry association suggested the concept of 4-year apprenticeships does not work anymore and the state funded Industry Training and Advisory Boards (ITABs) and progressive RTO's can shape a new approach. Variable length traineeships from periods of months to 2 to 3 years are now available across the industry in all VET sector qualifications, providing enrolments are made by industry.

ForestWorks has done a significant amount of work over many years to address a large number of these training deficiencies and to their credit they know and understand many of the gaps. They have also worked hard to streamline the inefficiencies in a training system that is federally funded but must meet varying state requirements. They have successfully

incorporated a number of state based ITABs into Forestworks to remove much of the federal versus state inefficiency.

ForestWorks' biggest challenge is to gain more industry acceptance of the work they do and the role they can play. If industry employers present employees for training in a co-ordinated manner then funding and training will generally be available.

Tertiary

There is no formal connection between the universities and industry on what is needed and how it can be cost efficiently provided. However working closer together can have both short and long term benefits. In the short term industry should increase its communication with 1st or 2nd year science undergraduates to alert them to the opportunities of developing a career in the forest and wood products industry. In the longer term gaps in support and or technical capability can be resolved through a combination of awareness of each others need and constraints.

Support funding in the industry for a range of education is potentially available (Gottstein, IFA, Cullity Fellowships, etc). However, the take up is low which suggests there is either disinterest or as suggested earlier a lack of awareness.

Even with support funding, attracting applicants appears to be a challenge, possibly due to the industry's low profile. From industry's perspective hiring graduate foresters with field experience also appears challenging.

With declining enrolments and potentially lower quality new recruits if enter scores are lowered in an attempt to attract more enrolments then the age profile of the forest industry personnel will become a problem as the more experienced and specialised operators leave the industry and are replaced by people with more general qualifications.

Weston (2009) suggested the following themes for the Masters of Forest Ecosystem Science at the University of Melbourne should be emphasised:

- Climate Change – forests central to carbon cycling, sequestration and biofuels
- Water – forested catchment management is crucial for water security
- Fire –is essential knowledge for a community response to a rising forest fire risk
- Landscape restoration – is a big part of future farming landscapes and land management

These themes are understandable in the current social environment. However, for industry to provide support they would need a further theme such as:

- Forest Business Management – investment analysis, decision making and operations planning etc.

Linking with and gaining leverage with other industries, particularly agriculture, could prove beneficial because they are suffering similar problems of declining undergraduates. Kanowski (2010 pers comm.) stated that a link has developed with the Australian Council of Deans for Agriculture which he believes will be beneficial. This has logic as both sectors have a land and production focus and although the production timing is different, the integration of ideas and network opportunities could prove useful career connections and assist with combating debates such as forestry versus agriculture.

Expanding wood products related training will be important to increase the pool of people who can work in wood processing at a technical level and provide technical education and marketing advice on timber to counter the pressure from competing products.

Developing an association with a group such as the Primary Industry Centre for Science Education (PICSE) may also prove a cost efficient method of assisting in attracting more forestry graduates. PICSE is a National Strategy of collaboration between universities, their regional communities and local primary industries, to attract students into tertiary science and to increase the number of skilled professionals in agribusiness and research institutions. (www.picse.net)

