Future Directions for Forestry and a Forest Products Industry in Northern Australia

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Foreword

The forest industry in northern Australia is small scale and fragmented across a vast landscape. There has been limited plantation establishment in Queensland and the Northern Territory since the 1960’s, mainly for sawn wood products and pulp.

The utilisation of native forests for timber production has also been small in scale and has played a role in supporting regional and indigenous economic and community development. While the potential development of the industry has been explored in the region for decades, little progress has been made.

This report considers whether commercial forestry is a viable option in northern Australia over the long term. It follows various reviews of the industry which have concluded that, for significant development to occur, a number of key issues need to be addressed including the sustainable management of natural resources and the economic, social and environmental goals of northern Australia.

The study lists specific issues that need to be addressed in future forestry industry related developmental activity in Australia. It suggests there is merit in refocusing some of the emphasis and effort presently directed at temperate forest industry R&D, towards northern Australia.

The authors conclude that, by doing so, the opportunities identified to expand the tropical forestry and forest products industry, based on sound commercial, planning, advocacy and research foundations, could be progressed.

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Acknowledgments

This research project has been substantially assisted by consultation with stakeholders. This occurred both via an initial questionnaire, on-the-ground and at a stakeholder forum.

The authors acknowledge the assistance provided by the Federal and state government agencies, researchers, private sector companies, land councils and industry advocates consulted via the questionnaire and on-the-ground prior to the stakeholder forum listed in Appendix 1.

The contribution of speakers, workshop leaders and participants at the Northern Australia Forestry Stakeholders Forum held in Cairns on 6-7 April 2011 is acknowledged with gratitude. Details of the forum are set out in Appendix 2.

Assistance in organising the stakeholder forum was provided by the Queensland Department of Employment, Economic Development and Innovation, Timber Queensland and the Cape York Land Council.

We also wish to thank the assistance and advice provided by Dr Bob Smith, John Powell and Daryl Killin, plus the support and participation of Ric Sinclair, Managing Director, Forest and Wood Products Australia (FWPA) and Ken Moore, Senior Research Manager, National Rural Issues, Rural Industries Research and Development Corporation (RIRDC).
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Executive Summary

What this report is about?

In the wake of the CSIRO Northern Australia Land and Water Science Review (October 2009), financial collapse of agroforestry managed investment schemes (MIS) and aspirations to improve the utilisation of native forest for limited timber production to assist aboriginal economic and social aspirations, this report examines opportunities for the forestry and forest products industry in northern Australia.

Within ‘theme’ activity areas, the report provides guidance as to how the opportunities to advance commercially robust forestry and forest products industry in northern Australia might be realised.

Who is this report targeted at?

The report is directed at a wide range of forest and related industry stakeholders, including Federal and state government agencies, researchers, private sector companies, Aboriginal land councils and industry advocates in northern Australia and elsewhere.

Background

To date the location, variability and extreme climate of northern Australia have presented major barriers to development. The forest industry in the region tends to be relatively small scale and fragmented. Various reviews of the industry have concluded that for significant development to occur a number of key issues need to be addressed.

The size and remoteness of northern Australia present significant challenges for forestry. Distance to wood processing facilities, ports and population centres creates price and competitiveness pressures. This coupled with the relatively poorly developed infrastructure needs to be factored into future forestry development planning.

The CSIRO Northern Australia Land and Water Science Review concluded that northern Australia may not become an important food bowl to supplement or replace the Murray-Darling Basin. Also, with the exception of sandalwood, larger scale tree plantation establishment would need to be rain-fed.

Northern Australia tree plantation establishment has been undertaken since the 1960’s in both Queensland and the Northern Territory mainly for sawn products and pulp. The utilisation of native forest for limited, sensitive timber production to assist in supporting regional or aboriginal economic and social aspirations without compromising ecological or heritage values has been explored in the region for decades without notable progress.

Aims and objectives

A basic issue for consideration in this paper is whether commercial forestry is a long term viable option in northern Australia taking into account the sustainable management of natural resources and economic, social and environmental development goals. The report examines issues and obstacles that need to be addressed to advance commercially sound forestry and forest products industry expansion in the tropical north.
Methods used

The preparation of this report has been assisted:

1. The findings of a questionnaire sent to government forest policy agencies in Queensland, Western Australia and Northern Territory

2. On-the-ground and written consultation with Federal and state government agencies, researchers, private sector companies, land councils and industry advocates

3. The contribution of speakers, workshop leaders and participants at the Northern Australia Forestry Stakeholders Forum held in Cairns on 6-7 April 2011

The report identifies, analyses and summarises the possible future direction of forestry industry-related activity in northern Australia under a number of theme areas and activities.

Results/Key findings

The deliberations of the workshop sessions conducted at the Northern Australia Forestry Stakeholders Forum are summarised under the following headings:

1. Tree plantation-related tasks

2. Financial viability-related tasks

3. Planning and advocacy-related tasks

4. Utilisation and marketing-related tasks

5. Native forest-related tasks

6. Strategic-related tasks

The specific actions identified in the report provide the broad direction of suggested future forestry industry-related developmental activity in northern Australia. They will need to be supported by:

- the maintenance and/or increase in Federal and state government financial and technical inputs
- the development and implementation of forest policy, plantation codes of practice and good neighbour charter
- a social licence to operate and community engagement
- the promotion of forestry as a viable alternative to other land use activities
- funding mechanisms and models for plantation development
- an audit of native forest resources that might be suitable for and support limited, sustainable timber-based industry on Aboriginal-owned land
- an examination of silviculture practices, utilisation methods, infrastructure requirements and marketing prospects related to a prospective native forest-based industry
- an assessment of land availability for viable plantation resource development
• collaborative research and development to address a wide range of forest related activities
• the development of technical services, including those related to pests and diseases
• the research and development of forest products, including the sawing, drying and further processing of solid wood products from small diameter logs arising from hardwood plantation thinnings.
• a study of wood flows, project economics and markets to underpin development of processing facilities in tropical Australia.

Implications for relevant stakeholders

On the basis of the research underpinning the report it is suggested that there is merit in refocusing some of the emphasis and effort presently directed at temperate forest industry research and developmental towards northern Australia.

The report concludes that by doing so the opportunities identified to expand the tropical forestry and forest products industry based on sound commercial, planning, advocacy and research foundations could be progressed.
Introduction

The forest industry in northern Australia tends to be relatively small scale and fragmented. Various reviews of the industry have concluded that for significant development to occur a number of key issues need to be addressed. Many of these issues are specific to the region and various approaches need to be considered.

The preparation of this paper has also been informed by the results of a questionnaire sent to government forest policy agencies in the three states (Queensland, Western Australia and Northern Territory) with an interest in the future of the forestry industry in northern Australia. The results of the questionnaire are summarised in Appendix 3.

A basic issue for consideration in this paper is whether commercial forestry is a long term viable option in northern Australia taking into account the sustainable management of natural resources and economic, social and environmental development goals.

The Northern Australia Forestry Forum viewed forestry in a broad context and hence considered:

1. Land and forest ownership and development requirements.
2. Establishment of tree plantation resources and their processing.
3. ‘New generation’ forest products including bio-energy, essential oils and other chemicals.
4. Carbon sequestration and trading related to climate change abatement outcomes.
5. Native forest-based activity emphasising sustained yield principles, environmentally sensitive management and compatibility with Aboriginal economic and employment aspirations.

ENVIRONMENT AND LIMITATIONS

Northern Australia is a vast region, almost a quarter of the continent. To date its remoteness, variability and extreme climate have presented major barriers to development. The environment can best be considered by examining climatic data.

Rainfall and temperature

Northern Australian rainfall is highly variable, but critical factors from a plant growth perspective include the high seasonality of the rainfall with 4-6 months dry season coupled with very high evaporation rates. The seasonality of the rainfall is shown in Figure 1 (expressed as the percentage of annual rainfall occurring each month) and compared with two temperate plantation sites. Total annual rainfall for each site is Townsville, 1161 mm, Darwin, 1535 mm, Penola 705 mm and Red Hill 1077 mm. Additionally, the mean monthly maximum (Figure 2) and mean monthly minimum temperatures (Figure 3) indicate warm and consistent temperatures.
Figure 1  Percentage of rainfall occurring in each month for two northern and two temperate sites in Australia.

