The future role of the

National Park Forestry Zone

in a
Sustainable Forestry Sector
on Norfolk Island

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I. Introduction

This report was commissioned jointly by the Minister for Community Services of Norfolk Island (Mr Tim Sheridan) and the Director of National Parks (Mr Peter Cochrane).

The background to this study is explained in the Terms of Reference (see Annex I). The Director of Australian National Parks has publicly circulated a proposal for the Forestry area of Norfolk Island National Park in 2011 (see Director of National Parks, 2011a). It envisaged:

- Protection of existing remnant native vegetation, of high conservation values, (about 24 ha) within the 124 ha Forestry area
- restoration of the weed infected areas (mainly African olive) to natural vegetation (about 49 ha);
- conversion of the existing 26 ha of eucalypt plantations to either rehabilitated natural vegetation or Norfolk Island pine plantation; and
- modest expansion of the existing area of pine, from about 25 ha to 27 ha.

A counter proposal from the Norfolk Island Government proposed expansion of pine plantations onto all areas of the forestry zone that were suitable for pine, apart from those areas of remnant natural vegetation of high conservation value which were to be managed for conservation. The Minister noted that the proposal from the Director of National Parks was a significant departure from the 1983 Management Plan for the forestry area and the Administration's previously stated objective of achieving a high level of self-sufficiency in timber, on Norfolk Island, from plantations of Norfolk pine.

This assignment therefore requires an independent assessment of the economic viability and sustainability of the native pine timber industry and then of the eucalypt plantations, on Norfolk Island. This in turn requires exploring the likely future demands for various wood products on the island and the prospects/options for satisfying those demands with wood from the Forestry Area plantations in the national park. The prospects of export of timber from Norfolk Island were to be considered, but are probably small (see annex V for an outline of issues associated with exports of agricultural products, over many decades, which equally apply to the forestry industry). The Norfolk Island Government's preference is to reduce the volume and value of imported wood products where that is feasible and efficient, by having a viable forestry sector on island – growing and processing pine for local markets.

Although this may sound straight forward, it is actually quite complex to estimate future timber demands (Byron, 1979; 1981). The fundamental drivers (the size and age composition of the resident population; the determinants of demand per capita such as changing technologies of construction; changing consumer preferences and styles; and changing relative prices of alternatives to wood products) are quite uncertain over the next five years, not to mention over the next 30-80 years – the time between new tree-planting and eventual harvest. It is always tempting to assume the future will be much the same as the present, but this would be very dangerous, especially over 50+ years. Almost all facets of modern life are very different to 50 years ago; the next 50 is likely to be more unpredictable and the pace of change is likely to be even greater.

Similarly on the supply-side, much can change in the potential wood supply over such long time periods – catastrophic weather events, pest and disease attacks, even technologies, labour supplies and access to markets.

Many past studies have been misleading and incomplete because they focussed only on the trees – the wood-resource – without considering the whole forestry sector including the processing industries and the markets for wood products (particularly the costs associated with capital infrastructure, running costs and provision of storage for product). All those involved in such "Forestry Sector Outlook Studies" around the world (including in Australia and New Zealand) are very conscious of past mistakes and the inherent difficulties (Byron 1997; 2006). The best approach seems to be for all projections and forecasts to be quite explicit about all the assumptions an analyst must make, and to highlight the key factors that could lead to very different outcomes.

A forestry sector supply-demand study cannot be undertaken without an appreciation of the past events, and other changes currently occurring in the broader economy and society. I have therefore tried to read extensively on both the background to Norfolk Island's Forestry sector and related issues (e.g. Butler,1974; Woolcock, 1978; Holzworth 2000; Huth et al 2005)); and concurrent changes such as the Road Map, the Public Sector Review (ACIG 2011), the Governance Report (ACIL Tasman 2012) and the Economic Development Report. I have endeavoured to ensure that this report is not incompatible with those.

The consultant wishes to thank all the people on Norfolk Island whom he met with (see Appendix II) for their time, patience and generosity in

- explaining the special situation of the forestry plantations in Norfolk Island National Park,
- offering and discussing their views on what would be on the best long-term interests for the people of Norfolk Island, as a whole, not just particular interest groups; and
- explaining the realities of life on a small and relatively remote island and the unique (sometimes idiosyncratic) institutions for managing natural resources on the island, and the constraints and opportunities on the path forward.

2. Recent History of Development of Norfolk Island's Forestry Sector

There is a long history of use of the island's unique Norfolk Island pines – indeed that was one of the reasons for the first British settlement. But for this report, the story begins after World War II.

Foresters all over Australia and New Zealand – indeed all around the world – then were convinced that a "world-wide wood famine" was threatening. They believed fervently that the rapidly increasing demands for timber for industrial/commercial purposes would result in massive depletion of natural forests everywhere, with catastrophic consequences for society and civilisation. As a result, fast growing industrial plantations – often of pines and eucalypts – were established around the world in all countries that could afford to do so. There was very little discussion of the economics of these forestry investments. But it was often assumed that, because of the desperate hunger in the future for whatever logs could be found, the prices for selling plantation logs would be quite high and so the

investments would be very worthwhile financially, as well as socially (job creation) and environmentally (prevention of massive deforestation and destruction of natural forests). Because it was assumed that private companies and individuals would not establish plantations (because they were assumed to be too short-sighted to anticipate the great future benefits) these timber plantations were nearly always created by government forestry agencies funded by taxpayers.

In the 1950s, Norfolk Island's forestry advisers from Australia strongly urged the establishment of fast-growing high quality eucalypt plantations on the western side of Mt Pitt Reserve near Anson Road, by a government agency. These plantations were to supply the public and private sectors with posts and poles, so they included species like ironbarks which are very hard, strong and naturally durable, as well as utility timbers like blackbutt and spotted gum, and some softer lighter timbers like flooded gum. Following some (pre 1939) trial plantings on private land near Anson Bay, about 26 hectares of the 10 most useful species from northern New South Wales and southern Queensland were planted between 1950 and 1960. The purpose of this was to prevent the massive destruction and removal of all natural timber, especial Norfolk Island pines (assuming the population and economy of the island would grow rapidly) by supplying alternative supplies of (much-needed) poles and posts.

Although they recognised the island's remoteness and freight difficulties, the forestry advisers did not aim for complete self-sufficiency for the Island, but to supply "an appreciable level of timber production" (McArthur & Benson, 1973). The initial planting target in the 1950s was 120 ha; in 1968 it was reduced to 40 ha; ultimately 26 hectares were planted.

In the 1980s, the Australian forestry adviser (Benson, 1983) observed that the eucalypt plantations were already mature, even over-mature, for posts and poles and so commercial harvesting should begin very soon. Many trees were already becoming too big for posts and poles, and he suggested that the rest should be cleared progressively to meet the Island's (at that time quite significant) demands for fuelwood.

In his 1992 report Benson recommended a government business enterprise be created to mill, treat and market all the eucalypt material soon, as the plantations should be clearfelled, given their age and size.

Benson also argued strongly for plantations of Norfolk Island pines (similar to the plantations in Qld of the very closely-related hoop pine, *Araucaria cunninghamii*) to further help take the pressure off the natural forests and help eke out the supply of big old Norfolk Island pines. It was feared that these big old trees – so important to the landscape and the attraction of visitors/tourists – would soon be extinguished. Subsequently about 25 ha of Norfolk pines were planted between 1986 and 1993. There have been no further plantations within the national park since then, possibly because of doubts about how much plantation was warranted, and possibly because the Island government and Administration perceived much higher priorities for their limited budget (such as health, education, communications, transport and community services).

