Models for a sustainable forest plantation industry: a review of policy alternatives

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Foreword

As part of the Australian Government’s Plantation for Australia: 2020 vision, the Department of Agriculture, Fisheries and Forestry has commissioned ABARE to undertake a review of investment models that can be used to encourage the development of the forest plantation estate in Australia. This ABARE review describes a range of investment models and government incentive schemes that have been used across leading timber producing and trading economies.

Forest plantations are an integral part of Australia’s forest industry. They provide a manageable and reliable source of timber and help to reduce logging pressure from native forests. However, private investors in plantations are often discouraged by the lengthy time period between the costs of establishing a plantation and the returns from thinning and from harvesting. There can also be other impediments including limited information on the likely markets and returns that will be available at harvest time. Consequently, private investors tend to discount future returns more heavily than socially desirable, as well as demonstrating preferences for plantation types that generate quicker returns. In some instances these factors are sufficient to justify a role for government in encouraging forest investment.

Phillip Glyde
Executive Director
May 2010
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Summary

This paper discusses the drivers of forestry investment and the potential role of government in the design of alternative instruments. The factors that could impede investment in forestry relative to other industries are discussed. A wide range of policy options available to governments to promote forestry investments are reviewed. The paper describes investment models that have been implemented both in Australia and overseas, and examines their relative success. Finally, the relevance of these alternative programs within the context of the Australian forest industry is discussed.

A summary of the various policies, their method of operation, and how they impact on impediments to forest investment, is presented in table 1.
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Introduction

This paper presents an overview of alternative government instruments and mechanisms that may be used to induce investment in forest plantations, in particular to expand investment in long rotation plantations for timber production.

The plantation estate in Australia consists of primarily eucalypt species and radiata pine in medium to high rainfall areas alongside agricultural enterprises. A large proportion of Australia’s plantation resource has been associated with active promotion of plantation development by the Australian Government as well as State governments over the past five decades. Among them were early initiatives such as the Softwood Forestry Agreement Acts in the 1960s and 1970s and the National Afforestation Program in the 1980s. More recently, a number of government policy initiatives have sought to improve the private profitability of land use for forestry by removing impediments to investment and providing greater certainty to long term forest investments. They included the Plantations for Australia: The 2020 Vision (2020 Vision), which promoted government–forest industry partnership; the National Forest Policy Statement (Commonwealth of Australia 1995) which achieved Australian Government–State joint commitments for conservation of native forests and increased reliance on plantation grown timber; and differential tax treatment of forestry investments.

Australia is not alone in this endeavour and many other countries have successfully implemented their own policies to promote afforestation and forestry investment. It is not likely that any single strategy could represent the panacea for low investment in forestry. The difficulties faced by the forest industry are varied, and hence a suite of policies designed to foster informed investment decisions, on the one hand, and to better manage risk, on the other, is more likely to deliver sustained investment in the sector.
In general, the decision to invest hinges largely on two factors – the expected returns to investment and perceived degree of risk. The returns to an investment and its risk are often positively related in that higher returns are generally needed to compensate the investor for accepting a higher risk. Hence, long term investments will, other things being equal, need to provide the investor with a larger potential rate of return compared with short term investments.

The challenge for investors is that they must determine in advance whether the returns from an investment are proportionate to the carried risk. As a plantation advances in age, so does the volume of timber, which is the capital that is liquidated at harvest. This carried risk can be in the form of financial loss associated with the timber as well as the opportunity costs of the initial investment and land put under forest (land rent) over the period. Hence, a decision to invest in forest plantation will be made when the investor considers those risks are acceptable for the expected future return.

Nature of forest plantation investments

Forest investment not only locks in arable land, but also takes several years between the outlay of expenditure and the realisation of returns from harvesting even-aged monoculture plantations. In Australia, forest plantations are now largely undertaken by private investors, including farmers on cleared agricultural land. The return from timber harvest is normally derived upwards to 25 and 50 years after establishment, depending on the type of trees being grown, whether softwood or hardwood. However, there are up to three thinnings during the cycle which provide some return. Further, from the viewpoint of the timber user, a continuous supply of timber is required to supply timber to sawmills, pulpmills and other users. This necessitates continued planting by investors to establish even aged stands of forests, sinking large amounts of capital – although this may be spread across a large number of investors who may not engage individually in continuous planting.

A salient feature of forest plantations is their scale economies. That is, a large scale plantation can reduce unit output costs, especially in marketing, and achieve a higher net return for the farm or firm. The market destination for the timber grown in softwood plantations is usually sawmills, which require a continued supply of large volumes of logs on a regular basis. In comparison, much of the timber grown in hardwood plantations is sent for pulplog processing. The average cost of logging and haulage over long distances drops significantly with increasing volumes. Thus, investment in forest plantations for timber would involve mobilising savings from small and large investors away from competing investment alternatives. It would also involve mobilising arable land from alternative farming enterprises.
At the time of tree establishment, prospective investors must have access to funds to acquire land and planting material to establish a sufficiently large area. Given the long period associated with plantation timber production, entrepreneurs have to make investment decisions based on expectations of timber volume, market prices and economic conditions at the time of harvest in the relatively distant future. Plantations are vulnerable to environmental risks not faced by other investments such as fire, drought, pest and diseases. At the time of harvest the investors have to negotiate with buyers – usually log processors – to derive the maximum possible revenue. A decision is also made at this time about the future use of the land, whether to replant or convert the land to another use. These decisions will be based on expectations of relative returns between forestry and alternative land uses.

In Australia, the forest plantation industry faces strong competition from other sectors, such as agriculture, for the use of land and also water use in certain areas. Kelly et al. (2005) argue that the challenge for forestry is that, in many cases, forest investment has not demonstrated higher rates of return than other, sometimes less risky, investments. Rising rural land rent in existing forest plantation areas and possible water charges for future plantations indicate that the average cost of timber production may increase in medium to high rainfall areas. Future options for forest plantations include utilising marginal rainfall areas, which may be low in productivity, given current forest management practice. There is scope for reviewing research and development (R&D) on species selection, silviculture and demonstrations of technology in these areas. However, consideration would need to be given also to the distance of these areas from current and possible future markets for the timber, and the transport costs involved.

Linkage between investments in forest plantation and processing, and assurance

Flexibility to shift land use from forestry may be limited if the plantation investor has a standing timber supply contract with a sawmill. Such contracts provide mutual ‘assurance’ to both plantation and timber processing investors by guaranteeing a market for harvested logs and supply of logs for processors. Sen (1967) first illustrated the role of assurance in conflicting but interdependent situations to allay uncertainty and achieve cooperation. Mutual assurance is often achieved through vertical integration of plantation investment and timber processing investment by several large commercial forest plantation companies, which also invest in processing capacity.

A strong backward linkage with input suppliers, especially high quality seedling producers, who are responsive to rising demand, is also important for an expanding forest plantation industry.

In addition to investment risks, there are certain impediments which relate to, or have an indirect effect on, the forest industry. These impediments include the lack of competitive neutrality in timber prices; lack of liquidity in secondary markets; regulatory uncertainty; and technical and environmental barriers. A more detailed discussion of these impediments is provided in appendix A.
Private investors discount the returns anticipated in the distant future rather heavily compared to society (Dasgupta et al. 1972). As a result of the claimed divergence between the social and private discount rates, private investors tend to under-invest in such projects and prefer shorter horizon alternatives to long rotation timber plantations. In other words, it could be argued that there is an inter-temporal or inter-generational problem. The expansion of forest plantations by the private sector in the past decade has been dominated by short rotation hardwood species for pulp making harvested in 10 to 12 years after planting and this may reflect a preference by private investors for shorter time horizons.

Where such an externality exists, if the costs of correcting the externality do not exceed the increased social welfare in correcting it then the government may have a role to play by policy intervention. The correction of externalities in forestry investment could involve encouraging increased private investment in forest plantations through, for example, the use of fiscal instruments or direct public investment in forest plantations.

