What does it take?
The role of incentives in forest plantation development in Asia and the Pacific
Asia-Pacific Forestry Commission

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Thomas Enters and Patrick B. Durst
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    *Thomas Enters, Chris L. Brown and Patrick P. Durst*
FOREWORD

The Asia-Pacific region is endowed with extensive and biologically diverse forests. Hundreds of millions of people depend directly on these forests for their livelihoods. Many more people make use of the products and enjoy the services that the forests provide. Since the middle of the last century, the region’s natural forests have provided millions of cubic metres of wood annually, supporting a wood-processing industry that employs millions.

Over the past two decades, political developments, and macro-economic and extra-sectoral policies have affected forests of Asia and the Pacific to an unprecedented extent. Many countries in the region continue to suffer the effects of deforestation and forest degradation, and today the natural forests are treasured as much for the environmental services they provide, as for the wood they produce. Millions of hectares have been protected as parks and reserves, or otherwise declared off-limits to the logging industry. As a result there have been dire predictions of an acute shortage of wood or a timber famine.

Responding to the diminishing capacity of the region’s natural forests to produce timber, many countries have turned to forest plantations. Plantations have the potential to be a highly productive and sustainable source of wood and non-timber forest products. They can also provide social and environmental services, including storing carbon, combating desertification and rehabilitating degraded lands.

Historically, public-sector agencies have dominated forest plantation development in most countries in Asia and the Pacific. However, for a variety of reasons, it has been widely accepted that private small- and large-scale producers offer considerable comparative advantages when it comes to growing trees and producing industrial wood in plantations. Consequently, there is a growing interest in involving the private sector directly in the development of forest plantations, and governments and their respective forestry agencies are increasingly asking what it takes to encourage non-government entities to grow trees. In other words, they are looking for the right incentives to make growing trees attractive to small- and large-scale investors.

To date, there has been no comprehensive study of incentives that encourage plantation establishment and management in Asia-Pacific countries, despite the fact that the region leads the world in plantation development. The existing body of analysis is small and fragmented and conclusions are preliminary in nature. As a result, countries of the region have not benefited fully from past experiences and scarce financial resources continue to be spent inappropriately.

To address this knowledge gap, the Asia-Pacific Forestry Commission (APFC) implemented a regional study to assess the impact of incentives on forest plantation development. The findings of the study clearly indicate that a blueprint for engaging non-government investors in forest plantation development does not exist. What has emerged, however, is that clear, consistent and stable policies and a favourable investment climate are essential ingredients to promote the development of forest plantations by small- and large-scale producers.

In presenting the findings of the study, FAO and its partners are pleased to continue their support for sustainable forest management in the Asia-Pacific region. We hope that this publication will help policy-makers and foresters to better understand the key issues, challenges and opportunities concerning the effective involvement of the private sector in forest plantation development.

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THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN THE ASIA-PACIFIC REGION

Thomas Enters1

Will we have enough forests and wood to satisfy the growing demand for wood products? The key message of a study by Nilsson (1996), which reviewed the available knowledge in the mid-1990s, was that probably we will not run out of forests but we may run out of wood. Nilsson (1996) forecasted a rather “substantial shortage of industrial roundwood already by 2010” (p. 53). Throughout the last century, similar predictions were made in many countries in the Asia-Pacific region. The first distress signals about an impending domestic timber famine were articulated in the 1920s in New Zealand. These concerns were reiterated in other countries, at first modestly, later fervently, until forest departments in most countries had convinced their governments of the necessity to provide the appropriate budget allocations for forest plantation programmes. Today, forest plantations make up about 16 percent of the forest cover of the Asia-Pacific region and the region accounts for around 61 percent of the world’s plantation forest.

Historically, public-sector agencies have dominated forest plantation development in most countries in Asia and the Pacific. This pattern has changed in many countries over the past ten to 20 years, mainly for four reasons. First, devolution of forest management has led to greater involvement of communities and the private sector in forestry. Second, the performance (financially and biologically) of public-sector plantations – with few exceptions – has been disappointing. Third, shrinking government budgets make it impossible for most forest departments to devote as many resources to forest plantations as they have in the past. Fourth, problems related to weak governance structures are driving many countries to reconsider the role of government in administering forest resources and in directly implementing forest programmes (Gregersen et al. 2004).

These developments have been paralleled by a shift in the main objectives of forest management, which traditionally focused on timber production. Although forest policies and forest management objectives diversified and expanded long before the United Nations Conference on Environment and Development (UNCED), since 1992 forestry has become even more multidimensional. Forests are increasingly valued for supporting local livelihoods and helping to reduce poverty, for providing local environmental services and as a reservoir of global biodiversity. In the Asia-Pacific region, this shift in thinking has affected forestry immensely over the last ten years. Perhaps the most far-reaching outcome is that forest areas set aside for conservation have expanded considerably and that the area of production forests has declined even faster, due to unabated deforestation rates and, even more so, due to complete or partial harvesting restrictions – the logging bans (Durst et al. 2001).

In environmental or conservation terms, the impact of the various conservation measures, especially logging bans, has been mixed. In terms of wood supply, the impact is clear-cut. Domestic timber supplies derived from natural forests have been reduced substantially, in some countries such as Thailand to a trickle. As a consequence of such developments, the search is on for generating alternative wood supplies. While some countries have turned to imports – at least in the short term – most have attempted to augment forest plantation resources. Today more

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industrial roundwood is sourced from plantations and trees outside forests in Asia and the Pacific than from natural forests (Brown and Durst 2003). With the public sector retreating from direct involvement in planting and tending trees, the question is whether the private sector can grow the wood that many expect is needed.

During the 18th Session of the Asia-Pacific Forestry Commission (APFC), held in Noosaville, Australia in May 2000, the Commission reviewed the results of the regional study on the Impacts and effectiveness of logging bans in natural forests in Asia-Pacific (Durst et al. 2001) and considered issues identified by the study as requiring additional information and analysis for effective policy-making. Inter alia, it recommended conducting collaborative activities in the area of commercial forest plantations. In light of the above, the APFC undertook a comprehensive multicountry study on the Impacts of incentives on the development of forest plantation resources in the Asia-Pacific region.

THE STUDY’S AIM AND SCOPE

There are several examples in the world where clear, consistent and stable policies, a conducive investment climate and well-programmed incentive schemes have made a significant impact on the success of forest plantation development. In contrast, where initiatives have been ill conceived or poorly implemented, the results have been disappointing despite heavy investment by governments. It is common knowledge that vast plantation areas are of very poor quality. Others exist on paper only, because mismanagement or some disaster led to their premature death in the field. Others were never established, but appear in records only to spuriously indicate that targets have been reached and funds spent.

This regional study was designed to comprehensively examine the reasons for the mixed results and to provide guidance in policy formulation to those countries interested in stimulating investments in tree growing through the provision of incentives to large- and small-scale growers. The study focused on policy instruments and mechanisms aimed at stimulating investment in commercial plantations grown for profits, while recognizing that forest plantations can also be established to meet broader social and environmental objectives.2

This publication is based on country case studies conducted in Australia, China, India, Indonesia, Malaysia (Sabah), New Zealand, the Philippines, Thailand and the United States of America.3 The countries were selected to represent examples of major private-sector involvement in plantation development. In addition, experiences from other countries were reviewed to strengthen the results of the study.

Many governments and their respective forestry agencies are increasingly asking what it takes to effectively involve the private sector and local communities in forest plantation development. Hence, the main purpose of the study was to gain insights into this pertinent question.

2 Readers interested in the broader role of incentives in natural resource management should consult Sanders et al. (1999) and FAO (1999).

3 The United States of America was included in the study as part of the Asia and the Pacific region, since it borders the Pacific Ocean, has territories in the Pacific and is a member of the Asia-Pacific Forestry Commission. The contribution from Malaysia focuses on the experiences of only one company, Sabah Softwoods Berhad (SSB) in Sabah, East Malaysia.
The principal objectives of the study were to:

- Document plantation development in the Asia-Pacific region;
- Analyse past and current experiences in providing direct and indirect incentives for tree planting;
- Assess the broader socio-economic and political conditions that encourage investments in forest plantations; and
- Provide recommendations for enhancing the involvement of the private sector in plantation development.

KEY CONCLUSIONS

The key conclusions that emerge from the regional study are presented below. The final chapter discusses these issues in greater detail.

1. Very broadly, plantation development in the Asia-Pacific region is at three stages (that is, initiation, acceleration and maturation stages). In Australia, New Zealand and the United States, interest in growing trees has a long history and by the 1990s these three countries had reached the maturation stage. Most Asian countries find themselves still in the initiation or early acceleration stage – especially with regard to involving the private sector – even though plantations may cover extensive areas such as in China (46.7 million ha) and India (32.6 million ha).

2. Broadly defined, incentives encompass anything that motivates people to act. In the context of the regional study, incentives were defined as *policy instruments that increase the comparative advantage of forest plantations and thus stimulate investments in plantation establishment and management* (for a detailed definition see Chapter 3). These include a wide range of interventions from the provision of free seedlings (a common direct incentive) to political and macro-economic stability (in the Asia-Pacific region, a less common indirect incentive). Under this definition, incentives constitute any means that provides encouragement to “do business” (that is, establish plantations). At the disposal of policy-makers is a vast array of incentives and none has emerged as a silver bullet, although some are more effective than others. The effectiveness of a particular incentive changes over time as countries move from one stage to the next.

3. During the initiation stage, direct incentives may be required, in certain instances, to raise awareness and to increase the pace and scale of tree planting, especially to build up raw material supplies for an expanding processing sector. However, as experience is gained and both capacity and infrastructure develop, direct incentives become less important (they can also suffer from very high transaction costs). They are likely to be replaced by variable incentives and complemented by research and development, and extension, during the acceleration stage. In fact, a good sign of success is direct incentives becoming obsolete during the acceleration stage.

4. In the long term, providing a favourable investment climate, technical assistance and well-established markets have greater influence than direct incentives such as free seedlings, subsidized credit or cost-sharing of planting expenses. In all cases, incentive systems must be timely, well-targeted and flexible if they are to successfully engage the private sector in forest plantation development. In deciding on measures that increase the interest of investors it is vital that consideration be given to factors that motivate people to invest in planting trees, rather than focusing on the needs and objectives of governments and their respective forest agencies. Thus, small grants provided with a minimum of administrative complexity tend to be more effective than loans that have bureaucratic repayment requirements.
5. In the countries that have reached the maturation stage, it has been recognized that key measures to maintain private sector interest and investment in plantation development are related to the reduction of barriers to investments and removal of structural impediments and operational constraints. The key to success in forest plantation development lies in providing clear and secure resource and property rights, and coherent and stable policies. An important component of an enabling environment that is supportive of economic activities is healthy debate on the merits of planting trees and particular incentives, and transparent decision-making.

6. Most people agree that forest plantations can help meet increasing demands for wood and provide public goods and services, although there are exceptions to this general statement. Most people also maintain that appropriate incentives – particularly enabling incentives – play a key role in stimulating plantation development. However, proponents of forestry need to recognize that alternative land uses may offer similar – often greater – benefits to society as well as higher returns to investments. Under such circumstances, it may be pointless to offer incentives for plantation development, since it may be more economically efficient to invest in alternative land uses.

7. In a historical context, incentives have largely been applied in an ad hoc manner. As improved understanding of the mechanisms and conditions related to economic growth and development has evolved, it has become apparent that, in many instances, plantation incentives have been less successful than they might otherwise have been, had various restrictions on – or disincentives to – plantation establishment, tree harvesting and transport also been addressed.

8. Finally, and not surprisingly, the overriding stimulus for commercial timber planting is real prices and perceptions of future price developments. Investors frequently react vigorously to changes in prices, as the price spike for wood in the early 1990s showed. In many countries in the Asia-Pacific region, it triggered an unprecedented planting boom, without much, if any, intervention from the public sector.

THE CONTRIBUTIONS

Chapter 2 provides an overview of plantation development in the Asia-Pacific region. It highlights the considerable increases in establishment rates during the 1990s and the more mixed results of the past several years.

Chapter 3 introduces the concept of, and the rationale for, providing incentives. It takes the reader through an assortment of diverse and sometimes confusing definitions. If it is agreed that incentives should only be applied for achieving public goals, what then is the justification for providing incentives to potential private investors in plantation establishment? There are a number of reasons that justify the transfer of scarce resources, especially in the nature of direct incentives, to commercial tree growers. There are also circumstances where such transfers should not be made.

Chapter 4, the main body of this volume, introduces the reader to the nine case studies conducted under the regional review. The country studies follow a common format. Dividing the history of plantation development into different phases, which is not always straightforward, they illustrate the use of incentives and the results or impacts. The reader will become aware of the difficulties in making these assessments, since the use of incentives has not been monitored rigorously in most countries.

Chapter 5 summarizes the main insights gained from the case studies. The impact of incentives on plantation development depends on numerous issues. There are considerable differences among the nine countries that were part of the regional study. What works in one country does not necessarily achieve the same outcomes in another country, even if situations are seemingly similar. Notwithstanding the diversity and the different paths taken to expanding plantation
areas, a common theme emerges. Those readers expecting clear guidance may be disappointed. A blueprint for stimulating investors to put their money and/or labour into trees does not emerge. However, the picture that does surface is sufficiently coherent to conclude the chapter and the book with guiding principles for supporting plantation development.

**LITERATURE CITED**


Forests in the Asia-Pacific region cover approximately 699 million ha (FAO 2001). Of this area, some 113.2 million ha are forest plantations, or 16 percent of the total forest resource. This is considerably higher than the global average of plantations, which stands at around five percent. The Asia-Pacific region accounts for some 61 percent of the world’s plantation forests (Figure 1).

The majority of the global forest plantation resource is held by a small group of countries. Five countries from Asia rank among the top ten plantation countries in the world: China (46.7 million ha); India (32.6 million ha); Japan (10.7 million ha); Indonesia (9.9 million ha); and Thailand (4.9 million ha). Together, these five countries account for 55 percent of the global forest plantation resource, and 91 percent of the Asia-Pacific plantations.

Forest plantations were established on around 34 million ha in the Asia-Pacific region (excluding Japan, Australia and New Zealand) between 1990 and 2000. This is a marked increase on the 27 million ha established during the 1980s. India (1.5 million ha per annum) and China (1.2 million ha per annum) currently have the highest plantation establishment rates (Brown and Durst 2003). Trend analysis confirms a significant increase in plantation establishment in the region during the 1990s (FAO 2003). This trend is likely to continue in the coming years.

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4 Please note that most figures are taken from FAO (2001). They have been updated whenever possible.
due to the increasing demand for wood and wood products, although in recent years planting rates in some countries have declined for a variety of reasons (see Chapters 4 and 5).

There has been a very rapid acceleration in plantation establishment in China during the past 20 years. China’s forest plantations comprise mainly Chinese fir (*Cunninghamia lanceolata*), poplars and a variety of pines. More than 80 percent of China’s plantations are of industrial species. In Japan, 45 percent of forests are classified as plantations, almost all of which were planted during the postwar reconstruction. The main species are sugi (*Cryptomeria japonica*), hinoki (*Chamaecyparis obtusa*), pine and Japanese larch (*Larix leptolepis*).

Forests plantations in India have, generally, had a markedly different focus, with more than two-thirds designated as non-industrial plantations. Although many of the plantations were established to produce fuelwood, a large percentage have subsequently been harvested for construction purposes and pulp. In recent times, there has been a shift in planting towards industrial purposes. India’s plantations are dominated by fast-growing hardwood species, particularly, acacias and eucalyptus. Teak (*Tectona grandis*) is commercially the most important timber species planted, totalling around one million ha.

Indonesia has 9.8 million ha of predominantly industrial plantations. Rubber (*Hevea brasiliensis*) is the most widely planted species, followed by teak, pines and *Acacia mangium*.

Thailand’s plantations are similarly dominated by rubber, with teak being the second most important plantation species.

Overall, pine, eucalyptus and rubber are the most import plantation species grown in the region (Figure 2).


**Figure 2: Distribution of species in Asia and the Pacific**

The dominant plantation species in Oceania is *Pinus radiata*. This species accounts for 89.2 percent (MAF 2004) of the plantation area in New Zealand, and 59 percent in Australia (NPI 2004). Other pine species, most notably *Pinus caribaea* in Fiji, and *Pinus caribaea* and *P. oocarpa* in northern Australia make up the bulk of the softwood plantations. *Eucalyptus* species in Australia predominate in hardwood plantations although Fiji also has significant areas of mahogany (*Swietenia macrophylla*).
Both New Zealand and Australia commenced plantation programmes prior to 1930. Significant areas of plantations have now reached maturity and are being harvested. Substantial plantation areas in New Zealand and Australia are in second rotation, with a few in a third rotation. New Zealand, Australia and Fiji all anticipate significant increases in their plantation wood production during the next decade.

**PRODUCTION: SHIFTING FROM NATURAL FORESTS TO PLANTATIONS**

New Zealand, Australia, Chile and South Africa comprise a group commonly known as the southern plantation countries. These four countries are characterized by large, mainly *Pinus radiata*, plantation estates, with significant export potential and age-class profiles that imply rapid increases in production over the next 15 to 20 years. These new plantation supplies seem likely to significantly alter the composition of Asia-Pacific wood and fibre markets.

Figure 3 illustrates a significant trend in wood production during the past 40 years, with wood production shifting from the natural forests of the traditional Southeast Asian producers to southern plantation countries. Large tracts of natural forests are likely to confer an advantage in the short-run, but that advantage will eventually diminish owing to advantages that plantations offer, that is, the ability to grow uniform trees quickly in accessible areas. Hence, the Philippines, having exhausted its natural forests during the 1960s and 1970s has become a minor player in forest product markets. Malaysia and Indonesia commenced logging in natural forests later and have exploited their natural advantage through the 1970s and 1980s. During the 1990s, the fast-growing plantations of the southern plantation countries began capturing the market share from Indonesia and Malaysia. At present the southern plantation countries account for more than 60 percent of the roundwood production share of the seven countries, up from about 40 percent in the mid-1980s.

![Figure 3: Comparative shares of wood production: Southeast Asian countries versus Southern plantation countries](source)


*Figure 3: Comparative shares of wood production: Southeast Asian countries versus Southern plantation countries*
FUTURE PLANTATION WOOD PRODUCTION

The future production of wood from plantations is of great interest to both the public and private sectors. Brown (1999) modelled three scenarios for future wood supply from forest plantations, as part of the Global forest products outlook thematic study on plantations.

**Scenario 1** provides a baseline forecast, by assuming that forest plantations are not expanded beyond their current area and that all areas are replanted after harvesting.

**Scenario 2** assumes that new planting will increase the forest plantation area at a constant rate of 1.2 million ha per annum in total (equal to one percent of the area of forest plantations in 1999).

**Scenario 3** assumes that the annual rate of new planting estimated in 1995 (4.71 million ha in total) is maintained until 2010, after which it is reduced by 940 000 ha at the start of each of the following decades (that is, until it declines to zero in 2050).

Figure 4 compares future wood production from industrial plantations under each of the three scenarios, with a forecast of total industrial roundwood consumption derived using long-term trend analysis, to 2050.

![Figure 4: Comparison of projections for industrial roundwood production with three plantation scenarios](image)


Several points of interest can be noted from Figure 4.

1. The difference between the three forest plantation scenarios until 2010 is not significant. This is because trees already in the ground will determine production over the next decade.

2. The heavy weighting towards the youngest age-classes in the global distribution means that even Scenario 1 (zero new planting) shows a significant increase in wood production from forest plantations. Scenario 1 shows an increase in production from 331 million to 712 million m³. Note, however, this growth production would be insufficient to keep pace with the forecast growth in roundwood consumption, and additional new sources of wood or fibre would need to be found to meet further new demand.
3. Scenario 2 increases at approximately the same rate as projected new demand for roundwood. It shows an increase in plantation wood production to 906 million m$^3$. Note, however, that current levels of harvesting in natural forests, recycling, etc. need to be maintained if no other new fibre sources are found, or efficiency is not significantly improved. This is, however, unlikely as the levels of harvesting in natural forest are decreasing and are likely to continue decreasing in the future due to the smaller area of available forest resources, increasing inaccessibility of the remaining forests and an increasing number of policies such as logging bans that have been imposed to protect the remaining natural forest resources.

4. Only Scenario 3, with its relatively large land-use implications, would enable forest plantations to substitute for wood production from natural forests. Scenario 3 expands plantation production to 1.5 billion m$^3$, approximately equal to current levels of global industrial roundwood consumption. Under Scenario 3, the forest plantation share of industrial roundwood production is estimated to increase from the current 22 percent, to 64 percent in 2050.

The long-term production forecast from forest plantations is very sensitive to the assumptions made about future forest establishment rates. The future rate of plantation establishment will be determined to a considerable extent by the availability of suitable and affordable land, policies, incentives, profitability of alternative crops, the opportunities that the Clean Development Mechanism (CDM) may offer, and perceptions of supply-demand balances for wood and fibre. In general, it is expected that plantations will supply a high proportion of raw material to fibre-based industries and for the production of utility sawn timber. High-quality hardwood timbers are likely to continue being sourced from natural forests, although plantation-grown teak can be expected to become increasingly important.

ALTERNATIVE SOURCES OF WOOD AND FIBRE

The increasing demand for wood and fibre has resulted in the identification of various alternative sources. There are a number of interesting sources in Asia and the Pacific including coconut palm, oil-palm, bamboo and agricultural residues. Although these sources cannot replace timber, they can supplement traditional wood resources, especially in the form of fibre.

Coconut palm (Cocos nucifera L.) has a long history of cultivation in the tropics, spanning some 4 000 years. The main product of the palm is the coconut oil. There are some ten million ha of coconut palm plantations in the Asia-Pacific region (Durst et al. 2004). Large quantities of stems become available at the end of a rotation (50-60 years depending on the variety). The anatomical properties of the stem make it difficult to process the stem using conventional tools. Despite the fact that the lumber is not very durable, the relatively low cost of the material make it appealing. Another advantage of coconut is the green image of the product, as it is a plantation by-product.

Oil-palm (Elaeis guineensis Jacq.) is a plantation species widely grown for its oil. The area under oil-palm is rapidly increasing and many rubber plantation owners are switching to oil-palm due to the higher profit margins. As of 2001, there were approximately six million ha of oil-palm plantations, of which 80 percent is located in the Asia-Pacific region (Killmann 2001). Unlike the coconut palm, the stem of the oil-palm is not suitable for direct use as a wood substitute. However, research on the use of the empty fruit bunches for the production of Medium Density Fibreboard (MDF) has been completed and subsequently, two plants have been established in Sabah and Peninsular Malaysia (Durst et al. 2004). Other potential uses for oil-palm residues include: moulded furniture, sawing and laminating palm stems, particleboard manufacture and the production of activated charcoal (Razak 2000).

Although bamboo has a long history of use in Asia, it is increasingly becoming an important source of raw material for further downstream processing, as new uses for it have emerged. Traditionally the culms were used as a wood substitute for construction and scaffolding and the
shoots of certain species were eaten. New processes use bamboo as raw material for particleboard, fibreboard, plybamboo, laminated boards, bamboo flooring and pulp and paper (Ruiz-Perez et al. 2001). Bamboo furniture is also a rapidly growing market segment. China and India have the world’s largest bamboo resources, with four million ha and ten million ha respectively (Ruiz-Perez et al. 2001; Ganapathy 1997).

Agricultural residues are also becoming increasingly important. Straw, a by-product of grain production, is used extensively for the production of pulp and paper. It is also possible to produce a panel board, with similar characteristics to MDF, using straw. Bagasse, the fibrous residue that is left over after the extraction of juice from sugar cane, is used for producing paper in several countries, including India, the world’s largest sugar-cane producer. The use of rice husks for the production of reconstituted panel boards is being investigated in Malaysia.

THE KYOTO PROTOCOL AND THE ROLE OF PLANTATIONS AS CARBON SINKS

The Kyoto Protocol was negotiated in December 1997. It requires developed countries to reduce their greenhouse gas (GHG) emissions by 5.2 percent compared to 1990 levels, between 2008 and 2012. The Kyoto Protocol recognizes forests, their soils and products in climate change mitigation. According to the protocol, reductions can be achieved by two means: (i) reducing the amount of emissions and (ii) increasing storage. Three so-called “flexibility mechanisms” were included in the Kyoto Protocol to help developed countries meet their reduction targets cost-effectively. These include Emission Trading, Joint Implementation and the Clean Development Mechanism (CDM). The latter enables developed countries to achieve a portion of their emission reductions by implementing carbon sequestration projects in developing countries.

Afforestation and reforestation were recognized as the only eligible land uses under the CDM. This offers interesting perspectives for the establishment of plantation forests for sequestering carbon. It has led to a steep increase in the establishment of plantations in developing countries with some four million ha of plantations having been established for GHG mitigation (Carle et al. 2002). Most of these plantations have been established by international investors and international development banks, such as the World Bank. Despite the fact that certain aspects of the CDM are still under negotiation and the technical instruments and standards for carbon accounting are still under development, forest plantations have interesting prospects to be utilized as carbon sinks. It is anticipated that forest plantations will play an increasingly important role in carbon sequestration and the implementation of the Kyoto Protocol.

CONCLUSION

The Asia-Pacific region has a large plantation resource, accounting for 61 percent of global forest plantation resources. Five of the top ten plantation countries are located in the region; together these countries account for 91 percent of the total plantation resource in the region. The rate of plantation establishment has increased dramatically during the 1990s. There has been a shift in wood production in the region, from predominantly natural forest production to plantation forest production over the past 40 years.

Modelling exercises for future plantation wood production indicate that the demand for plantation wood is likely to increase in the future. The wood from plantations will be used as feedstock for fibre-based industries and for the production of utility sawntimber. High-quality timbers are most likely to continue being sourced from natural forests, with the possible exception of teak.

Other sources of wood and fibre are becoming increasingly important. Coconut palm, oil-palm and bamboo are a few of the promising alternatives. Although these sources cannot replace timber entirely, they can supplement traditional wood resources, especially in the form of basic fibre.
The inclusion of reforestation and afforestation activities in the Kyoto Protocol offers interesting possibilities for plantation forests. To date, some four million ha of plantations have been established for GHG mitigation.

**LITERATURE CITED**


INCENTIVES: KEY CONCEPTS, TYPOLOGY AND RATIONALE

Thomas Enters

THE CONCEPT OF INCENTIVES

While there is no dearth of definitions for incentives, a single agreed definition does not exist (Meijerink 1997). Defined in very broad terms, an incentive is anything that motivates or stimulates people to act (Giger 1996; cited in FAO 1999). Sargent (1994; cited in Tomforde 1995) defines incentives as signals that motivate action. Other definitions refer to the “incitement and inducement of action” (Enters 2001). Within the context of development projects, incentives have also been described as “bribes” and “sweeteners” (Smith 1998).

Two points are illustrated by the various definitions and descriptions. First, incentives can be financial or non-financial in nature. Second, if incentives include “anything” that motivates, then surely they cannot just be policy instruments. In fact, there are incentives that cannot be influenced through intervention or can be changed only with great difficulty. Reliable rainfall and low fire danger are certainly factors – or enabling incentives – that determine investment decisions related to tree growing. While rainfall patterns are virtually impossible to change, the danger of fires breaking out and burning down a plantation can be managed to a certain extent. The following analysis concerns only those direct and indirect incentives that can be provided or withdrawn through policies.

To be of interest and to have an impact, incentives need to affect the cost-benefit structure of economic activities such as plantation management. Hence, in the context of the regional study, incentives can be defined as policy instruments that increase the comparative advantage of forest plantations and thus stimulate investments in plantation establishment and management.

This definition is broader than the more narrow definition for subsidies. The latter are of a purely pecuniary nature and usually viewed as payments provided to reduce the costs or raise the returns on an activity. The broader definition includes research and extension, which are important elements in supporting plantation development. The definition also includes sectoral and macro-economic policies which, as will be argued in the concluding chapter, establish much of the general investment climate and heavily influence the economic behaviour of individuals and corporations. Consequently, the spectrum of incentives is considerably broadened and a distinction is made between direct and indirect incentives (Figure 1).