For most of the past 30 years, the island's local timber supply has come from salvage of wind-blown or big old senescent pines, mainly processed through the small sawmill on Mill Road and then through the tanalith (Chromated Copper Arsenate, CCA) preservation

plant. This has supplied about 40-50% of the *sawn-timber* consumption, with the balance being mainly treated radiata pine from New Zealand. The demand for *roundwood* (electricity poles, telegraph poles, fence posts, rails etc) has been met mainly from NZ radiata. Although some eucalypt roundwood was used in the 1980s, but customer satisfaction was apparently very mixed (some customers got the very durable ironbarks while others got the softer lighter and less durable gums which were quite unsatisfactory). The supply of NZ radiata has since become dominant because of price, performance in use, and ease of working (sawing, nailing, carrying etc). The market for eucalypt *firewood* for domestic heating was greatly reduced once gas became widely available on island. Even sawmill residues are no longer sold (or even given away) as firewood.

3 Current Situation

3.1 Resources

There are now at least seven ***potential*** sources of supply of logs:

a) The big dead or dying (over-mature or senescent) or wind-blown pines or those that represent a risk to public safety are salvaged and removed for milling. The Forester has (quite rightly) been judicious in issuing such permits, in order to minimise the removals, to maintain the landscape aesthetics and biodiversity of the island, so important for tourism. Nevertheless, this source currently supplies nearly all the Norfolk pine used on island annually (about 80 trees/year yielding about 800 to 1000 cu.m. of logs which is converted to between 400 and 700 cu m. of sawn wood, subject to the vagaries of demand) . This also represents almost half of the estimated total consumption of sawn timber (the balance being mainly up to 1000 cu.m. per year of imported NZ radiata pine).

b) The 22 hectares of 25-30 year old pine plantations in the national park forestry area will soon be ready for commercial thinning, with many of the trees already over 40 cm dbh. (which is considered commercial size in Queensland's hoop pine plantations). Over the next 30 years, the existing plantations (together with salvage) have the potential to supply more logs than the existing processing and preservation plants can handle, and more product than the Norfolk Island population is likely to use. When clear-felled, a hectare of 50 year old Norfolk pine plantation could be expected to produce about 600-900 cu.m. of logs over 60 cm dbh, as well as producing 200 to 300 cu.m. of thinnings over 40 cm dbh during the rotation. Together with salvage and thinnings, this volume would be substantially more than the Island has ever used before, or is likely to use in the foreseeable future.

c) The Coastal Reserves (like 100 Acres Reserve) contain many mature pines. Although originally planted for production purposes, these now have well-accepted environmental and amenity values and are unlikely to be logged in future. However, there could be some salvage and thinning possibilities, which could readily supplement the log supply, if necessary (but it seems quite unlikely this would be called upon).

d) There are currently 20 registered plantations (mainly pine) or tree-farms, on private lands outside of the KAVHA. The best estimate is that these amount to approximately 17,500 trees, of varying ages. The intention of most of the owners is that these plantations will be commercially harvested at some time, and hopefully sold for a

reasonable price. However, unless the market for Norfolk pine timber grows substantially and/or there are serious failures with a) b) and c) above, it is likely that the owners of these tree farms will be receive little payment for any trees they are able to sell. Small-holder forest plots in almost all countries have difficulty selling their logs in competition with government forestry agencies who almost invariably can offer much larger volumes at lower prices (Byron & Douglas, 1979; Byron 2001)

e) Significant areas of private land within the KAVHA zone have been planted with Norfolk pine by the Authorities, primarily for landscape values and erosion-control. Nevertheless many of the landholders may have expectations that some of these trees (currently about 25-30,000 trees) may be available for harvest at some future date, whether for sale or for own-use. The status and conditions of these plantings seems ambiguous at present and may need clarification, but at least potentially these could supply additional logs if required.

f) Scattered plantings of pines in small plots and clumps, on private lands, are believed to amount to some 8,000 - 10,000 trees of all age classes from recently planted trees to some well over 100 years old. Some of these are being grown for timber, while many are grown for other (amenity and conservation) reasons, but will gradually move into the salvage category over the decades.

g) The eucalypt plantations in the national park (about 26 ha or about 20,000 trees after allowing for access tracks, mortality and some thinnings in the 1980s) are contentious. This *potential* resource is discussed in some detail below.

It is very important, in trying to decide what to do about the Pine plantations in the Forestry Area of the national park, not to ignore all the other potential log sources, or the related processing and marketing activities. The fact that the pines grow well there is important, but successful planning needs to be based on much more.

3.2 Industry

The main sawmill on island is operated by Mr Howard Christian on Mill Road. Although precise data for capacity and annual log input and sawn output are unavailable, the *Forestor* mill probably has a maximum annual capacity of up to 3000 cu m of log throughput, but is currently processing about 1000 cu.m. and producing about 600 cu m of sawn output on average. Although it only operates intermittently and uses only big old salvage logs, a substantial volume of sawn product is currently in the yards awaiting tanalith preservation treatment. Part of this stockpile is drying, as is necessary before it can be treated, but much of it is just awaiting its turn in the Tanalith plant.

There are at least two other very small mills operating occasionally on island, operated by Mr Steve Nobbs and Mr Neil Tavener, (a *Lucas* portable sawmill) again using either private or salvage logs. Some of their production also has to be treated at the Tanalith plant, (although Mr Taverner applies his own *Protec* (boron-based paint) preservative treatment). There appear to be no records about their sources of log supply, their production levels, or the markets they service. These are part-time micro-businesses that seem to serve a valuable function to the community, but they do not seem to have much potential for expansion without very substantial new capital investments.

The Tanalith plant was installed about 1965-67, and has given many years of service, partly as a result of extensive maintenance. There were upgrades in the past decade or so for Occupational Health & Safety (OHS) reasons and to minimise risks of environmental damage through accidental chemical spills and drainage of excess chemicals from treated wet wood. Nevertheless, the future life of this plant cannot be indefinite. It is already recognised that the cylinder (at about 8 metres) is too short to treat long lengths (often 11 metres is required, whether sawn or for electricity poles). It has been previously offered for sale, but apparently there were no offers (purportedly because it was seen as uneconomic or prospective bidders feared liability for past chemical spills and leaks).

There is some excess capacity in sawing and preservation, but it is not very much in aggregate volume terms. The home-grown share of Norfolk Island's timber consumption does not seem to be held back by shortages of logs. If the local share is to rise significantly, both the sawmilling and preservation processes would need to be substantially upgraded and expanded. It is unclear where the finance for this would come from, or whether doing so would be commercially viable, given the small size and volatility of the domestic market, and the strength of the competition from imported radiata pine.

3.3 Markets

In many countries, the bulk of the sawntimber consumption is in residential construction. A common method for estimating future consumption is:

- Estimate the likely number of new houses to be constructed in 20-50 years, based on the expected population and especially the number in the "household formation" age-cohort, usually 20-30 year olds;
- Estimate the average volume of timber used per dwelling (allowing for the relative numbers of houses Vs apartments, the expected construction style and technology and the amount of timber Vs substitute products like concrete, steel, aluminium and brick, etc)
- Multiply these 2 together to estimate the amount of wood used in new houses
- Add on another amount (sometimes 25% sometimes as much as 50%) for non-residential construction and for renovations/additions or decks/pergolas;

to derive an estimate of the total sawn timber likely to be used.