Conclusions

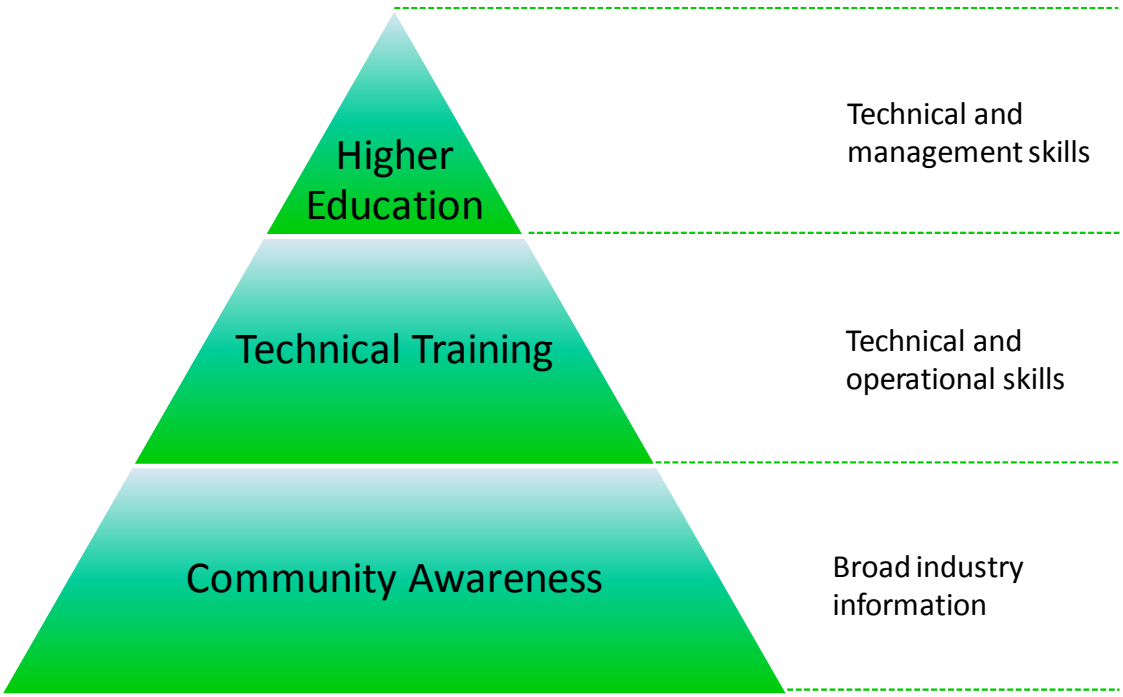
There are three levels of demand for education and training that need to be met within the forest industry. This demand can be considered as a triangle (See Figure 3 below) with three levels where at the base the demand for the widest and simplest level of education is for community awareness rising to VET type technical training to an apex of higher education at universities that provides the professional skills in policy, technical management and leaderships for the industry to operate successfully and competitively.

At the base of the triangle there is a need for a simple education message that can be widely disseminated outlining the positive attributes of the industry and the career opportunities. As the education level increases the messages and training becomes more complex but the demand for students declines as you move to towards the apex.

Some sectors of the forest industry have a poor image in the community which needs to be addressed to provide not only a social and political licence to operate but create a higher level of awareness particularly for career opportunities. This will not only assist in attracting high quality recruits but ensure their parents are supportive as well.

Community awareness can be undertaken through a number of means; general industry advertising, promotion through schools, industry associations and on the internet. There is evidence to suggest that students can be attracted to the industry with good communication and promotion both on the internet and where cost efficient in person.

Figure 3: Education and Training Triangle



Traditionally the industry has undertaken a schools program and there have been various online projects with varying success. Continuing a schools program needs careful consideration as it is not easy or cheap to manage in a country as large and diverse as Australia. While concentrating on the forestry regions may intuitively appear to have the best impact particularly for trade skills it would exclude the major metropolitan areas which could provide many university level recruits. Evidence from other organisations should be considered as there is a view that a direct schools program may not be effective for changing attitudes or increasing the number of recruits.

Developing a presence on the internet could be more effective as many people interviewed for this project suggested that young people looking for careers will do most of their research online. If an industry's online presence is poor or out of date then this can be harmful and present the industry as low tech and unexciting.

Vocational training in the industry appears to be generally well catered for although there are gaps and these are being monitored by ForestWorks. Training for specialist skills such as saw doctors and wood machinists is available but not in every timber producing region. One of the significant problems faced by trainers is the cost of purchasing state of the art equipment which they can use to train operators.

Some caution is needed in confirming that most training is under control in this sector as a significant amount of training is done "on-the job or in-house". While this provides many enterprises with useable skills, it results in an industry of workers who do not have qualifications or any benchmarking of their skills. This in turn can work against the industry by not providing an attractive career option for people who are seeking a qualification pathway as part of their recruitment.

There is a looming a gap in the provision of technical education support for TAFE and University lecturers in disciplines such as architecture, engineering, design and construction. This role is currently filled by industry associations in Victoria and NSW but their funding is limited. Good technical support for trainers of construction managers is very important because they are by nature and due to legal responsibility, risk averse. This means that if

timber is a risk for untrained people then they are likely to specify competing products like steel or cement!