Figure 2  Mean monthly maximum temperature for two northern and two temperate sites.
Despite substantial volumes of rain, northern Australia can be described as being water-limited. Except for localised areas, such as the Wet Tropics and northern Cape York, rainfall is limited to the wet season and there is almost no rain for the remaining six months. Further, evaporation and plant transpiration are so high throughout the year that, on average for 10 months there is very little water visible. Also a substantial amount of the rainfall occurs near the coasts and on floodplains, making it difficult to capture and store.

**Soils**

Northern Australia's soils have been highly weathered by millennia of monsoonal rain. They are typically low in organic carbon, have low water holding capacity and are highly erodible. These traits unite to produce soils that are susceptible to surface ‘sealing’ and have low infiltration rates which, combined with the North’s high rates of solar radiation and evaporation, confer a low water use efficiency on crops.

Utilisation of these soils requires availability of suitable information on soils, careful planning and recognition of requirements for significant quantities of nutrients, with actual levels being determined by the species planted. The soils are often erodible and hence disturbance on low slopes can lead to significant soil movement and loss.

**Infrastructure and distance**

The size and remoteness of northern Australia presents significant challenges for primary industries, including forestry. Distance to wood processing facilities, ports and population centres creates price and competitiveness pressures. This coupled with the relatively poorly developed infrastructure over much of the region needs to be factored into future forestry development planning. The climatic conditions, particularly during the wet season also present challenges for forest operations and for road transport over unsealed roads.
Figure 4  Northern Australia is vast, remote and variable with extreme climate having presented major barriers to development.

**NORTHERN AUSTRALIA AGRICULTURE AND FORESTRY**

Many of the locations where agriculture is being undertaken in northern Australia will also be suitable for tree plantation development. Where clearing of native vegetation is not desirable for plantation development, the main alternative is to use cleared agricultural or grazing land. This leads to competition with other land uses options.

The current value of irrigated agriculture in northern Australia is in the order of $160 million annual production, which represents around 0.8 per cent of the regional economic activity. The value of agricultural production is dominated by perishables such as mangoes and melons ($40 and $32 million respectively) with sugar, ornamentals, vegetables and fodder production worth about $15 million each annually. By contrast, beef cattle production in northern Australia is worth in the order of $1 billion annually.

Size and remoteness coupled with the predominantly fragile and nutritionally poor soil means that opportunities for large scale agricultural development are considered limited and to require challenging management approaches, including high levels of nutrient inputs and intensive crop husbandry practices. Inappropriate past development has resulted in major degradation of the region's soil and land resources. Over the decades there have been numerous studies and commercial ventures focused on the perceived agriculture potential of tropical Australia. Many of these commercial ventures have proved not to be commercially attractive with proponents appearing to underestimate the physical, technical, marketing, infrastructure and other limitations of northern Australia.

The CSIRO *Northern Australia Land and Water Science Review* (October 2009) concluded that despite several irrigation plans and a billion litres of rain a year, northern Australia would not become
an important food bowl to supplement or replace the Murray-Darling Basin. Further, strict limits on the region's future potential for agricultural production would apply. However, the report predicts that northern Australia's billion dollar a year beef industry is likely to more than double production by 2030. The report concludes that the growth of agricultural production in the north will be limited, despite rainfall of up to 2 metres a year in some areas, (equivalent to eight-and-a-half times the annual run-off in the Murray-Darling Basin).

The CSIRO report concluded that there was insufficient water to irrigate large tracts of land in the north without doing damaging river systems and the surrounding environment. The report also ruled out the prospect of more dams on environmental grounds. The report also concluded that the maximum area that can be irrigated from groundwater is 60,000 hectares, about three times that currently irrigated.

However, except for specialist products, such as sandalwood, irrigated forestry has not been considered as an option and larger scale tree plantations will need to be rain-fed utilizing careful moisture conservation techniques.

**FORESTRY ACTIVITY**

**Tree plantations**

Tree plantations include those established for sawn timber production, high value and specialty timbers, pulp, bio-energy, sandalwood, carbon and chemicals. Northern Australia plantation forestry has been undertaken since the 1960’s in both Queensland and the Northern Territory mainly for sawn products and pulp. Early plantation programs were government sponsored and while some were developed to a stage where commercial activity could be undertaken the limited scale of planting was a major limitation. Many of the plantings were on a trial basis to test species. For example, in the Northern Territory during the 1960’s almost 200 species were trialled, the vast majority of these succumbing to fire, termites or environmental factors. However, these trials did demonstrate the value of some species such as African mahogany.

A key issue is to develop a tree plantation resource with sufficient scale to support processing and marketing. This may involve multiple products and multiple owners and managers. A limitation on development to date has been the lack of critical mass leading to difficulties with further investment.
Trial plantings in the Northern Territory initially tested *Callitris intratropica* on the basis of termite resistance but growth rates were poor. *Pinus caribaea* proved to be a good plantation species. More recently, programs using hardwood species for either pulp (*Acacia* and *Eucalyptus*) or high value species (teak, African mahogany [*Khaya senegalensis*] and *Eucalyptus pellita*) have been established by private companies. Estimates of plantations currently in Northern Australia (prior to the impact of cyclone Yasi on 3 February 2011) are set out in Table 1 and the main locations are shown in Figure 6. If a conservative estimate of $2500 per hectare solely for establishment was placed on these tree plantations this represents an investment of about $200 million.

Note that preliminary estimates in Far North Queensland indicate that the impact of cyclone Yasi may be that up to 60 per cent of the standing volume of *Pinus caribaea* and *Eucalyptus pellita* plantations may have been severely damaged.
Table 1  Existing Forest Plantations in northern Australia (modified from Richardson 2009 and Gavran and Parsons 2009).

<table>
<thead>
<tr>
<th>Region</th>
<th>Species</th>
<th>Common Name</th>
<th>Rotation length (yr)</th>
<th>Area (ha)</th>
<th>Plantation Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>FNQ</td>
<td>Tectona grandis</td>
<td>Teak</td>
<td>20</td>
<td>6,000</td>
<td>AMA, Elders Rewards</td>
</tr>
<tr>
<td>FNQ</td>
<td>Eucalyptus pellita</td>
<td>Red mahogany</td>
<td>18</td>
<td>4,000</td>
<td>Elders</td>
</tr>
<tr>
<td>FNQ</td>
<td>Pinus caribaea</td>
<td>Caribaean pine</td>
<td>25</td>
<td>25,300</td>
<td>HQP</td>
</tr>
<tr>
<td>NT</td>
<td>Pinus caribaea</td>
<td>Caribaean pine</td>
<td>25</td>
<td>2,300</td>
<td>PMP</td>
</tr>
<tr>
<td>Katherine, NT</td>
<td>Khaya senegalensis</td>
<td>African mahogany</td>
<td>20</td>
<td>11,300</td>
<td>AMA, FEA, KTC, WFL, NTT</td>
</tr>
<tr>
<td>Cooktown, Qld</td>
<td>Khaya senegalensis</td>
<td>African mahogany</td>
<td>20</td>
<td>600</td>
<td>NTT</td>
</tr>
<tr>
<td>Melville Is, NT</td>
<td>Acacia mangium</td>
<td>Brown salwood</td>
<td>10</td>
<td>29,000</td>
<td>PMP</td>
</tr>
<tr>
<td>Kununura, NT</td>
<td>Santalum album</td>
<td>Indian Sandalwood</td>
<td>15</td>
<td>4,350</td>
<td>Elders, TFS</td>
</tr>
</tbody>
</table>

AMA- African Mahogany Australia; Elders – Elders Forestry; FEA – Forest Enterprises Australia (in receivership); HQP – Hancock Queensland Plantations; KTC – Kimberly Timber Company; NTT – Northern Tropical Timbers; PMP – Plantation Management Partners; Rewards – Rewards Group (in receivership); TFS – Tropical Forest Services; WFL – Willmott Forests Ltd (in receivership).
Future development of tree plantations depends on access to suitable land. In addition to being suitable for the growth of selected species, such land has to be within an acceptable distance of processing or port facilities and preferably be part of an aggregate area to develop a critical mass. General analyses can be undertaken using soils, topography, location, climate and tenure information. These become more explicit if a specific region is nominated.

At the broad level (Anon 2000), estimates were made of land suitable for plantations within proximity to Gladstone, Mackay and Cairns (Table 2). There are limitations on access to this land including cost.
Table 2. Areas (hectares) of cleared, freehold land in three rainfall zones suitable for plantation forestry within 200 km of three of Queensland’s major ports (Anon 2000).