The government often plays a role in the provision of public goods. These goods or services can benefit all in society (for example market price information in the public domain). For the private sector, engaging in the production of public goods is often unattractive and so can result in sub-optimal quantities of and/or poorer quality public goods being supplied. An important public good for the forest plantation sector is information of various kinds. Such information may include R&D on tree species, silvicultural practice and site quality, as well as market, product and technological information.

In addition to correcting for externalities, the government can create a favourable investment climate for long term timber plantations by:

- facilitating risk management strategies
- improving information flows
- reducing transaction costs
- encouraging market competitiveness of timber production.

These avenues all have several public good characteristics and could help attract investment into the industry.

In some areas, forest plantations can provide local public good benefits such as flood mitigation and reclamation of land from secondary salinisation. Often these benefits may be a by-product of the main purpose of the investment – and be a positive externality from the private investment – but in other cases may be the main reason for the plantation
establishment. There may be underinvestment by the private sector in such plantations where the investors are unable to appropriate the full benefits of the plantations. In these cases there may be a case for government intervention. For example, where direct beneficiaries can be identified, the government could facilitate payment to tree growers from the beneficiaries for the provision of the additional service. Recognition and payment for such additional contributions would make forest plantations more profitable for investors in those areas. In contrast, there may be situations where the forest plantations intercept or significantly deplete water available for competing agricultural and environmental uses. In such cases, government has a legitimate reason to get plantation owners to pay for water entitlements to ensure efficient use of the water resource (Hafi et al. 2010).

**Facilitate risk management strategies**

Reduction of fire risk through prevention measures such as controlled burning, fire warning, and fire brigades confer public good benefits. There is a legitimate case for government spending on them. A similar reasoning may apply to pest control in forest plantations.

The government could also facilitate risk management strategies, which can help investors reduce risk, or avoid the severity of potential losses. Risk management can be facilitated by government across two main areas – market and institutional risks. Market risks arise from factors such as exchange rate volatility; product price yields; and fluctuations in input prices (Moreddu 2000). Institutional risks arise from regulation and institutional developments, including changes in the cash rate; changes to government policy such as carbon emission taxes; and from regulation on timber harvesting practices. Early signals about future government regulation are beneficial to businesses because it can improve their expectations of the market. Further, early signals may also improve market expectations, increasing overall return to the business.

Facilitating risk management strategy is not necessarily unique to the forest industry. Improving the investment environment in general can help attract capital into other sectors as well. Further, there is a significant role for financial intermediaries to facilitate these risk management strategies.

**Improve information flows**

Information is a public good and various types of information form important inputs in forestry. Technical information can include planting material; yield performance; site quality; silvicultural practices; and susceptibility to pests and diseases. Governments can support the generation and dissemination of information in the industry.

Availability of timber price and market information over a long period of time helps form evidence-based expectations and make informed investment decisions to manage future market risk, thereby reducing the risk associated with the investment.
Uncertainty regarding future commodity prices and technology performance can be reduced by governments through the implementation of public information and education programs. Demonstration of new technologies and practices associated with forest plantations provides evidence of their reliability in practice and helps develop expectations on their future returns. Hence, the risk associated from the adoption of new technologies in forest plantation business is reduced.

Similarly, predictions of future commodity prices can provide early signals to participants and provide time for them to either adapt to the expected change or exit the market entirely.

Government forestry extension programs aimed at disseminating information to forest growers can play an important role in supporting forest investment.

Reduce transaction costs

Broadly, transaction costs are the costs incurred in the process of buying or selling of goods and services including searching, finding buyers, negotiation and completion of transactions. Hence, with forestry plantations, transaction costs are incurred in the process of buying or selling the trees. North (1994) argues that over time, transaction costs can be reduced by four factors: establishment of well functioning markets; improvements in technology; security of property rights; and enforcement of contracts.

High transaction costs present a barrier to investment in forest plantations, particularly for small investors. Minimising transaction costs can thus help stimulate investment in forestry plantations. Specific government policies that may reduce transaction costs associated with forestry plantations will be discussed later in this paper.

Improve market competitiveness

Plantation timber growers, especially small growers, may face monopsony in the market for their logs if the processing industry is highly concentrated with relatively large mills. As a result logs may be underpriced in spot markets and diminish growers’ incentive to expand production. While growers lose because of low prices for their logs, processing is also affected. Cheap logs reduce the incentive for processors to innovate and modernise the mill and operate efficiently. Government intervention to bring about a quasi competitive environment is possible. For instance, grower cooperatives can offer a collective bargaining avenue with single processors, thus creating potential for improved market outcomes.
Appropriate policy instruments can induce increased investment in long-term timber plantations and, in addition, could have flow on effects on other sectors. Thus, consideration of the direct impacts on forest investment and additional flow-on impacts to the broader economy may be warranted before implementing specific policies.

To achieve their policy objectives, governments employ a plethora of policy instruments such as supporting reforestation efforts, meeting specific standards in the industry, or improving environmental conservation. For simplicity, government instruments can be grouped into four main categories, namely: (a) tax-based incentive mechanisms; (b) government investment or support of forest enterprises; (c) government R&D and extension programs; and (d) indirect government policy. However, it should be noted that any particular programs may contain elements of some or all categories. In appendix B, several case studies of both domestic and international investment models are presented.

**Tax-based incentive mechanisms**

Tax-based incentive mechanisms have been used in several countries and industries as a direct means to promote long term investment. The 2020 Vision aims to treble the area under forest plantation by 2020 through the promotion of private investment in forestry with tax-based incentives as the main mechanism.

The tax-based mechanisms raise the rate of return to investors for a given risk level of forestry investments. They allow the investors to receive tax credits to offset a part of the cost of the investment early before the forest is harvested. Major tax-based incentives are discussed below.

**Tax credits on establishment costs**

Favourable tax treatment of the establishment cost of timber plantations eases the financial burden associated with the investment. These schemes involve the direct tax deductibility of some or all costs associated with establishing a plantation at the time of planting.

Managed Investment Schemes (MIS) fall in this category and allow an immediate tax deduction for all forest related, non-capital expenditures. Specifically, forest MIS has been generally successful in raising investment funds from small investors and superannuation funds for forest plantations, reaching $1141 million in 2005–06 (The Treasury 2008). However, the collapse of the two largest MIS operators, Great Southern and Timbercorp in 2009, suggest that the business model used, with its heavy reliance on up front tax deductibility to attract investment, may not have been appropriate for long term economic viability.
Internationally, several countries including New Zealand and Uruguay have used tax-based incentives on establishment costs with some success (Mendell et al. 2007; Rhodes and Novis 2002).

**Tax credits based on rotation length**

This mechanism differs from the standard tax credit scheme in one key respect – the tax incentives are implemented on a sliding scale. In a 2004 Senate Inquiry into Vision 2020, the Conservation Council of Western Australia proposed that long term plantation development can be encouraged if tax benefits were greater for long rotation compared to short rotation forests (RRATRC 2004). Such a scheme would provide a form of compensation to investors who are prepared to invest in long rotation forest plantations.

**Flow through tax schemes**

Flow through tax schemes gear the amount of incentive to the degree of risk of projects. It adopts a framework whereby riskier investments are awarded a proportionately high tax incentive. Therefore, the scheme is a method of increasing the attractiveness of risky investments in comparison to less risky alternatives.

Examples of flow through tax schemes include the Australian Government’s Early Stage Venture Capital Limited Partnership Program (ESVCLP). This scheme aims to create a reduced tax environment for a specific industry, thereby increasing production activity such as plantation establishment.