The distinction between direct and indirect incentives is somewhat blurred. Direct incentives are designed to have an immediate impact on resource users and influence returns to investment directly. Indirect incentives on the other hand have an indirect effect through setting or changing the overall framework conditions within and outside the forestry sector. There are some overlaps. For example, tax concessions for plantation investors are a direct incentive, whereas general tax reductions for fuel are considered indirect incentives, as they lower production and transport costs within as well as outside the plantation sector.

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1 National Forest Programme Facilitator, FAO Regional Office for Asia and the Pacific, Bangkok, Thailand.
2 Extension, awareness raising, and public investments in education and research have been described as social instruments (Enters 2001) but can also be subsumed under the category of “enabling incentives”.

Subsidies for plantation schemes

Subsidies to the forestry industry in the developed world have far exceeded those provided by developing country governments. At present the average subsidy for plantation schemes in 11 EU countries is US$1,421/hectare, with an additional US$761/hectare for maintenance. This compares with subsidies of less than US$400/hectare for most plantation schemes in South America. However, most developing countries with significant plantation interests have used, or continue to use, incentives and subsidies as a means of encouraging the industry. For example, between 1974 and 1994, the Chilean Government spent some US$50 million on afforestation grants. In Brazil, subsidies and taxation incentives were used to encourage the establishment of plantations, and in recent years Ecuador and Colombia have adopted a similar incentives model to Chile. Ecuador currently provides planting and maintenance incentives amounting to US$300/hectare. Paraguay provides US$350/hectare for planting and US$100/hectare for maintenance for the first three years.

Source: Cossalter and Pye-Smith (2003)

Direct incentives are provided directly by governments, development agencies, non-governmental organizations and the private sector. They include the following:
- goods and materials (for example, seedlings, fertilizers etc.);
- specific provision of local infrastructure;
- grants;
- tax relief or concessions;
- differential fees and access to resources;
- subsidized loans; and
- cost-sharing arrangements and price guarantees.

Indirect incentives can be divided into variable incentives and enabling incentives (Table 1). Variable incentives are economic factors that affect the net returns that producers earn from plantation activities. Enabling incentives on the other hand mediate an investor’s potential response to variable incentives and help to determine land use and management (FAO 1999). They can also be viewed as elements in the investment environment that affect decision-making behaviour. A country’s enabling incentives determine to a considerable extent investment risks, and information on them needs to be constantly updated to guide investors.
In the Asia-Pacific region, virtually all of the incentives in Table 1 have been or are used to stimulate tree growing. As we will see later, there has been a gradual evolution in the way that governments in the region have provided encouragement, with increasing recognition that provision of enabling incentives, the removal of structural impediments and market distortions or the creation of an “overarching climate of enterprise” is the most effective (and economically efficient) incentive in the long run. This shift in thinking has also unfolded in Latin America with a move from subsidies as corrective measures to the removal of impediments (Haltia and Keipi 1997).

### Table 1: Distinguishing variable from enabling incentives

<table>
<thead>
<tr>
<th>Sectoral</th>
<th>Macro-economic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input and output prices</td>
<td>Exchange rates</td>
</tr>
<tr>
<td>Specific taxes</td>
<td>General taxes</td>
</tr>
<tr>
<td>Trade restrictions (e.g. tariffs)</td>
<td>Interest rates</td>
</tr>
<tr>
<td></td>
<td>Fiscal and monetary measures</td>
</tr>
<tr>
<td></td>
<td>Land tenure and resource security</td>
</tr>
<tr>
<td></td>
<td>Accessibility and availability of basic infrastructure (ports, roads, electricity etc.)</td>
</tr>
<tr>
<td></td>
<td>Producer support services</td>
</tr>
<tr>
<td></td>
<td>Market development</td>
</tr>
<tr>
<td></td>
<td>Credit facilities</td>
</tr>
<tr>
<td></td>
<td>Political and macro-economic stability</td>
</tr>
<tr>
<td></td>
<td>National security</td>
</tr>
<tr>
<td></td>
<td>Research and development</td>
</tr>
<tr>
<td></td>
<td>Extension</td>
</tr>
</tbody>
</table>

The “new” conventional wisdom does not advocate subsidies as corrective measures to offset distortions existing elsewhere in the economy; rather it proposes the direct elimination of those distortions.

Source: Keipi (1997)

### JUSTIFICATION FOR PROVIDING INCENTIVES

Why are incentives necessary, or more specifically, what is the rationale for providing incentives to potential investors in forest plantation development? Why should taxpayers be interested in supporting the economic activities of others? Why should the private sector provide support to small-scale growers? If potential investors are dissatisfied with the low returns on their investments in plantations, would it not be more appropriate to suggest they invest in a more profitable land use?

Meijerink (1997) argued that incentives should only be applied for public goods. From the economist’s perspective, incentives are meant to correct a discrepancy between the financial attractiveness and economic (that is, social) desirability of an action (FAO 1999). Gregersen (1984; cited in Pardo 1990) pointed out that incentives from the public to the private sector are justified in an economic sense when one or both of the following conditions exist:

- Social benefits are greater than private benefits associated with a given private action; and
- Social costs are less than private costs associated with the given action and social benefits are at least equal to private benefits.

Where plantations provide environmental services such as watershed protection and carbon sequestration, incentives are appropriate because private net returns are often lower than social benefits. Real world incentives that fall into this category include those offered under the:
The role of incentives in forest plantation development in Asia and the Pacific

- Soil Bank Program, Agricultural Conservation Program and the Conservation Reserve Program in the United States;
- “Grain for Green Project” and the Great West Development Program in China;
- Landcare deductions for capital expenditures on soil conservation, prevention of land degradation and related measures in Australia;
- The Green Isarn Project in Thailand; and
- Benefit-sharing arrangements under joint forest management in India.

In each of these cases, incentives bridge the divergence between public and private goals and support activities that are primarily in the public interest.

Rice for trees

The “Grain for Green Programme” (in full, Conversion of Farmland into Forests and/or Grasslands Programme) introduced in western China in 2000 aims to reverse land degradation and soil erosion through the conversion of almost 15 million ha of steep lands that are currently cultivated or barren into forest and pasture by 2010. It will do this by providing a mixture of food and cash subsidies in the first eight years (2,250 kg of grain in South China and 1,500 kg of grain in North China, and 300 yuan [US$36] for management annually) and 750 yuan for seedlings costs per hectare in the first year.


Incentives are not needed when the private returns from plantation management exceed those from other land uses (Haltia and Keipi 1997; Williams 2001). In this case, the provision of incentives translates into a misallocation of public sector resources, merely enabling investors to earn “above normal” returns.

While addressing environmental concerns is an important justification, others include the goal of generating employment (particularly in less developed rural areas), and to jump-start the development of national forest industries in countries with comparative advantages such as Indonesia and Chile (Williams 2001). Incentives may be particularly justified to increase the pace of plantation development where a developing industry requires a minimum supply of raw material (Scherr and Current 1999). A rapid increase in scale is especially critical in commodity industries like pulp and paper, where economies of scale are essential for competitive operation (Clapp 1995).

THE DOWNSIDE OF INCENTIVES

The use of incentives, especially direct incentives, to induce particular behaviour, has been at the centre of intense, and sometimes fierce, debates. Incentives, particularly subsidies, are not without their critics who contend that incentives can lead to economically incorrect allocation of productive factors.

Programmes pressured to show progress frequently offer incentives to people “to win friends and influence people by resorting to handouts under the guise of incentives” (Smith 1994, p. 8). This should not come as a surprise considering that a hand-out for project desk officers, consultants and on-site project staff defined incentives in the following way (GTZ 1995):

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3 In 2001, the World Bank welcomed subscribers to an electronic seminar on “The political economy of persistent and perverse subsidies”.

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Incentives are understood to be project measures geared to motivating the local population to use their natural resources on a sustainable basis.

Attractive incentives offered in the early stages of a new initiative or project run the inherent risk of simply “buying” participation; the interest shown is not of a long-term nature and participation is just a pretense. Especially in natural resource management projects, subsidies have often succeeded in stimulating the adoption of conservation measures that were abandoned or even actively destroyed once payments ceased (Lutz et al. 1994). The same has been observed for plantations (Sawyer 1993). It should be obvious that particularly with regard to commercial activities, incentives should act as a catalyst and should not be the cause for change. As a cause for behavioural change, the discontinuation of incentives is likely to become a cause for reversal.

Related to the issue of triggering activities for the wrong reason, sometimes people delay desired activities they would normally initiate on their own until they have been given an anticipated incentive. In the worst-case scenario, the provision of incentives might have unintended, perverse side effects. For example, incentives for plantation development may contribute to unplanned conversion of natural forests. A lack of financial support for the management of plantations coupled with incentives limited to plantation establishment may lead to intensive planting activity without any real expansion of the total plantation area in the long run. Young plantations are simple destroyed and the land replanted to capture the financial support.

As Tiffen (1996, p. 168) has pointed out, “even poor people can find capital for what is really profitable…” Hence, low levels of investments in plantations, especially by small-scale farmers, may not be caused by a lack of capital but rather by insufficient information about suitable technologies, market opportunities and legislation, particularly related to environmental issues and taxation. The risk is that the reasons for inaction may not be properly understood and that financial incentives, provided in lieu of advice, are wasted. Technology transfer and extension programmes are the appropriate medicine for lack of knowledge.

LITERATURE CITED


IMPACT OF INCENTIVES ON THE DEVELOPMENT OF FOREST PLANTATION RESOURCES IN THE ASIA-PACIFIC REGION: AUSTRALIAN CASE STUDY

Clive Catton, Adam Gerrand, Annie Josline and Robert Miller

INTRODUCTION

Most of Australia’s highly urbanized population of 19 million is concentrated in the southeast and southwest of the country. Less than five percent of the population is engaged in primary production. However, the sector is highly mechanized and efficient, and accounts for around 25 percent of Australia’s exports. After the Second World War, the economy relied mainly on agriculture and mining until manufacturing grew. The service sector has since led growth, rising to about 78 percent of the gross domestic product (GDP). Australia’s exports are important for its economy, contributing over 21 percent to the GDP.

Australia has a land area of 7.7 million km$^2$. Accompanied by large seasonal variations, 80 percent of the continent has a rainfall of less than 600 mm per year. The northern part of the continent experiences wet tropical summers influenced by tropical monsoons with dry winters, while southern Australia generally has relatively dry summers and cool winters. Due to its extensive geographical isolation, Australia’s vegetation and animal species are unique, and have developed tolerance to Australia’s climate regime of lengthy droughts and fires. Only 6.5 percent of the land area is considered arable, and is concentrated mostly in a small band along the eastern coastline and the southwest corner of the continent. Australia has substantial areas of natural forests, with eucalyptus and acacia being the most dominant and wide-ranging genera. Forest$^2$ covers around 20 percent of the country or 164 million ha, most of it occurring as open savannah woodland. The large area of native forests has long been a source of wood and other forest products but plantations are rapidly increasing in proportion.

Plantations make up less than one percent of the forest area but contribute 60 percent to the timber production each year. Most of Australia’s plantations are located in areas with reliable rainfall of more than 700 mm a year and suitable soils for tree growth, and are within reasonable transport distance to a major market or processor. These locations generally correspond to the more habitable parts of the country. The plantations have been divided into 15 National Plantation

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$^1$ This report was co-authored by (in alphabetical order): Clive Catton (Department of Agriculture, Fisheries and Forestry – Australia [AFFA]), Adam Gerrand (Forest and Vegetation Program of the Bureau of Rural Sciences – [BRS]), Annie Josline (AFFA) and Robert Miller (AFFA), with editorial input from Robert Miller. Michael Stephens (AFFA) provided initial guidance, with forest data provided by Mellissa Wood and Geoffrey Dunn (BRS). The authors would also like to thank the various state forest agencies and forest industry stakeholders for the provision of valuable information and reviews of earlier drafts.

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$^2$ Forests, as defined by Australia’s National Forest Inventory (NFI), include native and plantation trees, and areas of trees often described as woodland.
Inventory (NPI) regions to facilitate quantitative regional and national management, decision-making and strategic-planning by government and industry (Figure 1). The regions reflect wood supply demarcations rather than political boundaries.
Table 1: Forest, plantation and population data for Australia, 2001

<table>
<thead>
<tr>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total land area in '000 ha*</td>
<td>768 203</td>
</tr>
<tr>
<td>Total forest area in '000 ha** (% of total land area)</td>
<td>165 896 (22%)</td>
</tr>
<tr>
<td>Total plantation area in ha** (% of total land area)</td>
<td>1 568 900 (0.2%)</td>
</tr>
<tr>
<td>Total softwood plantation area in ha** (% of total plantation)</td>
<td>979 633 (62%)</td>
</tr>
<tr>
<td>Total hardwood plantation area in ha** (% of total plantation)</td>
<td>587 856 (37%)</td>
</tr>
<tr>
<td>Total unknown type plantation area in ha** (% of total plantation)</td>
<td>1 411 (1%)</td>
</tr>
<tr>
<td>Population total (million)*</td>
<td>18.97</td>
</tr>
<tr>
<td>GDP per person*</td>
<td>A$32 539</td>
</tr>
</tbody>
</table>

Sources: *Australian Bureau of Statistics 2001; **Wood *et al.* 2002

Role of the forestry sector in the economy

Australia’s wood and paper industries (based on plantations and native forests) presently turn over A$14 billion, and include sawmilling, plywood and panel products, pulp and paper and woodchip exports. Exports are valued at A$1.8 billion. Woodchips, representing 41 percent by value of total forest product exports, remain the most valuable export product (Table 2). This has steadily fallen in recent years as outputs of other export wood products including paperboard, paper, sawntimber and wood panels have increased. In addition, Australia now produces 82 percent of its sawntimber needs of which softwood plantations provide about 66 percent, with the balance derived from native forests.

Australia remains a net importer of forest products in value terms, mainly due to high imports of paper products. In 2000 and 2001, Australia imported forest products valued at A$3.83 billion, accounting for three percent of total merchandise imports. Imports for sawntimber, paper and paperboard accounted for 67 percent of the total value of forest product imports (54 percent of paper and paperboard products and 12 percent of sawntimber, mostly coniferous). Most of the imported sawntimber comes from New Zealand, Canada and the U.S.A. with radiata pine, Douglas fir and western red cedar forming the bulk. Malaysia is the main source of imported hardwood timber.

Consumption of sawntimber in Australia generally varies between four and 4.5 million m³ per annum and is closely linked to the level of constructing activity (Table 3). Recent increases in new homes raised sawntimber consumption to almost 4.8 million m³. However, as existing plantations come to maturity, Australia is expected to become a net exporter of forest products by 2010 (ABARE-Jaakko Poyry 1999).

The forest and wood product industries, based on native and plantation forests, account for about one percent of the GDP and employment of about 75 000 people. There were 942 sawmills in Australia (674 hardwood and 268 softwood) in 1999 and 2000. The hardwood mills are generally small-scale and scattered, while the softwood mills are large and integrated with other processing facilities. There are also 22 pulp and paper mills and 30 veneer and panel-board mills. The number of sawmills has been declining as the average size increased. Further mechanization and productivity have reduced total employment in processing over time. The greater area of plantations has a significant potential to reverse this trend by creating new processing industries and employment opportunities in rural areas (Ministerial Council on Forestry *et al.* 1997).
Table 2: Australian export of woodchips

<table>
<thead>
<tr>
<th>Source</th>
<th>Financial year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardwood volume* (kt)</td>
<td>2 470.9</td>
</tr>
<tr>
<td>Hardwood value (A$'000)</td>
<td>400 191</td>
</tr>
<tr>
<td>Softwood volume* (kt)</td>
<td>852.3</td>
</tr>
<tr>
<td>Softwood value (A$'000)</td>
<td>118 109</td>
</tr>
<tr>
<td>Total volume* (kt)</td>
<td>3 323.2</td>
</tr>
<tr>
<td>Total value (A$'000)</td>
<td>518 310</td>
</tr>
</tbody>
</table>

*bone-dry tonnes

Table 3: Apparent consumption of sawntimber in Australia ('000 m³)

<table>
<thead>
<tr>
<th>Source</th>
<th>Financial year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic production</td>
<td></td>
</tr>
<tr>
<td>Plantation logs</td>
<td>1 954</td>
</tr>
<tr>
<td>Native forest logs</td>
<td>1 430</td>
</tr>
<tr>
<td>Sub-total</td>
<td>3 385</td>
</tr>
<tr>
<td>Imports</td>
<td>756</td>
</tr>
<tr>
<td>Exports</td>
<td>60</td>
</tr>
<tr>
<td>Apparent consumption</td>
<td>4 090</td>
</tr>
</tbody>
</table>

Source: ABARE (2001)

The contribution of softwood plantation sawntimber to the total Australian sawntimber consumption grew from 33 percent in 1990 and 1991 to 56 percent in 2000 and 2001. This increase has been primarily through import. To a lesser extent, it has filled a potential gap resulting from decreased harvesting in native forests. This expansion has only been achieved with very significant investments in processing capacity, illustrating the success of the policies and industry investment in the 1960s and 1970s.

Role of Commonwealth (national), state, territory and local governments in Australian forestry

The Commonwealth of Australia is a federation of six states and two territories, each with its own regional and local government infrastructures, as defined under the Australian Constitution. The national government is broadly responsible for taxation, defence, foreign policy, customs and telecommunications, and the states are responsible for education, health, transport and land administration. While the prime responsibility for land use, forestry and conservation matters rests with the state governments, each level of government has specific interests in, and responsibilities for, forest management.

The national government retains certain powers and interests, which can have significant implications for land use and management practices. It is responsible for coordinating a national approach to both industrial development and environmental issues including forest, land and water management. It also has an interest in achieving efficient and effective natural resource management, including a national approach to forest issues.
State governments have primary responsibility for forest management, in recognition of their constitutional responsibility for land use. The states have enacted legislation that allocates forestland tenure and specifies the administrative framework and policies for managing public and private forests. All Australian forest services are run by state forestry agencies, reflecting the constitutional demarcation of responsibilities. For this reason there is no national forest agency. The history of state forest agencies in Australia has been well documented by Carron (1990) and Dargavel (1995). Local governments are responsible for local land-use planning within the limitations set by their respective state governments, which affect public and private forest management and use. In practice, responsibility for policies affecting land use and the environment is shared among national, state and local governments.

**Role of public and private sectors in forestry**

Australia’s State of the Forests Report has identified that approximately 70 percent of the nation’s forest resources are privately owned or managed (National Forest Inventory 1997). This is a significant milestone as state forestry agencies held the majority until the early 1990s. This shift is due to the privatization of former state-owned pine plantations in several states and the expansion of private plantings.

The number of large-scale private investors is small. Of the plantation estate, 95 percent is considered industrial with only five percent actually held by small-scale landholders and communities (i.e. owners of estates that are less than 1 000 ha) until the early 1990s. Figures 2, 3 and 4 show plantation areas by age class, species and ownership.

![Figure 2: Australian forest plantation development by tree ownership](image)

*The 2000/2001 period was derived from only two years of data and may be higher than the long-term plantation expansion rate.

*Figure 2: Australian forest plantation development by tree ownership*
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Figure 3: Average increase in Australian forest plantation area by tree ownership, showing four developmental phases

Figure 4: Australian forest plantation development

Data for the three figures were derived from the Commonwealth Forest and Timber Bureau (pre-1975), Australian Bureau of Agricultural and Resource Economics (ABARE) (1976 to 1991) and Bureau of Rural Sciences’ National Plantation Inventory (since 1994). As the methodology for collection of information has changed over time, gaps are seen in certain years (for example, early 1990s in Figures 2 and 4). The data were averaged over five-year periods to minimize annual variability. Records before 1950 are incomplete except for 1939 and 1947. Therefore, early planting rates and trends cannot be quantified, but in general the planting rate was low and probably less than a few thousand hectares per year. Furthermore, ownership other than “public” is classified as “private” – this includes all joint ventures, annuities and unknown ownership. Large areas of plantation land were transferred from public to private in the late 1990s, through privatization/corporatization of state (public) plantations.
Key forest production and conservation policies
The principal national policy documents establishing priority actions for the sustainable management and use of Australian forests, relevant to plantations, are:

- National Forest Policy Statement (1992);
- Plantations for Australia: The 2020 Vision (1997); and
- Action Agenda for the Forest and Wood Products Industry (prepared in 2000).

In addition, a range of initiatives at state and national government levels further these policies, including programmes promoting farm forestry, revegetation and removal of government impediments to investment in growing and processing forest products. Numerous state acts cover conservation issues with implications for forestry, including Codes of Logging Practice, land-use planning, and flora and fauna protection. Other acts or legislation also cover the establishment and administration of National Parks, and regulate water rights and use.

National Forest Policy Statement
In 1992, the national and state governments developed a common policy position on forests, known as the National Forest Policy Statement (NFPS). As the primary means for integrating environmental sustainability and commercial production, it sets out objectives concerning conservation, wood production and timber industry development, private native forest use, plantation development, water supply and catchment area management, tourism development, employment, workforce education, public awareness and involvement, research and development (R&D), and the further development of intergovernmental arrangements and decision-making processes.3

Plantations for Australia: The 2020 Vision
In 1997, the industry and government developed a partnership called “Plantations for Australia: The 2020 Vision” to develop plantations and processing industries that are commercially oriented, internationally competitive and sustainable. The Vision aims to treble the plantation estate to 3 million ha by 2020. It also seeks to boost the availability of suitable land for plantations and improve the tree-growing skills of farmers through farm forestry. Achieving the target will require more than A$3 billion additional investment (mainly private capital investment) and annual plantings of 80 000-90 000 ha.4

Forest and wood products action agenda
Action agendas generally encourage industries to achieve best practice and to work together to realize international markets. The Forest and Wood Products Action Agenda of 2000 provides a framework for industries to pursue competitive advantages. Its market-driven focus is a natural progression from previous initiatives, which mainly concentrated on fundamental “supply-side” issues. “Demand-side” initiatives, encompassing issues such as value adding, expanding non-traditional forest and wood uses, and market and investment development, are further developed to take advantage of opportunities emerging from earlier initiatives.5

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3 A copy of the NFPS and further information is available at: http://www.affa.gov.au/content/output.cfm?ObjectID=D2C48F86-BA1A-11A1-A2200060B0A03131

4 Further information of the policy is available at: http://www.plantations2020.com.au

5 Further information of the Forest and Wood Products Action Agenda is available at: http://www.affa.gov.au/content/output.cfm?ObjectID=D2C48F86-BA1A-11A1-A2200060B0A03643
Research, extension and training

R&D will underpin the global competitiveness of Australia’s forestry, wood and paper industries over the next 20 years. It will assist resource development and sustainable management, improve wood and fibre performance, increase efficiency and environmental performance of wood and paper processing and increase value adding in wood and paper products.

There are three main Commonwealth research bodies, namely:

- Forest and Wood Products Research and Development Corporation (FWPRD);
- Commonwealth Scientific and Industrial Research Organisation (CSIRO); and
- Australian Centre for International Agricultural Research (ACIAR).

State governments have similar organizations working on forestry research issues, alongside forestry and associated research departments within Australia’s universities, in particular the Australian National University, Melbourne University and Southern Cross University. In addition, Cooperative Research Centres (CRCs) bring together researchers from universities, CSIRO and other government laboratories, private industry and public sector agencies in long-term collaborative arrangements to support R&D and education activities.

PLANTATION DEVELOPMENT AND INCENTIVES

Overview of plantation development

Efforts to establish plantations began with the state forest agencies in the early 1900s and are well described by Carron (1990) and Dargavel (1995). State governments established most of the initial plantations to offset Australia’s limited endowment of native softwoods. The State of South Australia took the lead in the 1870s establishing integrated operations based on *Pinus radiata* plantations, state-owned sawmills and later private panel board and paper mills. Other states followed by establishing softwood plantations so that by 1940, more than 90 percent of the plantations were state-owned.

It was not until 1950 that private planting grew in importance when large industrial companies commenced planting to supply pine (*Pinus radiata*) and eucalypt pulpwood to complement state resources. These plantations gradually supplied increasing quantities of sawlogs and pulpwood. Between 1936 and 1941 three pulp and paper mills were built in Tasmania and Victoria to use eucalypts and one mill was established in South Australia to use wood from softwood plantations. The mills expanded rapidly, and the new ones, built during the 1950s and 1960s, were supplied with a combination of softwood from pine plantations and hardwood predominantly from native forests.

Various schemes to encourage smaller-scale or woodlot planting on farms and other private lands were undertaken from the 1920s. The rate of planting on farms increased in the 1990s, aided by incentives often associated with achieving broader environmental benefits.

The widening gap between forecasts of demand and domestic supply became clear after the Second World War. Native forests could not sustain high harvesting rates in the long term, let alone meet rising demands. Plantations were seen as the solution to increase timber supply and reduce imports. Commonwealth and state governments jointly advocated a significant proliferation of *Pinus radiata* plantations. The states aimed to raise their planting rate from 16 000 to 28 000 ha per year, so that Australia would be largely self-sufficient through its 1.2 million ha of...
plantations by 2000. In 1966, the Commonwealth provided generous, low-interest “Softwood Loans” to the states to increase their planting by 26,000 ha per year. In addition, private growers were encouraged to plant 4,000 ha annually. The scheme succeeded in increasing the rate of planting and was extended to 1982.

*Pinus radiata* dominated softwood plantings until the 1980s, occupying over two-thirds of the area. However, the plantation sector has shifted from softwood to hardwood, focusing mainly on *Eucalyptus globulus*. About 87 percent of the total standing hardwood plantations have been established since 1990.

The Australian plantation industry exhibits a diverse range of ownership arrangements, including joint venture and annuity schemes between public and private parties. Since the 1990s, private plantations have increased dramatically; 89 percent of newly planted areas were on private land in 2001 (Wood *et al.* 2002). About 54 percent of the country’s 1.57 million ha of standing plantations are now privately owned.

The development of Australia’s forest plantations can be traced over a four-phase period since 1900. Particularly noteworthy is the 1.26 million ha increase in plantations (513 percent) since 1965/1966 when planting began to flourish. This reflects the transition from the goal of self-sufficiency underpinned by commercial development with direct incentives, to ecological sustainable development supported by broader micro- and macroeconomic reforms. In line with this change, indirect incentives are replacing direct incentives, with the private sector progressively taking over plantation management and investments from the governments.

**Phase 1: “Softwood import replacement” plantations – 1900 to 1960**

A “softwood import replacement policy” served as the driving force for early plantation establishment in Australia. Even though the country had a surplus of native hardwood species, softwoods were perceived as more desirable for a wide range of uses including construction. Consequently, forest agencies sought to establish softwood plantations to meet demands and reduce softwood imports.

**General investment climate**

Dargavel (1995) notes that relief work during the Depression period had increased the plantation area to 90,000 ha by 1939; almost all of this land was planted with softwood, predominantly *Pinus radiata*, and over 40 percent occurred in South Australia. Since a number of these early schemes were experimental in nature, as suitability and species selection were being refined, poor growth or even failures resulted on some sandy land that was initially thought to be suitable.

During this phase, private sector involvement in plantations was limited. Practically all industrial wood was sourced from Australia’s extensive native eucalypt forests. Despite South Australia’s success in growing *Pinus radiata*, some sawmillers were reluctant to process the wood.10

**Phase 2: “Self-sufficiency in timber” plantations – 1960 to 1980**

Similar to Phase 1, this period focused on softwood plantings but reflected a national goal of achieving “self-sufficiency in timber,” recognizing that softwood plantations could replace softwood imports and much of the hardwood production from native forests. Considerable concerns about the native forests’ capacity to sustain large production increases, triggered by mechanization and rapid development in the postwar years, led to the conclusion that softwood plantations were the solution.