<table>
<thead>
<tr>
<th>Port/distance</th>
<th>&gt;1200 mm</th>
<th>1000-1200 mm</th>
<th>800-1000 mm</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gladstone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-100 km</td>
<td>20,938</td>
<td>207,383</td>
<td>447,467</td>
<td>675,788</td>
</tr>
<tr>
<td>100-200 km</td>
<td>34,336</td>
<td>304,394</td>
<td>384,028</td>
<td>722,758</td>
</tr>
<tr>
<td>Total</td>
<td>55,274</td>
<td>511,777</td>
<td>831,495</td>
<td>1,398,546</td>
</tr>
<tr>
<td>Mackay</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-100 km</td>
<td>293,162</td>
<td>11,227</td>
<td>11,069</td>
<td>315,458</td>
</tr>
<tr>
<td>100-200 km</td>
<td>70,047</td>
<td>57,728</td>
<td>272,400</td>
<td>400,175</td>
</tr>
<tr>
<td>Total</td>
<td>363,209</td>
<td>68,955</td>
<td>283,469</td>
<td>715,633</td>
</tr>
<tr>
<td>Cairns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-100 km</td>
<td>228,179</td>
<td>52,578</td>
<td>118,506</td>
<td>399,263</td>
</tr>
<tr>
<td>100-200 km</td>
<td>239,156</td>
<td>95,320</td>
<td>71,663</td>
<td>406,139</td>
</tr>
<tr>
<td>Total</td>
<td>467,335</td>
<td>147,898</td>
<td>190,169</td>
<td>805,402</td>
</tr>
<tr>
<td>Total</td>
<td>885,818</td>
<td>728,630</td>
<td>555,133</td>
<td>2,169,581</td>
</tr>
</tbody>
</table>

Native forest utilisation

Resource information on native forests in northern Australia is limited in terms of species, volumes and access. Further information on optimal silvicultural systems, if forests were to be utilised, is also not widely available. Based on areas alone (Montreal Process Implementation Group for Australia 2008), there is the potential for the development of some native forest-based industries (Table 3).

In broad terms, the medium and tall eucalypt forests, (those which have potential for commercial utilisation) for the Northern Territory and Queensland extend over about 10.5 million hectares. Some of this area in Queensland is inaccessible or designated as existing or prospective nature conservation reserve.

However, if say just one per cent were available in a reasonable area with minimal harvestable volumes there is the basis for a resource that could provide opportunities for limited sustained yield, environmentally sensitive timber production that was compatible with Aboriginal economic and employment aspirations.
Table 3. Areas of medium and tall forest (hectares) in Northern Territory and Queensland (Montreal Process Implementation Group for Australia 2008).

<table>
<thead>
<tr>
<th>Forest</th>
<th>Northern Territory (ha)</th>
<th>Queensland (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eucalypt medium closed</td>
<td>73,000</td>
<td>32,000</td>
</tr>
<tr>
<td>Eucalypt medium open</td>
<td>5,499,000</td>
<td>4,733,000</td>
</tr>
<tr>
<td>Eucalypt tall open</td>
<td></td>
<td>156,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,572,000</strong></td>
<td><strong>4,921,000</strong></td>
</tr>
</tbody>
</table>

The utilisation of native forest for limited, sensitive timber production to assist in supporting regional or aboriginal economic and social aspirations, without compromising ecological or heritage values has been explored in the region for decades without notable progress. The reasons for this lack of progress have included:

1. The absence of timber and product yield data and prices compared with costs.
2. Issues related to land ownership uncertainty and to Federal and state legislative frameworks.
3. A lack of scientific, technical and operational expertise.
4. Tree species-related issues, such as appropriate sustainable forest management techniques, timber utilisation and marketing.
5. The lack of adequate roads and other infrastructure.

**Indigenous community cooperation**

Substantial areas of native forest in northern Australia are located on aboriginal land. Further, there is potential employment, social and other benefits by developing sustainable native forest-based industries. As an example of this potential to support aboriginal economic and social goals, a partnership has been formed between Gumatj traditional owners from north east Anthem land (Gove Peninsula) and Forestry Tasmania to facilitate a native timber industry. Under the terms of the partnership agreement Forestry Tasmania is working with the Gumatj Corporation to develop a sustainable timber industry, based on selective harvesting and management of hardwood trees on the Gumatj estate and use of the timber for a range of associated industries.

Currently indigenous forestry workers are selectively harvesting hardwood from 850 hectares of land on the Rio Tinto Alcan bauxite mining lease near Nhulunbuy and using the timber to construct community houses by adapting conventional building techniques to suit the tropical climate and traditional lifestyles. The houses have been designed with the assistance of the University of Tasmania.
Figure 7 shows an example of native forest in northern Australia with opportunities for limited sustained yield, environmentally sensitive timber production.

It is intended that the project will create ongoing employment through opportunities for downstream processing. In addition to the sale of sawn timber, it is planned to process some timber for high value uses such as furniture and wood veneer products.

Working in conjunction with relevant indigenous land councils in the first instance, it should be possible to formulation proposals to utilise some areas of native forest for limited timber production. In approaching this issue a number of issues will need to be considered, including:

- The utilisation and market potential of the tree species available.
- Assessments of timber yields, appropriate sustainable forest management practices and operational systems.
- The development of appropriate wood processing techniques and practices.
The integration of native forest-based activities with aboriginal economic and social goals, notably employment.

The preparation of business plans, including the possibility of joint venture capital inputs.

**TREE PLANTATION SPECIES AND PRODUCTS**

As a forerunner to this report, FWPA commissioned a review of hardwood plantation activity in northern Australia (Richardson 2009). This review indicated that hardwood plantation forestry in tropical Australia commenced in the 1960s, with small species trials of *Chukrasia*, *Khaya*, *Eucalyptus* and *Tectona* species and continued spasmodically with government agencies and farm forestry plantings into the 1990s. Richardson’s report documents the expansion of high-value hardwood plantation forestry across northern Australia in the last ten years, mainly by forestry managed investment schemes (MIS). [The Richardson study did not consider Indian sandalwood and other essential oil industries or *Acacia mangium* plantings for pulpwood production].

Indian sandalwood is grown in both the Ord River Irrigation Area (ORIA) and at Lakeland Downs, between Mareeba and Cooktown, Queensland. The introduction of sandalwood into the ORIA has been a success. It is a valuable product that has the potential to deliver a high return to growers. Of the 13,000 hectares of irrigated farming land in the ORIA, there were almost 2,000 hectares of commercial sandalwood plantations. The Queensland Government markets about 500 cubic metres of sandalwood each year from natural forest areas. Production from other sandalwood growing countries, such as India, Indonesia and the Pacific islands has now declined because of over-harvesting and forest clearance. This provides Australian sandalwood growers with distinct market advantages.

![Figure 8](image)

**Figure 8** With about 2,000 hectares of commercial sandalwood plantations, its introduction into the ORIA has been a success.
Information on the longer term growth of tree plantation species in northern Australia that is critical to provide confidence for ongoing investment is difficult to obtain. Caribbean pine has proven to be productive in northern Queensland and in the Northern Territory (Haines 1986). Little published information is available on hardwood species although some data is available from research trials. Perhaps because of long-standing limitations, forestry has not received the research support, such as tree breeding, enhanced site management and improvement to productivity and timber quality that the industry has enjoyed in southern (temperate) states.

**AGROFORESTRY**

Agroforestry activity should be well suited to northern Australia. It has the ability to combine agriculture, horticulture or grazing with shade and shelter, protection from wind and water erosion and a measure of biodiversity preservation. The CSIRO report indicates that the bush foods industry provides a $14 million annual retail turnover in Australia and there may be commercial opportunity for cultivation of suitable species, such as quandong, native figs and acacia. The extent to which agroforestry or bush foods production would rely on irrigation is uncertain.

Agroforestry and small scale forestry have been evaluated in a number of studies. For example, the RIRDC conducted a fifteen year review of their Joint Venture Agroforestry Program (Powell, 2009) that summarised the knowledge generated and $29 million dollars in investment in agroforestry research, development and extension throughout Australia. The report covered four main agroforestry topics: farm forestry for multiple benefits:

1. Products and markets.
2. Public policy
3. Investment options and grower initiatives.
4. Socio-economic issues, including training and extension.