Other variants add sophistication like assessing how the relative prices of building materials might affect consumption, or consumer preferences, or labour costs. (For example, concrete slab flooring replaced timber floors across most of Australia about 1978-80) not because concrete was cheaper than timber, but because the labour cost of installing a concrete slab floor was less than half that for a suspended timber floor, while consumers were willing to pay considerably more for a house with a concrete slab than for an otherwise identical house with a wooden floor because it was better insulated).

The ACIL Tasman report (2012) noted that the population of Norfolk Island grew strongly in the 1960s and 70s when access restrictions were relaxed, but had fallen over the past decade. The 2007 URS report shows a declining trend of the resident population since 2001:

Year	**1986**	**1991**	**1996**	**2001**	**2006**	**2011**
Population	1977	1912	1772	2037	1863	1796

More importantly, the ACIL Tasman report notes the "relative lack of people in the 15-54 age bracket and the relatively large number of people in the over 55 bracket" (page 27). The out-migration of the younger (more economically productive) cohorts is important for overall economic activity, but also because it also leads to much lower rates of household formation and home building. This suggests there is little basis to expect much higher rates of residential construction over the next 10-30 years **unless** there are radical demographic changes. Similarly, **unless** there is a large rebound in visitor numbers to absorb existing excess capacity in visitor bed numbers, and then even more growth in tourism, there is unlikely to be a great demand for constructing more new visitor accommodation and other non-residential construction like shops and cafes.

In the 1950s, the per capita consumption of sawn timber in NZ, Australia and Norfolk Island were all about 0.5 to 0.55 cu.m. per year Today, it is still about the same on NI, (or by some estimates even as high as 0.8 cu.m./person/year) but in NZ the corresponding figure has fallen to around 0.3 cu.m. and in Australia about 0.17 cu.m. This is not surprising – the cost of importing heavy, low-value products like bricks, concrete and steel gives timber a real advantage over substitutes on Norfolk Island, whereas intense competition has radically changed building styles and construction techniques elsewhere, in Australia especially.

It is difficult to confidently predict what sawn timber consumption might be in NI in the next 50 years, but it is probably safe to say that on a per capita basis, consumption is unlikely to increase from current levels and is more likely to gradually fall, especially if sea transport is improved and the cost of imported timber (and other non-wood construction materials) subsequently decreases (e.g. due to containerisation and wharf facilities).

Within the overall market for sawn-timber on NI, how much will be of imported NZ radiata pine and how much will be domestically produced? Although governments quite naturally have a preference that consumers buy and use local products to "keep money at home", consumers on NI seem to consistently prefer radiata over Norfolk pine for construction uses because it is lighter and easier to work, while preferring Norfolk pine for appearance grades (furniture etc), even though their retail prices seem to be very similar. Perhaps more importantly, a builder can order a shipment of radiata of specific sizes and grades, all gauged, and start using it within days of the ship arriving. In contrast, the delay in getting Norfolk pine, from order to usage, can be up to a year (because of the time taken to find a suitable salvage tree, saw and dry it, put it though the Tanalith plant and wait for it to dry again). The domestic industry (1-man, part-time micro-businesses) is simply not of a scale that it can afford to have many tens of thousands of dollars worth of finished inventory sitting in stock, pre-cut to various sizes and grades, awaiting buyers. Even with the delays and costs inherent in international shipping, it seems NZ can service Norfolk timber buyers more quickly and efficiently than the domestic industry can. This *might* change in the future – but it is difficult to be confident about that.

The market for **eucalypt** products – particularly poles and posts – seems to be similar in many ways. It seems some consumers had positive experiences (as noted by Snow Taverner in his Submission) many others had unsatisfactory experiences with the eucalypts first marketed about 1980s and have been reluctant to try them since. The species of eucalypts that reached commercial size first would have been the softer,

lighter, less-durable species; while the hardest, most durable species are much slower growing. Because many timber users on Norfolk are unaccustomed to using eucalypt timbers and were unaware of the very different wood-properties of each of the species planted in the Forestry area, (See Annex IV) often trees were used for the purposes for which they were ***least*** suitable. Different species were mixed and all sold as "gum". (This is like saying that goldfish, trumpeter and shark are all just "fish"). Furthermore, many of the Australian hardwoods are notoriously difficult to work with (sawing, drying and nailing) and so many wood users and builders have (quite understandably) decided it is much safer and easier to just use radiata or Norfolk pine. That seems to be one of the main reasons why very little eucalypt timber has been used, in spite of the trees being of usable size and quality for the past 30 years. (See Annex VI) Perhaps if there were much larger volumes of each of the species, it *might* have been worth the effort to understand the unusual quirks of each species, and to process and market them separately. But in practical terms, it simply hasn't been worth the time and effort to acquire this expertise for relatively small volumes of wood supply, for just a few years. This is also unlikely to change in the future.

The Value Chain for Pine Timber

It can be very informative to track the process from seedling to timber and finished products, and estimate the values at each point along the Chain. This example uses simple round numbers, just as a hypothetical, but they are plausible approximations.

Imagine a tree with the height, diameter, shape and branch-structure that would yield a sawlog 10 metres long, 70 cm diameter at the butt and 30 cm at the small end. It would have a volume of approx 2.5 cubic metres after the tree is felled.

If the price of standing trees was $20/cu/m – the apparent current royalty rate – the tree would be worth $50; [at $40/cu.m. that tree would be worth $100].

By the time that tree has been cut, and the log trimmed and taken to the mill, it is worth about $130.

Because only about 40% of the log volume can be recovered as finished sawn timber, the 2.5 cu.m of log would yield 1 cu.m. of timber – the rest being offcuts, defects, unusable material and sawdust.

log volume (cu.m.)	2.5	2.5	2.5
Log price $/cu.m.	**5.0**	**20.0**	**40.0**
log value $/cu.m.	12.5	50.0	100.0
Harvest $/cu.m.	80.0	80.0	80.0
sawing cost $/cu.m.	250.0	250.0	250.0
Conversion	0.4	0.4	0.4
green lumber cu.m.	1.0	1.0	1.0
green Value $/cu.m.	342.5	380.0	430.0
Preservation $/cu.m.	50.0	50.0	50.0
Wholesale $/cu.m.	451	495	552
Retail $/cu.m.	542	593	662

Table 1 simplified hypothetical **Value Chain** Tree to retail timber,
Showing effect of change in log price on retail price

So after buying the tree, paying for the harvesting costs, and about $250 in sawing costs per cu.m. of product, the green lumber has cost $380-400 to produce so far.

After waiting for it to dry, transporting it to/from the treatment plant and paying for the CCA treatment, this cubic metre might have cost $430 to produce.

If it is sold to a wholesaler for $500 (a profit margin of about 15%) and the wholesaler adds a margin of 20% (not at all uncommon on most products) the retail price would be near $600 per cu.m. and the product would be basically competitive with imported dried and treated radiata pine.

If the standing trees were sold at a nominal price (say $5 per cu m of log), the comparable retail price would fall to $540-550 per cu.m. A royalty of $40 would lead to a retail price of $660, all else the same. But if the value of the standing trees had to be say $100/cu.m. of log, to cover the growing costs, then all other things being as above, the breakeven cost of the finished product would become $850-900/cu.m. Under the assumptions of this example, log prices this high would make the finished product uncompetitive.