**Levies**

Levies are designed to make users of forest products contribute to the cost of future plantations. These systems impose a mandatory fee on forest users, whereby the revenue generated from the levy is channelled toward reforestation efforts. Either the government or the private investor may choose to undertake the reforestation activity. To encourage participation, these schemes also offer incentives, such as a tax deduction on contributions to the levy.

Examples of forest levies include Indonesia’s Reforestation Fund (DR) and the Norway Forest Trust Fund. In Indonesia, the DR levy is adjusted depending on the type, grade and location of the timber harvested. This system gives the government greater control over the rate of harvest, by type and location. In comparison, contributions to the Norway Forest Trust Fund vary for each participant depending on their financial position. Conditions on the use of the fund also require reforestation efforts to occur within the region where the levy was collected.

The use of levies can be an effective way to generate investment for plantations. Users of forest products have an incentive to invest in the levy, as future reforestation efforts will support the long term sustainability of the industry. However, both the DR and the Norway Forest Trust Fund have suffered from deficiencies which have diminished the scope of the levy to promote plantation development. They include restrictions in the type of tree species planted and illegitimate use of levy funds in non forest activities (CFS 2006; Resosudarmo et al. 2006). Further discussion of the DR and the Norway Forest Trust Fund is presented in Appendix B.
Indirect taxation

Tax-based incentive mechanisms can also be used indirectly to encourage plantation development. For example, the Australian Government’s proposed Carbon Pollution Reduction Scheme (CPRS) allows credits to be earned from carbon sequestration projects over the years during the growth of the trees. This revenue generating mechanism under the CPRS could provide an incentive for environmental plantation development. Given the possibility of earning carbon credits in future from timber plantations, if the carbon accounting rules change to allow credits when the timber is used for durable uses, the CPRS may also favour long rotation timber plantations.

Indirect taxation can be effective in encouraging plantation development without the government’s direct intervention in the forest industry. However, the effectiveness of indirect taxation may vary and be difficult to predict. It is only second best in promoting timber plantations.

Government investment or support of forest enterprises

State owned forestry plantations are not uncommon in Australia and governments have invested directly in forest plantations. In 2008, about 33 per cent of forestry plantations in Australia were government owned (Gavran and Parsons 2009). However, there are several disadvantages associated with state owned plantations (for a discussion, see appendix A). There has been a gradual shift towards private ownership of forest plantations since the early 1990s.

Direct government assistance in the early stages of an emerging private forestry plantation sector is often argued to be in the interest of maintaining international competitiveness of the timber industry. However, such assistance cannot be sustained in the long term or extensively. Nevertheless, the possible divergence between social and private discount rates could justify limited direct government assistance towards investment. Government assistance need not be limited to investment directly in forest plantations. Some governments provide financial grants to forestry cooperatives. For instance, the Canadian Government provides assistance through the Cooperative Development Initiative (CDI 2009). The Canadian Government also provides support to cooperatives by clearly stipulating their legal status and responsibilities in the *Canada Cooperatives Act 1999*. This legal stability has provided the necessary investment environment that has allowed sustained development of forest plantation cooperatives (CCA 2008).

Facilitation of partnerships

A cooperative is an enterprise that is jointly owned and operated by its members who subscribe to its rules and use its services. All members are equal decision makers in the enterprise and derive the benefits of cooperation, based on how much of the cooperative’s service they use (GCCS 2009). Forestry cooperatives help protect the interests of members, often rural landholders, rural workers or rural forestry asset owners. Cooperatives either use their surplus income to develop and expand the cooperative or return income to members (BCICS 2006a).
The main advantage of forestry cooperatives is that by pooling funds from a large number of small grower investors, they are able to enhance their purchasing power, provide independence for rural communities and promote sustainable forest usage. They are stable and reduce individual members’ risks (BCICS 2006b; Welch 2001). Forest grower cooperatives have more bargaining power than individual growers in spot markets; they may be able to protect its members from underpricing by monopsonistic buyers.

Cooperatives are similar to MIS in that they both pool resources to achieve economies of scale. However, they differ in that the MIS pools funds from retail investors who are not actively involved in management of the scheme, whereas forestry cooperatives may pool funds or assets, such as land and equipment, to achieve economies of scale in harvesting, processing or marketing. Forestry cooperatives also have a much greater emphasis on community development.

One such successful example is Athol Forestry Cooperative Limited (Athol), which is a cooperative of about 250 independent woodlot owners in Canada. Athol manages over 20 000 hectares of woodlots and provides a wide array of forestry services to landowners including woodlot management plans, forest improvement services (planting, thinning, harvesting) and consulting services such as woodlot assessments, timber marketing and scaling of forest products (AFCL 2007).

Public Private Partnerships
Public Private Partnerships (PPP) are schemes designed for joint investments between the public and private sector. These include development of infrastructure and provision of public goods and services on private land. Partnership between the public and private sector also helps spread investment risk, which is an important feature as government can bear greater risk than smaller investors (Davis 2005).

The use of PPPs is common in the development of public infrastructure (Davis 2005). PPPs have been used to establish schools, toll roads, railroads, hospitals and power generation in various states in Australia. Such partnerships have reportedly improved the rate of technological change, and also better harmonise the goals and interests of both the government and private sectors involved in the investment. However, the government is still required to monitor the compliance of private sector commitments in PPPs, to ensure that good quality services accrue from the investment to the community.

Enabling conditions such as tenure security and the development of infrastructure have been important to the success of forestry in developed countries such as Australia, New Zealand and the United States (Enters et al. 2003). Generally, infrastructure has public good characteristics and has a beneficial impact on various sectors of the economy. A government role in infrastructure investments is warranted as they may not be undertaken efficiently and at sufficient level by the private sector.

In New Zealand, government investment in roads, railways, modern port facilities and hydroelectric power stations has led to investment in large scale processing initiatives and plantation establishment by the private sector. It is argued that investment in infrastructure projects
signalled to the private sector that the government was serious about establishing a viable commercial forestry industry (Enters et al. 2003).

**Government extension/ R&D programs**

Various governments have played an important role in the provision of extension services to the forest industry (Enters et al. 2003). In this context, “extension” is considered to mean the extension of intangible benefits (such as industry specific information, know-how and results of R&D) to the appropriate people – in this case, potential investors in forest plantations. Such programs have in the past played an important role in disseminating research findings in agriculture in particular, but also to plantation foresters in Australia, New Zealand and the United States (Enters et al. 2003).

*Improving data quality for investment decisions*

Extension programs are mainly aimed at improving information flows to the forestry sector. Like other industries, forestry is often affected by a lack of reliable and accurate information flows. Government intervention may therefore be warranted to ensure sufficient flows of information. Extension programs can provide significant benefits to the community but no individual wants to provide them unilaterally. Through the dissemination of information and technology, extension programs can assist in reducing transaction costs and establishing a competitive, well functioning market that may ultimately encourage more plantation development.

Many governments around the world have introduced forestry extension programs (see appendix B for more details). For example, in the United States, the Forest Land Enhancement Program provides technical and educational support to landholders.

*Effectiveness of extension programs*

ABARE surveys have shown a steady increase in membership of Landcare groups (McInnis and Wicks 2009). This suggests increasing willingness in the community to participate in government extension programs. Survey data can also be used to infer how best to disseminate information. For example, ABARE’s resource management surveys found that field days are the most common avenue for learning by landholders: in both the 2001–02 and 2004–05 surveys, over 60 per cent of respondents indicated they had attended at least one field day (McInnis and Wicks 2009).

**Indirect government policy**

Indirect policies influence the forest industry through their effect on some economic variable or industry on which the forestry sector depends. Enters et al. (2003) divide indirect policies into two categories: variable policies and enabling policies. Variable policies are economic factors that may be shifted to affect the net returns that producers earn from plantations. Some examples are trade restrictions, interest rate policies, general taxes (e.g. income tax or
fuel tax) and subsidies for other industries. Enabling policies are defined as those external factors that affect how companies make investment decisions. Some examples are land tenure and resource security, socio-economic conditions, producer support services, accessibility and availability of infrastructure, market development, credit facilities, political and macroeconomic stability, and the research and development environment in the country. The effects of indirect incentives are often difficult to track.