Southern Cross University at Lismore in northern NSW and the Australian National University look like being the only major providers of a forestry undergraduate degree, as the University of Melbourne is proceeding to deliver its specialised forestry training at the masters' level. Industry understands the shift to the Masters Program but remains cautious that this program may not produce the required quantity of technical production foresters who are prepared to live in rural and regional areas. A closer relationship between the universities and the industry should assist in creating a better understanding of the needs of each and resolving some of these problems. The industry has a long history of supporting forestry university training through scholarships and cadetships and the universities are keen for this to continue, in fact they are concerned that without it teaching resources will inevitably decline and courses will close and with little hope of re-opening.

In terms of tertiary education there are two main challenges. Firstly to maintain the current forestry teaching capacity and secondly initiate education in wood products processing and construction. While there are opportunities to study forestry at the vocational, undergraduate and post graduate level they lack students so these universities need support to attract enrolments and maintain teaching quality to ensure their courses remain attractive in a competitive market for students. If the University of Tasmania proceeds and is supported in its Graduate Certificate in Timber (Processing and Building) then this will greatly assist in filling the current gap in wood science and the knowledge of timber in the processing and construction industries. Forest products' marketing remains a gap but this has existed for many years.

In conclusion, there is a gap in the co-ordinated promotion of the industry and the flow on attraction of students to undertake a career in the forest and wood products industry. As students are generally funded at both the vocational and university level then the challenge is to increase the number of students in forestry and wood products so that the industry has a wide pool of talent to fill the current shortage. FWPA can be a catalyst for change but it will be difficult for them to commit to any long term recurrent funding for education.

Considerable effort has been expended at regional, state and national level over a number of years to assist and address community education and industry training and much of it has been constructive. However, it has not been well co-ordinated. There are two organisations that have the ability and the mandate to operate nationally and they are ForestWorks Ltd and FWPA and if they can co-ordinate their activities and industry support then the gaps in communication and training can be filled, monitored and expanded as needed.

Recommendations

Following the review and gaps and needs in the Australian forest and wood products industry and comments from industry and the education and training institutions the following recommendations are made for FWPA's consideration:

1. **Education and Training Advisory Committee** – it is recommended that FWPA establish an education and training advisory committee to work with the educators, national skills council, government agencies and various industry and related industry associations to ensure a consistent approach to the numerous education and training programs conducted by the forest and wood products industry. It can also work to form alliances and gain leverage with groups such as the Primary Industries Education Foundation, the Primary Industry Centre for Science Education. FWPA has

a peak position in the industry that is independent and its non lobbying charter allows it to provide cohesion, co-ordination and objectivity to the needs of the industry.

2. **Australian Forest Industry Website** – to create greater industry awareness it is recommended that FWPA develop an Australian Forest Industry website. This website would provide a focal point for existing and new information to improve community awareness, promote career profiles for industry recruits and illustrate education and training opportunities. The site could also provide other pertinent information on the industry and links to other websites and organisations as appropriate. For example a link to the specialist recruitment website Seek could be established to widen the pool of prospective industry recruits and career changers.

3. **Primary Schools program** – there are over 6,400 primary schools in Australia and while many state government agencies and industry participants are involved in primary school programs it is extremely difficult for FWPA to have any cost effective national role. It is therefore recommended that FWPA support the existing industry programs where funds and resources permit and explore options within the primary schools curriculum for inclusion of forest related activities either on the internet or in association with government and the industry in forestry regions.

4. **Secondary Schools program** – There are over 1,400 secondary schools in Australia and nearly 1,300 combined primary and secondary schools which means that FWPA does not have the resources to have a physical presence in every school. Therefore a two stage approach is recommended. Firstly for secondary schools in forestry regions FWPA should work with industry and ForestWorks to attract students from years 9 and above who are keen to develop work and trade skills for a career in their local area. Secondly FWPA should develop an internet presence for students in years 11 and 12 who are considering Tertiary training in the Forest and Wood Products industry. In addition to the online presence FWPA should investigate participation in and gaining exposure for forestry and wood products career opportunities through organisations as mentioned in recommendation 1.