The attached excel spreadsheet could also be used to assess implications of changing any of the assumed costs or the log-to-sawn conversion factor, or retail margins.

4 Future Options

4.1 Pines

Should the existing area of Pine plantations be extended?

Based on plausible estimates of

- how much sawn-timber the residents of Norfolk Island are likely to consume annually, over the next 30-50 years, and how much of that is likely to be local rather than imported; and
- The volume of pine logs are likely to come available from the plantations in the Forestry Area of the national park, other crown plantations, private tree-farms and the salvage of old trees;

there seems to be little case for further expanding the area of pine plantation in the Forestry area of the National Park (especially when this area potentially has high conservation and tourism values if rehabilitated to mixed natural vegetation).

How much bigger do the forestry plantations in the National Park need to be?
This is the wrong question to ask - they do not **need** to be bigger at all – in fact they don't really **need** to be there at all. The current financial problems on Island have many causes, but they are clearly *not* caused by a shortage of trees for timber. The question should be re-phrased.

How large an estate of commercial timber plantations would be worthwhile, or a good investment for the people of Norfolk Island (in future as well as present)?

The case for governments investing tax-payers money into government run tree-farms, as a commercial venture, is very flimsy. If tree-farming was a serious government business, it would have collapsed already, due to high investment and maintenance costs, and very low revenues. That situation is unlikely to change. But the problem is not with growing the trees, it's with the processing and marketing of them. The processing operations, and the markets they serve, are so small and fragmented that they can barely compete with New Zealand production, even despite almost free logs and the freight penalty on imported competing products. If the processors had to pay log prices that were high

enough to cover the costs of planting and tending the trees for 50+ years, they couldn't exist. That is why the plantations have almost no prospect of ever being commercially viable in their own right. **There simply isn't the Crown land available on Norfolk to produce a resource big enough to justify a mill big enough to lower local processing costs.**

Could an argument be made that if only the plantations were bigger they might (together with the growing area of private tree-farms) attract a larger processing facility that would be more successful and competitive, and capable of paying much higher royalties? Unfortunately, the constraint then become the market size, and with export markets very unlikely, This strategy would rely critically on a rapidly expanding domestic market. But people don't construct new buildings just because wood is a bit cheaper or more readily available. This strategy would be very high risk and likely to result in increasing losses in forestry rather than reducing them.

The Norfolk Island government is considering closing Government Business enterprises that currently earn revenues, (especially where they exert unfair competition or inhibit the private sector, or are unnecessary). So it would seem very strange to invest more in an enterprise that has little prospect of paying for itself at any time in the next 30-50 years, is not necessary, and which competes (unfairly) with private tree-farmers who are trying to recover their forestry costs of production.

However, there may be a case for further encouraging the planting of Norfolk pines on private lands for amenity and conservation purposes with the possibility of some commercial harvest in the future. But at this stage, the economics of commercial farming of Norfolk pines for timber does not look attractive (if substantial volumes of low cost, or below-cost, logs are likely to come off Crown lands).

There *might* be a case for spending small amounts on silvicultural improvements of existing plantations on Crown lands, to get the maximum value recovery from the investments already made years ago – the existing plantations. However, if the market prospects for the logs being grown are not good, then spending more money to get them to commercial size sooner is unlikely to be a sound investment.

4.2 What should happen to the Eucalypt plantations?

In terms of ***conservation values*** the National Parks Director has decided that they are of low conservation value and are more of a liability in terms of bush fire risk, water use, potential encroachment and conflict with the conservation values of the Park. Some Island residents believe the eucalypts have become 'naturalised' and now provide significant habitat for birds, and should now be retained. As a forest area, these plantations are also popular with horse-riders, but that is not specifically because they are eucalypts – there could be equally good rides among a mixed pine forest in future.

This issue - whether the **net** environmental benefits of the eucalypt plantation are positive or negative - is outside the terms of reference for this study. We are asked to focus on the eucalypts as a commercial resource, not to consider their environmental merits or flaws, a question best left to the conservation specialists.

A few people with timber interests would like to see the eucalypts kept as a possible future raw material. However, there is little doubt that the eucalypt plantations are no longer suitable or desired for the purpose for which they were established.

There is little interest in harvesting them for post, poles or as sawlogs because there is limited consumer interest in the products that could be derived. The plantations are a ***potential*** resource if someone knew enough about the various species and their wildly different timber properties (Annex IV) to take the trouble to select and use each to best advantage. This is possible but it seems unlikely.

There is no doubt that **if** this plantation was in northern NSW, where

- it was surrounded by a much larger resource of trees of the same (or closely related) species, quality and sizes-classes, which was readily accessible to
- existing mills with the right technology and a suitably skilled and experienced workforce for producing high value products like dressed and seasoned furniture blanks, decking or tongue-and-groove flooring, as well as general green construction lumber (and selling the mill bi-products as chips or fuel); and
- that industry was accustomed to servicing large domestic markets who understand and want those products, in consistent volumes every month, year after year;

then such a plantation ***could*** be worth at least $500,000 in log value, in this year's market conditions (based on recent royalties and stumpage prices for similar logs from state forests and private lands in northern NSW).

Unfortunately, none of those prerequisites are met in the case of these plantations on Norfolk Island.

Instead we have almost the opposite, a small very diverse resource (in species, sizes and qualities) a micro-industry which has neither the machinery or the technically expert workforce for producing high-value finished products; and consumers who are unfamiliar with the products or have previously had bad experiences with eucalypt timbers and have little interest in trying again.

Under these conditions, the plantation trees are probably unsaleable, except at nominal prices. They are not actually a commercial resource *as is, where is* – they are just "standing biomass". If "Expressions of Interest" to acquire the timber rights to these 26 ha of (very) mixed eucalypts was advertised internationally, it is **very** unlikely that any serious applications would be received. Even if the governments of Norfolk Island and Australia agreed that the timber rights could be transferred at a nominal price, to any company that wanted to remove the trees within 8 years and to process them on-island, there would probably be no contenders. The cost of setting up a 'greenfields' processing operation on the island, even using second hand equipment which could cost as little as $50000, is likely to be too high, given the short life-span of the resource, the very doubtful market prospects (either on-island or for export), and the very considerable commercial risks involved.

Just as a hypothetical, (again using simple approximate round numbers for convenience):

> Assume 1300 eucalypt trees in the Forestry area are now of a species, size and quality suitable for sawmilling; (most are still too small or deformed or of the wrong species (see Annex VI)

Assume a lessee/contractor had 5 years or 60 months to remove the eucalypt plantations from the NINP;

This would mean 22 trees per month or 1 per working day.
Even if existing mills were suitable for sawing plantation sawlogs (and in NSW usually special equipment is used for plantation eucalypts), the existing processing facilities may not be able to handle that in addition to their regular pine business, and nor would they easily be able to sell that amount of that sort of wood, under current market conditions. But a new facility - even a very small one with appropriate-sized and good second-hand equipment - is most unlikely to be economically viable on one log a day, and would face the same marketing problems.

"**What should happen to the Eucalypt plantations?" is certainly a difficult question.**

There is a strong public feeling against "wasting" these plantations that have been created over the past 50-60 years at considerable public expense and effort. In an economic sense it may not be wasteful to remove these plantations, if "doing something with them" would actually cost much more than the resultant revenues. Setting up a specific processing facility just to convert these trees into something useable could be a case of "good money after bad" if such a processing facility was going to lose money and result in further waste of capital plus management time and effort.