**Market regulations**

The government may institute regulations through the market either to correct a negative externality or to encourage socially desirable activities. Market regulations such as environmental ratings systems may indirectly assist the forestry industry. For example, energy rating of building constructions, whereby buildings with more energy efficient materials are awarded more ‘stars’, may increase demand for timber (an energy efficient building material), which in turn may induce more timber plantations (Ozanne and Bigsby 2003).

**Emissions trading scheme**

Australia’s proposed CPRS has the potential to encourage increased plantation forestry investment. If passed into law in a form broadly reflective of the proposed scheme, it would create a market for carbon credits. Timber plantation forests would be able to earn sequestration credits up until they reach saturation. Once this biomass is reached no further credits can be earned. The income generated through carbon sequestration has the potential to make new timber plantation forests economically viable, when in the absence of carbon sequestration they may not have been (Burns et al. 2009). However, as the price of carbon sequestration credits rises, timber plantations may face competition for land from environmental plantations. Similarly, the pricing of other environmental values such as biodiversity may increase competition for land from non-timber forestry.

**Environmental regulations**

One example of environmental regulation creating an incentive for forestry plantations is the European Union regulation requiring member countries to generate 20 per cent of their electricity from renewable resources by 2020, which has led to a heightened demand for wood pellets as an alternative to coal. Wood pellets can be made from either sawdust leftover from sawnwood production or directly from timber, sourced from either plantation or native forests. European energy companies are using wood pellets as an alternative to coal in coal fired power stations, as they are considered carbon neutral when burned and hence qualify as a renewable energy source. Wood pellets are considerably cheaper than investing in new wind and solar power options, as raw materials (especially waste) in the forestry industry are plentiful (Gold 2009).

Growth in wood pellets as an energy source is entirely dependent on government regulations of mandatory renewable energy targets and may lead to an increase in short rotation timber plantations. Australia has introduced a similar program (Mandatory Renewable Energy Target) which will create the same mandatory requirements for renewable energy usage that has driven the large volume of wood pellet exports to Europe and may lead to similar growth in Australia’s wood pellet industry (appendix B).
Expansion of forest plantations by the private sector is constrained because of factors such as its biological nature, long time frame from planting to harvest, exposure to risks of loss from fire and pests, lack of industry information, lack of secondary markets, technology gap and environmental restrictions. Further discussion of these impediments is presented in appendix A. This paper has discussed a range of mechanisms which can form parts of a framework to support investment and expansion in timber plantations. Several domestic and international models and their performance are reviewed in appendix B.

Changes in taxation arrangements are a proven successful method for generating plantation establishment in developed countries (Enters et al. 2003). In the initial stages of plantation development, there is broad agreement that tax-based incentives are a simple and effective way of establishing plantations (ArborVitae 2004; Enters et al. 2003). However, Enters et al. (2003) argue that, in the long run, enabling incentives and facilitating a well functioning market are more important. This is because a well functioning market is important for the long run viability of an industry. There is also evidence that some landholders give consideration to non-economic factors when deciding whether or not to establish forest plantations (see appendix A). This suggests that there is need for a range of measures combining direct financial incentives with indirect enabling incentives.

It should also be noted that before implementing any new framework to support timber plantation development, consideration of Australia’s unique market, technical and environmental factors is needed. For example a study of the effects of a carbon price on environmental plantings in South Australia found that increased afforestation can result in reduced water availability and reduced biodiversity if monoculture timber plantations are established (Crossman et al. 2009; Hafi et al. 2010). Hence, implementation of new initiatives to encourage afforestation should give due consideration to potential on-site outcomes as well as flow through effects on the broader economy.

Conclusion
This section briefly discusses the range of factors that contribute to difficulties in attracting investment to forestry projects. These impediments may represent factors that restrict the potential returns to forestry projects relative to other enterprises that compete with forestry for resources; factors that restrict the ability of prospective investors to enter the industry; or may be issues that create a disjunct between the private and social net benefits of forestry projects. These impediments may arise from factors such as property rights, taxation, environmental regulations or the intrinsic structure of the industry (ABARE 2002).

In some cases these impediments may be the consequences of efficiently operating market processes, and do not justify government intervention in the market. Nor are these impediments necessarily unique to forestry. Hence policies to deal with such impediments should be open to all affected industries to ensure efficient resource allocation.

The impediments discussed in this paper are separated into three categories: market, technical and environmental factors. In some cases the impediments identified cross over into more than one of these categories.

Market-related impediments

Lack of competitive neutrality and market pricing

The public management of many, particularly native, forests, combined with a lack of competitive processes for the pricing and allocation of logs, may discourage private investment in forestry. Government agencies often make decisions based on regional development and employment considerations rather than the maximisation of resource rents. Methods used by some state agencies to calculate stumpage prices are often not derived using a market framework (Kelly et al. 2005).

These practices represent an impediment to private investment in forest plantations because log prices are effectively lower than they would be in a competitive private market. As a result the potential returns to private growers are lower than would otherwise exist. In other words, government ownership of forest resources has the potential to effectively crowd out private sector investment (Enters et al. 2003). Higher native forest log prices resulting from the adoption of more competitive market-based price determination would have a number of benefits for prospective plantation investors. Not only would log prices, and hence plantation returns, increase, but there would also be greater incentive to improve the productivity of forest plantations to supply these products.
With respect to forest plantation investments, there are several other factors that contribute to a lack of competitive neutrality (i.e. a non-level playing field) in these investments. As well as competing with (largely state government managed) native forest products in Australia, investors must compete against imported forest products, which also may derive from non-market based native forest management, or state government subsidised forestry investments. In particular, forest products that are sourced from illegally or unsustainably logged forests will often be priced below products from legal, sustainable sources. For example, some reports suggest that up to 30 per cent of internationally traded hardwood products may be from illegal sources, with the world prices for forestry products being depressed by 7 to 16 per cent on average as a result (Seneca Creek Associates and WRI 2004). Recent strategies to overcome the problem of illegal logging include the development of timber certification requirements, such as those enforced through the amended 2008 US Lacey Act on the protection of plants and plant products.

A further impediment to investment in plantation forests may be the degree of competition with other industries for land resources. In Australia there are restrictions on land use and change. Clearing of native vegetation is now restricted in all states, and forestry is subject to many restrictions ranging from the maintenance of biodiversity to managing the impacts of water use (Burns et al. 2009). Hence, the majority of land used for establishing plantations now derives from agricultural land (Gavran and Parsons 2009).

The long time horizon and relative illiquidity of forestry projects combine to make forestry relatively more risky than alternative investments. All investments entail some risk, and over time this risk compounds. In the context of plantation investments, these risks may include production risks on the plantation asset, such as fire or disease, and market risks, such as fluctuating international commodity prices or economic downturns. Within short time frames these risks are more manageable; however over the longer term they are likely to compound and ultimately impact on the overall returns to an investment. Small scale investors are especially vulnerable to such risks as they are less able to diversify their investment portfolios.

Long investment horizons may be overcome if plantations can be bought and sold prior to maturity; this is known as secondary market trade. While in Australia there have been some secondary trades of plantation assets, they have generally involved the sale of large, diverse assets between large institutional investors (Kelly et al. 2005). The high transaction costs inherent in such bulky and infrequent markets have precluded the participation of small scale investors. The recent relaxation on restrictions relating to secondary trade in MIS forest assets may enhance the market for forestry assets, as MIS investments are relatively small and homogeneous (Kelly et al. 2005). This would have the additional benefit of providing important market signals to investors relating to the potential returns from plantation investment. However, at this stage no secondary trade of MIS investments has occurred.