![Figure 9](image.png) **Figure 9**  Peanut farming and Caribbean pine shelter breaks demonstrating the ability to combine agriculture, horticulture or grazing with shade and shelter in agroforestry systems that are well suited to northern Australia.
The report was commissioned to increase public awareness of the role, value and potential of agroforestry and to highlight the significance of the RIRDC Joint Venture Agroforestry Program's research achievements. A summary of the report’s results and key findings as they relate to agroforestry and plantation forestry activity more generally in northern Australia are set out in Appendix 4.

Other agroforestry-related research (such as van der Sommen and Haines 1991) concluded that agroforestry could be successfully undertaken if it targeted specific markets or if larger scale markets were developing (such as private company plantations). Agroforestry can benefit through market access and complementing the development of industry plantation resources.

Agroforestry research has also recognised that improvements were necessary in species selection, genetics, site selection and silviculture. In relation to the significant areas of native forest in private ownership that were potentially available for some timber production, research points to the desirability of refinements to native forest management practices.

**CHALLENGES FOR TREE PLANTATION INVESTMENT AND DEVELOPMENT**

The challenges for tree plantation investment and development vary to a considerable degree depending on the proposed rotation length.

The rapid expansion of a MIS driven hardwood plantation industry in tropical Australia was primarily directed at short rotation plantation projects. This was in part because it was possible with short rotations to demonstrate a satisfactory return on investment. This notwithstanding a number of challenges to the industry emerged. These challenges have been identified in several reviews (Bevege 2004, Nikles *et al.* 2008 for *K. senegalensis*, Richardson 2009) and include:

- Coherent policy and regulatory frameworks including codes of practice.
- Community and social acceptance on environment, land tenure, forest management, plantation location, extent of planting and species issues.
- Funding of plantation development.
- Land tenure and availability, and access to land.
- Research, development and technology for development of plantations and timber processing.
- Plantation operations (plantation systems, managing risk, rotation length, transport, labour).
- Processing/economics/economies of scale.
- Longer term infrastructure and strategic planning requirements.
- Marketing of products.

Complementing these findings de Fégely *et al.* (2011) investigated potential policies and investment models for continued tree plantation investment. They examined polices and investment models from two perspectives. Firstly, policy in terms of strategies for continued plantation investment, and secondly the investment models or mechanisms used to attract investment.

With a particular emphasis on longer rotation tree plantations, they noted that despite strong demand for sawn timber products and a favourable outlook for the main markets in new housing and construction, Australia has not established any significant area of new long rotation plantations since
the early 1990s. It was also noted that notwithstanding the strong commercial market for sawn timber products from long rotation plantations there were significant, market barriers to investment in establishing such plantations.

The reason is primarily the relatively long term investment of forestry plantations compared to many other investment choices, with investment barriers including the high capital cost of establishment and relatively long waiting period for a return resulting in a low rate of return on investment for longer rotations in the order of 25 to 40 years.

The de Fégely et al. study considered that poor profitability could be attributed to the high initial costs of acquiring land and establishing tree plantations which has an opportunity cost of capital for a period of time until the investment matures. The growth rate and average log price were not high enough to counter these early costs. However, lowering the cost of access to land and introducing additional revenue for environmental services, such as carbon, can lift the investment to an acceptable rate of return.

![Figure 10 10-year old teak saw log plantation.](image)

Plantations such as that presented in figure 10, present challenges because of the relatively long term investment, coupled with barriers such as high capital cost of establishment and relatively long waiting period for a returns.

Given the particular characteristics of tree plantations and the recognition of their broader social and ecological benefits, there are sound arguments for addressing investment barriers through the development of incentives or other policy measures. These measures could take into account the range
of non-market benefits and services that plantations provide to both regional landscapes and economies which ultimately flow to the national economy.

The de Fégely et al. (2011) study also noted that most countries provided generous taxation or direct incentives to accelerate plantation development and once critical mass was achieved the tax incentives and other measures tend to give way to enabling incentives based around attracting world scale processing which was illustrated in the case studies of Brazil and Uruguay. Both countries started with taxation incentives and government controls but now generally operate within a commercially driven environment.

New long rotation tree plantation investment in Australia has effectively stopped while a new set of public policy drivers is emerging that may well justify targeted direct incentives in conjunction with an facilitating environment. In order to develop new long rotation plantations, policies will need to fundamentally address the economics of such investments by augmenting the high up-front costs and short to medium term cash flow issues, on the basis of their broader public benefits.

de Fégely et al. (2011) concluded that mechanisms to facilitate long rotation tree plantation development should represent a partnership between industry, landowners, community and governments. Importantly, these policies must improve the overall profitability of long rotation investments, either through lower costs, such as cheaper land access options, higher productivity or additional sources of revenue such as higher log prices or revenue from the externalities of forests such as carbon sequestration.

The de Fégely et al. (2011) study conclude that in order to develop new long rotation plantations, policies will need to fundamentally address the economics of such investments by augmenting the high up-front costs and short to medium term cash flow issues, on the basis of their broader public benefits. The study concludes that the common elements for ‘successful’ future investment, especially in long rotation tree plantations are:

1. Strong industry, government and community support for the mechanisms, underpinned by a clear comprehensive plan for the future of the industry.

2. Simple and transparent approaches that limit the potential for perverse or undesirable economic, social and environmental outcomes.

3. Approaches that promote industry ‘buy in’ and industry partnership with governments which assist in ensuring that commercial decisions are made on key planning issues.

**FOREST POLICY AND TREE PLANTATION CODES OF PRACTICE**

The Federal Government supports tree plantation development and expansion, through the national strategy *Plantations for Australia: The 2020 Vision*. At a state level there is an absence of a clear forest policy and a plantation code of practice in Queensland and the Northern Territory. This has created uncertainty for investment in tree plantation development.

Bevege (2004) considers policy and regulatory framework issues at the state and territory levels for development of tree plantations. These include:

- **Land use planning** including location of plantations.
- **Environmental impact** including modifying of native vegetation on green field sites, biodiversity management and water conservation.
Agricultural chemicals
herbicides, pesticides and fertilisers and pollution, eutrophication and residue issues relating to health and biodiversity of non-target species.

Weeds and potential weediness
alien tree species.

Resource tenure
issues separating ownership of trees from land tenure.

Transport access and maintenance
mainly a local government issue particularly with roads.

Fire protection
issues of scale of operation and risk mitigation.

Harvesting plans and operations
expertise and development issues.

Forest policy and a forestry code of practice form the basis for land use assessment and planning in local government policy in states except in Queensland and the Northern Territory. The absence of these instruments impacts local government’s planning regulations and approval processes for plantation development. As a consequence approval processes in Queensland and the Northern Territory for tree plantation development are cumbersome, uncertain, drawn out, costly and significantly hinder plantation development.

Richardson (2009) asserts that a plantation code of practice, based on sound science and operational, environmental, safety, community and legislative realities could provide the industry with best practice guidelines and demonstrate responsible, sustainable management. He notes that in Queensland Timber Queensland with the assistance of the Department of Employment, Economic Development and Innovation (DEEDI), have been working on a draft code of practice with industry, private growers and government.

The Queensland Government published its *Queensland Timber Plantation 2020 Strategy* in 2009 that details their policy objective of encouraging new private investment in forest plantation development. The strategy indicates that Queensland has a strong competitive advantage in growing and processing timber plantation products that is underpinned by extensive suitable land, a favourable growing climate, sound technical skills, strong research support and a robust business environment. Also that Queensland has:

- A strong, integrated and competitive downstream processing sector.
- Suitably located ports, relatively low port charges and proximity to emerging timber product markets in India and Asia.

In addition to working collaboratively with industry and key stakeholders, the strategy indicates that the Queensland Government will focus its efforts on strategies and actions based around five core areas:

1. Improved land-use planning framework for forest plantations.
2. Supportive legislative and policy frameworks.
3. Facilitate new investment in forest plantations.
4. Targeted industry development support.
5. Strengthen community support for forest plantations.

The strategy indicates there is about 4.7 million hectares of cleared freehold land suitable for forest plantation establishment available within 200 km of the major population centres and/or ports of Brisbane, Gladstone, Mackay and Cairns.
In attempting to streamline local government planning the Queensland Government has committed to reviewing legislation and administrative arrangements to identify and reduce impediments to forest plantation investment and growth. Reviews of the Queensland Tree Tenure System (contained in the Forestry Act 1959, the Land Title Act 1994 and the Land Act 1994) are underway. A notable step towards streamlining local government planning processes and related matters is being undertaken by Timber Queensland via the Plantation Industry Development Project in a joint initiative between with DEEDI. Further details of this initiative are set out in Appendix 4.