Most of the technologies for reconstituting small hardwood logs into boards (laminated veneer lumber (LVL) scrimber, valwood) or wood-panels (hardboard, medium-density fibreboard MDF or Oriented Strand Board OSB) are extremely capital-intensive and large scale. They would require a far greater wood resource that the Island could ever produce and a far greater capital investment than the Norfolk Island Administration (or likely private operator) could afford.

Some of the blackbutt (*E pilularis)* trees would be considered very desirable sawlogs in northern NSW and would be converted into high-value floorboards. However, the processing technology to produce such products doesn't currently exist on island and is unlikely to in the foreseeable future (especially for only about 1000 – 1500 trees).

Fortunately, there may be some conversion options that create some real value for Norfolk Islanders without creating excessive demands on the Island's limited funds for capital investment.

Some of the trees are still very suitable for poles and posts
if the users and processors are sufficiently interested to extract the right trees for the right uses and products, and
if consumers recognise that eucalypt products have different characteristics to the radiata or Norfolk pine they are familiar with.

Probably over half of the biomass in the eucalypt plantations is unusable for anything other than fuelwood or woodchips.

If the eucalypt plantations are to be removed for environmental conservation reasons, arguably the best way to do that would be phased over some years (perhaps 3 to 7) at the rate of about 5-6 trees per week, with any sawlogs and round-wood that is commercially usable being sent to the mill or Tanalith plant, as appropriate, while those unwanted for

either category are chipped on site, together with the tops and branches from the other trees harvested and removed to mills.

These chips could be used as landscaping material in the National Park and Coastal Reserves, or sold for other landscaping purposes if a market emerges.

Alternatively, they could be used to help solve another environmental problem on Norfolk Island, **waste disposal.** A 2007 report by URS assessed the feasibility of a high-temperature incinerator to dispose of Municipal waste as an alternative to the current procedures at Headstone which are agreed by all to be unsatisfactory. However, that study (URS Consulting 2007) found that the calorific content of the existing waste stream was too low to support the required temperatures. But if dried hardwood was added to the waste stream, then the clean high-temperature incinerator would seem feasible. This certainly warrants further investigations.

There may also be interesting possibilities for **co-generation of electricity** from such a high-temperature incinerator; electricity could be a high-value use for the trees that are unwanted as posts or timber. However the URS study conceded that the likely scale of the incinerator would be far too small (less than $1/10^{th}$ of what they consider the minimum efficient scale) to be commercially viable, even with the very high electricity prices on island (See pages 3.5 and 5.7).

A similar option might be to install new machinery that would feed the hardwood chips into generators at the power station, to supplement the existing diesel powered generators (to reduce the amount of (imported expensive) diesel required to produce a given amount of electricity). Such technologies are already being used in many places around the world, and are not considered expensive compared to the costs of the rest of the power station. They are considered carbon-neutral internationally provided the land where the trees were harvested from, is regenerated, as would be the case here (to natural forests in the Park).

For an excellent introduction to using woodchips for CHP, see Tomasello et al. (2010) and more generally www.wood2energy.org/

Xylowatt is a European CHP (Combined Heat and Power) unit available from Simmons Green Energy in Australia.[1] It comes in various sizes but the smallest is Model xW300(r) generating 300 kW of electricity plus 600 kW of heat, with a floor area footprint of $200m^2$ and utilising 270 kg of biomass/hour (approx 2 tonnes/day).

Freiburg in Germany has Badenova electricity generation (CHP) powered mainly with woodchips from surrounding forests and sawmill wastes.[2] On a much larger scale, the City of Montpelier, Vermont USA received an $8,000,000 US grant from the U.S. Dept of Energy in 2010, to support the installation of a 41 million Btu combined heat and power (CHP) district energy system fuelled with locally-sourced renewable and

[1] 755 Botany Road, Rosebery NSW 2018, Australia **Phone:** 61 2 8338 8660 | **Email:** info@simonsgreenenergy.com.au

[2] see www.local-renewables-conference.org/fileadmin/lr-conference/files/LR2011/02-Documents/Badenova_2011-10-24_Iclei.pdf

sustainably-harvested wood chips. The CHP system will be sized to provide heating to the Vermont Capitol Complex, city owned schools, the City Hall Complex, and up to 156 buildings in the community's designated downtown district, serving a total of 176 buildings. The project was developed as a public-private partnership between the city of Montpelier, the state of Vermont's Department of Buildings and General Services, Veolia Energy and the Biomass Energy Resource Center. Of course the requirement for heating in winter there is completely different to the Norfolk Island situation.

There are sawmills in Gippsland Victoria that use sawdust and pelletised sawmill residues injected into existing diesel generators (through specially modified nozzles) as a means of extending their diesel fuel, reducing costs, and disposing of waste wood in an environmentally acceptable and cost-effective way. However, these technologies would appear to be far too expensive and complex for application on island.

5 Conclusions and Recommendations

Four key assumptions underpinned the 1983 Forestry strategy for Norfolk Island:
1 Unless fast-growing plantations were established by the government,
a) all the big old Norfolk pine would be harvested (overcutting and deforestation)
b) no replacement trees would be planted by landholders outside the Crown lands.

2 If the government established such plantations, then
a) private sector processing industries and suitable markets would both emerge spontaneously; and
b) the prices paid to the government for these logs would exceed the costs of growing them (i.e. tree-farming would be profitable).

All four assumptions have proven to be quite wrong.

The plantations have grown but the market demand is not there, despite the high freight costs for competing products from NZ. The processing industry remains very small and generally unable to pay prices that would cover all the costs of growing the logs. **Markets and technology have by-passed the 1983 Benson strategy**. It should have been revoked years ago but has not been yet.

Pine Plantations
1. There is no basis to increase area of pine plantation in the Forestry area within the national park, given very modest projected increase in local demand, and that alternative log supplies can be sourced from salvage and plantations outside of the national park or finished timber can be imported from New Zealand.

2. Overall it is time for a phased divestment from forestry activities in the national park and to focus the management of the national park for conservation, recreation and tourism purposes as a more sustainable outcome for Norfolk Island. However, given the past investment in pine plantations, there is a good case for continuing to manage the existing pine plantations in the southwest corner of the park and, in future, use some of this pine from the national park:

- during the process of a transition from pine plantation to native vegetation, some pine will need to be removed to facilitate rehabilitation and hence there are opportunities for harvest from existing plantations during this process (likely to be staged over the next 10-20 years depending on resources); and
- providing for a long term "sustainable multi-use forestry zone" in the southwest corner of the forestry area, where occasional and very careful log extraction could be permitted from a rehabilitated forest of mixed native species.

Eucalypt plantations

3. I recommend the phased removal of the eucalypt plantations, utilizing any logs that are wanted for sawing or poles (probably relatively few) but chipping everything else. Chips could be used for landscaping (including in NINP) or as fuel for a new, specially acquired supplementary power station. But the best option might be supplementing the waste stream for a high temperature incinerator, to solve the Headstone waste disposal problem. There is a slim possibility also of cogeneration or use of "waste heat" from that process. I suggest that this process could be phased over 9 to 12 years, for two reasons:

- The plantations should not be removed faster than Parks' ability to regenerate the cleared areas to native vegetation;
- The supply of woodchips should be matched to the capacity and the economic life of the harvesting and processing plant. If the incinerator or mini-power-plant has an economic life of say 12-13 years, then 2 ha per year would provide about the right amount of dry biomass for such a unit (about 2 tonnes/day dry wood).