**Barriers to entry for small investors**

There are a number of factors relating to forestry investment that present a barrier to small investors seeking to invest in forestry. Long investment time frames and the associated compounded risk in forest investments can often only be overcome by large investors. Another barrier is the existence of economies of scale in forest product processing. To be
internationally competitive, forest plantations need to be of sufficient size to gain economies of scale, precluding smaller investors. Another barrier is the transaction costs associated with land acquisition, plantation establishment, management and timber processing. Transaction costs may be minimised for larger or vertically integrated (arrangements between growers and processors) companies. In contrast, the disconnect between small growers and downstream processors may result in risk being shifted toward, and bargaining power away from, small growers. Larger investment companies are also able to benefit from diversification, which can help mitigate risk. Diversification may be undertaken in terms of species planted, silvicultural management and timber products produced, as well as regional (geographic) diversification to manage the market and environmental risks associated with agribusiness. These factors will deter many small-scale individual investors.

**Information asymmetries which hinder investment decisions**

Associated with the high barriers to entry in forestry, ABARE (2002) identified the industry structure paradox as the principal reason for the lack of forest industry data availability. The predominance of state forest agencies, and the economies of scale required for an internationally competitive forest industry in Australia, have resulted in a high degree of concentration of the growing and processing industry. This has increased the commercial sensitivity of market data such as forest and processing productivity, log prices and volumes of production, creating an economic problem known as asymmetric information.

The widespread availability of relevant and accurate information is crucial to the efficient allocation of resources in a competitive economy. Factors which mitigate or distort the availability of this information will lead to investment decisions that may not necessarily be socially optimal. Asymmetric information may result in investments with similar returns, tax treatments and risk being valued differently across the economy, hence limiting the pool of potential investors to certain groups (Mackarness and Malcolm 2006). Asymmetric information also affects the ability of new entrants to make informed decisions on potential investment returns, while existing participants in the market benefit from the lack of transparency. For example, due to the heavy concentration of processors, log price information and trends are often not available to new entrants, contributing directly to the risk associated with plantation investment (Kelly et al. 2005).

**Regulatory uncertainty (sovereign risk)**

Governments intervene in the investment market in a number of ways. In particular, government policies concerning land use regulations, environmental restrictions on processing investment and changes to taxation provisions must all be balanced by prospective investors. Changes to government policy may have implications for the returns to forestry investments. Changes to environmental regulations may affect the ability to harvest, the cost of harvesting, or may restrict investments in processing infrastructure.

Major investments in processing capacity may also have implications for environmental outcomes, which must be resolved with government regulation. Uncertainties regarding the impact of these regulations on the likelihood of investment have flow on implications to investments in the resources required to supply the infrastructure; for example, uncertainties
regarding the impact of environmental restrictions on the construction of a pulp mill in ten years time will have some impact now on investors’ decisions to establish pulplog plantations to feed this mill.

Changes to the tax treatment of investments will also affect their relative returns, and uncertainties regarding future changes will be compounded with long term investments. For example, changes to the treatment of MIS tax deductions and product disclosure guidelines in 2001 and 2002 by the ATO and ASIC led to a temporary drop in investor interest in MIS plantation schemes, such that the amount of investment in MIS fell from $800 million in 1999–2000 to $300 million in 2001–02 (The Treasury 2008).

As with market uncertainty, regulatory uncertainty will compound with long term investments such as forestry and reduce the discounted present returns of these investments, relative to shorter term investments. This uncertainty may contribute to some degree of adverse selection in forest investment markets, such that the investors who remain are those focused on the immediate, short term benefits of the tax deduction, while the investors who are deterred are those more interested in the long term returns derived from the investment.

Social attitudes and adoption of forestry
In some cases, the reluctance of landholders to plant trees may not stem from consideration of economic returns or risk. Instead, many landholders may resist land use change to afforestation for personal or cultural reasons.

For example, ArborVitae (2004), a Canadian environmental consulting firm, conducted a survey of farm and non farm properties in all Canadian provinces to determine the drivers behind rural property owners’ participation in forestry activities. A number of respondents to the survey mentioned a strong reluctance to reforest land that had been cleared by their fathers or grandfathers, even if it would be economically beneficial to do so. It is reasonable to suspect that these attitudes also hold in Australia to some extent. This implies that for some land owners financial incentives may be ineffective at encouraging them to establish forest plantations.

Vanclay (2004) notes that farming is a socioeconomic practice. “Farming is a way of life, not just a way of making a living that acquires a meaning far deeper than almost any other occupational identity”. This means that farmers do not make decisions based entirely on profit maximisation. Farmers often accept a lower income because they enjoy their farming lifestyle, and thus may be reluctant to convert any or all of their land to forest plantation if this benefit would be lost. Also, even if farm forestry makes economic sense a lack of socio-cultural support may be a reason for farms to reject forestry. If a farmer is the first to attempt farm forestry in their region then they will have lost the option of seeking technical advice from neighbours, which farmers highly value.
Technical factors

Technology gap
As mentioned above, public management of native forests may constitute a competitive disadvantage to some private forest investments. In particular, investments in private forest sawlogs are less likely to be competitive with publicly sourced native forest logs, which may have implications for investment in privately owned forest plantations. If investors prefer one type of forestry investment over another (say, native forests over plantation forests), there is potential for a technology gap to develop. In other words, parts of forestry with less investment may find themselves with less technological advances than the parts of forestry which are able to attract external investment.

For example, the long timeframes associated with long rotation hardwood plantations may result in reduced investment in the technologies associated with establishment and management of long rotation varieties. In contrast, significant investment and advances have been undertaken in the technical aspects of softwood and short rotation hardwood growing and processing. The limited productivity growth and technical advice available for hardwood sawlog plantations may represent an impediment into investment in these projects (Kelly et al. 2005).

Skill shortages in forestry management and related industries
Many industries in Australia currently suffer from skill shortages and forestry is no different. The supply of labour with skills relevant to the timber growing and processing industry may be restricted due to lack of sufficient investment in education and training for these skills and the competition for labour with other industries, particularly mining. In the forest industry, skill shortages have been associated both with generalised trades (such as electricians and fitters) as well as industry-specific trades (such as wood machinists and harvest operators) (NAFI and A3P 2006).

It is argued that skill shortages in the industry are preventing the entry of new plantation producers, while it is also claimed that the lack of training in using timber for various applications is also inhibiting market demand for timber products (Bayne 2006).

Infrastructure issues
Timber processing facilities are often located in rural areas in order to be close to wood supplies. However, this means that timber processing facilities are often far away from major markets, both domestically (far from major cities) and internationally (far from ports), adding to the transaction costs associated with forestry.

Many of the factors discussed here are not unique to forestry and are indeed relevant to many agribusiness markets. Industries such as mining and electricity also have to deal with the distance between manufacturing and markets. Policies aimed at overcoming these obstacles should not focus on forestry specifically but rather be targeted to improve the economic viability of regional Australia.
Environmental factors

Environmental conservation

Over the past few years, there has been a greater interest in environmental conservation especially throughout Regional Forest Agreement (RFA) areas. This has reduced the available levels of wood supply to the timber industry (DECC 2009; Ramsay 2008; SSCECA 2009).

Environmental restrictions may have diverging effects on the forestry industry. Restrictions on the supply of native forests products (which compete with plantation forests in the market for forest products) may increase the price of forest products generally (given an unchanged supply of plantation forests, consumers unable to purchase native products due to the restrictions may substitute to plantation products) and hence increase the returns to investments in plantation forestry. Conversely, environmental regulations which impose restrictions on the access to land resources will constrain the supply of, and hence investment in, plantations.