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10 For information on areas planted for public and privately owned plantations, see Wilson (1969).
General investment climate

Although the plantations were mainly state establishments in the initial stages, 25 percent of the national total plantation area of 600 000 ha was privately owned by 1977. About 90 percent of this area was planted with conifers and ten percent with native species and poplars (Carron 1990). By the late 1970s, the private sector was planting over 10 000 ha per year mainly for industrial uses (predominantly for pulp and paper). Notable was the Australian Paper Manufacturers (APM), which established significant areas around their mill in Victoria. The Victoria Government set up an early system of leasing land to APM through a special Act of Parliament in the 1930s (Carron 1990). Both the New South Wales and Victoria governments provided low-interest loans for farm woodlots. Consumption of wood products during this phase was a factor of both population growth and rising living standards after the Second World War.11

By the 1980s, Australia had developed a strong reputation in plantation forest research, focusing mainly on exotic softwoods, notably Pinus radiata. Research was able to create a highly successful and profitable wood-based industry from a “fairly ordinary” species. The strength and importance of Australia’s research capability was well demonstrated by the resolving of a problem that first appeared in the 1960s when the plantation industry was “profoundly shaken” by decreased productivity in the second and subsequent rotations of Pinus radiata in South Australia (Shepherd 1986; Keeves 1966). Shepherd notes the issue received substantial research effort in both Victoria and South Australia and that the two states’ research agencies came up with quite different solutions. Opting for a highly technical approach, South Australia developed a “maximum growth sequence” using machinery, chemical fertilizers and herbicides (Woods 1976). In contrast, Victoria focused on conserving nutrients through retention of slash and aiming at water conservation for the seedlings (Squire et al. 1979). Over time, with the publication of the research results and sharing of information, the two states combined their methodologies to ensure continued productivity.

By comparison, surprisingly little work was done on Australia’s native eucalypts until the late 1980s and 1990s. Researchers’ negative views of eucalypts’ potential at that time did little to instil public or private sector confidence in investing in eucalypts during this period.

Incentives in Phase 2

Types of direct incentives offered

The policy of attaining self-sufficiency in softwoods by 2000 was formalized under the Softwood Forestry Agreements Acts of 1967, 1972 and 1976. These committed the Commonwealth to provide favourable loans to the states for establishing and maintaining softwood plantations. The agreements, commencing in 1966, aimed to help the state governments increase their planting rate to 26 000 ha per year, with an additional 4 000 ha per year from private growers (Dargavel 1995). Under these Acts, loans made on an annual basis from 1967 to 1982 enabled purchases of land as well as the establishment and tending of (approximately) an additional 100 000 ha of new softwood plantations. The Commonwealth paid A$78.1 million under these arrangements, which expired at the end of 1982 following a review of Commonwealth functions.

The loans were attractive to the states because of the ten-year interest free period. Financed from the Commonwealth’s Consolidated Revenue Fund, they were repayable over 20 years with payments commencing 15 years after the date of each advance. This “grace” period of 35 years matched the planned rotation, based on sawlog production patterns at the time. The agreements also provided for interest to be either capitalized over the deferment period, or paid when due at the prevailing long-term bond rates.

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11 For information on consumption of industrial wood and fuelwood, sources of supply from natural forests, public or private plantations, and imports, see Wilson (1969).
Under the agreements, the states carried out efficient planting and tending in accordance with sound forestry, financial and environmental practices. The Commonwealth also required the states to keep full accounts, books, vouchers, plans, documents and other records relating to planting and tending under the agreements. Programmes were monitored by the then Australian Forestry Council, which was made up of state ministers and chaired by the Commonwealth Minister responsible for forestry.

While large-scale incentive schemes for private investors were absent at this stage, this initiative was instrumental in enabling the state governments to dramatically increase plantations during the 1960s and 1970s. These plantations became the basis for Australia’s extensive wood-processing industry. Victoria and Tasmania continue to progressively privatize their softwood plantations, parts of which were established under these loans. The establishment of small-scale forestry operations was insignificant during this phase. Companies were still largely Australian enterprises, as foreign investment in forestry had not yet begun to make its mark.

**Impacts of incentives**

The Softwood Loans were successful in establishing large-scale softwood plantations, especially of *Pinus radiata*, by state forest agencies across Australia. These agencies established the majority of plantations during this phase. Given their already overstretched budgets which serviced plantation expansion, their least expensive option was to use existing native forest land. New markets for woodchip exports also encouraged the clearance of native forest for planting in some areas. This enabled moderate-quality eucalypt forests to be clear-felled and sold for timber and woodchips to fund the *Pinus radiata* planting programme. However, this coincided with a rise in conservation and environmental awareness and the states were criticized and attacked by opponents (Dargavel 1995). This marked the start of a long campaign of protests against forest agencies.

**Characteristics of established plantations**

State agencies used the Softwood Loans mainly to plant trees for sawlog production, seen at the time to be the dominant timber need of the future. Species included *Pinus elliottii*, *Pinus pinaster*, *Pinus caribaea*, *Araucaria* spp., *Eucalyptus pilularis*, *Eucalyptus grandis* and *Eucalyptus regnans*. The species of choice was *Pinus radiata*, grown on rotations of 30 to 40 years depending on the silvicultural regime. These rotations were considered to be remarkably short compared to native forest rotations of 80 to 100 years or more.

**Summary and lessons learned in Phase 2**

The Softwood Loan Agreements were very successful, expanding the overall plantation estate from around 170,000 ha to nearly 900,000 ha. Without the agreements, the softwood plantation industry would not have reached its present scale. The plantations became the basis for a wide range of domestic wood-processing facilities that developed subsequently (for example, pulp mills). Over A$78 million was loaned to the states during the 16 years the Softwood Loan Agreements operated. In 2001/2002 dollar rates, this equates to approximately A$390 million.
Phase 3: “Transition from government softwood to private hardwood” plantations – 1980 to 1990

General investment climate

The 1980s represented a transition period for plantation development. Considerable changes occurred in the forest industry and government, business and Australian society. For plantations, Phase 3 marked a switch from the dominance of government to private ownership of softwood plantations and the expansion of eucalypt (hardwood) plantations for industrial purposes.

Other notable changes were increasing commercial and budgetary pressures on government and industry, influenced by high interest rates during the decade. Forestry was a relatively unattractive proposition for all but large processing industries with economies of scale and linkages to downstream processing of higher value products. The society was concerned about forestry activities and a number of high profile environmental battles were played out during the decade (notably the Franklin Dam dispute in Tasmania, which also raised community concerns about harvesting, especially of old-growth native forests). Such unease was significant enough for governments to try to address the problems – over 30 enquiries into forestry were held around this time. Every state agency facilitated an active R&D programme to help resolve many of the technical issues facing the emerging industry.

Large-scale private sector forestry investment occurred during the 1980s. Exporting woodchips became an important business in most states. This enabled some companies to convert significant areas – mostly non-native forests – to plantations. Tibbits (1986) notes the large increases of eucalypt plantations in Tasmania from 20 ha per year in the 1970s up to an average of 1 500 ha per year from 1982 to 1984.

Incentives in Phase 3

Types of direct and indirect incentives offered

a. National Afforestation Programme and associated programmes

Dargavel (1995) notes that the National Afforestation Programme (NAP) funded the establishment of 6 000 ha of hardwood plantations between 1987 and 1992, and supported research on growth. A summary of the NAP and a useful overview of the major incentives and activities in relation to farm forestry programmes is provided by Donaldson (2001). Much of the information in this section is drawn from his analysis.

The Commonwealth established the NAP in 1987 to stimulate an expansion of commercial hardwood timber, assist in land rehabilitation and control degradation through afforestation. Nearly A$15 million over three years was targeted for state and large private industrial growers. The programme was also the first production forestry initiative that directly sought to engage private landholders, but it was not really designed to address the needs of non-industrial forest managers. It lacked a supportive policy framework to deal with the underlying social, economic and institutional impediments to plantation development (Donaldson 2001).

In 1989, the NAP was expanded and replaced by the “One Billion Trees and Save the Bush” programmes, as promoted in the Prime Minister’s landmark statement on the environment “Our Country, Our Future”. These subsequent programmes had a clearer focus on biodiversity conservation and were later supplemented by initiatives such as the Corridors of Green Programme and the Wet Tropics Tree Planting Scheme in North Queensland. In 1997, these were all incorporated in the Bushcare Programme with the advent of the Natural Heritage Trust 1.

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12 Bhati et al. (1991) provide an excellent overview of the Australian plantation incentives during the 1980s. Apart from identifying economic research gaps and priorities, the authors include an annotated bibliography of relevant research and publications.
During this time, funding for programme delivery increased from about A$3 million over the first five years to over A$350 million between 1997 and 2002.

b. Joint venture arrangements

Joint venture arrangements first appeared in the mid- to late 1980s, often between state government forestry agencies and private landowners. With the Commonwealth Softwood Loan Scheme coming to a close, the states saw the arrangements as one option to continue the growth in commercial plantations and to promote small-scale farm forestry. Since then, joint venture arrangements have become an important tool in plantation development, especially as a mechanism to attract overseas investment.

Western Australia provides a good example of such an arrangement where foreign investors, mainly in the pulp and paper industry, sought to secure reliable high-quality supplies from eucalypt plantations. The first agreement in 1993 was made with the Japanese Oji Paper Company and Itochu, which expected to invest A$60 million over ten years (Dargavel 1995). This was sufficient to plant 20 000 ha of *Eucalyptus globulus* in small farm woodlots and shelterbelts of ten to 20 ha each. The trees are to be harvested at ten years of age and the woodchips exported to Japan. The trees are to be coppiced for the second rotation crop. In addition to the direct benefits anticipated for wood processors, there are environmental advantages gained through the lowering of water tables and addressing dryland salinity problems. The Western Australian Government subsequently made a similar agreement with the Korean Hansol Forest Products Company to establish 15 000 ha of plantations over a ten-year period.

A number of other private plantation companies have followed, with private investment now leading the industry (see Box 1 for the Western Australian experience).

**Justification for providing incentives and intended target groups**

Rising awareness of a range of environmental problems during the 1980s led to a change in emphasis, stemming from historical land clearing for agricultural uses. A notable example is Western Australia where dryland salinity had become a major issue. Governments targeted farmers and small-scale landholders (i.e. of less than 1 000 ha) rather than large companies with incentives, although the effectiveness of these incentives in attracting smaller investors was limited.

**Impacts of incentives**

Figures 2, 3 and 4 also show the rise in plantation areas and change in tree species during the 1980s. Plantations were increasingly being established on former farmland. Although this was a relief to the predominantly urban conservationists, it was beginning to raise concerns among the farming community that their traditional livelihoods would be altered. Large-scale industries still dominated plantation development, and state governments still used subsidies in the form of infrastructure grants to attract industries to their regions.

**Summary and lessons learned in Phase 3**

Plantations and timber production started to generate significant employment and income in regional centres, creating an incentive to current and potential investors. Once a critical mass of plantation resources was achieved, processing industries developed, such as in the Green Triangle in southeast South Australia and southwest Victoria, and the Murray Valley in northeast Victoria and the southwest slopes of New South Wales. Enterprises included sawmills, paper mills, fibreboard and particleboard mills, pole and post production, and treatment plants.
**The Role of Incentives in Forest Plantation Development in Asia and the Pacific**

**Box 1: Forest plantations in Western Australia**

Western Australia’s Forest Products Commission (FPC) manages more than 112,000 ha of plantations and tree crops. By 2020, 800,000 ha of tree crops could be established on farms. Trials to find conifers suitable for local conditions began in 1896. The first softwood plantations, established in the 1920s were maritime pine (*Pinus pinaster*) grown on sandy areas north of Perth. Decades of tree breeding have produced trees that grow faster and straighter, producing more valuable timber. Significant areas of Monterey pine (*Pinus radiata*) were established south of Perth. The first hardwood plantations were mallet (*Eucalyptus astringens*), planted to support the tannin industry. Mallet plantations now support an industry making tool handles.

During the late 1980s, the focus changed from large plantations on Crown land to tree crops on agricultural land. The FPC developed the legal instruments and scientific foundations for integrating trees with traditional agricultural practices on farms. The greatest environmental threat is dryland salinity, which stems from the use of annual crops and pasture in agricultural areas. Deep-rooted perennial plants are critical to redress the water balance in these areas. Scientists estimate that 30 percent of the 18 million ha of cleared farmland in the southwest needs to be returned to perennial vegetation if salinity is to be controlled. This provides an opportunity for new industries in rural areas and greenhouse sinks on a massive scale.

Only commercial tree planting can attract investments at the required scale and provide continuous income to make it viable for farmers to work the land. In 1988 and 1989, the FPC planted about 4,000 ha of *Eucalyptus globulus* on farms along the western and southern coasts, demonstrating the potential of bluegum to landowners and investors. Together with other incentive schemes, major overseas companies were persuaded to invest in the venture. The FPC was contracted to manage three projects costing more than A$150 million with a combined target of planting of at least 60,000 ha over ten years. Another A$200 million would be paid to landowners over the life of the projects. At the end of the 1999 planting season, the FPC had planted 25,000 ha.

By the end of 1998, the state government and private investors had established more than 100,000 ha of bluegum. Altogether, about 125 million tree seedlings have been planted – one of the fastest planting rates in Australia.

In 1996, the FPC launched the Maritime Pine Project – a programme to extend tree crop cultivation on farms into areas with lower rainfall and selected catchments on the coastal plain – as a component of the state’s Salinity Action Plan. The first 700 ha of maritime pine trees were planted in 1996.

Another 2,000 ha were planted in 1997 and nearly 2,500 ha in 1998. The FPC’s target is to plant 150,000 ha of maritime pine in partnership with private landowners within a decade. Another 15,000 ha of mainly native trees will be planted under the Maritime Pine Project. Landowners can choose from more than 20 commercial and non-commercial species to plant in areas too rocky or saline for pines, or where landowners prefer native trees for landscaping reasons. Extending the area planted beyond sites suitable for pines increases the Landcare benefits. It will also increase biodiversity and help create corridors of native vegetation, which in turn will benefit native wildlife.

In January 1999, the FPC signed an agreement with British Petroleum marking the beginning of the first pilot study in Australia to examine the potential for planting tree crops as carbon sinks to offset greenhouse gas emissions. The crops will be planted in partnership with farmers.


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The structural impediments to the development of commercial plantations included:

- Taxation provisions (for example, inadequate recognition of differences between agricultural and forestry rotational periods and timing of returns, lack of adjustment for inflation);
- Monopolies (lack of competitive neutrality between state agencies and private growers);
- Trade interventions and protection from imports of forest products;
- Land-use interventions through government policies (for example, assistance to other industries such as dairy farming or sugar-cane cultivation); and
- Problems of internalizing external benefits and costs of plantations, imperfect knowledge, weak bargaining power of small-scale growers in the log market, and fire risks.

Bhati et al. (1991) summarize the key findings of a number of reports during the 1980s. A case study on the eucalyptus woodlot scheme offered by APM forests in Victoria found that the scheme established only about half its target area. Farmers cited loss of productive land, initial cost of establishment and lack of information about forestry investments (uncertainty and risk) as reasons for their non-participation. In another review of the effectiveness of incentive schemes by Byron and Boutland (1987), farmers and other small-scale landowners did not accept the incentive schemes because they claimed that the schemes were designed with the interests and resources of the sponsors in mind, rather than the needs of the landholders. Reasons for lack of success of the schemes included:

- Cost of finance (investment loan interest rates of up to 20 percent);
- Many farms were too small to support viable woodlots in combination with agriculture;
- Decision-making was influenced by agricultural priorities;
- Varying levels of expertise from innovative and successful to very poor;
- Slow return on investment;
- Uncertainty of markets, exacerbated by a lack of political or marketing leverage; and
- Doubts about the future taxation liabilities.

The authors suggest future schemes, including joint ventures, may have more chance of succeeding, especially if others can gain from shared information and experiences. For example, Western Australia learnt valuable lessons from Tasmania’s experience in setting up the Tasmanian Private Forestry Division (after the Everett and Gently Inquiry of 1976/1977).

**Phase 4: “Private plantation boom” – 1990 to present**

**General investment climate**

This phase is built on lessons learnt during the preceding 30 years, leading to what is presently the highest sustained growth in Australia’s plantation development. A number of factors are driving this growth, largely underpinned by:

- Commonwealth and state recognition for, and agreement on, targeted strategies and programmes to promote Australian forest plantations (including farm forestry) nationally and internationally;
- Opening of the economy (free-market) and increased foreign investment, facilitated by amendments to the tax system arising from broader generic changes and adjustments specifically designed to improve the competitiveness and attractiveness of plantations;
The broader farming and urban communities have also acknowledged the biodiversity and environmental benefits that plantations can provide when integrated into traditional agricultural areas or, in some instances, replacing them.

**Incentives in Phase 4**

Types of direct and indirect incentives offered

a. Tax policy

The Australian Taxation Office (ATO) is the Commonwealth government’s main revenue collector. The ATO has offered a range of direct and indirect incentives to support primary production generally, including plantations. These incentives include tax equity, recognizing the unique challenges of plantation establishment as against other primary productions that are annual or have shorter rotations. This aims to directly assist plantations as a competitive alternative to other primary productions. Related tax incentives that can be applied to forest plantations are listed hereunder.

- **Review of business taxation**
  
  The Review of Business Taxation (commonly known as the Ralph Report) was released in July 1999. Its recommendations – shifting the *profits à prendre* into the income tax stream – are expected to benefit the timber industry where a “right to harvest” is sold separate to land. The change may stimulate the development of secondary markets for immature plantations and the cost-effective establishment of plantations, and increase joint venture arrangements with landowners growing trees on the basis of a guaranteed market for timber.

- **New tax system**

  The New Tax System (NTS), launched on 1 July 2000, introduces a broad-based ten percent Goods and Services Tax (commonly referred to as the GST) and abolishes wholesale sales tax and some state taxes. Before the introduction of the GST, Australia had an indirect system with taxes levied at varying rates on specific groups of goods. The NTS, combined with changes to the marginal tax rates and tax brackets, will reduce indirect taxes, thereby lowering costs of operations and assisting businesses to be internationally competitive. Currently, the business taxation rate is 30 percent. The main benefits for forestry and associated industries, such as transport, will be through the removal of a number of state taxes, a reduction in the embedded taxes and less on-road transport costs for wood products. In effect, the GST affects all aspects of plantation investments, from establishment to processing and marketing.

- **Diesel and alternative fuels grants scheme**

  This scheme is part of the NTS and assists Australian businesses through lower transport and production costs for on-road transport. It is separate from the Diesel Fuel Rebate Scheme for off-road fuel use. The grant is based on a flat rate per litre of fuel (except for gas, which is calculated per cubic litre). For diesel, the rate is presently 18.51 cents per litre.

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14 Further information about the ATO is available at: [http://www.ato.gov.au](http://www.ato.gov.au)
### Prepayments

Prepayments or “12-month rule” taxation amendments came into effect in 2002. These amendments on prepayment are specific to forestry activities and apply to expenditure incurred on or after 2 October 2001. The concession allows investors to claim an immediate deduction for certain prepaid expenditures invested under a plantation forestry agreement. The 12-month rule applies to “seasonally dependent agronomic activities” that occur during tree planting. The prepaid activities must be completed within 12 months of the commencement date and by the end of the following income year. The concession applies to activities such as land preparation and planting.

Managers of plantation forestry agreements need to include the prepayments in their assessable income in the year in which they can claim deductions, rather than when the work is done. Where deductions are first claimed by an investor in either the 2001/2002 or 2002/2003 financial years (whichever is the “first year of use”), the manager can spread the assessment of that income from the first year of use equally between that year and the following year.

The amendment addressed industry concerns. It is expected that the rule will boost investment by providing greater flexibility and helping to better plan land, contracting and seedling requirements.

### Non-commercial losses

The Non-Commercial Losses taxation amendment came into effect in 2002. The rule applies from the 2000/2001 financial year onwards. It prevents losses from a non-commercial business activity being offset against other income in the year in which they occur. In the plantation industry, thinnings may produce a one-off profit, making it ineligible to claim deductions from that year on. However, under the rule the Commissioner of Taxation can exercise discretion prospectively over a number of income years until the activity is expected to produce a profit or pass one of the tests on a sustained basis rather than on each income year. This discretion will also help to reduce compliance cost for industries. In essence, the tax will be realized only when income from the investment occurs.

### Capital gains concessions

Since September 1999, Capital Gains Tax (CGT) was effectively reduced and rules streamlined. The CGT discount enables trusts and individuals to reduce capital gains from assets owned for at least 12 months by 50 percent. Small-scale operators satisfying certain conditions may also qualify for one or more of the following CGT concessions:

- The 15-year exemption provides a full exemption for capital gains from an asset continuously owned for at least 15 years.
- The 50 percent active asset reduction offers a 50 percent reduction of capital gains from an active asset.
- The retirement exemption grants an exemption for capital gains from active assets, up to a lifetime limit of A$500,000, if proceeds are used for retirement.
- The small business rollover defers capital gains if a replacement asset is acquired.

The CGT is relevant to forest plantations as most have long rotations. It also impacts commercial plantation-based annuity schemes that are promoted by several states and private companies. Many plantation-based annuity schemes promote the tax benefits, although the onus is on the investor to clarify and claim such benefits from the ATO.
- **Immediate deductibility of non-capital expenditure**
  Non-capital expenditure on plantations such as plantings, establishment costs and management fees can be claimed as an immediate tax deduction. Expenditure on items of a capital nature (for example, roads and dams) is deductible over a period of time, as specified in the recent tax changes.

- **Farm Management Deposits Scheme**
  This scheme is a tax-linked saving scheme. It allows primary producers to preserve some of their income from good years for use in those years where farm income is low or outlays are high.

- **Income tax averaging for primary producers**
  In primary production, the application of marginal tax rates and income brackets for taxable income implies a relatively high average tax rate that is not compensated by a lower average tax rate in poor income years. To overcome this fluctuation, primary producers may use an arrangement that averages income for five years. This incentive is useful for plantation companies in reducing the average tax rate that may apply to the rather “high” income occurring during years of thinning or clear-felling. While introduced before 1985, it remains ongoing.

- **Spreading insurance recoveries for loss of timber or livestock**
  Insurance recoveries from loss of timber or livestock and net income from forced disposal of livestock can be spread over five income years. This was introduced before 1985.

- **Landcare deduction and offset**
  Introduced prior to 1985, Landcare deduction is ongoing. Primary producers and users of rural land can claim an immediate deduction for capital expenditure on soil conservation, prevention of land degradation and related measures. While not a direct incentive for plantation establishment, it boosts land rehabilitation that indirectly aids plantation establishment (especially in the case of farm forestry).

  Landcare offset was introduced in 1998. Primary producers and users of rural land, with taxable income of up to A$20,000 a year, can claim a 30 percent tax offset for capital expenditure on soil conservation, prevention of land degradation and related measures. This measure can be claimed as an alternative to the Landcare deduction and may provide an incentive for plantation establishment on degraded lands, which provide commercial and conservation benefits.

- **Thin capitalization**
  With some exceptions, when an Australian company pays interest to a party offshore, tax is payable to the ATO. This tax is termed “withholding tax”. The thin capitalization rule may apply to such a withholding tax of Australian forestry companies with foreign partners. Under the rule, the Australian company may claim a tax deduction for such interest payments. However the rule does not apply if the foreign controller’s investment in the Australian company has a debt to equity ratio of more than 2:1.

- **De minimis exemption for thin capitalization**
  The *de minimis* exemption was introduced in 2001. It allows taxpayers to claim debt deductions of up to A$250,000 without being subject to the thin capitalization rule. An additional *de minimis* rule is included in the thin capitalization regime for outward investing entities, where the foreign assets of that entity and its associates represent up to ten percent of the total combined assets of that entity and its associates. Although the rule is not directly related to forests, it again benefits forestry companies with foreign assets.
- **Prepaid expenses – tax shelters**
  
  Under the tax shelter rules, prepaid expenses that would otherwise be immediately deductible are required to be apportioned over their eligible service period (ESP). Broadly, the ESP is the period during which the activity under the agreement (for example, management services) is to be undertaken. Subject to some exceptions, the tax shelter rules apply to prepaid expenditure incurred under a tax shelter arrangement after November 1999. The tax shelter rules apply to all taxpayers and there are no transitional rules. The tax shelter rules do not apply to that part of a prepayment that represents “seasonally dependent agronomic expenditure”. (See earlier explanation in “Prepayments” of the “12-month rule”.)

- **Income tax exemption for funds expended on scientific research**
  
  Income of funds expended for scientific research by, or in conjunction with, a public university or hospital is exempt from income tax. This exemption has been in effect since 1985.

- **R&D refundable tax offset for small companies**
  
  This offset, announced in 2001, encourages smaller companies to undertake R&D. Eligible companies must have an annual turnover of less than A$5 million and undertake R&D of up to A$1 million. Companies meeting the criteria receive tax offset equivalent to the value of the R&D tax concession.

- **R&D tax concession**
  
  The concession was introduced in 1985. Expenditure on R&D generally received an immediate 125 percent deduction. Until 29 January 2001, eligible expenditure on R&D was deductible at 125 percent over three years. Since then, expenditure is deductible over its effective life. Expenditure on “core technology” that relates to R&D is deductible at a rate of 100 percent over the period of the related R&D activities.

  Another premium tax concession became available from 1 July 2001. Companies that increase their R&D expenditure receive a 175 percent concession. This concession covers all R&D expenditure excluding plant, pilot plant, contracted plant, plant leases, core technology, R&D related interest and items excluded from the 125 percent R&D tax concession.

  The following forestry operations are considered to be primary production for accessing tax benefits specific to primary production:
  
  - Planting or tending trees in a plantation or forest that is to be felled;
  - Felling trees in a plantation or forest; and
  - Transporting trees or parts of trees that have been felled in a plantation or forest to the place where they are first to be milled or processed, or from which they are to be transported to the place where they are first to be milled or processed.

b. **The National Forest Policy Statement (NFPS)**

The Commonwealth and state governments jointly released the NFPS in 1992 in response to three major reports on forest issues in Australia – those of the Ecologically Sustainable Development Working Group on Forest Use, the National Plantations Advisory Committee and the Resource Assessment Commission’s Forest and Timber Inquiry. The NFPS outlined objectives and policies for the future of Australia’s public and private forests, and contained specific commitments to improve the management of commercial plantations. Primarily, the policy stated that decisions to establish plantations for wood production should rest on their economic viability. Recognizing the protracted nature of plantation investments, governments saw the importance
of secure long-term policies including the need to enable trading of capital, the establishment of “pooled development funds” with concessional taxation rates and simplified planning procedures.

In many ways, the NFPS became (and remains) the basis for all subsequent forestry policies and programmes for the Commonwealth, and for the states to a lesser degree.

c. The National Landcare Programme

The National Landcare Programme, established in 1992, incorporated elements of the former Federal (Commonwealth) Water Resources Assistance Programme, but had a much broader focus on natural resource management, including whole farm or property management planning.

The National Landcare Programme coordinated government and community activities across whole catchments. It encouraged community involvement in mitigating rural land degradation and emphasized a self-help approach (SCARM 1995). In essence, the concept of Landcare provided a way to integrate several strands of natural resource management policy within the context of community development.

d. Collection and dissemination of quantitative plantation information

Quantitative information on the national plantation resource is an essential ingredient for decision-making and strategic planning, nationally and regionally, by all stakeholders. The provision of data by growers and their representatives ensures that governments and industry use correct information and that a realistic picture of the industry is portrayed nationally and internationally. The National Forest Inventory (NFI) therefore established the National Plantation Inventory (NPI) in 1993 to provide up-to-date quantitative reporting of Australia’s plantation resources and to monitor plantation expansion. This included regional plantation wood-flow estimates critical to business plans, attracting new investment and marketing. The NPI focused on collecting data from growers whose total estate was greater than 1 000 ha each. The National Farm Forest Inventory (NFFI), another NFI programme, was developed in 1998 to collect and collate information on plantations of less than 1 000 ha (generally those within the National Farm Forestry Programme [NFFP]). The first coordinated findings of these two inventories were published in the Plantations of Australia 2001 report (Woods et al. 2001).

Collectively, the NPI and NFFI provided a reliable and transparent data series to assist regional and national resource planning, and guided investment in plantations and associated downstream industries.

e. Wood and Paper Industry Strategy (WAPIS)

In December 1995, the Commonwealth launched the four-year WAPIS, aimed at developing the wood and paper industries while protecting native forests for future generations. It focused on industrial development, value adding and new investment.