Forestry operations in general

4. There is no substantive case for creating any new GBEs for either the growing or processing of forest plantations – in fact the reverse. Given the discussions about other GBE's there is no need to create a forestry GBE (which would almost certainly not be commercially viable) or to transfer the plantation harvesting rights from the administration to the private sector. The case for creating a new GBE specifically to process the eucalypt plantations is even weaker. It should be possible to dispose of them beneficially, or at very low costs, if the decision is made that they need to be removed for conservation and biodiversity reasons.

5. The NI Government could privatise the tanalith plant (if anyone would take it on reasonable terms) but this is not crucial. The alternative is to improve its operations and financial performance within its current institutional structure. There seems to be little rationale to replace it with a much larger and more expensive new unit, as there is neither the resource base, nor the market demand, to justify such investment for the foreseeable future.

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Annex I Terms of Reference

ASSESSMENT OF THE NORFOLK ISLAND PINE INDUSTRY WITH PARTICULAR REFERENCE TO FORESTRY ZONE OF NORFOLK ISLAND NATIONAL PARK

Context

The Norfolk Island National Park is declared under both Commonwealth and Norfolk Island legislation and includes a Forestry Zone comprising previously cleared land which is managed in part for production of timber.

In addition to plantations of native pine and non-native eucalypts, the Forestry Zone comprises areas of remnant native vegetation of high conservation value as well as areas of weed-dominated vegetation. In relation to management of the Forestry Zone, the current management plan for the national park provides for the conduct of sustainable forestry operations, protection of remnant native vegetation and rehabilitation of areas not required for forestry operations.

The Director of National Parks has developed a proposal for future management of the Forestry Zone which seeks to: consolidate the area of land available for forestry purposes, in part through the removal of eucalypt plantations to enhance the condition of and conservation of habitat within the Forestry Zone and more broadly the Park; and to improve public access and recreation opportunities.

The Norfolk Island Government seeks to support a sustainable timber industry on Norfolk Island as a replacement for imported timber products, based on plantations of native pine drawn from the Forestry Zone as well as from private plantations and other on-island timber sources.

Requested Advice

In order to establish a sound basis for determining appropriate land use within the Forestry Zone, and to provide a rigorous analysis of the sustainability of locally sourced pine timber production for the Norfolk Island community, the Director wishes to engage a suitably qualified consultant to provide independent advice to the Director and the Norfolk Island Government on the following:

1. **Assessment of the economic viability and sustainability of the native pine timber industry** on Norfolk Island, specifically considering the effectiveness of land use in the Forestry Zone of the national park. This assessment should include:
    a) analysis, based on available information, of current and anticipated future demand for timber products on Norfolk Island;
    b) advice, based on available information, on the parameters (in particular area of plantings, harvest rates and rotation rates) required to support an economically sustainable industry based on native pine plantations, drawing on available growth rate and other relevant data.

2. **Assessment of the productive potential of the eucalypt plantations** within the Forestry Zone of the national park, including an outline of opportunities for possible future benefit for the Norfolk Island community from this resource.

3. **Identification of opportunities to deliver sustainable use** of native pine products on-island.

Assistance and Contact Details

In undertaking this work, the consultant shall have access to all relevant data held by the Norfolk Island National Park and the Norfolk Island Reserves and Forestry Service that can reasonably be made available within any time constraints and confidentiality considerations that may apply. The principal contact for the consultant is as follows:

Dr Coral Rowston, Manager, Norfolk Island National Park
Ph: 0011 6723 22695 Email: coral.rowston@environment.gov.au

Annex II
People Met on Norfolk Island to Discuss Forestry Issues

Mr Tim Sheridan, Minister for Environment & Forestry
Mr Bruce Taylor, Acting Administrator
Mr Peter 'Feathers' Davidson, Forester
Mr George Plant, former Forester and CEO, now advisor

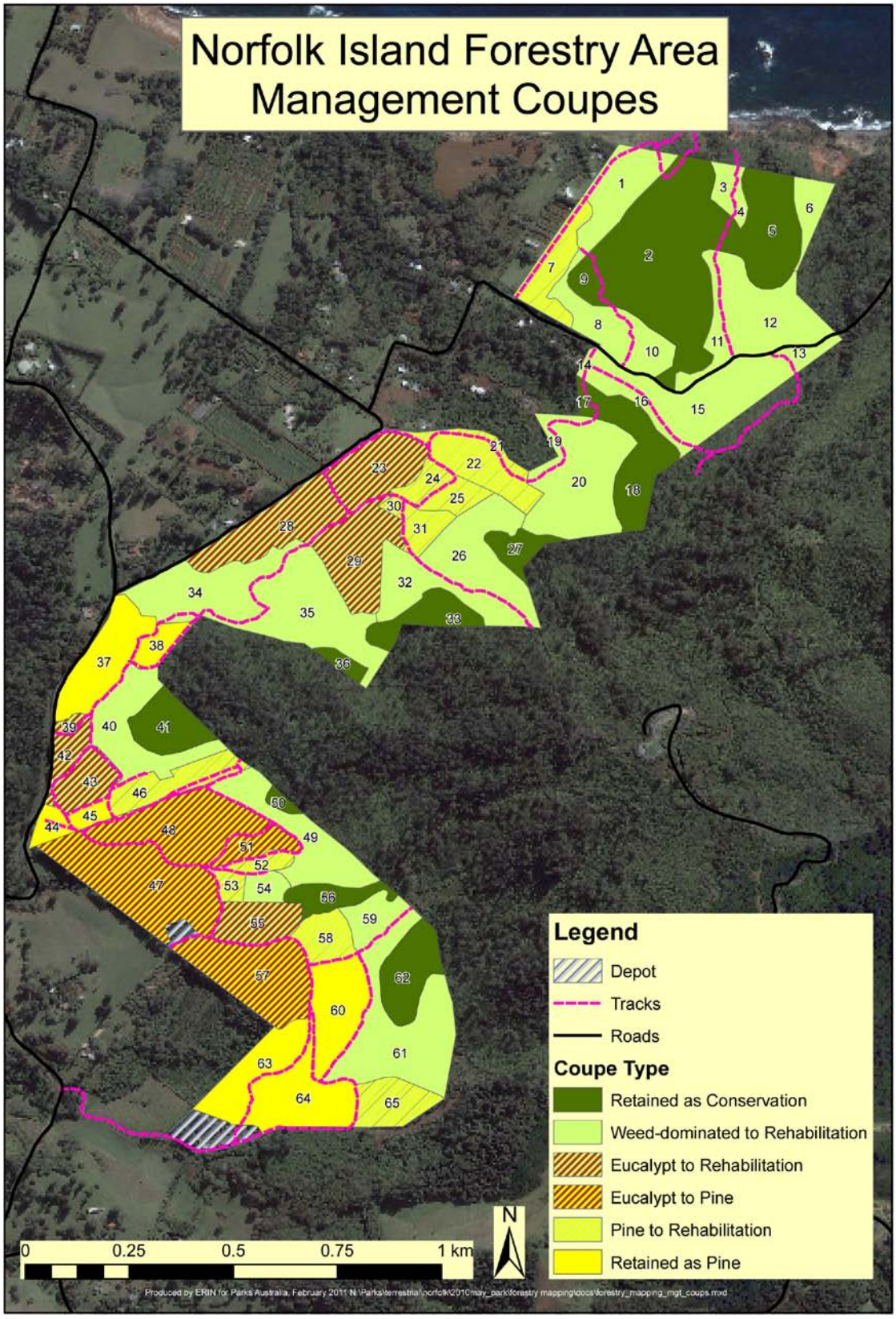
Dr Coral Rowston, Manager of NI National Park (and staff)