Land clearing restrictions

Land use management in Australia operate within a framework of environmental laws and regulations. At the national level, the Environment Protection and Biodiversity Conservation Act 1999 requires approval for activities that may threaten conditions deemed to be of national environmental significance, including nationally listed threatened species and ecological communities. However, environmental guidelines governing land use are implemented primarily at the state and territory level, where each jurisdiction operates under its own legislation. In addition, restrictions on water availability in many parts of Australia have increased scrutiny of the range of environmental and agricultural water uses. The National Water Initiative (NWI) recognises large scale afforestation as a water interception activity, and hence recommends the inclusion of forestry, along with other interception activities, in policies associated with catchment-scale water management (Burns et al. 2009).

The potential of forestry in areas covered by native vegetation may be limited because the intent of the state legislations is to preserve the vegetation existing in the state prior to European settlement. Therefore, forestry plantations would not be acceptable under current state legislation. In the White Paper on the Carbon Pollution Reduction Scheme (Commonwealth of Australia 2008), the government stated its intention to investigate the potential for accepting some biodiversity plantings in the emissions accounting scheme. This change is likely to open up further land to environmental plantings; however the potential to invest in timber plantations may remain restricted.
This section provides case studies of a range of government policies, both within Australia and overseas. The purpose of the case studies is to demonstrate that there are rafts of measures available to the government to achieve the 2020 Vision. In some cases they are similar to measures already in place, and in others they are markedly different. Nonetheless, they are included for illustrative purposes only and inclusion of any particular case study should not be viewed as an endorsement of that policy.

Domestic investment models

Australian Government programs for different sectors vary. This section provides a discussion on domestic policies in a number of different areas.

Caring for our Country

Caring for our Country is the Australian Government’s current NRM initiative designed to engage land managers in activities to advance biodiversity conservation of the sustainable use of resources. The initiative operates by having two pools of funds accessible to the initiative’s participants. One pool of funds is committed to previously agreed priority areas, such as expanding Indigenous protected areas; fighting the cane toad; and repairing fragile coastal ecosystems. The other pool is classified as contestable funds. These funds can be used to finance specific project proposals. The government invites interested parties to submit project proposals, and a review panel then decides which of the proposed projects to invest in.

Caring for our Country identifies six priority areas which cover a broad range of NRM issues:

- the National Reserve System
- biodiversity and natural icons
- coastal environments and critical aquatic habitats
- sustainable farm practices
- community skills, knowledge and engagement
- NRM in northern and remote Australia.

Each priority area contains a series of five year outcomes, and targets are specified for each of those outcomes. The projects that ultimately win government funding are the ones that best achieve the government’s stated targets, outcomes and priorities. Caring for our Country has $2 billion in funding for NRM projects from 2008–2013; $403 million in funding was awarded in 2009 (Commonwealth of Australia 2010).
Caring for our Country provides a good example of a government program which is aimed both at supporting research and development activities, as well as providing direct funding for relevant projects. While there may be some applications of such schemes to forestry, it should be noted that the intent of this program is generally to enhance the provision of public goods; investments that provide private benefits to investors are not funded under these programs. Hence, programs such as these are likely to be more relevant to environmental forestry investments (DAFF 2000; MPICA 2008; Schofield et al. 2007).

The investment aspects of Caring for our Country are not relevant for the 2020 Vision because they are aimed at funding public goods. However, it is possible that a program similar to Caring for our Country targeted at extension could be tailored for the 2020 Vision.

**Forest Industries Structural Adjustment Package**

The Australian Government has implemented financial support packages aimed at assisting the timber industry’s transition away from using native forest resources. These have included the Forest Industries Structural Adjustment Package (FISAP) and several similar state-based initiatives.

FISAP was an Australian Government initiative designed to assist the forest industry adjust to changes in native forest resource access negotiated under the Regional Forest Agreements (RFAs) between the Australian Government and State/Territory governments. The FISAP program originally ran from 1996 to 2000 which allocated over $200 million over the five years (DAFF 2010).

There were four major components under FISAP. These components included rescheduling assistance; labour adjustment package; restructuring assistance; and business exit assistance. Specifically, these assistance packages included retraining of labour; investment of new infrastructure such as road works; and supporting the exit of native forest businesses from the industry.

Several state-based structural adjustment packages have also been introduced since the completion of FISAP in 2000. Most recently, the Tasmanian Forest Industry Development Programme (TFIDP) was introduced in 2005 to assist the native timber industry adjust to changes in forest resources arising from the Tasmanian Community Forest Agreement (DAFF 2005). The program allocated over $42 million into developing new products; upgrading harvesting equipment; maintaining market competition; and long term employment. TFIDP concluded in June 2009. Similar adjustment packages have also been implemented in New South Wales; Victoria; Western Australia and in several RFA regions. All these programs have now finished.

These past structural adjustment packages have reportedly had some success in supporting the forest industry’s transition away from using native forests. In addition to the introduction of RFAs, these adjustment packages have also indirectly encouraged greater demand for timber plantations resources in Australia by promoting investment in regional infrastructure.
**Joint Venture Agro-forestry program**

The Joint Venture Agro-forestry Program (JVAP) is a public-private initiative to develop practical methods and systems for agro-forestry on farms (Schofield et al. 2007). Since 1993, the program has allocated around $29 million into farm forestry research, development and extension. Although not directly aimed at encouraging timber plantations, JVAP has helped encourage commercial forest production, improve agricultural activity and support the sustainable management of natural resources.

Research into JVAP found that the program has greatly improved the awareness of the environmental effects of forest plantings, and increased understanding of farm forest related knowledge and skill (Powell 2009). It was also found through JVAP that there are signs of traditional farm forest owners overcoming the lack of early financial returns through innovative processing technologies. These technologies have helped enable high valued timber products to be produced using short rotation pulpwood.

JVAP is currently being used as a mechanism to support horizontal integration between the agriculture and forest industry. The program has also reportedly supported the development and establishment of new technologies and practices (Powell 2009).

**Mandatory Renewable Energy Policies**

The uptake of renewable energy sources such as solar and wind are inhibited by similar barriers to that of forest plantation development. Similar to forestry, attracting investment into the renewable energy industry is generally difficult because of strong competition from relatively profitable sectors, such as fossil fuels. Further, the energy industry has targets committed to by the government, such as the Mandatory Renewable Energy Target (MRET).

Under MRET, the government has imposed a legal liability on wholesale purchases and large individual users of electricity to purchase electricity from accredited renewable energy sources and has announced a target of 20 per cent electricity production from renewable sources by 2020. Accreditation of renewable energy sources is awarded through a Renewable Energy Certificates (REC) system.

In addition to MRET, there are also several state-based initiatives which impose a legally binding renewable energy target. These schemes operate largely similar to the MRET, in that they both operate on a certificate-based system and impose penalties for non-compliance (DEUS 2006). Further, research is currently being undertaken to determine the relationship between these renewable energy targets on the emissions trading markets, such as the CPRS.

MRET may have benefits for the forest industry, if energy sourced from forest biomass can compete with other energy sources.

**Early Stage Venture Capital Limited Partnership Program**

The Australian Government’s AusIndustry Early Stage Venture Capital Limited Partnership Program (ESVCLP) is aimed at stimulating Australia’s early stage venture capital sector. For further information on ESVCLP refer to AusIndustry (2008a; 2008b).
A venture capital fund registered under the ESVCLP receives flow through tax treatment, i.e. it is not a taxing point. Limited partners (investors) in an ESVCLP have no tax liability on income or capital gains they receive from the ESVCLP. General partners (managers) of the fund can claim their carried interest on capital account rather than revenue account, meaning that interest earned is not considered assessable income for tax purposes.

The ESVCLP is designed to encourage investment in high risk start-up enterprises by creating a tax free environment for private investment in some limited small to medium sized Australian enterprises. Any investment structure for forestry that limits the tax liabilities of investors can lead to an increase in plantation area, as demonstrated by the impact of MIS. However there may be significant issues with applying the current ESVCLP to the forestry industry.