LOCAL GOVERNMENT AND COMMUNITY ISSUES

In some instances in northern Australia there is low local community acceptance of forestry as an acceptable and viable land use. Public and local government opinion has been influenced in a number of ways, including political pressure exerted by the sugar industry in northern Queensland, by some agriculturalists and by some environmental groups in the Northern Territory.

As an example of the challenges industry is having in Far North Queensland, local councils have singled out tree plantation establishment as the only rural industry required to carry out a full impact assessment as part of the planning approval process. Planning approval can take at least six months to achieve at a cost of $200 per hectare, with considerable land holding costs while the approval process is being conducted. In the event that the approval, once granted, is appealed – as has happened in a number of occasions – the cost to the forestry company for each appeal is in the order of $100,000 per property.

Figure 11 Community information field day at Ingham, Queensland to discuss the contribution of tree plantations to farming systems.
The forest industry is endeavouring to strengthen tropical Queensland capacity. Timber Queensland working in collaboration with DEEDI are seeking to improve the acceptance and planning regime as it applies to tree plantation development.

Even with the introduction of a forest policy and code of practice, it will take strong and clear guidelines from state governments to convince some local government authorities that tree plantations are a legitimate rural land use that should not be treated as significantly different from other agricultural enterprises.

Development of good neighbour codes of conduct and a focused effort by industry to engage and work with neighbours and the community is critical for a ‘social licence’ to undertake tree plantation activities in northern Australia.

**LAND TENURE CONSIDERATIONS**

It is apparent that there are varying attitudinal challenges across northern Australia to tree plantation development. This reality is exacerbated where there are conflicted with other forms of land use. It is fair to say that sometimes plantation establishment is seen as a competitor or an interloper by some local communities and local government authorities. In Far North Queensland the mindset is generally pessimistic in relation to plantation planning and establishment, but markedly more open in the Northern Territory and Western Australia.

Development of tree plantations occurs predominantly on cleared freehold agricultural land, with forestry companies mostly purchasing land for development. Despite the extent of northern Australia, suitable, affordable cleared land is a scare resource.

The Northern Territory, for example, has 1.35 million square kilometres of land, 45.3 per cent of which is freehold, with 97 per cent of that being Aboriginal freehold. This leaves approximately 20,000 square kilometres of ‘unencumbered’ land available in the Northern Territory, which includes urban precincts, roads and uncleared areas. As a consequence, prices for productive land are high, with a number of industries competing for the same areas. Queensland, by contrast, has larger areas of cleared freehold land.

In addition to freehold large tracts of leased land (‘station country’) are utilised in northern Australia for grazing. To date, this station country has not been considered for tree plantation development because leases are specific to grazing rights.

Policies and procedures for negotiating with aboriginal freehold owners may aid large-scale tree plantation development in northern Australia. Involvement of local farmers in farm forestry or in leasing portions of their land for plantation development could deliver a broader land base that would integrate tree plantations across the landscape and deliver greater involvement of local farmers and communities in the industry.

Indigenous communities across northern Australia have indicated an interest in developing forestry projects that provide economic and social benefits to traditional owners. To date, two tree plantation-based forestry projects on Melville Island and in Miriam Vale (Queensland) have been undertaken with indigenous communities. Dialogue and consultation with traditional indigenous owners tends to be a challenging process and can take several years to determine the community’s goals in relation to prospective projects. Nevertheless, with patience and adequate dialogue, opportunities exist for forestry development with indigenous communities. Land suitability for tree plantation
establishment is a function of biophysical factors, site requirements of ‘target’ species, land cleared, distance to markets and infrastructure. Land availability for future forestry activity will be influenced by:

- Land suitability
- Willingness of owners to sell or lease
- Market price determining land affordability
- Willingness of potential investors to commit to tree plantation ventures.

**FUNDING OF TREE PLANTATION DEVELOPMENT**

Early tree plantation development in northern Australia occurred through Government agencies. However, more recent developments have been undertaken by private companies mainly through MIS, especially since 1997. [MIS schemes include agricultural enterprises in addition to forestry]. In 2008, MIS companies had established about 670,000 hectares of plantations in Australia. However, since the collapse of Timbercorp and Great Southern in 2009, (and Forest Enterprises Australia, Rewards and Willmott Forests more recently in 2010) the sustainability of the MIS finance structure has been subject to considerable debate. The up-front tax deduction benefits offered under MIS were originally introduced because of the long term nature of plantation forestry investments.

Under MIS, investors are offered 100 per cent up-front tax deductions that in addition to commissions to financial advisers have resulted in significant sales of MIS investments as a means of promoting plantation development.

To date, most funding and development of hardwood tree plantation projects in tropical Australia has occurred through MIS investment. Although the Federal Government continues to support MIS, the recommendations of the Parliamentary Committee on Corporations and Financial Services Inquiry into MIS and from the Henry Review of Australia’s Future Taxation System may lead to future policy changes.

![Figure 12 Tropical Forestry Service's nursery at Kununurra – funding and development of tree plantation activity supported by MIS and other investment mechanisms](image)
The reality is that the financial collapse of most of the MIS companies has damaged investor, industry and community confidence. Prompted by this situation the Australian Government is taking action toward increased regulatory safeguards for investors and corporate disclosure arrangements for MIS entities, which should strengthen this mechanism to protect investors and rebuild industry confidence.

It is considered that MIS arrangements may continue to provide an ongoing mechanism for attracting investor funds to establish short rotation pulpwood plantations, but it is improbable that they will play a significant role in attracting investment in long rotation plantation development (de Fégely et al. 2011).

In order to develop new long rotation plantations, policies will need to address the fundamental economics of such investments by augmenting the high up-front costs and short to medium term cash flow issues, on the basis of their broader public economic and social benefits.

The private sector remains the likely source of new investment in northern Australia forestry projects. The challenge lies in how to achieve additional such investment. Diversified utilisation of plantations for multiple benefits such as thinning for energy and bio-fuels, sawlog production and possibly carbon credits may attract a wider range of investment sources for tree plantation investment.

**MARKETS AND TECHNOLOGIES FOR FOREST PRODUCTS**

It is apparent that as well as providing a renewable source of building materials to meet the increasing demand for housing and construction tree plantations are capable of making a significant contribution to a lower carbon dioxide emissions economy. Tree plantations can also provide a cost-effective and reliable form of renewable energy through the use of wood waste for green energy production. The contribution tree plantations can make to climate change abatement and to bio-energy may be an effective means of encouraging new plantation investment and development.

Bio-energy derived from wood residues is not yet widely used in Australia. Energy generation essentially remains geared towards natural gas and other fossil fuels that are more price competitive and better commercialised in the domestic market than is wood based bioenergy. However, emerging technological advancements provide the potential to expand the use of wood residues and tree crops in non-traditional markets, including bioenergy applications. Research has shown that wood from African mahogany plantations is of high value with suitable recoveries (Armstrong et al. 2004) but further work is required.

Several technologies have been, or are being developed to process sawmill and plantation residues into bioenergy products including pellets, organic matter bio-fuel, bio-diesel and ethanol. One of the more widely adopted processes in Australia is pelleting. Pellets are used for domestic heating and for fuelling small-scale power plants. Briquettes for fuel and energy applications are also produced in Australia.

Raw materials used in the production of pellets and briquettes are frequently abundant as significant quantities of residue and waste are produced from sawmills, wood chipping, other timber processing activities and plantations. However, the costs associated with the production of pellets and briquettes, such as drying, chipping and grinding have made these wood-based bioenergy products more expensive than fossil fuel-based energy.

Pongamia is an Australian native plant with prospects as a bio-fuel source. The plant is drought tolerant, fast growing and can be harvested from 5 to 6 years after planting. It is expected that the plant will achieve bio-diesel yields of 2.5 to 3.0 tonnes per hectare. Pongamia fixes nitrogen, reducing the need for fertiliser. The Northern Territory Government has indicated that if Pongamia plantations
can be successfully established on less arable land, with minimum fertiliser use and variable summer rainfall, then there is a significant potential for a renewable fuels industry in the territory.

The Ethtec pilot plant at Harwood, New South Wales is currently researching the conversion of wood-based materials, as well as bagasse, into ethanol. Such plants could also potentially produce a range of other chemicals.

**RESEARCH AND DEVELOPMENT**

Based on rudimentary research and field trials the high value hardwood tree plantation industry has expanded notably in tropical Australia in recent years. However, the rate of expansion appears to have out-run the building of experience. This has revealed a lack of important knowledge which, when combined with the difficult tropical environment, including threats of cyclones and with small windows of opportunity cycling from too wet to too dry, make tree plantation establishment and management in northern Australia complex and challenging.