WAPIS activities promoted greater investment, research and downstream processing in Australian forest industries, expansion of farm forestry and the plantation sector, a skilled and flexible workforce and improved regional job opportunities. Improved information on plantation areas and wood flows was one of the key achievements of this strategy, significantly aided by the 1997 NPI.

f. National Farm Forestry Programme (NFFP)

The NFFP operated from 1996 to 2001, funded from the National Heritage Trust. Its aim was to encourage the integration of commercial tree growing and management into farming systems.
for wood and non-wood production, increasing agricultural productivity and managing natural resources sustainably. This was aided at the regional level by establishing Regional Plantation Committees (RPCs) to promote information networks, increase the skill base, initiate demonstration projects and design regional strategies. The adoption of farm forestry was assisted by farmers wanting to diversify and enter new markets as a risk management strategy, investors establishing plantations on farmland through joint ventures or annuity schemes, agricultural gains (for example, increased agricultural yields) and provision of environmental services (for example, soil and water conservation). This mitigated, to some extent, the preliminary establishment costs and long lag-time for returns, future market uncertainty and initial lack of information and support networks.

More than one-third of the current total farm forest resources has been planted since 1995 (Figure 5). This period has seen a major shift from softwood to hardwood establishment. At the programme’s conclusion, farm forestry had contributed approximately five percent to the total plantation resource and 12 percent to the total privately owned resource. Approximately another 11 percent of industrial plantations came from leased or joint venture arrangements of farmland.17

![Figure 5: Farm forestry plantation establishment rates](source: Wood et al. (2001)).

**Figure 5: Farm forestry plantation establishment rates**

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**g. Regional Forest Agreements**

The Regional Forest Agreements (RFAs), developed jointly by national and state governments, emerged from the NFPS and are a long-term plan for Australia’s native forests. Beginning with the first agreement in 1997, each RFA operates for 20 years to be reviewed every five years. The RFAs are designed to create jobs and protect forests through:

- A comprehensive, adequate and representative reserve system based on nationally agreed criteria;18
- Support for innovative, internationally competitive forest industries; and
- Sustainable forest management of the whole forest estate.

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17 For more information, refer to: [http://www.affa.gov.au/content/output.cfm?ObjectID=F1B8B992-08B9-4EF9-959F6F6E8978BA4](http://www.affa.gov.au/content/output.cfm?ObjectID=F1B8B992-08B9-4EF9-959F6F6E8978BA4)

Important changes for the plantation industry followed the RFAs, for example allowing the Commonwealth government to remove the requirement for export woodchip licences because special values, such as rare species, now have agreed management frameworks through the RFA process. The Commonwealth’s export controls on roundlogs from plantations have gradually been lifted over the last five years, removing what the industry considered a deterrent to plantation investment. This signals the Commonwealth government’s endorsement of the plantation industry’s full participation in global wood markets and gives potential growers access to a greater range of markets.19

h. Plantations for Australia: The 2020 Vision

Released in 1997, the “Plantations for Australia: The 2020 Vision” is the most important strategic policy setting the current direction of plantation development in Australia, with many of the present incentives being a direct result of this policy.

It is a framework designed to achieve an internationally competitive plantation-growing and processing industry that is commercially focused, market-driven and market-oriented. It aims to develop a significant, long-term and environmentally sustainable plantation resource through major private sector investment, which will enhance the growth of Australia’s forest industries and the contribution made by plantations to the Australian economy, rural and regional communities and the environment.

The 2020 Vision details the main actions to encourage plantation establishment to meet the target of trebling the plantation area from 1.1 to 3.3 million ha by 2020. The Vision partners (the National Association of Forest Industries, Plantation Timber Association of Australia, Australian Forest Growers and the Commonwealth/state governments) are working jointly to implement these actions. Recent trends indicate that the current expansion in plantations is on track to meet this target. The focus is on boosting the availability of suitable land, getting incentives right, establishing a culture of commercial plantations and improving information flows. The government partners recognize their roles in:

- setting the overall attitude towards plantations;
- instilling market confidence;
- providing information;
- establishing rules and processes;
- providing education; and
- providing infrastructure for basic research.

In the initial phase, emphasis had been on increasing awareness of the Vision – particularly at the regional level, involving local government and seeking commitment from state governments to provide a regulatory environment that did not discriminate against plantation growing – and focused on overcoming obstacles to the development of plantation forestry.

A revised 2020 Vision stresses the need to remove some remaining impediments (such as the question of property rights) and to maximize the benefits from plantation expansion. It also highlights the potential for tree plantings to help maintain and improve the environment, while being productive at the same time, to stakeholders. It is expected that the social issues of water and land degradation, fire management and competing land uses will be increasingly addressed as a result.

19 For more information, see the RFA Web site: http://www.rfa.gov.au
Besides building an internationally competitive and environmentally sustainable plantation sector, other expected benefits of the 2020 Vision are reducing Australia’s net greenhouse gas emissions, turning around the wood and wood product trade deficit, rural development (including creation of up to 40,000 jobs) and improved land management outcomes.

In line with the increasing production of softwood, the hardwood sawmillers have begun diversifying their mills to produce kiln-dried timber for furniture, flooring, mouldings and other value-added products. The increased domestic production will see a surplus of sawn timber in the next five years accompanied by a decline in imports. A similar trend is projected for wood panel products, including particleboard and plywood.

i. Action Agenda for Forest and Wood Products

Launched in 2000 by Commonwealth/state governments and industry, the Action Agenda’s vision is maximizing sustainable and profitable activities for tree growing, value adding and marketing of Australian forest and wood products. In committing to this goal, industry and other stakeholders recognize:

- Australia’s public and private forests (including plantations) generate a diversity of wood and non-wood products and services, the benefits of which are not always appreciated by the Australian community;
- Forestry operations in Australia must be, and clearly demonstrated to be, environmentally and economically sustainable;
- Future viability of the industry will depend on its ability to compete in both domestic and overseas markets; and
- An innovative and cooperative approach is necessary to optimize the potential of the industry in traditional and non-traditional areas.

The Action Agenda has been designed to provide an enabling environment, within which industry can seek sustainable competitive advantages. It identifies six broad themes considered vital in dealing with those impediments and in pursuing emerging opportunities:

- Credibility of forest products (for example, implement an Australian Forestry Standard);
- Intelligence development and diffusion (for example, establish a consolidated industry database);
- Product development and innovation;
- Market and investment promotion (for example, integrated approach to market investment development);
- Human capital; and
- Coordination and collaboration.

Impacts of incentives

Following the settlement of European immigrants in Australia, most forest land had been cleared for agriculture. Since the 1980s, however, the establishment of plantations on former agricultural land has reversed the trend. Most states now prohibit clearance of native forest for establishing plantations.

Increasing numbers of small-scale plantings were undertaken, notably in Western Australia. In other areas, in what became known as the “Green Triangle”, the plantings were larger in size and often in contiguous blocks.
Investment companies, sometimes driven by tax advantages of various schemes, established many of the plantations during this period. Often they had no direct links to processors at the outset, but once sufficient critical mass was obtained, they negotiated sales agreements usually for woodchip exports to Japan or Korea. The largest plantation companies are closely tied to foreign companies, especially Japanese pulp and paper enterprises.

**Summary and lessons learned in Phase 4**

During the 1990s, Australia’s economy opened up and moved to a freer market-based approach. This is reflected in the incentives now employed and has led to the highest sustained growth and total area in Australia’s plantation development. At the state level, incentives are predominantly direct mechanisms and include those offered by large private companies targeting small-scale private landowners, while the Commonwealth has moved towards indirect mechanisms. Overall, governments have increasingly distanced themselves from hands-on participation and are focusing on removing impediments, supporting existing investors and attracting new ones. Table 4 sets out a comparison of factors constraining the effective use of incentives in plantation forestry in the early 1990s and how these have been reduced or overcome by 2002.
Table 4: Comparison of effectiveness for forest plantation incentives between 1991 and 2002

<table>
<thead>
<tr>
<th>1991 constraints</th>
<th>2002 situation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Taxation provisions</strong></td>
<td></td>
</tr>
<tr>
<td>Long lead-time between establishment costs and revenues from harvesting made forestry unattractive, compared with agricultural crops.</td>
<td>Tax policy changes, including tax averaging, 12-month rule and farm management deposits scheme.</td>
</tr>
<tr>
<td>Lack of competitive neutrality between state forest agencies and private growers affecting (depressing) log pricing and log allocation.</td>
<td>By 2002, many of the largest state forest agencies corporatized during the preceding ten years (New South Wales state forests, Tasmanian and Victorian pine plantations, privatized agencies) now pay some taxes, putting them on a more level playing field than in the late 1980s/early 1990s.</td>
</tr>
<tr>
<td><strong>Trade interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Export approvals required for unprocessed wood and woodchips.</td>
<td>For RFA regions, export controls for woodchips have been removed, with no ceilings in place for private plantation wood.</td>
</tr>
<tr>
<td>Protection from imports of forest products.</td>
<td>By 2002, tariffs had been reduced to between zero and five percent, to open up markets.</td>
</tr>
<tr>
<td>Land-use interventions through government policies (e.g. assistance to other land-using industries such as dairying or sugar cane).</td>
<td>By 2002, many of these subsidies had been reduced or eliminated.</td>
</tr>
<tr>
<td>Much uncertainty in the supply of forest resources and hence in forest investment overall.</td>
<td>The RFA process was finalized in 2001, with ten agreements in effect. The agreements provide a 20-year certainty to forest industries as well as setting out extensive reserve systems for conservation purposes.</td>
</tr>
<tr>
<td><strong>Marketing for logs from commercial plantations</strong></td>
<td></td>
</tr>
<tr>
<td>Other impediments are associated with problems of imperfect knowledge.</td>
<td>By 2002, market intelligence reports are produced by several firms (e.g. the comprehensive but expensive AUSNEWZ by URS Forestry aimed at large industrial growers and processors, and the free Australian National University [ANU] Forestry Market Report which is primarily aimed at Australia’s small forest growers [see Bhati 2002]).</td>
</tr>
<tr>
<td>The reliability and availability of information on the full nature and extent of Australia’s forests and plantations were limited as it was compiled individually by the states and not reported consistently.</td>
<td>The Commonwealth government initiated the NFI programme in 1995. This grew to include statistics on plantations and culminated in the first comprehensive statistics on the plantation estate through the initial NPI reports of 1997 and the more comprehensive report of 2001 (Wood et al. 2001). This important resource information is vital for government policy-makers, industrial processors and investors to make better informed decisions. This reduction in uncertainty over the information and consequent reduction in risk is very important for investor confidence.</td>
</tr>
<tr>
<td>Limited bargaining power of small growers in the log market.</td>
<td>By 2002, several cooperative schemes for private forest owners have developed (e.g. in Tasmania) and these are assisting small-scale growers to collectively market their wood with regular and increasing sales even into the international markets (e.g. Korea).</td>
</tr>
</tbody>
</table>

Collectively the incentives have proven highly effective. Combined with an eager pulp market and the easing of the export and foreign investment restrictions, they have produced a steep increase in planting rates (see Figures 2, 3 and 4; Table 4). Since the 1980s, most plantations have been established on former agricultural land. Planning approval processes in many states now prohibit clearance of native forests for establishing plantations. Plantation growers actively compete for land with other sectors on a commercial basis.

CONCLUSIONS

Through international competitiveness and value adding, Australia’s native forest and wood product sector is targeting niche markets utilizing the unique characteristics of these timbers. Nevertheless, Australia has substantial plantation resources and is increasingly using them as a primary source of wood products, both for export and domestic use. Plantations cover just one percent of the total forest area but contribute 54 percent to all roundwood and 66 percent to all sawlog production.

Plantation incentives in Australia were initially offered to achieve self-sufficiency. Over time, this narrow focus broadened to encompass the strategic goal of creating an internationally competitive plantation-growing and processing industry by developing a long-term and environmentally sustainable plantation resource through major private sector investments. Although plantations are established for numerous reasons, wood production is now the most significant (Figure 6).

Incentives have been changed over time, reflecting the evolution of government, industry and community expectations of forestry. The Commonwealth government, most state governments and industry have provided a range of direct and indirect incentives with varying success. Specific plantation incentives now focus on creating an environment attractive to investors in commercial plantations and processing facilities. They include:

- A secure strategic policy framework;
- Removal of impediments through tax reforms;
Resource security for industrial investments;
Elimination of market distortions through the introduction of competitive neutrality principles, leading to progressive privatization/commercialization of state plantations;
Progressive lifting of export controls on unprocessed wood from plantations;
Development of internationally competitive wood-processing industries;
Sustainable management of private forests;
Integrated land-use planning, including farm forestry, to increase the availability of private land for plantations and environmental benefits; and
Environmental benefits, for example, land and water conservation/carbon sequestration.

R&D and an associated strong extension programme to distribute research findings to stakeholders have contributed also to the successful provision of incentives.

Non-plantation specific incentives arising from broader national agendas and institutional changes over the last ten years have also benefited plantation development. These include:

- Relaxation of foreign investment restrictions;
- Expansion of rural development and employment opportunities;
- Provision of port and transport infrastructure; and
- Efforts to free market policies.

A summary of the more significant direct and indirect incentives is provided in Annex 1.

The result has been a sustained increase in total plantation area since the 1950s, particularly in the 1960s and early 1970s with the Softwood Loans, and more so since the early 1990s following national agreement of a secure strategic policy framework through the NFPS and 2020 Vision, and broader macro-economic reforms. In 2001, the total plantation area increased by six percent, the majority of plantations was privately owned (54 percent) and growing, with 89 percent of new areas being on private land (Wood et al. 2002). Ownership and partnership arrangements are diverse and reflect the success of recent initiatives to attract private investors. This includes a variety of joint venture and annuity agreements for tree ownership, where both public and private parties add some equity in the tree crop. Farm forestry is a growing area for such arrangements.

Based on Australia’s experiences, conditions in which forest management and plantation investments may prosper include:

- Political and macro-economic stability;
- Trade liberalization and open foreign investment;
- Well-defined and stable property rights for land resources;
- Government with adequate institutional capacity to enforce laws and administer incentive schemes;
- Availability of appropriate technologies and basic infrastructure (for example, roads, electricity, ports) to support investment;
- Availability of commercial knowledge and expertise to establish, maintain, harvest, process and market plantation products; and
- Critical mass of the plantation resource to support internationally competitive, integrated processing facilities.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

FUTURE DIRECTIONS

Creating a favourable climate for plantation establishment and growth

Australia’s plantations largely began through the Commonwealth government’s investment loans to the states. The success of the states’ plantation developments in turn encouraged private investments. The increase in plantation area was sufficiently large to meet Australia’s concerns for self-sufficiency in timber and the sustainability of its native forests, allowing the Commonwealth government to then gradually wind down the Softwood Loans. Despite this decline in direct support, plantings increased, facilitated by the removal of a range of tax inequities and general impediments, and by introducing supportive Commonwealth and state government policies and programmes. This pattern is not limited to Australia. Other countries that previously used substantial subsidies to encourage plantation establishment (for example, New Zealand, Chile, Brazil and Uruguay) have experienced similar increases in plantings, despite reduction or elimination of direct support.

According to Adams and Castano (2000), preconditions for establishing plantations are similar to those required to manage natural forests sustainably, namely: security of tenure, effective planning, yield control and environmentally sound harvesting (Poore et al. 1989). As such, simply possessing large areas of natural forest is not sufficient to maintain wood production. The initial relative advantage of countries with substantial natural forests will ultimately decline, if the underlying infrastructure and support mechanisms are not maintained and developed (Durst and Brown 2000). As such, countries with initially small areas of natural forests but having a well-developed forestry infrastructure, access to capital and the ability to shift their wood production to plantations and grow trees quickly, are well placed to capture existing markets and create new products and markets.

However, growth rates are only part of the equation for financial competitiveness. Overall rates of return are of critical importance. Besides growth rates, they also depend on other factors such as initial investment costs, interest rates, transport costs and the final product’s price. Many developed temperate countries continue to have significant advantages in infrastructure, technology, labour and skills, and have lower interest rates compared with developing countries. Economic efficiencies arising from integrated processing are important. Likewise, having processing industries in close proximity is also important. The crucial point is that the ability to grow trees quickly is only one of a complex set of factors determining success in forestry.

Political will and policy stability

The Australian Government’s policies, refined over time, remain remarkably consistent in supporting plantation establishment over the decades. This stability provides confidence to investors that the government is not likely to suddenly change the ground rules.

The Commonwealth and state governments have a range of policy instruments to promote natural resource management for the public good. These include regulation, education and provision of information, and the provision of economic incentives such as tax deductions, subsidies, grants and market-based instruments. Increasingly, Australia is moving away from direct subsidies and incentives to a market-based investment approach. The Commonwealth government achieves this through enabling incentives based on an appropriate policy and legislative framework to remove impediments (dissincentives) and provide a conducive environment for private industry and capital to set up sustainable and profitable plantations. The 2020 Vision is a good example of industry-specific policy at the micro-level.

State government plantation ownership was a critical factor in advancing Australia’s plantation industry. However, market distortion and a lack of competitive neutrality, caused by the continued dominance of some state-owned forest agencies as softwood suppliers, led to a monopoly in many regions. The Commonwealth government initiated the National Competition Policy (NCP)
to inculcate public agencies’ competitive neutrality by separating their business and regulatory functions. As such, governments now apply full taxes or tax equivalent payments, debt guarantee fees and private sector equivalent regulations on public agencies. An essential element of the obligations is that government business activities, like their private sector counterparts, set prices to earn sufficient revenues to cover their costs. This ensures that public sector investments face the same costs and commercial pressures as their private sector competitors. Several state forest agencies have been corporatized with some states selling off most or all of their plantation estates. Most now pay taxes and adhere to price transparency, thereby creating a level playing field for timber sales.20

**Tariffs and trade barriers**

In recent years, tariff barriers have declined in most of the main timber import markets and tariffs worldwide will continue to fall through bilateral, regional and global trade negotiations (Adams and Castano 2000). Non-tariff measures can also influence trade. These include a wide variety of rules and procedures ranging from health and technical standards to measures influencing price. Restrictions on log exports have traditionally been used to support the domestic processing industry in timber-producing countries.

Bhati (2001) highlights the issue of tariff barriers facing Australia’s forest product exports. A further Commonwealth government economic study projects that Australia’s net exports of logs and wood-based panels will rise significantly within ten years, and the country should change from a net importer to a net exporter of sawn timber. Paper imports will fall as a percentage of total paper consumption. The Australian forest product industry will soon transform from largely a domestic market-oriented to an export-oriented industry.

Australia nevertheless imposes tariffs on imports of forest products, generally between zero and five percent. However, due to the policy of preferential tariffs for the developing countries, forest products from such countries are duty free. Bhati (2001) argues that for this reason and the fact that Japan and Korea (developed countries) impose higher and escalating tariffs on some products than Australia, it is in Australia’s interest to take the initiative to have tariffs on its exports in Asian markets removed (assuming it can retain and increase access to overseas markets).

**Institutional changes supporting incentives**

There is a clear and increasing trend in Australia to privatize many government-owned commercial ventures. This has ranged from telecommunications to banking and has occurred to some extent in two state-owned plantations. The State of Victoria has sold its pine plantation estate of several hundred thousand hectares to Hancocks Pty. Ltd., a subsidiary of the international firm Hancocks U.S.A. Likewise Tasmania has entered into a 50 percent joint venture of their pine plantations with the North American investment company GMO Renewable Resources.

**Extension and dissemination of information**

Commonwealth and state governments have extension and information dissemination systems actively providing information and advice to private industries and landholders. An example is the RPCs established by the Commonwealth government in 1996 in Australia’s main plantation regions. Their aim is to promote wood production on cleared agricultural land and integrate

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20 Further information on the NCP is available at: [http://www.ncc.gov.au/articleZone.asp?articleZoneID=72#Article-94](http://www.ncc.gov.au/articleZone.asp?articleZoneID=72#Article-94)
The Role of Incentives in Forest Plantation Development in Asia and the Pacific

commercial tree growing for wood and non-wood products with other agricultural land uses, with an emphasis on developing commercial uses of native species, through the coordination of stakeholder activities and the development of strategies for industry development. Since then, RPCs have worked with local and regional stakeholders, including landholders, state and local governments and industry to:

- address planning, infrastructure and coordination issues;
- undertake feasibility studies;
- develop regional plantation and farm forestry strategies to encourage commercial forest-based industries in the region;
- formulate related marketing, investment and wood-flow plans;
- facilitate communication among stakeholders;
- identify national R&D priorities for the plantation sector; and
- improve information flows on marketing and management of plantations and private native forests.

The RPCs have the potential to further contribute to improving linkages at the national and regional levels.

Other projects that prepare and provide information to support the plantation industry include the ANU Market Report project that contributes towards creating more informed forest product and input markets in Australia, primarily for small-scale forest growers.21

Possible future drivers

The Kyoto Protocol, greenhouse gas and carbon credits

The inclusion of “sinks” in the Kyoto Protocol has created expectations of increased investment in forest plantation development for carbon storage. Grant and Keenan (2000) note that because the total area that might be converted to plantations is limited, increased carbon sequestration in forest plantations is generally regarded as part of a transitional strategy to reduce atmospheric concentrations of greenhouse gases over the next 50 years or so. However, before carbon-oriented forestry can become a significant factor in global plantation development, the Kyoto Protocol has to be ratified and come into effect internationally.

Even so, this has not prevented initial investments. In New South Wales, the Tokyo Electric Power Company has signed a contract to establish a forest estate for carbon sequestration and timber products over a ten-year period. The target area is between 10 000 and 40 000 ha, with 1 000 ha to be planted initially. The estate is expected to comprise half hardwoods and softwoods. The investment opportunity is attractive because the underlying forestry asset achieves a positive return over time, even assuming no value for carbon. Hence, if the Kyoto Protocol is not ratified, or if ultimately the value of carbon sequestration from the carbon sink is not realized, a valuable asset will still have been created.

Other commercial and market-driven activities are resulting in plantation investment for carbon offsets. Commonwealth and state governments have developed specific policy initiatives to facilitate carbon-related investments, including:

- Bush for Greenhouse (1997) (Commonwealth);
- National Greenhouse Strategy (1998) (Commonwealth);

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Still, a number of issues require resolution before carbon offsets can play a significant role in plantation development, for example:

- risks from trade barriers;
- transaction costs;
- measurement of above- and below-ground biomass and verification; and
- social and community concerns.

**Plantations as a financial investment**

Plantation investments may provide portfolio diversification, long-term returns and improve risk management through reduced portfolio volatility. Experiences of large institutional investors in North America and Europe indicate that plantation returns are often counter-cyclical to the returns from financial assets such as stocks and bonds. As such, they may be worthwhile investments for superannuation funds because the long maturity periods match the fund’s rising long-term obligations.
### Annex 1: Summary of forest plantation incentives used in Australia

<table>
<thead>
<tr>
<th>Date started/ ended</th>
<th>Brief description of incentive</th>
<th>Initiated by</th>
<th>Common wealth, state, timber industry, private sector</th>
<th>Target group (e.g. state, timber industry, private landowners, others)</th>
<th>Direct/ indirect funding</th>
<th>Outcomes/impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing</td>
<td>Infrastructure provision (e.g. roads and port facilities)</td>
<td>Commonwealth and state</td>
<td>Regional Australia and associated rural industries</td>
<td>Indirect</td>
<td>Attracts and facilitates investment, reduced cost of production, opens new areas to forestry</td>
<td></td>
</tr>
<tr>
<td>2002 - present</td>
<td>Tax equity package</td>
<td>Commonwealth</td>
<td>Timber industry</td>
<td>NA</td>
<td>A range of tax measures for current and future investors in plantations. Removed impediments will ensure forest plantations are treated equally with other rural industries, especially agriculture.</td>
<td></td>
</tr>
<tr>
<td>2002 - present</td>
<td>Natural Heritage Trust 2 (restructure of Natural Heritage Trust 1 with additional funding)</td>
<td>Joint Commonwealth and state</td>
<td>States, timber industry, private and communities</td>
<td>Direct</td>
<td>More strategic focus on environmental services and improved natural resources management. Mainly assists farm forestry</td>
<td></td>
</tr>
<tr>
<td>2001 - present</td>
<td>Investor attractiveness framework e.g. reduced interest rates, attractive exchange rate, incentives for large-scale processors</td>
<td>Commonwealth</td>
<td>Timber industry</td>
<td>NA</td>
<td>Attracts and facilitates investment, reduced cost of production, improved competitiveness of operations</td>
<td></td>
</tr>
<tr>
<td>2000 - present</td>
<td>Australian Forestry Standard</td>
<td>Joint Commonwealth, states and industry</td>
<td>Timber industry</td>
<td>NA</td>
<td>Provides credibility of Australia’s sustainable forest management practices and improved sale of forest products to global markets</td>
<td></td>
</tr>
<tr>
<td>2000 - present</td>
<td>Action Agenda for Forest and Wood Products</td>
<td>Commonwealth</td>
<td>Timber industry</td>
<td>NA</td>
<td>Promotion of demand-side initiatives, encompassing such issues as value adding, expanding non-traditional forest and wood uses, and market and investment development</td>
<td></td>
</tr>
<tr>
<td>1998 - present</td>
<td>National Farm Forest Inventory</td>
<td>Joint Commonwealth, state and industry</td>
<td>Farm forestry</td>
<td>NA</td>
<td>Support the development of farm forestry and plantations generally by the collection, interpretation and dissemination of data, and assist to monitor the outcomes of the NFFP</td>
<td></td>
</tr>
<tr>
<td>1997 - present</td>
<td>Plantations 2020 Vision strategy</td>
<td>Joint Commonwealth, state and industry</td>
<td>Timber industry</td>
<td>NA</td>
<td>A trebling of Australia’s forest plantation area by 2020 through removing impediments, encouraging value adding and regional development, and contributing to environmental services and a market-driven timber industry</td>
<td></td>
</tr>
<tr>
<td>Date started/ended</td>
<td>Brief description of incentive</td>
<td>Initiated by Commonwealth, state, timber industry, private sector</td>
<td>Target group (e.g. state, timber industry, private landowners, others)</td>
<td>Direct/indirect funding¹</td>
<td>Outcomes/impacts¹</td>
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</tr>
<tr>
<td>1997 - 2001</td>
<td>Natural Heritage Trust 1</td>
<td>Joint Commonwealth and state</td>
<td>Commonwealth, states, timber industry, private and communities</td>
<td>Direct</td>
<td>Assists farm forestry programmes and contributes to broader environmental services by, in part, community involvement and stimulating additional investment in the natural environment sustainably</td>
<td></td>
</tr>
<tr>
<td>1996 - present</td>
<td>Removal of Export Controls on wood from plantations</td>
<td>Commonwealth</td>
<td>Timber industry</td>
<td>NA</td>
<td>Increased access to export markets, creating additional demand for forest products</td>
<td></td>
</tr>
<tr>
<td>1995 - present</td>
<td>Regional Forest Agreements</td>
<td>Commonwealth</td>
<td>State, timber industry and conservationists</td>
<td>Direct to state</td>
<td>Certainty of resource availability, comprehensive reserve system and sustainability</td>
<td></td>
</tr>
<tr>
<td>1995 - present</td>
<td>Establishment of networks to provide advice and streamline planning approvals (Regional Plantation Committees)</td>
<td>Commonwealth</td>
<td>Timber industry and private landowners</td>
<td>Indirect</td>
<td>Provide focal point in 17 regions to disseminate information and encourage plantation establishment and farm forestry</td>
<td></td>
</tr>
<tr>
<td>1995 - present</td>
<td>National Competition Policy</td>
<td>Joint Commonwealth and state</td>
<td>Timber industry</td>
<td>NA</td>
<td>Removal of unfair competitive advantage of state-owned forest corporations</td>
<td></td>
</tr>
<tr>
<td>1995 - 1999</td>
<td>WAPIS</td>
<td>Commonwealth</td>
<td>Timber industry and processors</td>
<td>NA</td>
<td>Greater research and downstream processing, expansion of farm forestry and the plantation sector, and improved information on plantation areas and wood flows</td>
<td></td>
</tr>
<tr>
<td>1993 - present</td>
<td>Joint Venture Agroforestry Programme</td>
<td>Commonwealth</td>
<td>Timber industry (including farm forestry)</td>
<td>Direct</td>
<td>Integrating sustainable and productive agroforestry within farming systems</td>
<td></td>
</tr>
<tr>
<td>1993 - present</td>
<td>National Plantation Inventory</td>
<td>Joint Commonwealth and state</td>
<td>Timber industry</td>
<td>NA</td>
<td>Support the 2020 Vision, through provision of reliable and transparent quantitative data series to aid regional and national resource planning and guide investment in plantations and associated downstream industries</td>
<td></td>
</tr>
<tr>
<td>1992 - present</td>
<td>National Forest Policy Statement</td>
<td>Joint Commonwealth and state</td>
<td>Timber industry</td>
<td>NA</td>
<td>Integrated environmental sustainability and commercial production for Australia's public and private forests, with specific commitments to improve the management of commercial plantations</td>
<td></td>
</tr>
<tr>
<td>Date started/ended</td>
<td>Brief description of incentive</td>
<td>Initiated by Commonwealth, state, timber industry, private sector</td>
<td>Target group (e.g. state, timber industry, private landowners, others)</td>
<td>Direct/indirect funding</td>
<td>Outcomes/impacts¹</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------</td>
<td>---------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
<td>------------------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>Early mid 1990s</td>
<td>Numerous development incentives designed to attract and encourage new investors to forest plantation, maintain and improve quality and quantity of existing plantations, incentives for large-scale processors</td>
<td>State and private (normally larger timber and paper companies)</td>
<td>Private landholders</td>
<td>Direct</td>
<td>Numerous – often specific according to who funded the incentive, e.g. encourage reforestation within reasonable distance of paper mills, establish private softwood and hardwood plantations, increase pulpwood supply, re-establish plantations on suitable lands after harvesting, farmers to grow trees commercially</td>
<td></td>
</tr>
<tr>
<td>1990 - present</td>
<td>Relaxation of foreign investment rules</td>
<td>Commonwealth</td>
<td>International timber industry</td>
<td>NA</td>
<td>Increased foreign investments in plantations with improved attractiveness to potential new investors</td>
<td></td>
</tr>
<tr>
<td>1990s - present</td>
<td>Dissemination of information for investors and landholders</td>
<td>Commonwealth, states and industry</td>
<td>Timber industry</td>
<td>NA</td>
<td>Greater awareness of government programmes, superior decision-making, increased plantation rates and areas</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>Grants to downstream processors</td>
<td>Commonwealth</td>
<td>States</td>
<td>Direct</td>
<td>Improved integrations and efficiency, value adding, greater market demand</td>
<td></td>
</tr>
<tr>
<td>1989 - present</td>
<td>Landcare: environmental issues an additional factor in planting trees</td>
<td>Joint Commonwealth and state</td>
<td>Timber industry and conservationists</td>
<td>Direct</td>
<td>Enhanced environmental gains arising from community participation and strategic targeting of national environmental issues, greater public awareness and acceptance of forest management practices</td>
<td></td>
</tr>
<tr>
<td>1987 - 1989</td>
<td>National Afforestation Programme</td>
<td>Commonwealth</td>
<td>State and private forests</td>
<td>Direct</td>
<td>Contributed to a 6 000 ha increase in hardwood plantations</td>
<td></td>
</tr>
<tr>
<td>1980 - present</td>
<td>Taxation deductibility arrangements for plantation establishment, Managed Investment schemes, reduction of company tax rates</td>
<td>Commonwealth</td>
<td>Timber industry</td>
<td>Direct</td>
<td>Improved attractiveness of plantations as investment vehicles and viable alternative options for diversification</td>
<td></td>
</tr>
<tr>
<td>1966 - 1982</td>
<td>Commonwealth Softwood Loan Agreement Act</td>
<td>Commonwealth</td>
<td>State forest agencies</td>
<td>Direct</td>
<td>Large increase in softwood planting</td>
<td></td>
</tr>
</tbody>
</table>

¹ A quantitative assessment of each incentive and its costs was not possible, as many incentives were generic to the whole timber industry – not just plantations. They operated in conjunction with other incentives and cannot be isolated. Impacts have changed over time and with the development of different aspects (e.g. farm forestry). Individual costs were unavailable as many incentives were/are part of broader natural resource management, general government policies and programmes.
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THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC


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INTRODUCTION

The People’s Republic of China (PRC) is the world’s most populous country with more than 1.3 billion people. The population growth rate is about 0.5 percent. About 64 percent of the people live in rural areas.