Most importantly, the biggest barrier to applying the current ESVCLP to the forest industry is the restriction on property development, as the sale of plantation land may provide significant return to investors. Also the five to 15 year limit would exclude long rotation timber plantations, possibly in favour of short rotation, as the secondary market for plantation timber is still in its infancy. The ability to invest in projects with economies of scale may be diminished due to the strict investment rules of the ESVCLP. Reporting possibly commercially sensitive information to the board of the Australian Taxation Office, which must be made public, could also deter investment.

While forestry is a high risk industry it cannot be considered a startup industry, as forestry investment has been undertaken for hundreds of years. This may lead the Board to reject forestry application under current ESVCLP program regulations. In addition, the ESVCLP is applicable to all industries. This means that the disadvantages faced by forestry when compared with other land uses still exist; consequently there is really no incentive under the ESVCLP to invest in forestry compared to with agriculture.

**Unit trusts**

Owning part of a unit trust is similar to owning shares in a company. The unit trust holder is entitled to receive a proportion of the trust income corresponding to the percentage of the unit trust they hold. Unlike MIS, unit trusts do not receive tax deductibility for establishment costs, as these are considered an ongoing capital item. However if the investment is funded through a loan, interest may be tax deductible; also some management costs are deductible when they occur. The unit holder pays tax at their marginal rate on any income received from the unit trust and capital gains tax is payable on any capital gain the unit trust makes. Further, unit trusts have a very high level of liquidity as they can be traded immediately and individual investment costs are low (BDL 2010).

Unit trusts are a common investment vehicle used widely in a range of industries including forestry. Forestry unit trusts are usually vertically integrated as they invest in existing plantations and timber processing activities, as well as new plantations, to provide an immediate stream of income to investors. Forestry unit trust investments will appeal to investors who do not value immediate tax deductibility highly, e.g. large institutional investors such as superannuation funds.
Overseas investment models

Most countries around the world have some sort of national forest policy, albeit with different aims. Brazil, for instance, aims mainly at conservation of existing forests whereas Chile aims to increase plantation areas. The type of policy varies, although they generally include some sort of financial incentive. This section presents an overview of forest policies in a number of different countries: Chile, Indonesia, Norway, the United States, New Zealand, South Africa and Uruguay. A discussion is also provided on the applicability of these schemes to the Australian forest industry.

Chile afforestation program

The forestry sector in Chile is largely covered by Decree 701, which was passed in 1974. The law provided a subsidy of 75 per cent of the plantation costs for afforestation projects, aimed at low productivity lands that had been deemed unsuitable for agricultural use. The subsidy is repaid to the government once the survival rate of trees exceeds 75 per cent (González 2008). Another important aspect of the law was that it secured private property rights by declaring that planted areas could not be nationalised (Castilleja 1993). In 1998 the law was amended to enhance participation of small landholders, with a 90 per cent subsidy paid to small landholders for the first 15 hectares of forested land in a year.

Chile has seen a significant growth in its plantation forestry sector, from 375,000 hectares in 1974 to 2.05 million hectares in December 2003 (González 2008).

González (2008) used regression analysis on data held by the Chilean forestry authority, CONAF, to determine the true effect of the subsidy program. The study found that although the subsidy had undoubtedly had some effect, a number of other factors may have been equally important in the dramatic expansion of plantation forests. For example, alongside the subsidy came the protection of private property rights, which may have been a more important factor than the subsidy (Castilleja 1993; Guerin 2008). Guerin (2008) notes a number of adverse effects of the policy, including: urban migration; rural poverty; water shortages; and land conflicts between indigenous populations and forestry companies.

Despite its criticisms, the Chilean subsidy program seems to have been broadly successful in encouraging forestry plantations. However there are a number of issues that make it uncertain whether or not such a scheme would work in Australia. First, the subsidy was implemented in conjunction with other reforms such as trade liberalisation and securing of private property rights that are not applicable in Australia. Second, the subsidy was initially implemented under a military dictatorship. There are bound to be more political pressures in implementing such a scheme under democratic rule. Finally, subsidies such as this provide short term assistance without enhancing the competitiveness of the subsidised industry. It may be true that a subsidy encourages more investment in a particular industry, but when the subsidy inevitably runs out that industry may find itself unable to operate without government assistance.
Indonesian Reforestation Fund

The Indonesian Reforestation Fund (DR) is a government initiative designed to help improve accountability of environmental impacts on land users. The DR is implemented through a volume-based fee on each cubic metre of timber harvested which is collected and distributed by different tiers of government. The size of the fee varies according to the type, grade and location of the wood harvested. These fees are then redistributed through a loan scheme whereby investors may borrow money from the government to support land rehabilitation efforts including plantation development and soil conservation (Resosudarmo et al. 2006).

Despite government efforts, the DR has generally been ineffective at reducing the dependency on native forests in Indonesia (Setiono 2008). The problem appears to be that alternate land development activities, such as oil palm and mining, are of greater interest to both government and private industry. Further, land tenure issues in Indonesia are also inhibiting the development of long term plantations because of difficulties in reaping private returns from forest investments.

Another concern is that both the Indonesian forest industry and public sector lack the incentive to develop plantations. According to Setiono (2008), many large timber companies invest less than one per cent of their total cash flow in developing timber plantations. Instead, the cash flow is redirected towards purchasing raw materials, usually from sister companies. Similarly, lack of financial monitoring in using DR has reduced its effectiveness in developing timber plantations. In practice, some DR funds are directed toward high return non-timber industries, such as property, finance, insurance, trade and agriculture. Since there is currently no effective financial measure to monitor the use of DR funds, the returns from these investments are used to pay the DR loan without having any increase in timber plantations (Setiono and Husein 2005).

These issues relate to governance and competitive neutrality concerns in Indonesia, which are not as severe in Australia. Hence, the scheme may actually have more applicability and success in Australia than in Indonesia.

Norwegian Forest Trust Fund

The Norwegian Forest Trust Fund was originally established in 1932 as a way to support forest conservation in the country. The Fund operates by requiring forest owners to deposit a certain share of their gross income from forest sales into a private trust account administered by the government. The required percentage ranges from 5 per cent to 25 per cent, depending on the financial performance and plans of the forest owner. Each forest owner is able to set their own percentage on an annual basis. However, permission is required from the government if this percentage is set below 8 per cent. Contributions to the Forest Trust Fund is limited to owners with average annual harvesting potential below 3000 cubic metres and who are located in areas deemed important by the government (CFS 2006). Hence, the scheme focuses on establishing a network of small scale growers.

The money in the Forest Trust Fund must be reinvested back in the forest areas from where it originated, typically in long term investments such as forest revegetation measures (NFOA
Forest owners have an incentive to contribute toward the Forest Trust Fund as they are able to reduce their taxable income by the amount invested in the fund. When money is withdrawn from the trust and applied to long term investments an additional tax deduction is available.

Any interest earned on the Fund is used to reimburse potential losses associated with the collection of Trust Fund payments or redirected into forest activities. Hence, forest owners do not receive any interest earned through the Trust Fund. Disputes over the use of the Trust fund are heard in front of a County Tribunal.

The Trust Fund, in addition to other forest policies, is estimated to have more than doubled the rate of afforestation in Norway compared to pre-2000 rates (CFS 2006). However, several conditions would need to be considered if such a forestry framework were to be implemented in Australia. First, the Norway Trust Fund is not strictly for plantation development, but rather to encourage land use conversion. Second, consideration of the type of tree species planted would be needed before implementing a similar scheme in Australia. Some tree species have rotation periods that are too long for the Fund to provide the necessary incentive for landowners and investors to participate. Hence, research is needed before implementing a similar Trust Fund approach in Australia.