5. **Tertiary Program** – recommendations for the tertiary sector are as follows:

    a. **Vocation –** Vocational education and training for forest growing, management, harvesting and processing is generally provided (but not necessarily in every region) but needs industry support. Curriculum support for TAFE lecturers in building and the use of wood products will need to be maintained. There is an opportunity to develop specialist non degree programs through organisations such as the Gottstein Trust for wood science, processing, marketing etc for both new recruits and as refresher courses. It is recommended that FWPA liaise with ForestWorks to monitor this sector and maintain contact with the New Zealand organisation FITEC to ensure all sectors of the industry training needs are cost efficiently provided and industry is aware of the opportunities.

    b. **University** – University level training is considered in four sectors

        i. *Forestry – tree growing and management* - While there is an urgent need for more students there are opportunities to study for a forestry degree at both the undergraduate and postgraduate level. Without students these courses are in dire danger of closing. The Universities are seeking support from FWPA to increase the awareness of forestry career and education opportunities. In addition while student numbers are low they are seeking financial assistance to reduce the cost of tuition particularly travel and this should be considered by FWPA. The Universities would also like industry support for vacation employment, contribution to scholarships and potentially an accelerated HECs

repayment scheme for graduates who join the industry. A short term strategy should include industry working with the Universities to communicate with science undergraduates to encourage them to consider a forestry or wood products degree and promote the wide career options in the forest industry.

ii. *Wood Products Processing and utilisation* – there is no dedicated University level training in wood products processing and the use of timber in building. The University of Tasmania is proposing a Graduate Certificate in Timber (Processing and Building) which is expected to commence in 2011. It is recommended that FWPA and industry initially support this course while it establishes itself.

iii. *Marketing* – many interviewees suggested that the industry is not marketing its products effectively against its competitors. There are no dedicated wood products marketing courses associated with the recognised forestry or proposed wood products courses. It recommended that FWPA continue to explore opportunities to address this gap on a national or international collaborative basis.

iv. *Post graduate* – FWPA and the Co-operative Research Centre for Forestry provide scholarship support for post graduate studies. The number of applicants has declined, in response to a lower undergraduate pool and the availability of competing scholarships. Post graduate investments should be targeted to addressing specific skills gaps as identified within the national Research, Development and Extension strategy.

c. **Mid-career** – FWPA has several programs aimed at mid-career development, which have not attracted much interest from potential applicants. The design and promotion of these programs needs to be reconsidered to better address the needs of the sector.

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Appendix 1 – Main organisations consulted during the review

Forest Growers & Managers

- Forests NSW
- ForestrySA
- Forestry Tasmania
- Gunns
- Wilmott Forests
- ITC /Elders Forestry
- VicForests
- Forest Enterprises
- Forestry Plantations Qld
- Hancock Victorian Plantations
- WA Forest Products Commission
- Hume Forests Ltd
- Timberlands Pacific Tasmania
- Great Southern Ltd
- Midway Plantations
- Auspine

Grower Association and Industry Support Agencies

- PIRSA Forestry
- Plantations 2020
- Australian Agroforestry
- NAFI
- Timber Communities Aust
- Aust Timber Importers Federation
- Timber Queensland
- Forest Industries Association of Tasmania
- Forest and Forest Industries Council of Tas
- NSW Forest Products Association
- Timber Development Association of NSW
- Private Forestry Southern Qld
- Australian Forest Contractors Association
- COFI - British Columbia
- Private Forestry Tasmania
- Institute of Foresters of Australia
- Australian Forest Growers
- A3P
- Australian Wood Panels Association
- Dept of Agric, Fisheries & Forestry
- Truss & Frame Mfrs Association
- TABMA NSW
- Forest Industries Federation of WA
- Timber Merchants Association of Vic
- Victorian Association of Forest Industries
- FIAA - Furnishing Industry Association of Australia
- AUSTimber
- CFMEU

Forest Product Processors & Contractors

- Hyne Timber
- Wesbeam
- AKD
- Whiteheads Timber
- The Laminex Group
- Finlaysons
- Boral Timber
- Sth East Fibre Exports
- Hallmark Oaks
- Britton Timbers
- Hurfords Timber
- Pentarch
- Carter Holt Harvey
- Wespine
- NF McDonnell & sons
- Wesbeam
- Whittakers
- Alpine MDF
- McCormack Timber
- Finlaysons Hardware
- Australian Solar Timbers
- Porta Mouldings
- Harvestco