China’s land area is about 9.33 million km$^2$ extending over a wide array of climatic zones including tropical, subtropical, warm-temperate, temperate and cool-temperate zones. Annual precipitation similarly ranges from 2 000 mm in the southeast to 100-200 mm in the northwest. These geographical and climatic variations give rise to China’s tremendous biodiversity. To protect this diversity, 1 276 protected areas covering 123 million ha had been established by the end of 2000, accounting for about 12.4 percent of the total land area. Among these protected areas are 909 forest areas, which cover 103 million ha (SFA 2001a).

The country’s land area is categorized as cropland (10.4 percent), permanent pasture (42.9 percent), forest and woodland (16.6 percent) and others (30.1 percent). About 95 million ha are cultivated, mainly in the Northeast Plain, North China Plain, Middle-Lower Yangtze Plain, Pearl River Delta Plain and Sichuan Basin.

The country is composed of 23 provinces, five autonomous regions (Inner Mongolia, Ningxia, Xinjiang, Guangxi and Tibet), two special administrative regions (Hong Kong and Macao) and four municipalities. Under each province and autonomous region, the next levels of administration are prefectures and cities. Further down in the administrative hierarchy are counties, townships and villages.

For over 20 years, China’s economy has grown between seven and ten percent per year. The growth, market liberalization and economic reforms have lifted some 300 million people out of poverty (Ziegler 1997, cited in Lu et al. 2002). The reforms promote efficiency through the expansion of markets, improved allocation of resources and greater roles for the private sector. Today, private enterprises are estimated to account for 33 percent of the GDP, almost on par with the 37 percent state-corporation contribution (Kynge 2000, cited in Lu et al. 2002). Reforms have been greatest in rural areas where farmers have been allowed greater freedom to work for themselves on leased land, and are permitted to keep the rewards of their labour.

Forests and forestry in China

According to the fifth national forest resources inventory (1994-1998), China’s forests cover an area of 153.63 million ha, which includes bamboo and economic forests (for example, fruit, rubber and oil seed trees). The stocking volume is estimated at 11.27 billion m$^3$. About 263 million ha, or 27 percent of the total land area, are set aside for forestry. Against most
measures, China is forest-deficient and has only 0.1 ha of forest per capita, considerably less than the world average of 0.6 ha (FAO 1997).

China’s forest product output has been falling short against increasing demands. China is one of the world’s largest timber importers, and the only major net timber importer among developing countries (WWF 2002). In 2000, imports of timber and related products reached US$14.25 billion, with US$7.61 billion for timber products and US$6.64 billion for pulp and paper. Forest products are now the largest imported commodity in China.

**Regional variations**

In terms of area and volume, forest resources are concentrated in state-owned forests in nine provinces or autonomous regions. These provinces account for just under half of the forest area and a significant 66 percent of the standing forest volume. Another 38 percent of the forest area and 18 percent of the volume are located in ten southern collective forest provinces and autonomous regions (Table 1).

<table>
<thead>
<tr>
<th>Forest regions</th>
<th>No. of provinces</th>
<th>All forests Area</th>
<th>Volume</th>
<th>Natural forests Area</th>
<th>Volume</th>
<th>Plantation forests Area</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Collective Forest Region*</td>
<td>10</td>
<td>38.40</td>
<td>17.79</td>
<td>31.43</td>
<td>13.96</td>
<td>54.40</td>
<td>52.05</td>
</tr>
<tr>
<td>Tibet</td>
<td>1</td>
<td>2.66</td>
<td>12.42</td>
<td>3.81</td>
<td>13.82</td>
<td>0.002</td>
<td>0.0001</td>
</tr>
<tr>
<td>Other 10 provinces with little forest**</td>
<td>10</td>
<td>9.61</td>
<td>3.65</td>
<td>3.64</td>
<td>2.49</td>
<td>18.72</td>
<td>13.99</td>
</tr>
<tr>
<td>State Forest Region***</td>
<td>9</td>
<td>49.33</td>
<td>66.14</td>
<td>59.12</td>
<td>69.73</td>
<td>26.88</td>
<td>33.96</td>
</tr>
<tr>
<td>Heilongjiang, Inner Mongolia, Jilin</td>
<td>3</td>
<td>25.66</td>
<td>31.52</td>
<td>32.03</td>
<td>33.02</td>
<td>11.06</td>
<td>18.01</td>
</tr>
<tr>
<td>Sichuan, Yunnan</td>
<td>2</td>
<td>17.04</td>
<td>27.07</td>
<td>19.74</td>
<td>28.95</td>
<td>10.85</td>
<td>10.13</td>
</tr>
<tr>
<td>Other provinces</td>
<td>4</td>
<td>6.63</td>
<td>7.55</td>
<td>7.35</td>
<td>7.76</td>
<td>4.97</td>
<td>5.82</td>
</tr>
</tbody>
</table>

Source: SFA (2000a)

* Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hubei, Hunan, Jiangxi and Zhejiang.

** Beijing, Hebei, Henan, Jiangsu, Liaoning, Ningxia, Shandong, Shanghai, Shanxi and Tianjin.

*** Inner Mongolia, Jilin, Heilongjiang in Northeast China; Yunnan and Sichuan in Southwest; Sha’anxi, Gansu, Qinghai and Xinjiang in Northwest.

6 Collectives usually refer to villages. Collective forests are those found on forest lands that belong to the villages collectively, and forest lands are lands designated by the national zoning system for forest use. Since 1978, nearly 80 percent of the forest lands are managed by rural households as self-keeping and responsibility forest lands. Farmers living in the forests are allocated self-keeping forest lands for subsistence purposes, growing crops of their own choice and owning the products they harvest. On the other hand, farmers need to sign a contract with collectives to be allowed to operate on responsibility forest lands for a designated period of time. In the early 1980s, the contract period could be up to 15 years. In cases where input comes from the farmers only, the products grown on the land belong to the farmers alone, whereas if the collective has contributed to forest management, then farmers receive only partial income from timber sales.

7 Plantation forests are established through artificial regeneration, and they stabilize three to five years after planting, or five to seven years if they are seeded aerially and attain a canopy of 20 percent.
Economic contribution

In economic terms, forestry accounts for less than one percent of the GDP, but is an essential source of energy for 40 percent of the rural population and supplies virtually all the timber to the construction sector. In global terms, China’s output of forest products is ranked amongst the top in many product categories. For instance, China is the third largest producer of sawnwood in the world, and accounts for over 30 percent of total bamboo-based production and for 40 percent of rosin, an important chemical raw material for industry (Zhang et al. 1998).

Since the 1980s, China’s forest product industry, including the production of wood-based panels, forest chemical industry and paper, has experienced rapid expansion. In 1999 alone, the production of logs reached 48 million m³, that of wood-based panels exceeded 15 million m³ and the production of paper and paperboard reached 22 million tonnes (STB 2000).

Forest tenure system

Official forest land in China is either owned by the state or collectives. This system of forest land ownership is a result of China’s late 1950s collectivization movement, which basically eliminated private forest lands. Ownership was shifted from households to collectives, and later to communes. Today, after two decades of rural tenure reform, the legal status of the village collectives as owners of the forest land remains but most of the collective forests are managed and used by rural households through contractual arrangements. Initiated in 1978, the process of decollectivization turned the formerly uniform collective forest sector into a non-state forest sector with diverse components – forest farms still under village collective management; forests managed jointly by collectives, farmers and/or state forest entities; forest parcels managed by farmers; and forest parcels managed by private companies. In contrast, state-owned forests continue to be under the jurisdiction of the state forest enterprises and forest farms.

The state forests held 68 percent of the total standing volume, but collectives owned 58 percent of the forest land (Table 2). Collectives dominated the area and volume of plantation forests, while state forests are primarily composed of old-growth natural forests.

Table 2: Forest resources and ownership in 1998 (in million ha and million m³)

<table>
<thead>
<tr>
<th>Tenure</th>
<th>Area of forested land</th>
<th>Volume of total forests</th>
<th>Area and volume of forest stand</th>
<th>Area of economic forests</th>
<th>Area of bamboo forests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Natural forest</td>
<td>Plantation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area</td>
<td>Volume</td>
<td>Area</td>
</tr>
<tr>
<td>State</td>
<td>63.89</td>
<td>7 641</td>
<td>62.01</td>
<td>7 124</td>
<td>7.70</td>
</tr>
<tr>
<td>Share (%)</td>
<td>42</td>
<td>68</td>
<td>48</td>
<td>71</td>
<td>26</td>
</tr>
<tr>
<td>Collective</td>
<td>89.75</td>
<td>3 665</td>
<td>67.19</td>
<td>2 961</td>
<td>21.44</td>
</tr>
<tr>
<td>Share (%)</td>
<td>58</td>
<td>32</td>
<td>52</td>
<td>29</td>
<td>74</td>
</tr>
<tr>
<td>Total</td>
<td>153.63</td>
<td>11 306</td>
<td>129.20</td>
<td>10 085</td>
<td>29.14</td>
</tr>
</tbody>
</table>


8 Private forests are established through investments on private land, with all rights to the forests accorded to the private owners. This type of ownership was common in the Min-Guo period, from the end of the feudal Qing Dynasty until the founding of the PRC, after which, private forests were gradually eliminated during collectivization (Chen 1983).

9 Forest stands are forests grown, both naturally and artificially, on forested land except what are classified as economic forests and bamboo forests. They are forests with timber as the main product including timber forests and fuelwood forests. Forested lands are lands with forest cover meeting certain criteria (e.g. canopy cover greater than 20 percent), and include areas of forest stands, economic forests and bamboo forests.
The relative importance of collective forests has been growing over time. Between 1950 and 1980, state forests were major suppliers of timber. Since the early 1980s, however, state forest output has declined significantly. Between 1984 and 1988, the Northeastern State Forest Region recorded an annual loss of 277,000 ha in forest areas (Zhang 1998). Deforestation is the direct result of overharvesting and a lack of investment in forest regeneration. The role of the collective sector in forest management increased mainly because of its success in developing plantation forests. Table 3 illustrates the change in forest area by ownership types between 1973 and 1998. Table 4 highlights the increase of plantations held by collectives between 1984 and 1998.

**Table 3: Forest area change by ownership type, 1973-1998 (in million ha)**

<table>
<thead>
<tr>
<th>Years</th>
<th>Total</th>
<th>State</th>
<th>Collective</th>
<th>Collective share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-1976</td>
<td>121.86</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1977-1981</td>
<td>115.28</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1984-1988</td>
<td>116.36</td>
<td>52.71</td>
<td>63.65</td>
<td>55</td>
</tr>
<tr>
<td>1989-1993</td>
<td>128.53</td>
<td>58.20</td>
<td>70.33</td>
<td>55</td>
</tr>
<tr>
<td>1994-1998</td>
<td>153.63</td>
<td>63.89</td>
<td>89.75</td>
<td>58</td>
</tr>
</tbody>
</table>

Source: SFA (2000b)
NA = not available

**Table 4: Plantation development, 1984-1998 (in million ha and million m³)**

<table>
<thead>
<tr>
<th>Area (years)</th>
<th>Total</th>
<th>State</th>
<th>Collective</th>
<th>Collective share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-1988</td>
<td>18.74</td>
<td>5.48</td>
<td>13.26</td>
<td>71</td>
</tr>
<tr>
<td>1994-1998</td>
<td>29.14</td>
<td>7.70</td>
<td>21.44</td>
<td>74</td>
</tr>
</tbody>
</table>

**Volume (years)**

| 1984-1988    | 529.85 | 213.20 | 316.65    | 60                   |
| 1989-1993    | 711.98 | 295.27 | 416.71    | 59                   |
| 1994-1998    | 1,012.99 | 378.33 | 634.66    | 63                   |

Source: SFA (2000b)

**EFFORTS TO INCREASE FOREST RESOURCES AND PLANTATIONS**

Since the foundation of the PRC, the government has placed great emphasis on forestry development and invested significant sums in forest resource expansion through afforestation and natural forest regeneration. As a result, China’s forest area and volume has steadily expanded over time (Table 5).

Today, China has the largest plantation area in the world with 46.7 million ha, accounting for 30.4 percent of the total forested land (SFA 2000a). In terms of volume, plantations account for one billion m³, or nine percent of the total standing stock. Moreover, the government is seeking to raise the forest cover to 19.4 percent, 24.4 percent and 26 percent of the total land area by 2010, 2030 and 2050, respectively (SEPA 1999). More recently, the government’s decision to implement a logging ban in large areas of natural forests has highlighted the urgency to shift to plantations. To achieve the pronounced targets, the government is increasingly looking towards the non-state sector as a major stakeholder in forestry.
Table 5: Forest resources expansion from 1973 to 1998 (in million ha and million m³)

<table>
<thead>
<tr>
<th>Year</th>
<th>Area of forest land</th>
<th>Volume of standing stock</th>
<th>Area of forested land</th>
<th>Timber volume of forested land</th>
<th>Forest cover (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973-1976</td>
<td>257.60</td>
<td>9,530</td>
<td>121.86</td>
<td>8,660</td>
<td>12.7</td>
</tr>
<tr>
<td>1977-1981</td>
<td>267.13</td>
<td>10,260</td>
<td>115.28</td>
<td>9,030</td>
<td>12.0</td>
</tr>
<tr>
<td>1984-1988</td>
<td>267.43</td>
<td>10,570</td>
<td>124.65</td>
<td>9,140</td>
<td>13.0</td>
</tr>
<tr>
<td>1989-1993</td>
<td>262.89</td>
<td>11,790</td>
<td>133.70</td>
<td>10,140</td>
<td>13.9</td>
</tr>
</tbody>
</table>

Source: SFA (2000b)

*The data for 1994 to 1998 were assessed by the new criterion that crown density (canopy) of forest is at least 20 percent. In previous years, forests were associated with crown density of at least 30 percent. Figures exclude forest resources in Taiwan Province of China.

As a result of government measures to promote private tree planting, by 1985 households were estimated to be responsible for over 50 percent of the increase in forest area (Li et al. 1988). The private sector is set to play a major role in plantation establishment for the government to meet its 2010 target.

ASSESSING THE DEVELOPMENT OF FOREST PLANTATION

Afforestation

The Government of China attaches great importance to forest resource protection and development. While the protection of old-growth forests – mainly under state enterprises’ jurisdiction – has not been satisfactory, plantation development has been more successful, in particular over the past two decades.

Clarifying forest plantation statistics

China has an afforestation performance reporting and verification system. Data on annual areas afforested are collected by local governments and forwarded through the various administrative levels to the central authority. The data comprise planting targets, allocated funds, and actual areas planted. The forest authority might verify achievements in the field based on indicators such as survival rate in the first year and preserving rate in the third year. The preserving rate is used to calculate the afforestation area for the national forestry statistics. Before 1985, the areas with a preserving rate of 40 percent and above were counted as plantations. Since 1985, the quality of afforestation has improved and the preserving rate indicator increased from 40 to 85 percent (SFA 2001a). Existing silviculture statistics illustrate that before 1976 the preserved plantation area was only 28 percent of the reported afforestation area (MoF 1980). In addition, based on the third forest inventory (conducted from 1984 to 1988), the preserved plantation area was below 30 percent for the 30 years before the inventory. Later inventories no longer provide this information, but the China Forestry Yearbook started providing statistics with regard to the preserving rate of afforestation projects, based on the re-investigation by the central forest authority. Available data indicate that preserved areas increased sharply in the 1980s to 91 percent in 1988, and further to 95 percent in 1990, ranging between 85 and 90 percent in the 1990s.

Therefore, the data reported in the official statistics have been adjusted accordingly (Figure 1). The top line in the figure shows the reported annual afforestation area from 1949 to 2000. The middle line represents the estimated real afforestation area. The bottom line indicates the share of state-owned enterprises in the official statistics. The (reported) afforestation by the state-owned sector has been smaller relative to the area (reported) by the collective sector. The average
annual gross increase in plantation areas from 1949 to 1982 was about one million ha. The average annual gross increase after 1982 was over four million ha. Figure 2 presents the accumulative afforested area.

Source: SFA (2001b)
Note: The criterion for land area to be counted as plantation area was a preserving rate larger than 45 percent before 1985, and 85 percent after 1985. Under the 85 percent preserving rate, the afforestation area in the 1980s should demonstrate a smoother trend in the reported area.

Figure 1: Annual afforestation rate, 1949-2000

Net increase in plantation area

Since 1949, about 100 million ha of plantations have been established. According to the fifth national forest resource inventory, completed in 1998, China had 46.7 million ha of plantations. This means that approximately half of the area planted was lost to other land uses or replanted. The mean annual loss was around one million ha. Between the fourth and fifth inventories, 6.69 million ha were lost due to harvesting without replanting and various forms of forest conversion (legal and illegal) (Table 6). The annual loss during this period was about 1.34 million ha. This indicates that plantation forests have been increasingly converted and degraded, owing to economic growth and increased domestic demands.
On the other hand, afforestation efforts have obviously outpaced deforestation. There was a net increase of 8.82 million ha between the second to third inventories at an annual rate of 1.56 million ha, 3.24 million ha between the third and fourth inventories (0.65 million ha annually), and 12.42 million ha between the fourth and fifth inventories (2.48 million ha) annually. The annual rate of net increase in plantation area has accelerated in recent years (SFA 2000a).

<table>
<thead>
<tr>
<th></th>
<th>Area of closed plantation</th>
<th>Net Increase between inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Inventory</td>
<td>23.69</td>
<td>NA</td>
</tr>
<tr>
<td>2nd Inventory</td>
<td>22.19</td>
<td>-1.50</td>
</tr>
<tr>
<td>3rd Inventory</td>
<td>31.01</td>
<td>8.82</td>
</tr>
<tr>
<td>4th Inventory</td>
<td>34.25</td>
<td>3.24</td>
</tr>
<tr>
<td>5th Inventory</td>
<td>46.67</td>
<td>12.42</td>
</tr>
</tbody>
</table>

**Table 6: Change in the area of total plantation forests* (million ha)**

Source: SFA (2000b)

* Total plantation forests include plantations, economic forests and bamboo forests.

Based on the fifth inventory, between the fourth and fifth inventories, an area of 1.75 million ha of plantation forests degraded to open forests, shrubs, or barren land, and 1.66 million ha were converted to other types of land use. The estimated total plantation area lost was 6.69 million ha, or 1.34 million ha per year.

**Reforestation**

Reforestation was unable to match the speed of deforestation and afforestation. Over the last 50 years, the average annual replanted area was around 0.4 million ha, far short of the average one million ha of plantations deforested, and considerably below total deforestation of natural forest and plantations. By the late 1990s, the reforestation rate reached only half of the total area of plantations lost each year (SFA 2000a).

**Evolving role of non-state sector in plantation forests**

Historically, the state sector managed mostly the good quality, old-growth forests while the collectives were left with the poorer quality forests and extensive areas of barren land designated for forest use. The state forests were to supply timber to support the nation’s industrialization, while the collective forests were more for conservation purposes. In the more recent past, collective forest management has increasingly responded to economic incentives, such as those created by higher government investment, tenure change and market liberalization. The investment was used to create employment for farmers who participated in government-initiated plantation projects, although the projects were on land managed by farm households. Tenure change (towards household-based forest management systems) ensured farmers a specified share of revenue from forest production, which used to be insignificant or even prohibited in the pre-reform era. When the demand for timber increased, farmers responded by planting trees (Yin 1994, 1998; Yin and Newman 1997). Under imperfect market conditions or when forest regulations are restrictive, collective forest farmers tend to shift from timber forests to economic forests and bamboo forests, but maintain the rate of forest area expansion.
In considering the impacts of incentives on the performance of afforestation efforts in China, plantation development can be divided into the period before rural reforms (1949-1978), the period after the launching of the reforms (1978-1987) and the period since 1987. This division reflects the transition of China’s tightly controlled forestry sector under the planned economy (1949-1978), to a period of decentralization and market-oriented reform mainly in collective forestry (1978-1987), and finally to a period of initiating and implementing large-scale afforestation projects. The first two periods saw the sector undergo institutional changes, while maintaining the national goal of increasing timber supply. The third period started with a shift from timber production and timber self-sufficiency goals to an increased emphasis on the provision of environmental services.

1949-1978: Era of planned economy (insignificant private sector role)


The first and most important reform introduced at the time of the founding of the PRC was the Land Reform Act of 1950, which permitted the government to nationalize all forestry enterprises and confiscate feudal forest lands in mountainous areas for distribution to farmers. Along with their new parcels of forests, farmers received ownership certificates. Effectively, two systems of forest ownership were established: state-owned forest land and individually owned mountain forest land. The transfer of forest land ownership and management rights to households resulted in significant productivity increases (Chen 1983; Liu 1998).

Only three years after the Land Reform Act, China proclaimed its policy of collectivization. In forest areas and mountainous regions, the era of cooperatives began in 1953 and “people’s communes” were organized in 1958. This resulted in a dramatic shift in farmers’ attitudes, when the household-based production system, under which farmers owned forests and were free to keep the fruits of their labour, gave way to collective ownership and the introduction of distribution systems according to labour provided and needs. Forest farms managed by communes, production brigades and teams10 began to emerge, and private forests were confiscated. Even though communes – or team-managed forest farms – experienced rapid development throughout the 1970s, numerous problems arose. A major stumbling block was the unclear land titles to mountain forest lands. Furthermore, the replacement of merit-based payments with salaried work in production teams seriously blunted farmers’ enthusiasm for increasing production. The planned economic structure impeded advances in productivity, hampered efforts to increase investment in new forests, delayed economic diversification and generally resulted in poor economic performance (Lu et al. 2002).11

The collectivization of forest land in rural areas, nevertheless, was not implemented without efficiency considerations by the government. Economics of scale were deemed very important. Resource allocation through central authorities was viewed to be more efficient and was expected to generate higher productivity than a market-based system. Small-scale, individually operated cropland and forest farms were also seen as obstacles to the efficient management of the central planning system. These expectations warranted the conversion of private cropland and forest farms into relatively large-scale and homogeneous production units. The efficiency gain was to materialize through:

---

10 A production team was formed to organize collective production in rural China, usually within the boundary of a natural village, before the early 1980s. It normally included ten to 30 rural households.

11 Based on Lin’s (1990) analysis, low productivity in collective production teams, before rural reform began in late the 1970s, was the result of high monitoring costs, asymmetry between contribution and reward and the inability of farmers to choose whether they wanted to participate in the system. This argument applies to the low success rates of China’s plantation efforts before 1978.
A centralized wood-distribution system that linked wood producers to wood processors and other designated users through the state-owned wood storage and shipping facilities located throughout the country; and

A centralized pricing system that was to eliminate profits enjoyed by wood producers and provide inexpensive raw materials to the processing industry and urban users instead.

Fund allocations for the sustainable production of raw materials were inadequate. In the state-owned forests, due to emphasis on timber extraction from old-growth forests and a lack of regeneration, degradation became a problem. In the collective areas, funding for reforestation and afforestation was the responsibility of the government. Farmers were constantly requested to provide free labour for afforestation activities and infrastructure projects (for example, road construction and irrigation). By and large, the quality of afforestation was poor.

Due to the general failure of collectivization and the Great Leap Forward strategy, the government relaxed the control over forest resources. In 1961, around ten percent of the collectively owned forests were redistributed to farmers as self-keeping forest plots, mainly to provide subsistence resources. Farmers were allowed to use the land to grow trees and benefit from their work directly.

This modest decollectivization was short-lived. In 1966, the Cultural Revolution began and rights to the self-keeping forest and agricultural plots were withdrawn. The communal system again played the dominant role in organizing rural production.

1978-1987: Decentralization and establishment of household-based forestry


The 1978 to 1987 period saw dramatic changes in rural China. When the Household Production Responsibility System (HPRS) replaced the old collective production system, agricultural production accelerated. The reform had a profound impact on collective forestry, as the forestry sector started adopting the forest production responsibility system in the southern collective forest area in 1981. By 1986, about 70 percent of the collective forests were contracted to farmers for management (SFA 2001c). The market was opened and timber production rose in tandem with prices. Plantation development appeared to multiply during the decollectivization of forests. With lower standards (40 percent of preserving rate), the plantation area almost doubled from 1980 to 1984. From 1985 onwards (with the higher preserving rate), annual plantings averaged nearly five million ha.