South Africa

Historically the private sector has been the driver behind the South African forestry industry. The emergence of the domestic pulp and paper industry has been a major driving force in commercial timber plantations. The existence of strong domestic demand and healthy domestic competition between producers within the sector and also between sectors, coupled with South Africa’s previously significant protective tariffs have been drivers of private plantations. Private plantation investment was also encouraged by the South African Government though programs to promote foreign direct investment post World War Two (Chamshama and Nwonwu 2004).

According to the Department of Water Affairs and Forestry (DWAF) review (2004) the general view of the forestry industry is that they are not looking for government incentives and welcome a free market. They are concerned with being treated equally to agriculture, especially with regards to water use charges.

In 1998 the National Forestry Action Program was developed under the National Forest Act and outlined a series of reforms for the industry which emphasised the need to raise efficiency and increase private sector involvement to ensure sustainable forest management. The reforms all place an emphasis on social equality (Gilsenan 2003).

There has been an emphasis on the creation of corporate-community partnerships such as outgrower schemes. These schemes involved the international pulp and paper companies South African Pulp and Paper Industry (Sappi) and Mondi Paper Company Ltd providing marketing and production services to farmers to grow trees on their own land under purchasing agreements set out in a contract (Gilsenan 2003).
In 1990, Sappi introduced the Management Associated Program (MAP) outgrower scheme that offered free seedlings, technical advice, a loan of US$275 per hectare and a guaranteed market price for timber. Under the scheme 28 000 hectares of forest have been planted and participation in the scheme is dependent on following harvesting practices set out by Sappi and not being able to sell harvested product to any other company (Gilsenan 2003).

The South African private plantation industry has been driven by the needs of its domestic processing industry. It should be looked at in an Australian context as an example of what effect the existence of a strong domestic processing industry can have on the private plantation industry.

**United States Forest Land Enhancement Program**

The United States Forest Land Enhancement Program (FLEP) is an initiative to either establish or supplement existing non-industrial private forest land and complement other sustainable forest programs currently in force. Support from FLEP is provided through technical, educational and financial assistance to landowners. The program is federally funded and is available for all 50 states and offshore territories (Federal Register 2003).

Implementation of FLEP is undertaken through a State Priority Plan, which determines the mix of educational, technical and financial assistance provided under FLEP. Support from FLEP is restricted to projects affecting up to 1000 acres of land annually or variances up to 5000 acres if the project can demonstrate significant public benefits. In regards to financial assistance, the maximum cost sharing payment may be up to 75 per cent of any practice, including afforestation (USDA 2005).

The introduction of FLEP in 2003 was intended to replace two previously similar forest initiatives – the Forestry Incentives Program (FIP) that allowed for cost sharing timber stand improvement, site preparation for natural regeneration and tree planting practices, and the Stewardship Initiatives Program (SIP) that allowed for cost sharing of a wide range of multiple resource management practices (Federal Register 2003). The aim was to provide greater focus toward integrating conservation values compared with both FIP and SIP and integrated all financial aspects of both programs.

FIP was initiated in 1975 and under the program the US Government paid up to 65 per cent of the cost of tree planting and stand improvement providing the landowner agreed to maintain their plantation for 10 years. From the program’s inception in 2003, 1 618 800 ha of trees were planted at a cost of US$200 million and subsequent economic analysis concluded FIP was successful in both increasing timber supply and providing acceptable financial returns for private and public landowners (Federal Register 2003). Federal tax revenue from FIP plantation harvests was more than double the scheme’s costs (Gilsenan 2003). SIP was initiated in 1990 and 150 964 hectares of trees were planted at a cost of US$23.5 million. The program allowed for up to 75 per cent of cost sharing for approved practices (Gilsenan 2003).

While the United States is a country with similar socio-economic conditions to Australia, consideration should be given to the distortionary effects plantation subsidies would have on the forestry industry in Australia. Subsidies may lead to investment in forestry above what is economically efficient and give an advantage over unsubsidised sectors of the economy.
New Zealand forest policy

As of 2007 the total estimated area of plantation in New Zealand was 1,790,000 hectares, 95 per cent of which was privately owned. Radiata pine, a long rotation conifer, accounted for 89 per cent of plantation forest. This figure has remained relatively stable since the late 1990’s, with a pattern of marginal deforestation developing from 2005 (MAF 2009).

Between 1960 and 1984 plantation area grew significantly from 352,000 hectares to over 1,000,000 hectares, largely because of direct government plantings as well as the availability of forestry encouragement loans, which were originally only available to private land holders (i.e. farmers), and then later extended to local governments. Further, forestry encouragement grants of up to 50 per cent of qualifying costs, available to individuals, trusts, partnerships and smaller companies but not large forestry companies, who already received similar taxation exemptions (until 1982, after which all other forestry incentives were removed and all investors were eligible for the grant), contributed to plantation growth (Rhodes and Novis 2002).

A combination of factors during the mid 1990’s led to plantation growth of 60–80,000ha per year. These included the removal of direct government subsidies and export incentives for all industries during deregulation in the 1980’s. The removal of subsidies caused 1.5 million ha of agricultural land to become marginal or uneconomic, and forestry became the preferred viable alternative on this land. Depressed rural land prices caused by the removal of agricultural subsidies also helped attract investors to forestry (Rhodes and Novis 2002).

Other contributing factors included almost total privatisation of government forestry assets combined with the cessation of new government planting in 1991; the introduction of immediate tax deductibility of qualifying costs against income from any source in 1991 for all forestry investors (Rhodes and Novis 2002); and continuing indirect subsidies for infrastructure development, biosecurity, research, market access initiatives and forest industry information. Finally, a global log price spike in 1993-94 further spurred growth in long rotation plantations even after prices stabilised (Gilsenan 2003)

Some aspects of the New Zealand forestry policy, if applied to the Australian forestry industry, could have a significant effect on Australia’s plantations. The privatisation of almost all forestry resources in New Zealand led to increased competitiveness; however this was coupled with general economic reforms which must occur in order to create a level playing field between all sectors of the economy.

Uruguay forestry law

The Uruguayan Government has aggressively promoted the expansion of the forest sector since the implementation of their Forestry Law in 1987. Forest plantings are encouraged in Uruguay mainly through a combination of subsidies and tax incentives. These instruments include tax and tariff reductions for forestlands; tax and tariff reductions for inputs used for forestry activities; credit loans, which allowed financing of up to 80 per cent of the forest investment; investment protection; and establishment of free trade zones benefiting the forest sector (Morales 2006)
The impact of the aggressive Uruguayan forest policy had immediate results in expanding the national timber plantation area. Between 1988 and 1998, establishment rate of new timber plantations increased from 2000 hectares a year; to 85,000 hectares a year (Mendell et al. 2007). Further, the 1987 Forestry Law attracted significant new, primarily foreign, investment into the forest sector. Based on a 2004 survey, 44 per cent of respondents involved in forest investments used some form of foreign capital. In comparison, 53 per cent of respondents claimed that they did not use any form of external financings, such as loans, bonds or equities. These funds were generated primarily through normal operations of the firm (Mendell et al. 2007).

The success of the Uruguayan forest policy can be attributed to the development of an attractive long term forestry investment environment, which resulted in significant inflows of foreign capital. Other factors that may have influenced the success of the policy is the organisational and market structure of the Uruguayan timber market. Based on the 2004 survey of forest owning firms, 65 per cent of respondents were classified as corporations under the Uruguayan tax code. The remaining 35 per cent of respondents were classified as smaller firms that, under Uruguayan tax law, are not required to pay capital gains tax.

The survey also found that firms are marketed heavily towards either the supply or demand side for forest products. Thus, investment has been geared towards meeting the needs of the market, such as developing timber plantation resources or new processing facilities. Further, survey revealed that firm operations were predominantly export oriented, with 94 per cent of output being sold overseas and the remaining 6 per cent being domestically consumed (Mendell et al. 2007).
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