Education, Training & Reseach Providers

- Australian National University
- University of Melbourne
- University ofQueensland
- ForestWorks
- Timber Training Creswick
- Landlearn DPI Victoria
- Toolangi Visitors Centre Vic - DSE
- Batchelor Inst of Indigenous Tertiary Ed
- Tocal Agricultural College
- LITA - Mt Gambier
- Rimfire Resoures
- Sustainability
- FIEA - New Zealand
- Rural Industries RDC
- Southern Cross University
- Edith Cowan University
- University of Tasmania
- Riverina TAFE
- South West TAFE & Southern Cross University
- Landlearn NSW
- Tas Forest Education Foundation
- The Gottstein Trust
- Marcus Oldham Farm Agric College
- Maitland- Primary Industries Education Foundation
- Great Southern TAFE Albany WA
- FITEC - New Zealand
- CRC for Forestry
- CSIRO - Sustainable Ecosytems

Appendix 2 – Questionnaire used in the review

Organisation..... Name

Review Objective

To undertake an audit and review of the education programs currently being provided by the forest industry sector in Australia to both the industry and the wider community.

Main Questions

1. ***What is your organisation providing in terms of forestry education and to who and for what aspect of the industry?***

	Area of coverage		
Level of education	Tree growing/ sustainable resources	Processing (inc. Harvesting)	Market development
Primary school			
Secondary school			
Vocation			
Tertiary			
Post-graduate			
Mid-career			
Community			

2. ***Where is this education provided in terms of location and coverage?***

   Location of program.....
   Anticipated coverage.....

3. ***How is this education provided***?
   a. Face to Face
   b. Online
   c. Correspondence – (supply requests for information)
   d. Seminar /Conference
   e. Short course with Field day (i.e 1 to 2 weeks)
   f. Course of study leading to a qualification (1 to 4 yrs)

4. **Is any sponsorship/support provided by your organisation.....Y/N?**

   If yes what form does it take.....

5. ***What resources are involved in terms of people and annual expenditure?***
   a. Number of people involved
   b. Amount of funding applied to program

6. ***What is the objective of the program?***
   a. Community Awareness & licence to operate
   b. Educate students on facts of the industry
   c. Recruit to industry

d. Educate students who wish to work in the industry
e. Train industry operators
f. Market product

7. ***Given your current experience what do you see as the current challenges and trends for education in the forest industry from schools to university and to industry and the wider community?***

8. ***Other Comments***

Appendix 3 – Web addresses for community engagement, education & training programs

Program	Website
Australian Forests	http://www.australianforests.org.au/education/index.htm
COFI – British Columbia	http://www.cofi.org/
Certified Practicing Accountants	http://www.cpaaustralia.com.au/cps/rde/xchg
FITEC - NZ	http://www.fitec.org.nz/
Forest Education Service - Victoria	http://www.dse.vic.gov.au/DSE/nrenfor.nsf/childdocs/-3146C558D297DF104A256AA40000D687?open
Forestry Insights - NZ	http://www.insights.co.nz/
Forest Education Foundation - Tas	http://www.forest-education.com/
Forestry matters (PIRSA)	http://www.pir.sa.gov.au/forestrymatters/home
Forests NSW	http://www.dpi.nsw.gov.au/forests/education/excursions
ForestWorks Ltd	http://www.forestworks.com.au/
LandLearn NSW	http://www.landlearnnsw.org.au
Minerals Council	http://www.miningcareers.com/
Ollies World	http://www.olliesworld.com/island/aus/index.htm
Treedudes (Plantations 2020)	http://www.treedudes.com.au/
Timber - Building in Australia	http://oak.arch.utas.edu.au
Timbertrek (NAFI)	http://www.nafi.com.au/timbertrek.html/
Timber Queensland	http://www.betterforests.com.au/
The WA Forest Heritage Centre	http://www.forestheritagecentre.com.au
Primary Industries Education Foundation	http://www.primaryindustrieseducation.com.au/
Primary Industry Centre Science Education	http://www.picse.net/HUB/index.htm
Wood – Naturally Better (FWPA)	http://www.naturallybetter.com.au/
WOODCAREERS - NZ	http://www.woodcareers.org.nz/home/

Appendix 4 – Strategic framework and action plan for Australian forestry education