NP Advisory Committee Members
- Dr Nicole Diatloff
- Mr James "Jimbo" & Lou Tavener
- Mr Jason Evans
- Mr John Anderson (by emails)

Mr Howard Christian, Sawmiller
Mr Neville Christian former Minister and sawmiller
Neil "Snowy" Tavener part-time sawmill operator

Mrs Honey McCoy, naturalist
Mr Richard and Mrs Linda Chapman
Mr David 'Dids' Evans

Annex III Map of Forestry Zone in Norfolk Island National Park



Key to Map of Forestry Zone in Norfolk Island National Park

Forestry coupe details			
Coupe number	Coupe Type	Area (ha)	
23	Eucalypt	2.58	
28	Eucalypt	3.10	
29	Eucalypt	3.05	
39	Eucalypt	0.21	
42	Eucalypt	0.84	
43	Eucalypt	1.37	
47	Eucalypt	5.16	
48	Eucalypt	4.01	
51	Eucalypt	0.91	
55	Eucalypt	1.64	
57	Eucalypt	3.80	
subtotal		**26.67**	
7	Pine	1.75	
21	Pine	0.53	
22	Pine	2.02	
24	Pine	0.69	
25	Pine	0.81	
30	Pine	0.17	
31	Pine	0.87	
37	Pine	2.76	
38	Pine	0.78	
44	Pine	0.56	
45	Pine	0.46	
46	Pine	1.82	
52	Pine	0.56	
53	Pine	0.45	
58	Pine	1.24	
60	Pine	2.64	
63	Pine	2.28	
64	Pine	3.05	
65	Pine	1.62	
subtotal		**25.05**	
TOTAL plantation		**51.72**	

Annex IV
EUCALYPT SPECIES
in FORESTRY ZONE of NI NATIONAL PARK

The Forestry Working Plan by Benson (and related reports) does not provide a list of the eucalypt species planted in the Forestry Zone. Formal identification of eucalypts in the Forestry Zone has not yet been undertaken.

The eucalypts listed below are generally agreed to be present, although there are no clear written records readily available, on which were planted when, or where.

Scientific Name	Common Name	Durability	Uses	Sawing	area (Est)	Locations (Approx)
Eucalyptus microcorys	Tallow-wood	Durable	All	easy	3	43 48 47 53 55 57
E. paniculata	Grey Iron Bark	Very Durable	Round & Construction	V diff/ unstable	2	47
E. maculata	Spotted Gum	Mod Durable	Flooring & Construction	Easy	2	29?
E. pilularis	Blackbutt	Mod Durable	Construction & Decking	Easy	5	39 42 43
E. grandis	Flooded Gum	Low Durability	Construction	Easy	3	55 57
E. acmenoides	White Mahogany	Very Durable	Construction	Easy	2	48
E. cloeziana	Gympie Messmate	Very Durable	Construction	Easy	2	48
E. fibrosa	Broad-leaved Red Ironbark	Very Durable	Round & Construction	V difficult unstable	2	48
E. botryoides	Southern Mahogany	Durable	Construction	Fair	5	47
					26 ha	

Annex V Extracts from
The Prospects For Rural Development on Norfolk Island.
Bureau of Agricultural Economics, Canberra 1978

When the Pitcairn community settled on the island in 1856 a large part of the island had been cleared as the result of earlier convict settlements. The island was then subdivided into 157 blocks each of roughly 20 hectares with access to a road and with most containing a natural stream. Presumably the philosophy behind this was based on providing an area which could be used to support a family in a largely subsistence economy. Thus one of the constraints to agricultural development often mentioned in the various reports, that of the small size of the holdings, was inherited early on in the island's history. Few parcels of 10 hectares or more remain today.

Professor Butland summarised the situation in 1974 thus:

> In the 60 years since Norfolk Island became a territory of the Australian Government, the economic history of the primary sector of the island's economy has consisted of a series of booms and slumps. The pattern has been depressingly similar with each and every 'development'. Rosy opportunities are seen for the new crop, product or industry. A surge of activity galvanises the labour force of the community. Unused land is ploughed, new factories are built, markets sought and established, and the yield from the development increases year by year. Many islanders exiled from their homeland by its previous economic stagnation return to share in its new prosperity; some mainlanders participate in the same way. Then the bubble bursts. Persistent transport difficulties, climatic hazards, crop diseases, mainland competition, over-production, poor marketing, import restrictions and falling output are but a few of the repetitive sequence of reasons to convert the promising development into yet another depressing failure to make the island's economy a viable one.
>
> Such has been the story of the lemon seed and peel activity of the immediate post-World War I period, of the banana export trade of the late twenties and early thirties, of the passionfruit and guava pulp heyday of the late thirties and early forties, of the bean seed industry of the fifties and of the short-lived whaling prosperity of the early sixties. More persistently tried, but equally more short-lived, have been the numerous attempts to establish a fishing industry, the last effort ending in the burnt-out fish factory of 1972.
>
> In all these 'developments', the products have been either the harvested crops such as bananas and bean-seed or the primarily processed products of such harvests, into which category can be included the frozen fish fillets, the whale oil , the passionfruit pulp and the butter and pine-wood. In some cases the industrial component of this primary processing provided employment for a few hundred folk, in addition to the harvesting labour force.

At one point during the banana boom, over 400 hectares were under cultivation. However, following each boom the majority of the area brought under cultivation fell into disuse and became over-run with noxious weeds, such as tobacco bush, guava and lantana, and buildings and fences fell into disrepair. The net result of all this was that there was no significant growth in resident population for the 50 years 1914 to 1964. The population expansions accompanying primary industry booms and mainlander settlement and investment were all neutralised by subsequent contractions and emigration.(Butland, 1974)

A general study of soils and land use by CSIRO concluded that the soils and climate of Norfolk were generally favourable for a wide range of pastoral, agricultural and horticultural activities. There is ample evidence to support this conclusion even though more recent experience indicates that periodic droughts can occur causing quite serious damage to intensive

horticulture. For example, a wide range of crops was successfully grown during the various agricultural booms and the reasons for failure of these ventures have not generally been the unsuitability of the environment for plant growth.

The examination of the history of primary industries on Norfolk Island has revealed a number of constraints to the development of a viable rural export sector:

- The high freight rates both for imported inputs into the production process and for the exported products.
- The small size of all the holdings.
- Problems with shipping frequency and reliability
- The uncertainties of export markets.
- Overseas competition.
- Trade barriers.
- Lack of expertise in marketing and production techniques.

In broad terms, these constraints add up to a lack of comparative advantage in agricultural production and the factors behind most of these problems have not changed and in many cases have become considerably worse. It is against this background that an examination of the prospects for stimulating the rural economy must be made.

Norfolk Island has an absolute advantage in tourism due to its unique physical characteristics. Absolute or comparative advantage with respect to primary industry on Norfolk would not appear to exist, due to its remote geographic location and due to the absence of a relative abundance of the required resources. Thus it is the tourist industry which has provided the opportunity for growth and higher living standards.