Illustrating this point Reilly *et al.* (2007) point out that in the Northern Territory climatic factors and soil deficiencies have generally lead to low levels of natural productivity. Further, that this low soil fertility coupled with the prevailing extreme climatic conditions, especially the long annual dry period, are the major limiting factors to tree plantation establishment and survival. They stress that it is essential to conduct thorough evaluations of new species, provenances and hybrids to determine their potential in the climatic environment of the region.

Reilly *et al.* go on to note the increasing industry interest in *Eucalyptus pellita* and African mahogany in northern Australia and the research effort that has been concentrated on these species to date. They argue that further funding is required to measure tree performance and yield, to identify and collect improved seed, and to build on the broad research effort to date.

![Figure 13 African mahogany trials, Far North Queensland.](image-url)
In broad terms, forestry and forest products research investment in Australia is declining and many of the research structures and organisation are changing and/or being reduced (Turner and Lambert 2010). The northern Australian forestry industry will need robust research and technical support in the future. While there is a DEEDI research group in Queensland, there needs to be an evaluation of additional requirements, capacity and proposals for future models for research and investment.

Key research knowledge gaps have become apparent including:

- Development of site specific tree plantation management
- Tree improvement - selection of suitable species and genetic improvement of these species
- Site-to-species matching, growth rates, growth model development and plant propagation
- Silvicultural systems including site preparation, stocking, weed control, nutrition, pest and disease identification and control
- Pruning and thinning regimes
- Climate change assessment, including tree plantation influences on water interception
- Wood quality and wood processing options
- Alternative technologies including bio-energy.

The forestry industry has not yet undertaken a thorough inventory and assessment of suitable, available land in northern Australia. Nor has the amount of area of land required to support a viable resource for competitive wood processing been determined. Strategies for sourcing this land that do not rely solely on freehold purchase need to be formulated.

Research into improved nutrient management practices for the tropics is required to ensure the efficient delivery of nutrients and uptake by tree plantations. In addition, research is needed into determining the costs and benefits of nutrient application to different types of plantation and minimising off-site impacts from plantation development.

With the extreme climatic regimes of tropical Australia, the relatively high capacity for nutrient leaching and movement to surrounding aquatic environments is an issue. Appropriate nutrient management plans would need to be formulated and monitored.

The Queensland Government has indicated that it will continue to invest in targeted, priority research projects to support the development of the tree plantation sector. Key investment areas will include:

1. The development and release of improved hardwood plant material
2. The development of effective tree plantation management strategies
3. Tree physiology research to support commercial outcomes, such as resource use efficiency, carbon sequestration and the identification of effective control strategies for endemic pests and diseases
4. The development of profitable and sustainable early return wood products and production processes.
Work will also be required with the private tree plantation sector, prospective investors and peak bodies to identify, clarify and support new market opportunities for plantation products.

Initiatives to form an African mahogany growers group and a tropical Queensland timber industry organisation may lead to improved industry collaboration. In the event that the industry decides on a collaborative research and development approach, an effective independent group would be required to coordinate, manage and deliver the program. As an example of the existing lack of a coordinated collaborative research effort, the breeding of African mahogany and teak species has led to individual companies undertaking their own separate breeding programs or relying on overseas seed and/or plantlet supplies.
Future forestry Directions in Northern Australia

To date forestry development in northern Australia has largely taken a temperate tree plantation model and moved it to the tropics without adequately considering key differences and limitations. While much of the forestry activity to date in northern Australia has been driven by private companies there will be a requirement for significant Government assistance and cooperation into the future.

The future direction of forestry industry activity in northern Australia outlined below has been informed by:

1. The findings of a questionnaire sent to government forest policy agencies in Queensland, Western Australia and Northern Territory. (Appendix 3)

2. On-the-ground and written consultation with Federal and state government agencies, researchers, private sector companies, Aboriginal land councils and industry advocates (Appendix 1)

3. The contribution of speakers, workshop leaders and participants at the Northern Australia Forestry Stakeholders Forum held in Cairns on 6-7 April 2011 (Appendix 2).
Recommendations and Conclusion

The following summary lists likely future key forestry and forest products industry-related activity in northern Australia identified by the above consultation process:

1. Developing critical mass areas of hardwood tree plantations directed at higher value African mahogany, teak and *Eucalyptus pellita* sawlog production

2. Short rotation *Acacia mangium*, or other species, plantation establishment for export pulpwood or woodchip production, biomass for energy production or other carbon-based products

3. Extension of *Pinus caribaea* plantations for sawn, pulp and bio-energy production

4. Indian sandalwood plantation expansion, notably associated with the further expansion of the ORIA scheme, but also in proposed Queensland and the Northern Territory sites

5. Limited, selective use of native forests for timber production, especially to advance Aboriginal economic, social and employment goals.

These activities were further analyzed at the Northern Australia Forestry Stakeholders Forum and summarised under the following headings:

- Tree plantation-related tasks
- Financial viability-related tasks
- Planning and advocacy-related tasks
- Utilisation and marketing-related tasks
- Native forest-related tasks
- Strategic-related tasks

**Tree plantation-related tasks**

1. Identification of regions suitable to develop tree plantation areas of ‘critical mass’ to support competitive wood processing activity

2. Continuation of *Eucalyptus pellita* province testing, including related establishment and silviculture regimes

3. African mahogany tree breeding program to improve tree form, growth rates and timber yields

4. Teak clonal performance analysis and improvement, including form pruning and other silvicultural practices

5. ORIA buffer plantation development potential (mixed species, short rotation options and saw log and other products)

6. Tree plantation establishment options in West Kimberley including species, land-ownership, financial modeling and wood-based products
Figure 14  Teak trials, north Queensland researching clonal performance analysis, form pruning and other silvicultural practices.

Financial viability-related tasks

7. Requirements of levels of Government support to give confidence to investors

8. *Acacia mangium* short rotation production options, notably value-adding options, such as bio energy and carbon-based products

9. Plantation financial modeling, involving the use of indigenous-owned land, yields, products, markets and financial returns

10. Administration and management issues related to the use of indigenous-owned freehold land for tree plantation establishment

11. Investment options and modelling for future tree plantation establishment, utilising ‘patient’ capital, including international managed funds and superannuation funds

12. African mahogany ‘critical mass’, utilisation options and market development analysis and recommendations

13. Development of business case modelled around the African mahogany resource in the Douglas Daly region of the Northern Territory aimed at attracting international investors

14. Biomass tree plantation establishment and commercial utilisation prospects on non-irrigated indigenous-owned land

15. Silvo-pastoral systems integration, including the mapping of suitable land will help to define ‘tensions’ between tree plantation establishment and grazing
16. Development of business cases for utilisation of indigenous-owned land for tree plantations in Western Australia, Northern Territory and Far North Queensland

17. Tiwi Island study of future commercial use options for established *Acacia magnum* plantations, including reestablishment options and economic prospects

**Planning and advocacy-related tasks**

18. Community and indigenous owner advocacy and support for forestry development

19. Local government ‘improvements’ to planning arrangements to encourage plantation forestry development

20. Test the value of regional workshops to examine further development options

**Utilisation and marketing-related tasks**

21. *Eucalyptus pellita* saw log yields, and sawing testing (recovery, grades and applications)

22. Examination of sawing, drying, finishing and development of applications and markets for African mahogany solid timber products

23. Consider integrated products where there are peeling and/or sawing, but with a recognition of the importance of economic scale

24. Further development of low tech, cost effective spindleless lathe technology that may be capable of being used *in situ* using small sizes, but that adds value down-the-chain with an emphasis on African mahogany and *Eucalyptus pellita*

**Native forest-related tasks**

25. Northern Australia native forest ‘economic’ species utilisation (sawing, drying and product) options, marketing, promotion strategy and economics

26. Estimates of regional native forest resources and the development of business and operational plans to access those resources, including economic analysis of costs and returns are various utilisation options and marketing models

27. East Arnhem Land native forest sustained yield production potential, management techniques, employment and cultural issues

28. Cape York native forest sustained yield management potential (yields, environmental issues, management techniques, economics and marketing)

29. Utilisation and marketing of endemic native forest species on Cape York and in East Arnhem Land

30. Consider the merits of developing a ‘traditional owner’ quality assurance brand and logo.
Strategic-related tasks

1. Development of the case to advocate for Federal Government financial support for Northern Australia forestry development

2. Consider the merits of forming an African mahogany growers group and/or a tropical forestry and timber industry organisation to improve industry collaboration, particularly in relation to research and development

3. Development of the case to support additional research, development and extension activity by FWPA, RIRDC and the Cooperative Research Centre for Forestry

4. Regional synergies with Papua New Guinea, Solomon Islands and East Timor in relation to hardwood tree plantation forestry advancement.