The Three Fix Policy (1981)

In March 1981, the State Council issued its “Resolution on Issues Concerning Forest Protection and Development”, also known as its Three Fix Policy, marking the beginning of a long legislative and policy process aimed at encouraging private sector participation by providing increasingly secure resource rights (SFA 2001c). The Three Fix Policy sought to transfer responsibility of forest planting and management to households by:

- Clarifying rights to forests, with an emphasis on mountainous areas;
- Delimiting private plots; and
- Establishing a forestry production responsibility system.

This reform represented an extension of the HPRS used successfully in agriculture (Lu et al. 2002). The Three Fix Policy re-established a household-based forestry sector that occupied 70 percent of the former collective forests, to a certain degree. Since 1981, institutional changes occurred continuously in the collective forest area. From the household-based system emerged
various forms of non-state/non-collective forest entities (for example, rural forest cooperatives, shareholding groups, joint-venture forest firms and private forest farms).

**Forestry Law (1984)**

The key legal document guiding forest resource management is the Forestry Law, which was first issued in 1984 and amended in 1998. According to this law, forest resources were divided into state and collective forests. The former were owned by the state and managed by state forest enterprises (including state forest industry bureaus and forest farms), while the latter were owned and managed by rural collectives. While the state and collectives retained ownerships, the law re-enforced the earlier Three Fix Policy by allowing private use rights to trees (Lu *et al.* 2002).

**Liberalizing timber markets – an iterative process**

Prior to 1978, the state dominated the domestic forest product market. About one-quarter of all timber production was organized under a centrally planned system called the Unified Procurement System (UPS), administered by the Ministry of Forestry at that time, and the remainder was used locally. Under the UPS, state and collective farms sold forest products to state-processing enterprises at prices set centrally. Although prices were linked to costs of production, they did not take account of most forest management requirements and were consequently well below market prices (Lu *et al.* 2002).

Since 1978, the market was gradually liberalized and private producers were increasingly permitted to sell some or all of their outputs freely. In 1985, the UPS was officially abolished and the timber market was fully opened in the southern collective forest area. However, the government re-imposed controls in 1987 following rapid deforestation, including a monopsony of state-owned local timber companies over timber procurement, and new harvesting and shipping quotas.

Despite the control of timber procurement, restrictions on sales of timber end products were continuously being lifted. Until 1980, the central government was allocated 81 percent of the total wood production (Zhang *et al.* 1998; Waggener 1998). By 1993, it was responsible for only ten percent of timber purchases, much of which were designated for military use, disaster relief, coal industry and railway construction (Zhang *et al.* 1998; Waggener 1998). Nevertheless, regulations on logging and shipping remained restrictive.

The establishment of the household-based forest management system through the Three Fix Policy transformed plantation development significantly. Although afforestation remained a government initiative, farmers were no longer passive participants. Local forest authorities looking for land for planting trees often had to sign contracts with actual landholders, that is, farmers. The land rights empowered farmers to negotiate for compensation payments. Farmers’ rights to benefit were better recognized, and incentives to support the afforestation initiatives also increased – major advancements relative to the years before the reform.

In summary, the 1978 to 1987 period was characterized by significant forest land tenure reform and policy changes. The extension of rural HPRS into forestry gave birth to household-based forestry in China’s collective forest areas. Government control over collective forestry was transformed into a system that accepted farmers’ rights to invest in and manage the forests, and benefit from their efforts. Marketing controls were also removed but soon re-imposed to counter massive deforestation. In the meantime, government initiatives, directed at increasing forest resources through the establishment of protection forests, began to take shape. Due to the transfer of forest tenure rights, farmers responded with better performance in tree planting. Investment remained mainly from government initiatives. The preserving rate reached new heights.
1988-2000: Major forestry projects and shift from production to environmental forest management objectives


Change from direct financial transfer to loan-based financing (1988)

Private sector investment and local initiatives had been growing since the late 1970s, along with decentralization. This trend called for further reforms of fiscal policies to facilitate the development of local and private initiatives. The performance and efficiency of government-funded direct investment projects became an escalating concern. Consequently, in 1988, the fiscal policy was revised. A large portion of the government’s direct financing was shifted to loan-based financing. Direct transfers were gradually replaced by subsidized loans. As a result, the share of direct central government investment declined (Figure 3).

![Figure 3: Share of central government investment in afforestation](image)

Source: SFA (2001b)

The reform of the fiscal system was accompanied by several waves of downsizing of government bodies. The roles of government agencies transformed from direct project implementation to planning and monitoring. The power of the national forestry authority was significantly reduced. Funding previously controlled by the Ministry of Forestry (MoF) was allocated to the newly founded Forestry Investment Corporation (which later became the National Development Bank). The MoF retained only limited funds to support national-level projects (for example, the Three-North Shelterbelt Development Programme) and special-purpose activities (for example, fire management, pest and disease control). This reform dramatically shrank the central government’s share of direct afforestation investment. Most of the central government funding was shifted to provide interest subsidies and other forms of indirect investment. This decline of government financing was reversed in the late 1990s with the implementation of national programmes, such as the Natural Forest Protection Programme (NFPP) and the Conversion of Steep Cropland to Forests and Grassland Programme (Land Conversion Programme [LCP]) (Figure 3).
**Auctions of the “Four Wastelands” (1993)**

The government’s decision to permit the auctioning of barren forest lands (referred to as the “Four Wastelands”) to private operators for afforestation was a key prerequisite for its subsequent Forest Law Amendment of 1998. The Four Wastelands included uncultivated barren hills (sloping land), valleys, riverbanks and wilderness. Together, these areas covered about 5.6 percent of China’s total land area. Through the auctions, farmers were able to compete for long-term (70-100 years) utilization and management (though not ownership) rights over barren land, rather than to depend on administrative allocation. Moreover, the policy re-invigorated efforts to clarify use rights (Lu et al. 2002).

By 1996, 3.7 million ha of “wasteland” had been auctioned. Since the passing of the Forest Law Amendment, the practice of selling forest land through a public bidding process has been extended to lands with immature, middle-aged and mature forests (Lu et al. 2002).

The transferability of forest land use rights provided critical flexibility in resource allocation and boosted productivity by allowing less-able and labour-constrained farmers to sell their rights to others with the necessary skills and resources. This flexibility had been particularly important in regions experiencing significant outmigration since it permitted farmers to sell forest land to those with extra capacity. Transferability of forest land use rights also helped to mitigate the high risk and transaction costs from existing marketing constraints (for example, logging quotas, shipping permits and high taxes), and therefore improve farmers’ economic returns of forest investments. In some cases, rights were being sold back to collectives and state forest farms.

**Liberalization of timber trade**

In 1981, China’s timber imports started to increase to partially release pressure on the natural forest. In recent years, import tariffs have been reduced in line with commitments under the Asian-Pacific Economic Cooperation (APEC) Forum and the World Trade Organization (WTO). Timber imports have also been promoted to fill the shortfall in supply created by the NFPP. Prior to January 1999, tariffs on timber and other forest products ranged from one to 22 percent, and a total of 14 different rates were applied. Since then, tariffs have been eliminated for some roundwood, sawn timber and lumber products and where tariffs are still charged the average rate has fallen to 12.3 percent (Sun 2001).

**Amendment of the Forestry Law in 1998**

The amendments of the Forestry Law in 1998 stipulate that timber forests, economic forests, fuelwood forests and their use rights are transferable, although forest conversion is prohibited. Resource rights may last for up to 70 years, and are renewable. The revised law provides a range of government financial incentives for private investment in management (for example, inexpensive loans, tax breaks) and the Forest Environmental Benefit Compensation Funds to encourage forest protection (Lu et al. 2002).

**Afforestation programmes throughout the 1980s and 1990s**

Alongside various legislative initiatives, the government initiated a number of programmes (Table 7). Since 1978, China has invested in several programmes to expand its protection-oriented forest resources. The National Afforestation Project (NAP), financed by a World Bank Loan of US$300 million and domestic funding equivalent to US$200 million, provided new technologies and management schemes. The NAP contributed to China’s plantation efforts in many ways and assisted in adopting an engineering afforestation approach (Rozelle et al. 2000). By 1999, the programmes had established a total of 38.39 million ha of plantations.
Traditionally, programmes were implemented in a top-down manner. Recent programmes have attempted to generate greater private sector involvement. This shift is notable in the two large-scale forestry programmes: the NFPP and LCP. In the LCP, private resource tenure is encouraged and people planting trees on barren lands are awarded rights to these resources.

Table 7: Main afforestation programmes since 1978

<table>
<thead>
<tr>
<th>Name of programme</th>
<th>Years</th>
<th>Coverage (area)</th>
<th>Targets</th>
<th>Achievements to date</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Greening Campaign: Tree-Planting Campaign</td>
<td>1987-current</td>
<td>551 counties in 13 provinces, 40.6 million ha (50 percent of northern China)</td>
<td>Aforestation of 35.08 million ha by 2050</td>
<td>1987-1997, 27.9 billion trees planted</td>
</tr>
<tr>
<td>Three-North Shelterbelt Development Programme</td>
<td>1978-2050</td>
<td>271 counties in 12 provinces</td>
<td>Aforestation of 67.05 million ha</td>
<td>1989-1999, 4.8 million ha planted</td>
</tr>
<tr>
<td>Shelterbelt Development Programme along the upper and middle reaches of the Yangtze River</td>
<td>1989-2000</td>
<td>918 counties in 26 provinces</td>
<td>Set standard</td>
<td>1988-1999, 850 counties reached standard</td>
</tr>
<tr>
<td>Taihang Mountain Aforestation Programme</td>
<td>1990-2010</td>
<td>598 counties in 27 provinces</td>
<td>Control desertification in 7.186 million ha</td>
<td>1991-1999, desertification controlled in 8 million ha</td>
</tr>
<tr>
<td>National Programme on Combating Desertification</td>
<td>1990-1997</td>
<td>306 counties in 16 provinces</td>
<td>High-yield fast-growth timber forests</td>
<td>1.39 million ha of plantations generated</td>
</tr>
</tbody>
</table>

Sources: Lu et al. (2002); SFA (2001a)

**Natural Forest Protection Programme (adapted from Lu et al. 2002)**

In the wake of widespread flooding of the Yangtze and Yellow rivers in 1998, the State Forestry Administration (SFA) proposed the NFPP to protect over 95 million ha of natural forest by 2010. The central aim of the programme is to protect valuable forest environmental services, most notably watershed protection. The programme has two major components: natural forest protection and afforestation.

Most funds are being channelled to the upper reaches of the Yangtze and Yellow rivers, where 61 million ha of natural forests will be conserved. In some areas, logging bans have been imposed, while in others harvesting is restricted. On average, annual timber production is being reduced by 12.39 million m$^3$ between 2000 and 2010. This compares with total production of 64 million m$^3$ in 1997. In addition, 8.67 million ha will be planted. The ultimate aim is to raise forest cover from its current 16.6 percent of the land area to 21.24 percent by 2010, well above the targeted forest cover of 19.4 percent set out prior to the NFPP.

In addition to its work in the upper catchments of the Yangtze and Yellow rivers, forest harvesting in the northeast and Inner Mongolia is also being restricted and 33 million ha of natural forest are to be conserved. In total, reforestation of 30.97 million ha in 17 provinces is to be achieved by 2010.
The State Council approved the programme in 2000 and has committed 96 billion yuan over ten years. As timber production shifts from natural to planted forests, private entities will become a growing force in the sector. According to the NFPP, the government will “vigorously encourage private involvement in contracting for forest protection and management, and gradually set up a new model of Natural Forest Protection Programme implementation which is market-economy-oriented and participated with multidisciplinary stakeholders, including private sectors” (SFA 2001a).

It is hoped that the NFPP will have important positive environmental impacts. The social and economic costs will be substantial, however, including job losses and reduced local revenues in timber-dependent areas. Costs to rural communities are also extensive but largely overlooked. Collective forests in the NFPP area are affected by the logging bans and the owners have yet to be properly compensated. This has exacerbated the problem of tenure insecurity and will further discourage the private sector to invest in forestry.

Conversion of Steep Cropland into Forests and Grasslands

As an important element of China’s Western Development Strategy, the Conversion of Steep Cropland into Forests and Grasslands (also known as the “Grain for Green” Programme because of its components that subsidize land conversion with food) is a major initiative to integrate water and soil conservation with agricultural restructuring, poverty reduction and sustainable development. It focuses on the upper reaches of the Yangtze River, and the upper and middle reaches of the Yellow River.

With the approval of the State Council in 2000, pilot projects of the Grain for Green Programme were launched in 174 counties in 13 provinces. Funds allocated for the programme up until 2001 totalled 3.65 billion yuan. The implementation of the LCP was supported by the following measures (Xu and Cao 2002):

- Free grain for farmers converting their croplands: at present, the standard grain subsidy is 150 kg of unprocessed grains per mu per year in the upper reaches of the Yangtze River, and 100 kg in the upper reaches of the Yellow River.
- Cash payments for farmers converting their croplands: 20 yuan/mu/year.
- Free seedlings for farmers converting their croplands: the standard quantity is 50 yuan/mu.
- “Converting one to two or three or even more”: farmers are responsible for growing trees and grass not only on their former agricultural land, but also on one mu or more of barren hills and wastelands that are suitable for afforestation.
- Implementing and monitoring an accountable compensation system.
- Free grain and seedlings for five years if economic plots are established and for eight years if timber trees are planted. The support period may be lengthened if necessary.

According to official statistics, the entire area of cropland with a slope of more than 25° in the country is about six million ha, of which more than 70 percent is located in the western region. Recent assessments during the pilot projects, however, indicate that the actual area of reclaimed and cultivated sloping land is far larger than that originally reported. The total area of converted croplands and afforested barren lands reached 17.4 million mu and 15 million mu respectively in three years (Xu and Cao 2002). Goals were met; and in some cases, they were exceeded.

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12 US$1 = 8.28 yuan
13 1 mu = 1/15 ha
In general, farmers welcomed the programme support, as the value of compensation was more than agricultural yields in most cases. Encouraged, the central government decided to extend the programme across the whole country. The total target for land conversion by 2010 was doubled to 220 million mu as was the programme budget. With the exception of Shanghai, Hong Kong and Macao, all provinces participated in the programme.

**Contribution of the non-state sector to forest resources**

Due to its dominance in plantation development, the collective forest sector (recently divided into collectives, cooperatives, households) contributed considerably to the recovery of China’s forest resources. Between the first (1973-1976) to the fifth (1994-1998) inventories, the plantation area increased from over 17 million ha to over 29 ha (Figure 4) and the stock volume of plantation forests increased from 160 million to 1 010 million m³ (Figure 5).

**Figure 4: Area of plantations, 1973-1998 (million ha)**

**Figure 5: Volume of plantations 1973-1998 (million m³)**
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

SUMMARY OF INCENTIVES

A variety of incentives have contributed to the development of plantation forests in China, especially in the non-state forest sector (for example, collective forests, newly developed joint ventures, rural forest cooperatives, private forests). They include financial support, services, and incentives created by institutional changes (Table 8).

Direct investment includes afforestation grants from the central government, subsidies in the form of reduced interest rates, food, seeds and seedlings, and loans. Historically, afforestation activities were directly funded through government grants and rural labour was provided as a free input. Since the late 1970s, levying free labour became increasingly difficult, and adversely affected afforestation efforts, most prominently in the Three North Shelterbelt Forest Programme. Nevertheless, strong government commitment, coupled with an increase in investments, remains the most important contributing factor for the growth of plantation forests in China.

### Table 8: Categories of incentives affecting plantation development in China

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Characteristics</th>
<th>Source/period</th>
<th>Target group</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment</td>
<td>Cost-sharing</td>
<td>Government 1949-</td>
<td>SOE*, collectives, farmers</td>
<td>Large</td>
</tr>
<tr>
<td>Subsidy</td>
<td>Cost-sharing</td>
<td>Government 1949-</td>
<td>Collectives, farmers</td>
<td>Large</td>
</tr>
<tr>
<td>Low-interest loan</td>
<td>Cost-sharing</td>
<td>Government, International Aid 1988-</td>
<td>SOE, collectives, farmers</td>
<td>Large</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical assistance</td>
<td>Increasing productivity</td>
<td>Government 1949-</td>
<td>Collectives, farmers</td>
<td>Small</td>
</tr>
<tr>
<td>Seed and seedling supply</td>
<td>Cost-sharing, quality control</td>
<td>Government 1949-</td>
<td>Collectives, farmers</td>
<td>Large</td>
</tr>
<tr>
<td>Pest and disease control</td>
<td>Increasing productivity and reducing risk</td>
<td>Government 1949-</td>
<td>SOE, collectives, farmers</td>
<td>Unclear</td>
</tr>
<tr>
<td>Fire control</td>
<td>Increasing productivity and reducing risk</td>
<td>Government 1949-</td>
<td>SOE, collectives, farmers</td>
<td>Unclear</td>
</tr>
<tr>
<td>Institutional change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest tenure reform</td>
<td>Providing incentives for forest investment and management</td>
<td>Government, local community 1981-</td>
<td>Collectives, farmers</td>
<td>Large</td>
</tr>
<tr>
<td>Market reform</td>
<td>Providing incentive for forest investment and management</td>
<td>Government 1985-1987</td>
<td>SOE, final products</td>
<td>Small</td>
</tr>
</tbody>
</table>

*SOE = State-owned enterprises

Institutional changes such as tenure reforms are also very important. However, due to the existing restrictions on harvesting and marketing, the reforms could easily lead to deforestation and forest conversion, as past experiences have illustrated. The restrictions also reduced the incentives for plantation development by inhibiting the private sector from investing in forest plantations using loan funds borrowed at commercial interest rates. Even if private sector incentives were in place, a functioning local financial market was not: the national banks were seriously affected by bad loans and have become more profit oriented through the reforms. Government subsidies were provided to reduce the loans of forest farmers and local enterprises. More funds became...
available for afforestation as a result of the shift in the government’s fiscal policy. The increase in government investment in the late 1990s was due to the implementation of the NFPP and LCP (see Table 9).

<table>
<thead>
<tr>
<th>Year</th>
<th>TSI¹</th>
<th>DAI²</th>
<th>Nursery</th>
<th>I/P³</th>
<th>Education</th>
<th>R&amp;D⁴</th>
<th>FC⁵</th>
<th>PDC⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>573</td>
<td>204</td>
<td>12</td>
<td>7</td>
<td>22</td>
<td>16</td>
<td>25</td>
<td>4</td>
</tr>
<tr>
<td>1985</td>
<td>572</td>
<td>175</td>
<td>10</td>
<td>7</td>
<td>42</td>
<td>22</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>1990</td>
<td>975</td>
<td>308</td>
<td>24</td>
<td>11</td>
<td>44</td>
<td>29</td>
<td>112</td>
<td>13</td>
</tr>
<tr>
<td>1995</td>
<td>2,017</td>
<td>616</td>
<td>44</td>
<td>14</td>
<td>67</td>
<td>85</td>
<td>106</td>
<td>34</td>
</tr>
<tr>
<td>2000</td>
<td>15,016</td>
<td>5,594</td>
<td>1,175</td>
<td>32</td>
<td>234</td>
<td>67</td>
<td>231</td>
<td>175</td>
</tr>
</tbody>
</table>

Source: SFA (2001b)
¹ Total silviculture investment
² Direct afforestation investment
³ Investigation and planning
⁴ Research and development
⁵ Fire control
⁶ Pest and disease control

**IMPACT OF EXTRA-SECTORAL POLICIES**

China’s forest sector has been influenced by a number of important extra-sectoral policies, such as rural reforms and decollectivization, food policies, urban reforms and market liberalization policies.

Rural reforms and decollectivization in China started in the late 1970s. The reforms established rural household-based agricultural production systems, which triggered substantial production increases in agriculture. The benefits gained through decollectivization encouraged similar changes in tenurial arrangements in forestry.

To achieve food self-sufficiency, the government protected prices for agricultural goods. In combination with various incentives, this policy instrument kept grain production attractive for many years in the rural areas. Liberalizing markets for other agricultural products (for example, fruits, fish, livestock and vegetables) helped these sectors to grow in an unprecedented way, which in turn increased competition for land.

Urban industrial reforms started in 1984. The reforms opened markets for industrial products, and stimulated economic activities that required labour. Employment opportunities in the industrialized areas triggered rural outmigration and drew nearly 100 million people to the cities. The increase in off-farm employment opportunities partially relieved pressure on forest lands and forest resources.

Market liberalization had the most significant effect on final forest products. Government control over commercial forest products declined from 80 percent in the early 1980s to ten percent in the mid-1990s. Forest product imports were also liberalized gradually and filled gaps in the domestic supply. Combined with the impact of reduced marketing constraints in key forest regions, the forest industry in coastal areas and the non-traditional forestry areas (i.e. northern plain) are growing faster and reshaping the forest landscape.
REMAINING CONSTRAINTS

Restrictive harvesting quota scheme

The government imposes very restrictive harvesting regulations across all forest ownerships. The basic principle is that production should not exceed growth. The central authority determines separate annual harvesting quotas for each province, based on forest conditions and expected annual growth. According to the quotas, forestry workstations at the township level issue logging permits to villages and farmers. Permits are also required for cross-county and interprovincial transportation of logs and other forest products.

The current harvesting quota system diminishes the attractiveness of forest-use rights since farmers can only partially reap the benefits from adopting more productive management practices and adjusting to market demands. Even if they can raise productivity and shorten rotations, they may not be allowed to harvest trees (Hu 1995).

Tenure insecurity

Tenure reform has advanced considerably in the forestry sector, but insecurity remains a major threat to forest management. Land-use conflicts are common. Even when land titles are clear, use rights are subject to frequent adjustments to accommodate population change and land zoning. Another contentious issue is customary rights of local communities over forests and mountain land. Furthermore, frequent policy changes have been the main cause for insecurity, as witnessed when logging was banned in collective forests under the NFPP without any proper compensation (Lu et al. 2002).

High taxes and fees

Forest taxation is a major impediment to private sector investment in forest management (Lu et al. 2002). Taxes, charges and fees can be as high as 70 percent of timber selling prices. Forest authorities endorse such high rates because they view forestry as a source of government revenue to pay the salaries of staff who are needed to implement various government programmes (Sun 2002). The negative impacts of the forestry taxation system include reduced income, a decline in the value of the leased forest land and stands, constraints on forest industrialization, increased illegal harvesting and corruption, and increased rural-urban inequalities. The low financial returns expected from afforestation, also severely undermine the motivation of private investors. In some counties, private investments in tree planting have completely ceased (Lu et al. 2002).

Rationalizing tax and fee structures has to be accompanied by significant administrative reforms, and the devolution of forest administration to local organizations and the private sector, to reduce the high cost of government staffing.

IMPACTS OF INSTITUTIONAL CHANGE AND VARIOUS INCENTIVES

Increasing forest resources has been a top priority on the Chinese government agenda, especially since the 1990s. The government has augmented resource allocations to support the forestry sector’s efforts in afforestation and reforestation. Numerous institutional innovations have been tested with apparent mixed results, although rigorous empirical research on the impacts of government policies, initiatives and reforms remains sparse. A few exceptions are the recent reviews by Rozelle et al. (2000), Yin (1994; 1998), Yin and Newman (1997) and Zhang et al. (2000).

Rozelle et al. (2000) found that over the last 20 years, the structure of the forest in Yunnan Province changed significantly. There was a decline in old-growth forests, from 28 to 25 percent. The area of plantations and monoculture forests rose sharply, from 39 to 43 percent of the total.
forest area. Most notably, forests producing non-timber products expanded from less than one percent in the 1970s to 5.2 percent in 1996, with most of the growth occurring since the early 1990s.

Zhang et al. (2000) found that higher timber prices promoted investment in managed forests and led to a decrease in rain forest area in Hainan. This indicates that increased hardwood prices had, in the past, caused an increase in the “mining” of rain forests. Higher prices for tropical agricultural crops complemented rain forest conservation but reduced investments in plantation development – implying competition between plantations and tropical food crops. On the other hand, Zhang et al. (2000) found that the area of managed forest in Hainan had actually increased with growing population pressure. Managed forests increased alongside improvements in economic welfare, indicating that a combination of demand-side effects, infrastructure development and stricter law enforcement had promoted plantation development. Finally, decollectivization stimulated investments in plantations and promoted the loss of natural forest before the 1980s (although this trend may have been reversed subsequently).

Yin (1994; 1998) and Yin and Newman (1997) found significant regional differences in the development of plantation forests between traditional collective forest regions and the agricultural regions (mostly in the northern plain). In the 1980s, while both regions were experiencing similar decollectivization, the northern agricultural area was subject to much less forestry regulation, such as for logging, marketing and taxation. Consequently, the north had much better achievements in increasing forest cover.

**SUMMARY**

There is no systematic documentation and analysis of the impacts of government policies on plantation forests. Primary data and a limited number of empirical studies indicate that the improved performance of plantation forests in the last two decades in the non-state sector could largely be attributed to strong government commitment and associated resources made available to support the initiatives. Decentralization in China’s collective forest and plain areas increased private investments. Government subsidies and improved services (for example, fire management, pest and disease control and technical assistance) facilitated the implementation of afforestation and reduced costs, offsetting to a certain extent underlying constraints to private sector involvement in plantation development. As a result, private investments in afforestation multiplied, and the proportion of plantations in collective forest areas increased. This underlined the shift of China’s forest resource distribution in favour of the southern collective forest areas. Nevertheless, major constraints (for example, high taxes, logging quotas and tenure insecurity) remain. It is still uncertain whether current incentives will lead to a sustainable increase in afforested areas. In the near term, plantation development will probably continue to depend on direct government initiatives in tree planting.
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IMPACT OF INCENTIVES ON THE DEVELOPMENT OF FOREST PLANTATION RESOURCES IN INDIA

S.K. Pande¹ and Devendra Pandey²

INTRODUCTION

Geographic and economic background

With an area of 328.72 million ha, India is the seventh largest country in the world. It shares borders with Bangladesh, Bhutan, China, Myanmar, Nepal and Pakistan. The climatic and topographic features are diverse. The country is bounded by the Great Himalayas in the north, the Indian Ocean in the south and transversed by the Tropic of Cancer in the centre. The country can be divided into broad four regions – the great mountain zone; the plains formed by the Indus, Ganges and Brahmaputra rivers; the desert region; and the southern Peninsula. The alluvial plains of the Ganges and Indus (with their tributaries) are the most fertile and densely populated lands. The country is divided administratively into 28 states and seven centrally administered territories.

Agriculture is the dominant land use and covers about 143 million ha (43 percent of the total land area). The total forest cover is 63.7 million ha, which constitutes 19.4 percent of the total land area (FSI 2000). In addition, scrub, which has a crown density of less than ten percent, occupies about 5.2 million ha. The tropical dry and moist deciduous forests make up about 70 percent of the forest cover (FSI 1987). Other forest types occupying significant areas include tropical rain forests, montane subtropical and temperate forests. The distribution of forests across the country is highly uneven (FSI 2000). Details of land use in India are shown in Table 1.

Table 1: Land uses in India

<table>
<thead>
<tr>
<th>Land-use category</th>
<th>Area (million ha)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net shown area (agriculture)</td>
<td>142.50</td>
<td>43.35</td>
</tr>
<tr>
<td>Forest (legal)</td>
<td>76.52</td>
<td>23.27</td>
</tr>
<tr>
<td>Cultivable wasteland</td>
<td>16.00</td>
<td>4.87</td>
</tr>
<tr>
<td>Pastureland</td>
<td>12.00</td>
<td>3.65</td>
</tr>
<tr>
<td>Miscellaneous tree crops and groves</td>
<td>3.00</td>
<td>0.91</td>
</tr>
<tr>
<td>Urban and developmental use</td>
<td>21.88</td>
<td>6.66</td>
</tr>
<tr>
<td>Uncultivable wasteland and others</td>
<td>32.83</td>
<td>9.99</td>
</tr>
<tr>
<td>Fallow land</td>
<td>24.00</td>
<td>7.30</td>
</tr>
<tr>
<td>Total</td>
<td>328.73</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: NFAP (1999)

¹ Former Director of Forests of India, New Delhi, India.
² Chief Conservator of Forests, State of Goa, India.
The area of land legally designated as forest land does not tally with actual forest cover because it includes barren lands that have been legally classified as forests. Cultivable wastelands and fallow lands are areas that have the potential to grow crops but have remained fallow for many years. On uncultivable wastelands (for example, water bodies, rocks, mountains and deserts), biomass production is impossible.