Growth of the primary sector can only occur if it can generate sufficiently attractive returns to enable it to compete for resources with other industries, notably the tourist industry. This is not to ignore the possibility that expanding tourism may create some opportunities for profitable investment in the rural sector. As already mentioned, the island has a favourable environment for a wide range of rural activities. However, there are no specific characteristics or resources which are either unique or relatively abundant on the island. Thus local farmers would have to compete directly with Australian or N.Z. farmers with the added economic costs that geographic isolation brings. This would appear to be the key reason why all attempts, without exception, to develop an export rural sector have failed.

Even without the freight and other disadvantages it is doubtful whether Norfolk farms or forests could compete effectively on world markets. During the past decade there have been tremendous changes in, and restructuring of, the rural sectors in Australia and elsewhere as a result of increasing market competition and institutional intervention in markets. These changes have involved increases in productivity leading to a greater volume of rural products being produced by a smaller volume of resources. With few exceptions, long-term trends in the world supply and demand for agricultural products have resulted in steadily declining expected real prices. These price trends can be expected to continue into the foreseeable future despite short-term fluctuations. In addition, real costs have been rising which, combined with falling real prices, has resulted in a cost-price squeeze on farm incomes. The result is that a large percentage of farmers and their employees have had to leave their farms and find alternative employment. Those that remain have to become more efficient, enterprises have to become much larger to take advantage of economies of size, more capital investment is required and the latest technology needs to be adopted. All of these factors work against the feasibility of Norfolk farmers being able to compete on export markets.

The freight disadvantage means that local farmers would be less able to withstand the cost-price squeeze, there is a shortage of capital and technology on the island; and it is not feasible to make enterprises large enough given the land tenure situation. In addition to the above factors, there is the high cost of freight and the associated problems of the frequency and reliability of the shipping service. The freight disadvantage works in two directions, namely, the inputs into the production process have to be transported in and the produce transported out. Modern agriculture tends to use inputs such as fertilisers and chemicals in increasingly large quantities.

In summary, it would not be feasible to develop and sustain the long-term economic viability of an export industry based on primary production. There will of course be the occasional exception, such as the small scale success of the Kentia palm seed[3]. However, in the long run, the cost of production of Norfolk products will be above mainland costs implying an absolute disadvantage for agricultural export industries on the island. Furthermore, in terms of returns, tourism would appear to have a clear comparative advantage over agriculture in competing for scarce resources on the island.

High freight rates act as a deterrent to the development of an export industry. However, in the case of goods produced locally for local consumption the high freight rate can, under certain circumstances, be used to advantage. The freight charges increase the cost of imports and therefore can act as a barrier of protection for a local industry.

DISCUSSION AND CONCLUSIONS

Two basic strategies for development of the primary sector have been examined; firstly the development of an export industry and secondly the prospect of becoming self-sufficient in primary produce.

With respect to an export industry the lessons of the past have repeatedly shown that, while short-term opportunities will be available from time to time, in the long run Norfolk producers cannot compete on the export market. The reasons for this are fairly obvious: the freight costs for both importing the inputs into the production process and exporting the produce are prohibitive; the shipping service is infrequent and often unreliable; and the island has no special advantages for plant and animal growth which do not exist elsewhere. Norfolk's special advantage lies in its attractiveness to tourists and, in terms of the island economy, this is the export industry which provides the island residents with the living standards they now enjoy.

Self-sufficiency in agricultural produce is the other alternative and a wide range of possibilities has been discussed. Given the small size of the domestic market, the high costs of local production and the competitive prices of many imported items, it would appear that the island is already as self-sufficient as it is likely to become under natural market forces. It has also been demonstrated that in most cases, even if 100%self-sufficiency were feasible, it could be achieved from very small scale enterprises, in terms of farm size or employment potential which would have an insignificant impact on the island economy. It follows that even if the tourist industry were significantly expanded, the additional domestic market created could in most cases be supplied by very small additions to existing enterprises, possibly without any additional employment of labour.

To increase the degree of self-sufficiency or to establish an export industry would require government intervention in one of two categories: either directly by some form of production

[3] Even the Kentia palm seed venture may be vulnerable in the long run. It has been recently reported that a large scale seed production project has been commenced overseas.

subsidy or indirectly by measures which would attempt to improve the working of market mechanisms.

From a purely economic viewpoint, direct production subsidies are not usually recommended as they can cause resource misallocations resulting in a lowering of living standards generally, when measured by income level. There may be political, social or welfare reasons for such subsidies; however, there would probably be a more efficient way to achieve the desired objectives. For example if unemployment were to become a serious problem in the future, rather than stimulate rural production, it may be more efficient to expand the tourist industry, change the migration policy, or provide welfare relief.

In summary, there is very little that the Norfolk Island Council can do towards stimulating the rural sector that has not already been achieved by market forces.

However, a further point which needs to be raised is that, in determining future land-use policy, agricultural production is possibly not now as important an objective as has often been implied in the past. More emphasis could perhaps be given to environmental preservation in relation to any expansion of the tourist industry envisaged.

Photo 1 Pole-sized Tallowood (E microcorys) plantations

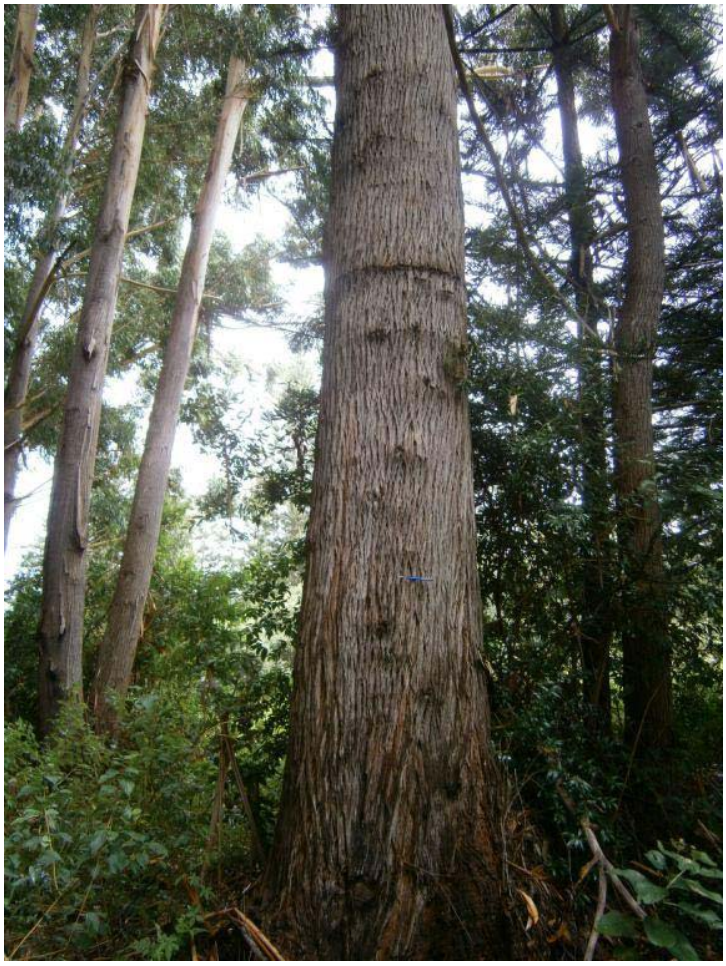
Photo 2 Failed mixture of gums, stringybarks and ironbarks on ridge-top

Photo 3

Photo 4

Photo 5 A stand of *E pilularis* (Blackbutt) sawlogs adjoining Anson Road

Photo 6 *E pilularis* (Blackbutt) sawlog over 60 cm dbhob (blue pen is 15 cm long)



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