While the above and preceding activities are listed individually, the research and development focus should be on mixed or mosaic integrated forestry development. If the activities listed form the broad future direction they will need to be supported by the following:

- Maintenance and/or increase in Federal and state government financial and technical inputs
- Development and implementation of forest policy, plantation codes of practice and good neighbour charter
- Social licence to operate and community engagement
- Promotion of forestry as a viable alternative to other land use activities
- Funding mechanisms and models for tree plantation development
- An audit of native forest resources that might be suitable for and support limited, sustainable timber-based industry on Aboriginal-owned land
• An examination of silviculture practices, utilisation methods, infrastructure requirements and marketing prospects related to a prospective native forest-based industry
• Assessment of land availability for viable tree plantation resource development
• Collaborative research and development to address a wide range of forest related activities
• Development of technical services, including those related to pests and diseases
• Research and development of forest products, including the sawing, drying and further processing of solid wood products from small diameter logs arising from hardwood plantation thinnings
• A study of wood flows, project economics and markets to underpin development of processing facilities in tropical Australia.

It is apparent that there is merit in refocusing some of the emphasis and effort presently directed at temperate forest industry research and developmental activities towards northern Australia. Doing so is likely to realise opportunities identified in this report to expand the tropical forestry industry based on sound commercial, planning, advocacy and research foundations.

Within the ‘theme’ activity areas used in this report the concluding two sections provide guidance as to how the opportunities to advance commercially robust forestry and forest products industry in northern Australia might be realised.
References


CSIRO Northern Australia Land and Water Science Review (October 2009)

de Fégely, Rob, Michael Stephens, Michael and Hansard, Allan (2011) Review of policies and investment models to support continued plantation investment in Australia. Forest & Wood Products Australia, Melbourne


Richardson, C. (2009). The current challenges in development of a sustainable hardwood plantation industry to support wood based industries in tropical Australia. Report for FWPA.


Appendix 1. List of parties consulted during the preparation of this paper

- Department of Agriculture, Fisheries and Forestry
- Office of Northern Australia, Department of Infrastructure and Transport
- Various Northern Territory Government agencies
- Queensland Department of Employment, Economic Development and Innovation
- Western Australia Forest Products Commission
- Kimberley Development Commission
- Forestry Tasmania
- Australian Plantation Products and Paper Council
- National Association of Forest Industries
- Timber Queensland
- Balkanu Cape York Development Corporation
- Kimberley Land Council
- Tiwi Land Council
- Elders Forestry
- Tiwi Plantations Corporation
- African Mahogany Australia
- Plantation Management Partners
- Tropical Forestry Services
- Lincfel
- Oasis Farms

Significant consultation has also taken place with:

- Forest and Wood Products Australia
- Rural Industries Research and Development Corporation
DAY ONE (Wednesday, 6 April 2011)

10:00 am – 10:30 am  Registration and arrival coffee

10:30 am – 11:00 am  Preliminaries Project Team

11:00 am – 11:30 am  Opening address Noel Pearson

11:30 am – 11:45 am  Opening address response Rod McInnes

11:45 am – 12:15 pm  Forum background, scope and purpose John Halkett

12:15 pm – 12:45 pm  Research development and innovation: shaping the future of tropical plantation forestry Prof Gordon Duff

12:45 pm – 1:15 pm  Research and development activity in the tropics: what does future hold? Dr Mark Hunt

1:15 pm – 2:00 pm  Lunch

2:00 pm – 2:45 pm  Some suggestions for plantation forestry in tropical Queensland Mark Werren

Tree improvement for tropical hardwood plantations: a commercial focus Simon Penfold

2:45 pm – 3:15 pm  Utility of African mahogany in northern Australia Dr Geoff Dickinson

3:15 pm – 3:25 pm  Workshop scope methodology & purpose John Halkett

3:25 pm – 4:30 pm  WORKSHOP 1

Workshop leaders outline Dr Mark Hunt, Dr John Turner and Dr David Brand

i. Research – what is being done; what needs to be done, and how it could be done - species, performance, genetics, silviculture Leader: Dr Mark Hunt

ii. Plantations development – objectives, targets, options and limitations. Leader Dr John Turner

iii. Business issues and commercial Investment – risk assessment, funding, land, infrastructure and, constraints Leader Dr David Brand

(3:45 pm)  Afternoon Tea
DAY TWO (Thursday, 7 April 2011)

8:30 am – 9:00 am  
The changing Queensland forest industry – towards 2020 and beyond Rohan Allen

9:00 am – 9:30 am  
Biomass energy prospects for wood residues in northern Australia Robert Carey

9:30 am – 10:00 am  
Indigenous land development aspirations and potential in a forestry context Terry Piper

10:00 am – 10:30 am  
Morning Tea

10:30 am – 11:15 am  
Native forest management – employment and social opportunities Michael Hartman

11:15 am – 11:45 am  
In situ sawmilling development for remote sites Warren Lucas

11:45 am – 12:15 pm  
Discussion

12:15 pm – 1:00 pm  
Lunch

1:00 pm – 2:15 pm  
WORKSHOP 2

Workshop leaders outline Dr Henri Bailleres, Jim Burgess and Dr Hans Drielsma

i. Research and development – products, potential products, processing and marketing Dr Henri Bailleres

ii. Planning and community impediment and advocacy actions Leader Jim Burgess

iii. Native forest-related issues Leader Dr Hans Drielsma

2:15 pm – 3:00 pm  
Workshop groups report back

3:00 pm – 3:30 pm  
Afternoon Tea

3:00 pm – 4:00 pm  
Discussion

4:30 pm – 5:00 pm  
Action plan, future pathway and conclusion

Forum speakers and workshop leaders

Rohan Allen, Principal Industry Development Officer - Forest & Wood Plantations Agriculture and Food, Department of Employment, Economic Development and Innovation

Dr David Brand, Managing Director, New Forests
Jim Burgess, Resource and Environment Manager, Timber Queensland

Robert Carey, Director and Chairman, North Queensland Bioenergy Corporation

Dr Geoff Dickinson, Senior Scientist (Tropical Forestry) Horticulture and Forestry Science, Department of Employment, Economic Development and Innovation

Dr Hans Drielsma, Executive General Manager, Forestry Tasmania

Prof Gordon Duff, Chief Executive Officer, CRC Forestry

John Halkett, Director, Forestlands Consulting

Michael Hartman, Chief Executive Officer, Forest Works

Dr Mark Hunt, Forestry Research & Science Leader, Forestry Science Agri-Science Queensland, Department of Employment, Economic Development and Innovation

Warren Lucas, General Manager, Lucas Mills

Rod McInnes, Chief Executive Officer, Timber Queensland

Noel Pearson, Chairman, Cape York Institute for Policy and Leadership

Simon Penfold, Director, African Mahogany Australia

Terry Piper, Chief Operating Officer, Balkanu (Cape York Development Corporation)

Dr John Turner, Director, ForSci

Mark Werren, Forestry Manager Queensland, Elders Forestry
Appendix 3. Summary of the questionnaire results