India’s population is 1.03 billion, of which 741 million (72 percent) reside in rural areas (Census India 2001). With 324 persons/km², India is one of the most densely populated countries in the world. To ensure food security, productivity has been increased through improved technologies and more efficient irrigation facilities. The area under agriculture increased from 118 million ha to 143 million ha during the second half of the twentieth century. The per capita forest area is only 0.06 ha. Small-scale and marginal farmers, who constitute 78 percent of the farming community, possess only 32 percent of the operational land (Table 2). The cattle population of the country increased from 252 million head in 1951 to 445 million head in 1992, of which approximately 30 percent grazed in the forests. The forests in India are, therefore, under tremendous pressure.

<table>
<thead>
<tr>
<th>Category of holdings</th>
<th>No. of holdings (million)</th>
<th>Area (million ha)</th>
<th>Average size (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal (&lt; 1 ha)</td>
<td>63.4 (59.4%)</td>
<td>24.9 (15%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Small (1-2 ha)</td>
<td>20.1 (18.8%)</td>
<td>28.8 (17.4%)</td>
<td>1.43</td>
</tr>
<tr>
<td>Semi-medium (2-4 ha)</td>
<td>13.9 (13.1%)</td>
<td>38.4 (23.2%)</td>
<td>2.76</td>
</tr>
<tr>
<td>Medium (4-10 ha)</td>
<td>7.6 (7.1%)</td>
<td>44.7 (27.0%)</td>
<td>5.90</td>
</tr>
<tr>
<td>Large (&gt; 10 ha)</td>
<td>1.7 (1.6%)</td>
<td>28.7 (17.4%)</td>
<td>17.33</td>
</tr>
<tr>
<td>Total</td>
<td>106.7 (100%)</td>
<td>165.5 (100%)</td>
<td>1.57</td>
</tr>
</tbody>
</table>

Source: Anon (2000)

Concerned with the depletion of the forest resource, the Government of India (GoI) enacted the Forest (Conservation) Act 1980, which prohibited the conversion of forest land without approval of the federal government. One of the essential conditions for approving any conversion stipulated the afforestation of an equivalent non-forest area to compensate for the loss of forest area. Since 1980, the rate of deforestation has slowed considerably. In addition, tree cutting has virtually ceased in seven northeastern states due to judicial interventions. No tree cutting in the forests can be carried out without a management plan approved by the GoI.

Economic and social contributions of forestry and the forest policy

Forests in India play an important role in the country’s economic development. Besides producing raw materials for industries, forestry generates employment in the primary, secondary and tertiary sectors (NFAP 1999). Forests also provide materials for villagers (for example, small timber and non-timber forest products) and grazing land for livestock. About 200 million rural people living in and around forests are wholly or partially dependent on forest resources for their livelihoods (Anon 2001). Forests used to contribute significantly to the country’s exports until 1978 when exports were scaled down. The official forestry sector’s contribution to the gross domestic product (GDP) is low due to the undervaluation of a wide range of forest products and services. Over the years, this has ranged between 1.1 and 2.9 percent of the total GDP, and a decline since 1996 is primarily due to a ban on logging in most natural forests.

The current National Forest Policy (1988) focuses on conservation. The policy emphasizes environmental stability and maintenance of the ecological balance. The derivation of direct economic benefits is subordinate to this aim. For biodiversity conservation, a protected area
network – consisting of national parks, sanctuaries, biosphere reserves and other protected areas – has been strengthened, and 15.6 million ha forest have been brought under its purview.

The policy lays heavy emphasis on meeting the requirements of fuelwood, fodder, non-timber forest products and small timber for rural and tribal people who have been given priority over the raw material requirements of forest-based industries. The latter have been advised to meet their own needs by dealing directly with farmers who can grow trees. It has been clearly enunciated that natural forest areas, even if these are degraded, will not be made available or leased to industries for creating industrial plantations (MoEF 1988).

**Role of the public and private sectors in forestry**

Almost all of the natural forests, including large-scale forest plantations lying within forest reserves, are owned and managed by the government through the state forest departments. They are required to prepare a working plan for managing each administrative unit (Forest Division), including protection, harvesting of timber and other products.

The private sector (that is, farmers, individuals, wood-based industries and entrepreneurs) has established only small-scale and scattered plantations. The land ceiling laws forbid the holding of large areas (maximum: 21.85 ha) by the private sector (Table 3). It is thus difficult for private industries to raise commercially viable plantations.

**Table 3: Ceiling limits on landholdings in India**

<table>
<thead>
<tr>
<th>State</th>
<th>Irrigated (two crops)</th>
<th>Irrigated (one crop)</th>
<th>Dry land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>4.05-7.28</td>
<td>6.07-10.92</td>
<td>14.16-21.85</td>
</tr>
<tr>
<td>Assam</td>
<td>6.74</td>
<td>6.74</td>
<td>6.74</td>
</tr>
<tr>
<td>Bihar</td>
<td>6.07-7.28</td>
<td>10.12</td>
<td>12.14-18.21</td>
</tr>
<tr>
<td>Gujarat</td>
<td>4.05-7.28</td>
<td>6.07-10.92</td>
<td>8.09-21.85</td>
</tr>
<tr>
<td>Haryana</td>
<td>7.25</td>
<td>10.90</td>
<td>21.80</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>4.05</td>
<td>6.07</td>
<td>12.14-28.33</td>
</tr>
<tr>
<td>Jammu and Kashmir</td>
<td>3.6-5.06</td>
<td>–</td>
<td>5.95-9.20</td>
</tr>
<tr>
<td>Kerala</td>
<td>4.86-6.07</td>
<td>4.86-6.07</td>
<td>4.86-6.07</td>
</tr>
<tr>
<td>Madhya Pradesh</td>
<td>7.28</td>
<td>10.93</td>
<td>21.85</td>
</tr>
<tr>
<td>Maharastra</td>
<td>7.28</td>
<td>10.93</td>
<td>21.85</td>
</tr>
<tr>
<td>Manipur</td>
<td>5.00</td>
<td>5.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Orissa</td>
<td>4.05</td>
<td>6.07</td>
<td>12.14-18.21</td>
</tr>
<tr>
<td>Punjab</td>
<td>7.00</td>
<td>11.00</td>
<td>20.50</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>7.28</td>
<td>10.93</td>
<td>21.85-70.82</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>4.86</td>
<td>12.14</td>
<td>24.28</td>
</tr>
<tr>
<td>Sikkim</td>
<td>5.06</td>
<td>–</td>
<td>20.23</td>
</tr>
<tr>
<td>Tripura</td>
<td>4.00</td>
<td>4.00</td>
<td>12.00</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>7.30</td>
<td>10.95</td>
<td>18.25</td>
</tr>
<tr>
<td>West Bengal</td>
<td>5.00</td>
<td>5.00</td>
<td>7.00</td>
</tr>
<tr>
<td>National guidelines on ceiling (1972)</td>
<td>4.05-7.28</td>
<td>10.93</td>
<td>21.85</td>
</tr>
</tbody>
</table>

Source: Anon (2000)
In general, private individuals, industries and foreign investors do not find the existing policy environment conducive for plantation development. On the other hand, since the mid-1990s, the GoI has promoted people’s participation in protecting, managing and developing the forests to address the problem of rehabilitating degraded forests and wastelands.

**Current wood production**

Due to the increasing emphasis on forest conservation, the production of industrial wood from natural forests has gradually declined over the last two decades. Collection of fuelwood from forests by local people continues unabated. Logging in natural forests has been gradually restricted since 1982 when felling of trees above 1000 m above sea level was banned in some states. The data on production and consumption of forest products are incomplete and unreliable. The annual production of industrial wood during the 1970s was about ten million m³ (NCA 1976), which had gradually declined to about three million m³ in 1999 (ICFRE 2000). On the other hand, production of industrial wood from trees outside the forests and private plantations has increased (Table 4).

<table>
<thead>
<tr>
<th>Forest product</th>
<th>Quantity</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timber</td>
<td>12 million m³</td>
<td>Forests</td>
</tr>
<tr>
<td></td>
<td>31 million m³</td>
<td>Farm forestry and other wooded lands</td>
</tr>
<tr>
<td>Fuelwood</td>
<td>101 million tonnes</td>
<td>Forests</td>
</tr>
<tr>
<td></td>
<td>98 million tonnes</td>
<td>Farm forestry and other wooded lands</td>
</tr>
</tbody>
</table>

Source: Rai and Chakrabarti (1996)

**AN OVERVIEW OF THE DEVELOPMENT OF PLANTATION FORESTRY**

Teak (*Tectona grandis*) was used to establish the first plantation in India in 1840 at Nilambur in Kerala State. Regular planting, mainly of teak, commenced in 1865 in many central and southern states. Eucalyptus was introduced in the Nilgiri Hills of the present Tamil Nadu State in 1858. Plantation development of other native species accelerated after the *taungya* (agroforestry) system was introduced in 1911. By 1950, the total area under forest plantations had reached 29 210 ha (NCA 1976).

Planned afforestation for soil conservation and production of industrial wood, fuelwood and fodder started slowly in the late 1950s. Industrial plantations were raised mainly within the forest reserves after clear-felling of the economically less important forests. The practice continued up to the Fifth Five Year Plan (1974-1979). Until then, most plantations were of teak, sal (*Shorea robusta*), deodar (*Cedrus deodara*), chir pine (*Pinus roxburghii*), eucalypts and acacias. The annual planting rate between 1956 and 1979 ranged from 62 000 to 244 000 ha. By 1979, the total plantation area had reached 3.33 million ha. A shortage of financial resources was one of the main factors limiting forest plantation development.

The establishment of the Forest Development Corporations in the states and launching of numerous donor-assisted social forestry projects led to a considerable expansion of plantations after 1979. While the Forest Development Corporations continued planting industrially important species, plantations under social forestry schemes were mostly established outside forest reserves, along railways, roads and canals, government-owned wastelands, and on private farmlands with short-rotation species. In the 20-Point Programme for the development of the country, the GoI declared tree planting a priority. Annual planting rates increased to about one million ha between 1980 and 1985. The Union Ministry of Environment and Forests (established in 1984) created a National Wasteland Development Board (NWDB) in 1985 to give further impetus to plantation development. The annual planting rate increased to 1.78 million ha between 1985 and 1990.
Since 1991, it has slightly declined to 1.5 million ha due to the termination of many externally funded projects and lack of funds from the central government. The area planted in the Sixth (1979-1984), Seventh (1984-1989) and Eighth (1989-1994)\(^3\) Plans was 4.65 million ha, 8.86 million ha and 7.95 million ha, respectively (Figure 1). The total area planted between 1951 and 1999 was 31.21 million ha (NAEB 1999).

![Figure 1: Annual plantation rate between 1951 and 1999](image)

Source: FSI (2000)

Between 1980 and 1990, the indicator for assessing progress in plantation development was “number of seedlings planted”, whether in block planting or linear formation. This figure was then converted into a “notional” area estimate, using a norm of 2 000 seedlings/ha, to arrive at the total plantation area at the national level. Since 1990, the planting targets have been divided into area coverage (block planting) and number of seedlings planted in linear patterns. To date, the same approach is adopted to convert seedlings distributed to private individuals and institutions. The planted area reported by the National Afforestation and Eco-development Board (NAEB), a new agency created by re-organizing the NWDB, under the Union Ministry of Environment and Forests, has two components: area of block plantations and notional area. About 35 to 40 percent of the total annual plantations are classified as notional areas. Of the total plantation area of 31.21 million ha, 10.26 million ha were planted with seedlings distributed to individuals, farmers, public and private institutions after 1980 (FSI 2000). The distribution of free seedlings boosted tree plantations by small-scale landholders, who also benefited from the extension services and technical guidance provided by the forest departments. The supplementary cash income derived from the sale of trees, in addition to recurring agricultural incomes, has been the main motivating factor for farmers.

Plantation development in India can be divided into three phases. The first phase started with the first Five-year Development Plan (1951-1956) and ended in 1978. Progress during this phase was slow. The second phase (1979-1992) saw a considerable expansion of areas planted due to the implementation of social forestry projects and the national commitment to rehabilitate wastelands. The National Forestry Policy (1952) was revised during this period. A small number

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\(^3\) Since 1951, India has completed nine five-year plans and is currently implementing the Tenth Plan (2002-2007). The guiding principles of planning are determined by the basic objectives of growth, employment, self-reliance and social justice.
of wood-based enterprises began raising quality seedlings and launched incentive schemes to attract farmers to plant trees. This approach was replicated by many other enterprises during the third phase. The beginning of the third phase (1992 to present) was marked by the end of donor-supported projects, a more active role of the private sector in supporting farmers and a shift in focus from social forestry to Joint Forest Management (JFM). Many activities of the second phase overlap the third phase.

DEVELOPMENT OF FOREST PLANTATIONS BEFORE 1978

After India attained independence in 1947, the government focused on developing infrastructure and industries. Forestry was not a priority sector. Although forest lands, which included treeless areas, covered about 23 percent of the total land area, the allocation of funds to the forestry sector in the national developments plans ranged only between 0.26 and 0.61 percent of the total budget allocations between 1951 and 1979. In contrast, the agriculture sector, which covered about 43 percent of the land area, received fund allocations of up to 17 percent. Government investments in forest plantations were limited to plantations of industrially important indigenous species, and of eucalyptus, within forest reserves and on degraded sites for soil and water conservation.

The National Forest Policy (1952) identified natural forests as the prime source of industrial timber. Scientific management was emphasized to produce sustainable supplies of wood for the industries. Tree planting by private entities, governmental agencies and local authorities was emphasized mainly for environmental reasons. Tree plantations established outside the forests were limited to homesteads and farms. In some states, farmers planted rubber, coconut and cashew trees. The state forest departments were expected to raise awareness, and provide (i) seeds and seedlings of suitable species and (ii) technical guidance (MFA 1952). The available budget for all these activities was limited.

Research on forest plantations was confined to government forestry research institutions. Moreover, studies focused on industrially important species (for example, teak), fast-growing exotic species (for example, eucalyptus, pines and poplars), nursery techniques, growth yield, spacing and silvicultural aspects.

The tangible incentives were seedlings distributed by the forest departments either free-of-charge or via subsidized rates (about ten percent of the production costs), particularly during the celebration of Van Mahotsva (the tree planting festival). Seedlings were distributed for about one week to one month per year during the rainy season. The occasion of Van Mahotsva was used to raise awareness about planting trees. Events were mainly organized in schools, colleges and other institutions. The ritual made little impact on developing a viable resource for wood production, but the number of trees along roads increased visibly.

DEVELOPMENT OF FOREST PLANTATIONS BETWEEN 1979 AND 1992

Investment climate and initiatives for plantations

The establishment of the National Commission on Agriculture (NCA) marked the turning point in plantation development. The NCA realized the potential of plantations in meeting India’s industrial and fuelwood needs, and pointed out the lack of investment in the sector (NCA 1976). Based on the NCA’s interim report on production forestry, Forest Development Corporations (FDCs) were set up by many state governments as fully state-owned companies to support tree growing. A major task of the FDCs was to establish plantations with industrially important timber species on forest land after clear-felling. The FDCs leased forest lands on a long-term basis with the provision to receive institutional finance from the former Agricultural Refinance and Development Corporation, now the National Bank for Agriculture and Rural Development (NABARD). Due to the inherent risks involved in forest plantation management, commercial
bankers were reluctant to finance the undertakings. The NABARD provided loans to the FDCs, which covered half of the financial costs required for different activities. Of the 26 FDCs that existed until 1990, only seven4 were involved in large-scale industrial plantations. The total area planted by the FDCs was 1.21 million ha in 1989 (Anon 1990).

Another recommendation of the NCA was to establish plantations on wastelands outside forest areas through social forestry programmes. The basic philosophy was to involve people in growing trees on marginal farmlands, barren lands and other vacant lands. In 1979, with the World Bank’s assistance, the first Social Forestry Project was launched in the state of Uttar Pradesh. Similar donor-funded projects followed in other states. The plantation programmes envisaged plantings on three types of lands: (i) vacant lands along roads, canals and railway lines, and water ponds – planted and managed by the government; (ii) common village lands (planted by the government and then handed over to village communities for their management); and (iii) farmlands – planted and managed by farm owners.

In addition, the afforestation programme by the GoI under the “20-Point Programme” further boosted tree planting outside the forests in rural areas. In fact, tree planting became an integral feature of many rural development programmes such as the National Rural Employment Programme and the Rural Landless Employment Guarantee Programme, which aimed to generate employment opportunities. Until 1992, 25 percent of the rural development funds was earmarked for tree plantations and was extended to either forest departments or other planting agencies. The NWDB identified Tree Growers Cooperative Societies as important institutions for organizing people for the rehabilitation of wastelands. Two public sector cooperative organizations, namely the National Dairy Development Board and the Indian Farmers Fertilizers Co-operative Ltd., founded such societies in different parts of India in 1986. Pilot projects were launched for the formation of a two-tier structure with tree growers’ cooperatives at the village level as the first tier and state-level federations as the second tier.

**Role of research and extension in supporting plantation development**

In the early 1980s, research and development in support of plantation forestry remained with government institutions and consisted mainly of basic research. Public sector research on the propagation of high-yielding varieties of fast-growing species began only later. This research focus was also initiated by the private sector, such as Wimco Seedlings Ltd., Tata Energy Research Institute and ITC Bhadrachalam Paperboard Ltd., among others.

**Wimco Seedlings Ltd.**

Wimco Ltd., a premier match manufacturing company, has been collaborating with the Uttar Pradesh Forest Department since the late 1960s to identify suitable clones of poplar for producing matches. In 1984, the company founded Wimco Seedlings Ltd. in Uttar Pradesh to initiate research on improved planting materials for the production of industrial wood. Initially, research was confined to poplars and later extended to other fast-growing species like *Eucalyptus* spp., *Gmelina arborea*, *Acacia auriculiformis* and *Ailanthus* spp. The company has achieved remarkable success in the development and propagation of two clones of *Populus deltoids*, G-3 and G-48. These clones attained the desired form (less taper) and growth rate, and were much preferred by farmers. Since then, two new clones have been developed, which have reached growth rates of up to 49 m³/ha/year in some of the best-managed plantations in Punjab and Haryana (Dwiwedi et al. 1990). Due to its versatility, fast growth, range of end uses (packing cases, pulpwood, poles, sports goods, plywood industry, false ceilings and fuelwood) and compatibility with agricultural production, poplar has become a valuable agroforestry species and is widely accepted by farmers.

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4 These were the Andhra Pradesh FDC, Madhya Pradesh Rajya, Van Vikash Nigam, Maharashtra FDC, Tamil Nadu Forest Plantation Corporation, Tripura Forest Development and Plantation Corporation, and West Bengal FDC.
**Tata Energy Research Institute (TERI)**

Researchers at TERI have worked on clonal multiplication techniques and developed clonal technology for several species (for example, *Anogeissus* spp., *Eucalyptus* spp, *Populus deltoides*, *Populus euphratica* and *Paulownia* spp.) since the late 1980s. By early 2001, nearly 3.5 million seedlings had been dispatched to various State Forest Departments, NGOs and private growers for field trials and routine plantings. TERI also assists in the transfer of technology to different private agencies involved in plantation forestry (TERI 2000).

**ITC Bhadrachalam Paperboard Ltd.**

ITC Bhadrachalam Paperboard Ltd., an integrated pulp and paper mill in Andhra Pradesh, has been raising and distributing seedlings to farmers since 1982. In 1989, it launched a research and development project focusing mainly on genetic improvement of planting stock and better plantation management practices. It developed genetically improved, high-yielding, fast-growing and disease-resistant clones of eucalyptus. Gene banks of tested and proven superior clones for large-scale commercial multiplication were also established (Lal et al. 1998). About 5.6 million Bhadrachalam clones were supplied to farmers between 1992 and 1999, and 1.6 million to various state forest departments. The annual production of clonal seedlings is now more than two million. The average productivity of Bhadrachalam eucalyptus clones ranges between 20 and 44 m³/ha/year (Lal 1999a). ITC Bhadrachalam also provides information on improved practices for establishing plantations to farmers.

**Incentives during the period**

The incentives offered during the period can broadly be classified as assistance provided under social forestry programmes and financial incentives for the rehabilitation of wastelands.

**Incentives under social forestry programmes**

The incentives provided by state governments to promote social and farm forestry varied among states and included:

- Subsidized seedlings;
- Survival incentives;
- Subsidies to private nurseries; and
- Extension and technical guidance to the farmers.

Providing free seedlings in the initial stage and then at nominal prices (about ten percent of production costs) to the farmers and individuals was a common incentive. Survival incentives were provided in Bihar and Orissa but not by programmes supported by the World Bank and United States Agency for International Development (USAID). Motivators were appointed in Andhra Pradesh, Tamil Nadu, West Bengal, Madhya Pradesh, Bihar and Orissa but not in the northwestern states. Incentives to nurseries included subsidies for healthy seedlings (about Rs0.40 each⁵) or buy-back arrangements. The seedlings raised in the private nurseries were purchased by the forest departments and distributed to farmers or used by the departments when planting on the public land.

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⁵ US$1.00 = INR46 (16 September 2004).
Financial incentives for the development of wastelands

One of NABARD’s functions was to provide financing for farm forestry. In 1986, the loans arranged through NABARD were at a concessional rate of 12.5 percent, which was lower than the commercial rate banks charged individuals and industries for other activities. Furthermore, loans had to be repaid only after benefits were derived from the plantations (NWDB 1987). Although some wood-based industries assisted farmers to make use of NABARD, farmers faced numerous difficulties, as they had to produce extensive documentation from all the local banks.

After the creation of the NWDB in 1985, the scope for provision of loans at concessional rates was broadened to encourage planting on wastelands and degraded sites owned by individual farmers. Public lands under lease or “tree patta” schemes were also covered. Financial support was to cover tree-planting expenditures, including materials and labour costs. The repayment period varied according to species but could not exceed 15 years. Enterprises or voluntary agencies engaged in wasteland development could assist in motivating farmers, preparing projects and providing liaising services between farmers and banks, the costs of which were not to exceed 15 percent of the total costs, and had to borne by the beneficiaries (NABARD 1989).

The NWDB also initiated a Margin Money Assistance Scheme in 1987 (modified in 1989) to enhance the flow of institutional funds for afforestation and wasteland development activities that were not economically viable but socially beneficial. Under the scheme, the federal government provided grants of up to 25 percent of the project costs for community-based production of fuelwood, fodder and small timber. The scheme operated for five years (1987-1992) and the total funds provided were about ten million rupees. The assistance was offered only to registered voluntary agencies, cooperative societies and other similar organizations.

Incentives for rubber plantations

In 1954, the GoI established the Rubber Board to promote rubber plantations, to provide technical guidance to growers and to support rubber-based industries. The expansion of rubber plantations has been gradual. In 1956, the total area of rubber plantations was 86 000 ha, with 85 percent under private holdings. The development schemes introduced by the Rubber Board included subsidies for replanting and materials. Productivity improvements, marketing assistance and interest-free loans in 1957 helped in expanding the area planted with rubber trees. A total of Rs193 million was provided for replanting 53 605 ha between 1957 and 1979. Incentives targeted smallholders who managed most of the area (Table 5).

Since 1980, incentive schemes were revised. Smallholders owning up to five ha of rubber trees were entitled to a planting grant of Rs5 000/ha, paid in instalments over six to seven years after planting. Smallholders who used improved seedlings received an additional Rs6/plant (Rs8 if they belonged to schedule caste and schedule tribes) for up to 450 plants/ha. Over the years, the planting grants have been raised to adjust for increasing costs. In 1993, grants were set at Rs8 000/ha and in 1997 at Rs18 000/ha (Rubber Board 2002). Due to the attractive prices for latex, many smallholders planted rubber trees. At present, about 86 percent of the total rubber plantation area is held by smallholders (Rubber Board 2002). Apart from the latex, the current annual wood production from the rubber plantations is about one million m³. Smallholder rubber plantations have expanded rapidly since 1980, but the growth has levelled off as a result of a slump in the rubber market and less attractive prices since the mid-1990s.

6 The Constitution of India directs the states to promote with special care the educational standards and economic interests of the weaker sections of the people to protect them from social injustice and all forms of exploitation. The government by public notification(s) specifies the castes, races or tribes, or tribal communities that shall, for the purposes of the Constitution, be deemed to be “scheduled castes” or “scheduled tribes” for positive discrimination of their statutory rights and speedy social and economic development. Since the names of such communities appear in the schedules appended to the aforementioned public notifications, these are generically called scheduled castes/tribes, as the case may be.
Table 5: Classification of rubber holdings according to size at the end of 2000

<table>
<thead>
<tr>
<th>Holding size</th>
<th>Units</th>
<th>Area (ha)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 ha</td>
<td>963 613</td>
<td>407 601</td>
<td>83.1</td>
</tr>
<tr>
<td>2-4 ha</td>
<td>17 627</td>
<td>45 031</td>
<td>9.2</td>
</tr>
<tr>
<td>&gt; 4 ha</td>
<td>5 249</td>
<td>37 645</td>
<td>7.7</td>
</tr>
<tr>
<td>Total</td>
<td>986 489</td>
<td>490 277</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Characteristics of plantations established and monitoring mechanism

Most small-scale and marginal farmers planted trees on farm boundaries and sometimes in multiple rows. Block plantations were established by medium- to large-scale farmers who were either absentee landowners or were very enterprising. Plantations raised on leased lands by landless people in rural areas ranged between 0.5 and one ha in size.

Species selection depended on numerous factors, the most important being the availability of seedlings from the government nurseries and attractive short-term economic returns. Farmers also tried to minimize competition between trees and agricultural crops. In northern India, *Eucalyptus* spp., *Populus* spp. and *Dalbergia sissoo* were planted widely, whereas in southern India, *Eucalyptus* spp., *Casuarina* spp. and *Acacia* spp. dominated.

Seedling quality control was often poor. Insufficient attention was also paid to species-site matching and technical aspects as too much emphasis was placed on achieving physical targets in terms of number of seedlings distributed or planted. This resulted in poor survival rates and low productivity. Only enterprising farmers with larger holdings used superior planting materials and applied improved practices.

Impact of incentives

It is difficult to assess the impact of each incentive on tree planting because monitoring in the various projects was inadequate. In many cases, implementing agencies only reported on targets attained, which were assumed to be partially the result of providing incentives. The total notional area of such plantations established from 1979 to 1992 was about six million ha through the support of the national and state governments as well as donor organizations (Table 6).