Underlying issue	Key strategic & operational responses	Comments
1. The Australian higher education system is strongly market-driven	Grow student numbers by: • offering access at both undergraduate and graduate levels • improving articulation pathways from technical qualifications • *offering scholarships so that forestry education is competitive & attractive* • *develop and implement a short- and medium-term strategy for working more effectively across the sector (eg with FWPA) to promote professional forestry opportunities, and address the low or poor public profile of the profession/ sector*	• Given the architecture of Australian higher education system, realising greater student numbers is fundamental to maintaining professional forestry education in Australia, and to providing forestry sector with adequate pool of talented professionals • Universities' internal systems respond to student numbers, so maintaining/growing them is the easiest way to sustain and grow programs • The sector can assist by contributing to scholarship funding (attracts new students to grow talent pool) and by supporting staff participation in relevant courses (doesn't grow sector, but develops skill base & assists in class sizes) • There are opportunities for strengthening linkages with the VET sector, through Forestworks
2. Even with greater student numbers, the current & likely sizes of forestry cohorts is only close to, or below, university thresholds	• As for #1 • Consolidate cohort size by collaborating across universities for specialist courses, and/or schedule specialist courses biennially	• Minimum viable class sizes are c. 30 (& you need some at c. 50 to be safe); many institutions penalise for small class sizes • Given reduction in staff capacity, sharing staff expertise across institutions makes sense • Core courses can't be offered less frequently than biennially if students are to access them
3. Forestry degree programs need to be both attractive and accessible to prospective students, and relevant to employers' & the sector's needs	• Design and continually revise curricula to meet these goals, *drawing on ongoing close liaison with employers* • Ensure degree structures are sufficiently flexible to accommodate different modes of participation, and allow diversity of interests • *Continue to offer and promote vacation employment and related professional development opportunities for students* • *Develop and offer delivery modes that are accessible to and effective for different cohorts of students.*	• There is ongoing debate between & within universities on the 'ideal' curriculum structure; in practice, a number of options around the country might be preferable, for students and the sector, to a single prescribed curriculum. • Formal industry advisory structures to universities have lapsed in some cases (often because all parties felt they were not working well); functional structures need to be developed and implemented • Optimum delivery modes vary – intensive courses can be problematic for undergraduates; but for graduate students, some form of intensive delivery is usually practical and effective. For all students, it means the best mix of face-to-face and online delivery, and self-directed learning. Experiences of entirely remote delivery in forestry have not been promising. • Geographically-dispersed delivery (eg in each state) remains problematic because of the need to align course content, local participation, and overall student numbers
4. Staff capacity in specialist forestry areas has diminished, and is continuing to do so	• As for #2 • *As a sector (universities and industry), identify and pursue opportunities (eg through particular government funding*	• The shift to a market-mediated system means universities haven't been able to maintain staff in specialist areas, based on low student numbers. • Because of the other demands on staff (especially research performance),

	programs) to (re)build specialist strengths	and the costs of teaching, it's preferable - where student numbers are low - to move students (physically or virtually) than to move (ditto) staff to teach a course more than once
5. Forestry programs are small and therefore vulnerable at each institution	• As for #1, 2, 4 & 6 • Build effective collaboration between universities for mutual benefit/ protection • Implement strategies within each university to maximise resilience of forestry programs	• An alternative to building a 'distributed model' is to select a single institution to deliver forestry education. This could eventuate as a result of, for example, of decisions within individual universities, or of #6. However, in a market-driven system, there would be risks in entrusting all forestry education to the internal decision processes of a single university, in which forestry is always going to be a small actor. A single institution model is also predicated on other institutions agreeing to forego their interests, and is unlikely to reflect the distribution of expertise across universities; it also presents challenges in maintaining both undergraduate and graduate forestry education.
6. There is no recognition in the university sector currently of the 'national interest' case for forestry (or other natural resource/ environment professions)	• *Develop strategy across sector for forest sector peak bodies and forestry interests to press this case with government; ideally, jointly with agricultural/ rural peak bodies & interests* • Work with Australian Deans of Agricultural Science, who are facing very similar issues, to press national case • *Use contacts in government to pursue this case*	• In some other areas of skill shortage (eg nursing, teaching, rural doctors), the government has recognised 'national interest' needs and provided dedicated funding to maintain/ grow programs • As a relatively small sector, forestry is unlikely to be able to press its case in isolation • "Critical skills" issues have been flagged in Australian Government education policy, but initiatives so far have focused on technical training • The union movement is sympathetic to this case

Source: ANU Professor Peter Kanowski, 2010.