These were sent to government forest policy agencies in the three states (Queensland, Western Australia and Northern Territory) that have an interest in the future of the forestry industry in northern Australia.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Critical aspects</th>
<th>Desirable outcomes/actions</th>
<th>Challenges/Impediments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear forestry policy</td>
<td>Policy needed to recognise tropical forestry as an industry.</td>
<td>Forestry allowed on pastoral land.</td>
<td>Political will</td>
</tr>
<tr>
<td></td>
<td>Pastoral land act amendments.</td>
<td>Tropical hardwood forestry recognised as an industry.</td>
<td>Native title</td>
</tr>
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<td></td>
<td>Carbon policy affecting forestry.</td>
<td>Aspects of carbon trading worked out for forestry.</td>
<td>Environmental lobby groups.</td>
</tr>
<tr>
<td>Land use planning</td>
<td>Issues related to land use planning framework for timber plantations</td>
<td>Improve the social license of the forest plantation sector in North Queensland through a community education program that will engage relevant parties in local communities.</td>
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<td></td>
<td>Inconsistencies between Local Government planning schemes constrain plantation development.</td>
<td>Timber Queensland has identified the need for more than 100,000 hectares of additional sawlog plantations. Further investigation is required to determine what size and composition of plantation estate is required by Queensland for next 50 years.</td>
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<tr>
<td></td>
<td>Plantation development is generally treated differently from agriculture and consequently required to undergo higher levels of assessment under planning schemes.</td>
<td></td>
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<td></td>
<td>Third party appeal rights cause delay and expense.</td>
<td></td>
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<td></td>
<td>Excessive road usage costs are applied to plantation development relative to other similar land use developments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inconsistent application of environmental and other conditions applied on plantation developments relative to other similar land use developments.</td>
<td></td>
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<tr>
<td>Genetics</td>
<td>Coordinated approach to genetic improvement.</td>
<td>Increased research on species adaptation and matching of species to environments and fast tracking of improved varieties to industry.</td>
<td>Tissue culture technology</td>
</tr>
<tr>
<td></td>
<td>Continued support of existing programs.</td>
<td>Continuation of the Smart Forest Alliance</td>
<td>Cost of new genetic technology</td>
</tr>
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<td></td>
<td>(see additional comments below)</td>
<td>Consistent and reliable supply</td>
<td>Time</td>
</tr>
<tr>
<td>Growth rates, productivity yields, commercial performance, species suitability</td>
<td>Lack of proven commercially available tree varieties for most regions. Constraints on the economic viability of timber plantations in some areas at present due a number of issues including a lack of ‘off the shelf’ commercial tree varieties, insufficient total resource to support an industry and a lack of markets for products.</td>
<td>Further investigation is required, at a state level, into opportunities for leveraging of ‘carbon’ co-investment to improve the commercial viability of plantations for some regions.</td>
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<tr>
<td>Value adding opportunities</td>
<td>Management of thinnings into ply, potting mix, biofuels, veneering. Emerging carbon markets.</td>
<td>All products from plantations (including thinnings/waste) are profitable. Market opportunities for value added product identified. Critical mass of product for value adding established. Distance from markets. Economics</td>
<td></td>
</tr>
<tr>
<td>Available land</td>
<td>NT land mostly controlled by indigenous interests or pastoral leases. Little freehold available. Restrictions on clearing.</td>
<td>Equity in land tenures. Identification of soil types and mapping. Pastoral land legislation Native Title Pastoral and environmental resistance to development</td>
<td></td>
</tr>
<tr>
<td>Nutrition</td>
<td>Critical deficiencies need identification. Amount of fertiliser needs to be determined relative to phenology. Site classification or indexing needs development.</td>
<td>System of site assessment developed. Nutritional programs developed on site assessment. Nutritional and prescriptive models developed. Funding Time</td>
<td></td>
</tr>
<tr>
<td>Silviculture</td>
<td>Skilled seasonal &amp; available labour</td>
<td>Good training courses</td>
<td>Skill shortage</td>
</tr>
</tbody>
</table>

**Additional topics identified for consideration**

Effects of climate change on plantations and forests

Carbon storage in plantations and forests
Appendix 4. Summary of results and key findings

This summary is of the RIRDC review of their Joint Venture Agroforestry Program (JVAP).

Although the JVAP has adapted to changing circumstances over its three five-year phases (1993-1998, 1999-2004, and 2004-2009), it has had some consistent themes including:

1. To build confidence in agroforestry's capacity to enhance agricultural sustainability while providing additional public benefits.
2. A desire for agroforestry to be commercially viable, through either combined returns from public and private benefits, or from having sufficient scale to be profitable in its own right.
3. Consultation with the industrial plantation forestry sector.

Key messages concerning agroforestry from the JVAP report include:

1. Except for short-rotation pulpwod, the profitability of 'traditional' farm forestry, including thinning private native forest is generally marginal at best.
2. Emerging markets (in carbon sequestration, bioenergy and biofuels) have the potential to change the profitability of agroforestry. Carbon 'farming' appears to offer significant potential for 'mainstream' farmers to add to and diversify their income streams, and/or mitigate emissions from their livestock and cropping operations.
3. There are encouraging signs that the lack of early financial returns for 'traditional' farm forestry are being overcome by innovative processing technologies that enable high-value products, such as appearance grade timber to be produced from short-rotation pulpwod grown in higher rainfall areas and pruned sawlogs.
4. The 38 million hectares of privately native forests have significant potential to augment diminishing hardwood sawlog supplies from public native forests. Enhancing research into the biodiversity outcomes from good silvicultural management, combined with the development of emerging markets in environmental services from privately owned native forest will assist in realising their economic potential.
5. With increasing rainfall predicted for northern Australia, there appears to be significant potential for good returns on investment from research into agroforestry in the wet and dry tropics.
6. Research to elicit the key drivers and barriers that influence behaviour of target audiences can optimise time, resources and effort in developing the agroforestry sector.
7. It is recognised as critically important to engage key regional interests in consultation and planning for research, development and extension and on-the-ground action, particularly where larger scale plantings are proposed.

The JVAP identifies priority issues for a future research, development and extension programs to be pursued by key forestry and rural industries as including:
1. Tree species and plantations for carbon sequestration and biomass-related industries.

2. High-value, farm-grown, wood-based industries, such as short-rotation sawlogs, cabinet timbers in the wet tropics, and timber products in the dry tropics.

3. The social trajectories and relevant knowledge, attitudes, skills and aspirations of farming and regional communities who may become involved in growing the tree species and plantations as indicated in 1 and 2 above.

4. Integrating knowledge in holistic assessments of the social, economic, water, biodiversity and agricultural outcomes of various carbon sequestration, biomass-related and high-value wood-based industry scenarios and designs.

5. Unlocking the potential of privately native forests through improved forest management practices, yield determinations and timber product marketing.

6. Knowledge sharing between research programs, investors and managers to improve the direction and operation of research and maximizing the adoption of research findings.
Appendix 5. Summary of the Queensland Plantation Industry Development Project

The release of the Queensland Timber Plantation Strategy 2020 has identified a range of priority actions for the Queensland Government in relation to the land use planning framework, legislative and policy projects, investment initiatives, targeted industry development support and community engagement. The Plantation Industry Development Project provides an important mechanism to deliver on many of the proposed actions, particularly where industry input or leadership is required.

The project is a joint initiative between Timber Queensland (TQ) and the Department of Employment, Economic Development and Industry (DEEDI) aimed at supporting the sustainable development of Queensland's plantation sector.

TQ's collaboration in the project was initiated in February 2009 with grant funding from DEEDI. The project represents a key mechanism for the Queensland Government to engage with Queensland's plantation industry and other interested parties in facilitating industry growth in a sustainable manner.

The project's objectives include:

- Develop and maintain collaborative relationships with key elements of the Queensland plantation industry supply chain to provide a technical knowledge base and link role within the industry.

- Assist the Queensland plantation industry's technical and strategic input into industry issues, initiatives to address impediments to growth and development and forest industry policy development.

- Build productive relationships with other plantation industry stakeholders to improve community understanding of the plantation sector and to improve working relationships with other industries, Local Governments and other stakeholders.

- Facilitate community forums, field tours, information sessions, etc as part of a communication strategy to improve community awareness of the benefits of the plantation forestry sector.

- Initiate and lead industry development projects to deliver beneficial outcomes for the private plantation forestry sector, including assisting industry to develop funding proposals to meet any identified gaps and to address industry challenges.

The project direction and activities are guided by a Project Reference Committee involving representatives from the plantation growing and processing sectors, private forest growers, DEEDI and Timber Queensland.
Future Directions for Forestry and a Forest Products Industry in Northern Australia

By John Halkett, John Turner, Simon Penfold and Geoff Dickinson

Pub. No. 12/081

This report considers whether commercial forestry is a viable option in northern Australia over the long term. It follows various reviews of the industry which have concluded that, for significant development to occur, a number of key issues need to be addressed including the sustainable management of natural resources and the economic, social and environmental goals of northern Australia.

The study lists specific issues that need to be addressed in future forestry industry related developmental activity in Australia. It suggests there is merit in refocusing some of the emphasis and effort presently directed at temperate forest industry R&D, towards northern Australia.

RIRDC is a partnership between government and industry to invest in R&D for more productive and sustainable rural industries. We invest in new and emerging rural industries, a suite of established rural industries and national rural issues.

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