Farm forestry achieved significant success in some states (for example, Gujarat, Haryana, Punjab, Karnataka, Western Uttar Pradesh and West Bengal). The characteristics of viable farm forestry enterprises are large landholdings, assured irrigation, owner cultivation, marketable agriculture surplus, re-investment of profits in farming activities, risk-bearing capacity and generally better management. Plantation establishment rates declined around 1988, mainly due to falling wood prices. It is clear that to encourage tree planting on private lands, there is a need to reach out to the small-scale landholders with research, extension and improved technologies, demonstration areas, availability of inputs including certified quality planting materials at affordable prices, market information and credit facilities offering soft loans (NFAP 1999).
Table 6: Donor-assisted social forestry projects in India and area covered by incentives

<table>
<thead>
<tr>
<th>Name of the project and state</th>
<th>Donor agency</th>
<th>Project period</th>
<th>Plantation targets ('000 ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Farm forestry</td>
</tr>
<tr>
<td>National Forestry Project</td>
<td>World Bank</td>
<td>1985/1986 to</td>
<td>147.21</td>
</tr>
<tr>
<td>Uttar Pradesh Phase II*</td>
<td>USAID</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>National Forestry Project</td>
<td>World Bank</td>
<td>1985/1986 to</td>
<td>230.50</td>
</tr>
<tr>
<td>Gujarat Phase II*</td>
<td>USAID</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>National Forestry Project</td>
<td>World Bank</td>
<td>1985/1986 to</td>
<td>66.80</td>
</tr>
<tr>
<td>Himachal Pradesh Phase II*</td>
<td>USAID</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>National Forestry Project</td>
<td>World Bank</td>
<td>1985/1986 to</td>
<td>91.50</td>
</tr>
<tr>
<td>Rajasthan Phase II*</td>
<td>USAID</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>Haryana Social Forestry</td>
<td>World Bank</td>
<td>1982/1983 to</td>
<td>30.00</td>
</tr>
<tr>
<td>Project</td>
<td>DANIDA**</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>Jammu and Kashmir Social</td>
<td>World Bank</td>
<td>1982/1983 to</td>
<td>19.00</td>
</tr>
<tr>
<td>Forestry Project</td>
<td>DANIDA</td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>Karnataka Social Forestry</td>
<td>World Bank</td>
<td>1983/1984 to</td>
<td>120.50</td>
</tr>
<tr>
<td>Project</td>
<td>ODA***</td>
<td>1987/1988</td>
<td></td>
</tr>
<tr>
<td>Kerala Social Forestry</td>
<td>World Bank</td>
<td>1984/1985 to</td>
<td>14.10</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>1989/1990</td>
<td>69.00</td>
</tr>
<tr>
<td>West Bengal Social Forestry</td>
<td>World Bank</td>
<td>1981/1982 to</td>
<td>52.00</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>Bihar Social Forestry Project</td>
<td>Sida****</td>
<td>1985/1986 to</td>
<td>71.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1990/1991</td>
<td></td>
</tr>
<tr>
<td>Orissa Social Forestry Project</td>
<td>Sida (2 phases)</td>
<td>1983/1984 to 88.50</td>
<td>84.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1992/1993</td>
<td></td>
</tr>
<tr>
<td>Tamil Nadu Social Forestry</td>
<td>Sida (2 phases)</td>
<td>1981/1982 to 85.00</td>
<td>131.40</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>1992/1993</td>
<td></td>
</tr>
<tr>
<td>Andhra Pradesh Social Forestry</td>
<td>CIDA*****</td>
<td>1983/1984 to 108.00</td>
<td>25.00</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>1989/1990</td>
<td></td>
</tr>
<tr>
<td>Maharasthra Social Forestry</td>
<td>USAID</td>
<td>1982/1983 to</td>
<td>44.00</td>
</tr>
<tr>
<td>Project</td>
<td></td>
<td>1989/1990</td>
<td></td>
</tr>
</tbody>
</table>

Source: Saxena (1995)

* The data of Phase I started in 1979/1980 was unavailable.
** DANIDA = Danish International Development Agency, Denmark
*** ODA = Overseas Development Administration, United Kingdom
**** Sida = Swedish International Development Cooperation Agency, Sweden
***** CIDA = Canadian International Development Agency, Canada

A number of problems reduced the effectiveness of incentives. Important constraints included (NAEB-RC 1995):

- Legal restrictions on tree felling, transport and sale of harvested wood:
  
  Strict regulations on tree felling on private land discouraged private sector involvement in plantation development. In addition, land revenue rules and regulations of the state governments have indirectly restricted tree planting, as land-use changes are not permitted under the rule (Hegde 1991).

  Legislation covering harvesting, transporting and marketing of trees grown on private land varies among the states. Several states have enacted Tree Preservation/Protection Acts to restrict uncontrolled felling of trees even on private lands. Transport of timber in most states is governed by transit passes, which stipulate that specific permission is required from the local forest officer for transporting wood. For example, in Gujarat, felling and removal of trees from private lands have been governed by the Saurashtra Felling of Trees Act (1951). Felling of 21 listed tree species is controlled by the revenue department and transport by the forest department. In addition, there are five reserved tree species (Tectona grandis, Madhuca latifolia, Acacia catechu, Dalbergia latifolia and Santalum
The role of incentives in forest plantation development in Asia and the Pacific

album) that can only be felled, transported and marketed by the forest department. Charges and royalties for these species further reduce tree owners’ incomes. During the 1980s, restrictions on felling and transport of the two most commonly planted species (Eucalyptus spp. and Leucaena leucocephala) in non-forest areas were removed. Sandalwood (Santalum album) has been declared as a reserve tree in its native states (Tamil Nadu, Karnataka and Kerala).

In Punjab and Haryana, there are no restrictions on felling and transport of trees except in the narrow belt of the Shiwalik Hills where trees are required for conserving soil and water. In this case, the felling of trees is regulated under the Punjab Land Preservation Act (1900). Himachal Pradesh promulgated the Land Preservation Act (1968) to control commercial felling of trees on private lands over a ten-year felling cycle. It has also introduced trading controls of common species found in the state forests. This effectively regulates the felling of conifers (cedar, fir, spruce and pines) and important broad-leaved species (walnut and Dalbergia spp.) on private lands.

Rules and regulations were gradually simplified to encourage tree planting on private land. The Tree Preservation Act (1976) of Uttar Pradesh that imposed restrictions on felling of trees on private lands without permission was revised in 1991 and 19 tree species were exempted. Farmers are now free to fell such tree species on their lands in the districts where forest cover is less than one percent. Similar changes are being contemplated in other states.

- Lack of market information and low prices for wood products:
  Marketing mechanisms for wood produced by farmers remained underdeveloped. In northwest India, the farmers who planted eucalyptus on a massive scale in the 1980s were disappointed when they did not obtain reasonable prices for their wood from paper mills. Poles had to be sold as fuelwood when there was a surplus in the market (Saxena 1991). Combined with the legal constraints and bureaucratic procedures for felling and transport, low prices were a great disincentive to producers, especially small-scale farmers.

- Shortage of good quality planting materials:
  Traditionally, the state forest departments produced planting materials. However, as the demand for seedlings multiplied, some villagers collected whatever seeds were available, ignoring technical guidelines for collection and usage. In trying to meet planting targets and generate employment, the government had to rely on unskilled labour for seedling production, which adversely affected the quality of the planting stock.

Lessons learnt

The incentives offered to the private sector between 1979 and 1992, particularly to farmers, helped in augmenting tree resources outside the forest. The trees planted during this period contributed substantially to the overall wood supply, but actual production was still short of targets, principally because of the following factors:

- The goal was to meet targets (such as the numbers of seedlings produced, area planted) rather than to produce adequate supplies of wood but not wood yielded;
- Plantations were frequently established with insufficient consideration given to matching sites with species, quality of the planting materials, adequacy of plantation practices and testing of different approaches;
- Monitoring was inadequate;
- Data on the actual extent and productivity of plantations were unavailable;
- Technical guidelines and funds for long-term plantation management (five to seven years) were lacking;
Fluctuating prices caused unease amongst the growers; and Legal restrictions on tree felling, transport and sale of harvested wood inhibited investors’ commitment and interest in tree growing.

Notwithstanding these shortcomings, the period from 1979 and 1992 in general, and the implementation of social forestry projects in particular, provided field staff with considerable experience in recognizing farmers’ perspectives related to planting trees on private land.

**DEVELOPMENT OF FOREST PLANTATIONS SINCE 1992**

**Investment climate in forestry plantations**

An important goal of the National Forest Policy (1988) is to raise the forest cover to 33 percent of the total land area. The National Forestry Action Programme (NFAP 1999) proposes to achieve the goal in 20 years by enhancing natural regeneration of degraded forests and tree planting in degraded forests and non-forest lands of over two million ha annually. The notional area to be established annually by farmers has been projected to be 0.2 million ha (NFAP 1999).

The GoI announced a new investment policy in 1991 for facilitating the inflow of foreign capital and for encouraging investments in different sectors. However, the forestry sector has remained stagnant, and domestic financial resources are insufficient to reach the target of 33 percent forest cover. In accordance with the National Forest Policy, wood supplied to industries from government forests has been greatly reduced. Industries are expected to meet their raw material requirements mainly from private sector plantations, farm forests and imports. No policy has been formulated to attract investors to develop forest plantations. In 1992, donor-funded social forestry projects also declined. In accordance with the National Forest Policy, the federal government requested the state governments to involve local communities in the management of the degraded forests in June 1990. By 2001, most state governments had issued resolutions in support of JFM. While this has shifted the focus of tree planting to local communities, state governments continue to promote plantations albeit with reduced funds. The current generation of donor-funded projects has multiple objectives and focuses on institutional development, capacity building, technology improvements in forestry and people’s participation in forest management.

**Export-import policy**

India’s market for wood and wood products is predominantly domestic in nature. The export-import policy of 1992 further restricted the export of wood products. Exports of logs, timber, stumps, roots, bark, chips, powder, flakes, dust, pulp and charcoal have been totally banned. The total exports of wood products in 1994 and 2000 were only US$25 million and US$29 million, respectively. On the other hand, wood and wood products were put on the Open General License list in 1992, which means that their imports are not restricted. The tariff charges on the import of logs or rough wood (round logs and sawn timber) have been drastically reduced over the last decade (Table 7).

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Import tariff (%)</th>
<th>Finished good</th>
<th>Import tariff (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round logs</td>
<td>5</td>
<td>Veneer sheets</td>
<td>30</td>
</tr>
<tr>
<td>Sawnwood</td>
<td>15</td>
<td>Particleboard</td>
<td>30</td>
</tr>
<tr>
<td>Wood chips</td>
<td>10</td>
<td>Plywood &amp; veneered panel</td>
<td>40</td>
</tr>
<tr>
<td>Pulp</td>
<td>10</td>
<td>Newsprint</td>
<td>0-45</td>
</tr>
<tr>
<td>Waste paper</td>
<td>20</td>
<td>Other paper products</td>
<td>65</td>
</tr>
</tbody>
</table>

Source: NFAP (1999)
The reduced tariff resulted in a gradual increase in imports. The value of imported wood and wood products increased from US$481 million in 1992 to US$1.3 billion in 2000. It is expected to reach US$2 billion in the April 2002 to March 2003 financial year. The quantity of rough wood has increased from about 0.5 million m$^3$ in 1992 to 1.9 million m$^3$ in 2000 (MoC 2001). Due to raw material shortages and low production volumes, domestically produced pulp is more expensive than imported pulp. The corporate sector has responded by developing partnerships with farmers for production of raw materials at competitive costs by funding intensive high-technology plantations on private lands.

**Research and development**

Public sector forest research was restructured in 1990 after the creation of the Indian Council of Forestry Research and Education (ICFRE). A number of new Regional Forest Research Institutes were created to develop high-yielding clones of different tree species suitable for their regions. Seed production areas in many natural forest stands and plantations were identified, large-scale seed orchards were established and improved plantation management packages were developed.

Several wood-based companies also recently set up in-house research centres for the production of clonal seedlings to be supplied to farmers. For example, the Grasim Forest Research Institute set up by Harihar Polyfibres, a unit of Grasim Industries Ltd. in Karnataka, is now distributing about nine million seedlings annually to farmers. The company has also established 57 demonstration plots on farmers’ lands in strategic locations in Karnataka to demonstrate the effect of scientific plantation management (Maru et al. 2001). Another example is JK Corporation based in Orissa. It has undertaken research to develop high-yielding and disease-resistant clones of eucalyptus and established a four-ha clonal seed orchard.7

**Incentives by the government**

The federal government’s incentive schemes for plantations have focused on the development of wastelands, degraded forests and private non-forest lands. Financial assistance provided to government institutions, registered bodies and non-governmental organizations during the Eighth Plan is presented in Table 8.

<table>
<thead>
<tr>
<th>Schemes</th>
<th>Expenditure (Rs million)</th>
<th>Area planted/developed (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated afforestation and ecodevelopment projects</td>
<td>2 031.2</td>
<td>289 917</td>
</tr>
<tr>
<td>Fuelwood and fodder projects for forest areas</td>
<td>1 541.9</td>
<td>387 216</td>
</tr>
<tr>
<td>Grant-in-aid 100 percent to NGOs to promote afforestation</td>
<td>75.1</td>
<td>338 projects</td>
</tr>
<tr>
<td>Integrated Wastelands Development Projects in non-forest areas</td>
<td>2 161.6</td>
<td>284 000</td>
</tr>
<tr>
<td>Grant-in-aid 100 percent to registered voluntary agencies</td>
<td>137.5</td>
<td>18 684</td>
</tr>
</tbody>
</table>


The Department of Wasteland Development has recently initiated the Investment Promotion Scheme. It offers a grant covering 25 percent of the cost of plantation establishment to enterprises for rehabilitating wastelands. One of the conditions for the subsidy requires that the activity

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7 Sharda, A.K., Chief General Manager (Commercial), JK Corporation, Rayagada, Orissa, 2000, personal communication.
should not adversely affect the livelihoods of poor people. The government employs local agencies to evaluate the plantations in the first and the second year. The grant is released only after a satisfactory report on survival rates has been obtained.

In addition, state governments have devised numerous incentive schemes mainly to support small-scale farmers’ efforts to plant trees on their land. For example, in Andhra Pradesh farmers have been exempted from sales tax on the three most popular species (*Leucaena leucocephala*, *Eucalyptus* spp. and *Casuarina* spp.) planted in Prakasham District since May 1999. The state government has also passed a resolution to sell the wood produced by farmers through the Agriculture Market Committee based on a fixed price and payment within five days. Farmers in this district are already supplying about 0.65 million tonnes of wood to various paper and rayon mills of Andhra Pradesh and neighbouring states (APFD 2001).

Under the Rural Development and Rural Employment Guarantee Programmes, many states have also developed schemes to provide incentives to small-scale farmers. In Gujarat, the state forest department plants suitable trees, including those bearing edible fruits, on marginal land owned by farmers belonging to the poorer castes or tribes as identified in the Indian Constitution. The entire cost of plantation establishment is borne by the forest department. From the second year onwards, the beneficiaries are responsible for protection and maintenance, for which they are paid at the rate of Rs1/plant in the second year and Rs0.50 in the third year, provided that the survival rate is above 50 percent. In Maharashtra, small-scale farmers are provided with Rs12 000/ha to cover costs for block plantations until the third year. The payment is released in stages after performance evaluations. The survival rate has to be at least 60 percent to obtain funds in the second and third years. For teak plantations on farm bunds, grants are in the order of Rs12/tree provided in three annual instalments. The area covered under these schemes is small in comparison to the intended scale of afforestation in India. In Gujarat, it ranged between 10 000 and 12 000 ha annually between 1997 and 2001. The achievement under the programme, since its inception in 1981, is 119 817 ha.

NABARD has continued to refinance the financial institutions at 100 percent of the loans disbursed to borrowers for developing wastelands in forest or non-forest areas. Interest rates have changed over time – from 8.5 percent applicable with effect from 1 July 2001 to 7.5 percent in February 2002.

While grants have increased over the last ten years, the use of subsidized seedlings is declining. In Haryana, the distribution of seedlings (subsidized at 90 percent) was discontinued in 1993, although some subsidized seedlings are still handed out to the poor and needy. In West Bengal, five seedlings per industrial unit and 100 seedlings per institution are provided free-of-charge. Subsidized seedlings are also provided to small-scale landholders with up to 0.4 ha upon the recommendation of the village panchayat. In Karnataka, seedlings of valuable species such as teak are priced according to market rates.

**Incentives provided by the private sector**

In 1984, Wimco Seedlings Ltd. started an innovative scheme to promote tree planting on farms, with (refinance) assistance from NABARD, in selected districts of Uttar Pradesh, Haryana and Punjab. Under the scheme, Wimco offered high-quality one-year old poplar seedlings to farmers at a reasonable price, provided technical assistance and extension support, arranged fertilizer inputs and provided, most importantly, a buy-back guarantee at an agreed price. The banks participating in the project disbursed long-term loans to farmers for purchasing the seedlings,

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11 An administrative body of elected members for a group of villages.
The role of incentives in forest plantation development in Asia and the Pacific

Planting and management. Repayment of loans was usually linked to the length of rotation (between six and eight years). Although NABARD refinanced the banks at the interest rate of 6.5 percent, the banks charged farmers ten percent. The agreed price was according to market demand and the buy-back rates offered by the company in 1993 and 1994 were as follows (Joshi and Chandra 2001):

- 90 cm and above girth at breast height: Rs870.00/m³
- 75-90 cm girth at breast height: Rs450.00/m³
- 60-75 cm girth at breast height: Rs245.00/m³

Since then, the rate has been revised to a flat rate of Rs1 600/m³ for all girth classes.12

The annual rate of planting by the farmers gradually increased from around 500 ha in 1984 to about 4 000 ha during 1988/1989 (Jones and Lal 1989; Lal 1991). The total area covered by the NABARD-assisted project was 30 700 ha, involving a total of 15 831 farmers, with an average of about two ha per farmer. Even after the end of the project, enterprising farmers have continued expanding plantations as a result of the impressive performance of the poplar and attractive returns. The market demand for high-quality veneer logs for manufacturing match splints, plywood and flush doors has grown over the years. The total area of poplar plantation in West Uttar Pradesh, Haryana and Punjab reached 56 100 ha in 2000 (Joshi and Chandra 2001). The farmers participating in the project ranged from small-scale farmers with less than two ha of land to large-scale farmers with more than six ha of land. Small-scale farmers who selected block plantings reported a decline in agricultural income after the third year. Therefore, planting poplars on farm boundaries was preferred to block plantings.

In 1994, Wimco launched a scheme of “smart units” to raise funds for planting poplars. Buyers of each unit would pay Rs4 000 for planting ten poplar trees on the company’s land. In return, they would receive Rs16 000 from the company after eight years. Nearly 30 000 units were sold between 1994 and 1997, and trees were planted on about 750 ha. The success of the scheme stimulated replication by several other plantation companies that made attractive financial returns on their propositions, such as doubling their investments within three years. The Security Exchange Board of India (SEBI), a wing under the Ministry of Finance responsible for overseeing investments under mutual funds, intervened to protect gullible investors and drafted stringent conditions, which the companies were unable to fulfil. The sale of new units ceased in 1999, as growth rates – and hence returns to investments – claimed by the promoters were unrealistically high.

ITC Bhadrachalam launched an incentive scheme in 1987, with refinance assistance from NABARD, for producing pulpwood by farmers. The company provided high-quality eucalyptus seedlings, technical extension services and a buy-back promise at a minimum guaranteed price or the prevailing market price, whichever was higher, at the time of harvest. The cost of seedlings and extension services offered by the company amounted to about Rs35/seedling and trees were harvested after seven to eight years. In total, 6 185 farmers participated in the scheme and planted 17.4 million seedlings covering an area of 7 441 ha. The average area planted per farmer was less than 1.5 ha, and only two to three farmers per village opted to join the scheme. In addition, 5.65 million eucalyptus clonal seedlings developed by the company benefited 1 914 farmers who planted on 3 217 ha between 1992 and 1999 (Lal et al. 1998; Lal 1999b).

Misuse of incentives and plantation schemes

About 3.5 percent (550) of all the participants in the Wimco-NABARD project breached the contract or misused the incentives. Some farmers sold their plantations before maturation to a third party and reneged on their loans from the banks. In turn, district authorities attached the

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properties of such farmers. Others did not pay for the seedlings and services rendered by the company even though they had obtained loans from the banks. As a result, legal action has been taken in the courts. Although the funds were partially recovered, a considerable sum of Rs52.5 million remained outstanding (Joshi and Chandra 2001). On the other hand, some farmers have also approached Consumer Forums to take action against the promoters of the schemes for misleading them about the productivity and for providing poor technical assistance, which allegedly resulted in their financial losses.

The experience of ITC Bhadrachalam in the NABARD project was more alarming compared to Wimco Seedlings Ltd. as the majority of the farmers felled their plantations prematurely at four or five years. Many farmers sold their plantations to third parties and refused to repay the loans, despite having signed tripartite agreements for the sale of pulpwood to ITC Bhadrachalam.

Many other private plantation companies were also set up in the early 1990s to raise funds, promising very high returns for investments in teak plantations. They attracted a large number of individual investors, most of whom started planting teak on leased lands that were either degraded or of low productivity. The total area brought under teak plantation was about 5 000 ha. After receiving complaints about the companies’ financial mismanagement, the Ministry of Environment and Forests appointed a technical committee to look into the matter. The committee concluded that predicted yields and financial returns were grossly inflated. The teak stumps planted were also not of genetically superior quality. The SEBI found that most of these private companies were using new investments in teak units, and not the interim returns from the established plantations, for their operations. The area of established plantations was disproportionately low compared to the funds raised and investments shown. Since the companies could not justify their claims of high returns, they were asked to terminate their operations by the SEBI in 1998. Some companies collapsed because they could not pay out promised interim returns (Chundamannil 2000).

Impact of the incentives offered by the private sector

Despite problems in the arrangements among companies, banks and farmers, wood supplies from farmers have increased. Many wood-based industries followed the examples of Wimco Seedlings Ltd. and ITC Bhadrachalam, by offering financing arrangements through NABARD or independent buy-back guarantees. In addition, some companies have developed captive plantations (Table 9).

While data provided by the companies cannot be independently verified, the estimated notional area covered annually is about 38 250 ha (2 000 seedlings/ha). Since most initiatives are comparatively recent and plantations are still young, the full impact in terms of wood production will only be realized in the future. However, it is certain that the companies, after initial trials and difficulties, have now attained the confidence and the expertise to produce their own raw material supplies, primarily in collaboration with farmers.

Lessons learnt

Due to the recent forest policy shift from production to conservation, the main objective of government wasteland development programmes is ecological restoration based on peoples’ participation. Priority has been given to supporting local livelihoods over the production of industrial wood. At the same time, afforestation activities financed externally and internally have declined

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13 An attached property cannot be sold or mortgaged by the owner. If the owner fails to pay up after being given sufficient opportunities to do so within a reasonable length of time, the dues can be recovered as arrears of land revenue by auctioning the property.

14 Plantations established and managed by a company for its own use.
since the early 1990s. Even the state-owned FDCs are discouraging intensive, monoculture industrial plantations.

On the other hand, the quality of the planting materials used by farmers has improved markedly, mainly due to the efforts of private companies. The productivity of the plantations raised through cloned seedlings has increased two- to threefold. Considering the huge demand for industrial wood, the plantation areas are still too small. The main impediments to plantation development are: (i) small landholdings; (ii) weak market development; and (iii) land ceiling regulations. Whereas small-scale farmers are often not willing to plant trees due to the long gestation period and market uncertainties, private companies fail to achieve the economies of scale to raise captive plantations cost-effectively due to the stringent land ceiling regulations. To move forward and realize the advantages that India can offer (for example, potential for high productivity, large labour force, huge demand for wood and wood products). Enabling policies, legislation and policy instruments need to be devised, and structural impediments and direct disincentives need to be removed.

Table 9: Number of seedlings distributed

<table>
<thead>
<tr>
<th>Name of the company</th>
<th>Number of seedlings distributed annually to farmers</th>
<th>Total area planted (ha)</th>
<th>Captive plantations (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wimco Seedlings Ltd., Rudrapur, Uttarakhand</td>
<td>2.7 million poplars</td>
<td>56 000</td>
<td>750 (Populus deltoides)</td>
</tr>
<tr>
<td>ITC Bhadrachalam, Paper Boards Ltd., Andhra Pradesh</td>
<td>2 million</td>
<td>10 700</td>
<td>20 million (eucalyptus)</td>
</tr>
<tr>
<td>Andhra Pradesh Paper Mills Ltd., Rajahmundry, Andhra Pradesh</td>
<td>20 million (Casuarina and Leucaena leucocephala)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ballarpur Industries Ltd., New Delhi</td>
<td>2.5 million</td>
<td>1 200</td>
<td>(eucalyptus)</td>
</tr>
<tr>
<td>Century Pulp and Paper, Lalkua, Uttar Pradesh</td>
<td>5 million</td>
<td>4 100</td>
<td>(eucalyptus)</td>
</tr>
<tr>
<td>Hindustan Newsprint Ltd., Kerala</td>
<td>1 million</td>
<td>2 030</td>
<td>2 800 (eucalyptus and Acacia auriculiformis)</td>
</tr>
<tr>
<td>JK Corporation, Rayagada, Orissa</td>
<td>10 million</td>
<td>15 000</td>
<td></td>
</tr>
<tr>
<td>Mysore Paper Mills Ltd., Bhadravati, Karnataka</td>
<td>2 million</td>
<td>30 000</td>
<td>(eucalyptus)</td>
</tr>
<tr>
<td>Sirpur Paper Mills Ltd., Sirpur-Khagaznagar, Andhra Pradesh</td>
<td>12 million</td>
<td>10 303</td>
<td>4 820</td>
</tr>
<tr>
<td>Siv Industries Ltd., Sirumugai, Tamil Nadu</td>
<td>12 million</td>
<td>10 303</td>
<td>4 820</td>
</tr>
<tr>
<td>West Coast Paper Mills Ltd., Dandeli, Karnataka</td>
<td>4 million</td>
<td>2 400</td>
<td></td>
</tr>
<tr>
<td>Kitply Agroforestry Project, a unit of Kitply Industries Ltd., Raipur, Chattisgarh</td>
<td>2 million</td>
<td>700 (Gmelina arborea)</td>
<td></td>
</tr>
<tr>
<td>Harirhar Polyfibres, a unit of Grasim Industries Ltd., Karnataka</td>
<td>12 million</td>
<td>60 000</td>
<td></td>
</tr>
</tbody>
</table>

Source: Data provided by companies
CONCLUSIONS

According to the National Forest Policy, government incentive schemes for tree planting are to target small-scale farmers and especially the weaker sections of society. Their main goals are to improve rural economies, support local livelihoods, enhance access to forest products for local use (for example, fuelwood, small-diameter wood and fodder), and achieve environmental stability. The production of industrial wood is only a secondary objective. Incentives, in the form of tax benefits, subsidized loans and extension services, to medium and large-scale farmers and others have been negligible. Income derived from selling trees grown on farmlands is exempted from the taxes. Incentives offered by the government have helped to improve the overall situation, but the cost-effectiveness and real impact have never been quantified due to the absence of adequate monitoring and appraisal tools.

To meet the demand for industrial wood, private companies have offered their own incentives to farmers. Besides buy-back guarantees, some companies assist farmers in obtaining bank loans through tripartite agreements. There are many successful experiences in establishing high-yielding plantations. However, regulatory frameworks for the operation of such schemes have not been developed, which has led to some problems. Moreover, the land ceiling laws limit the size of companies’ landholdings. This restriction seriously affects the efficiency and economic viability of plantation management.

FUTURE DIRECTIONS

The Planning Commission of India, in finalizing the “Approach Paper to the Tenth Five-Year Plan (2002-2007)”, has taken note of land and forest degradation in the rural areas. The deterioration of these resources, in combination with the overexploitation of the groundwater, poses a potential threat to food security. The Commission has also linked deforestation to the increasing drudgery of rural women in collecting fuelwood, which is further aggravated by the worsening condition of traditional water sources.

The National Development Council15 has directed that the forest cover16 be increased to 25 percent by 2007 and 33 percent by 2012.17 Achieving this target requires adequate funds, an appropriate policy framework, innovative and people-centred policies and schemes, efficient delivery mechanisms and effective monitoring at the field and national levels.

Despite the high population density, sufficient land is available to expand tree plantations not only for ecological restoration but also for the production of industrial wood. Opportunities have not been fully realized because of limited funds. Increasing investments in plantations through the involvement of the private sector requires innovative policies and support through appropriate financial policy instruments, including the following:

- The land ceiling laws need to be relaxed (to match those for tea, coffee and rubber), particularly in dry areas that cannot support agriculture, so that wood-based industries can establish large-scale and economically viable plantations. Companies should be allowed to enter into long-term lease agreements, free of land ceiling restrictions, with farmers to raise commercial tree plantations. To ensure that prime agricultural land, which forms India’s grain bank, is not diverted to tree growing, exemptions should be provided only for rainfed areas.

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15 The National Development Council, headed by the Prime Minister, is the highest planning body in India.
16 Although forest cover in the country extends over 19 percent of the geographical area, the extent of good forest cover (over 40 percent crown cover) is only 12 percent.
17 The NFAP envisages a time horizon of 20 years, which was recently reduced to ten years.
The role of incentives in forest plantation development in Asia and the Pacific

- Proper regulations should be developed to control the quality of planting materials supplied to farmers through public or private agencies to ensure high productivity and disease-free planting materials. Only certified producers should be allowed to market seedlings.
- Private companies starting in-house research should be encouraged and supported in developing high-yielding, disease-resistant planting stock and improved management practices. One possible approach would be tax exemptions on investments made in research.
- Laws and procedures related to cutting, transporting and selling of privately owned trees should be simplified. Where government forests are absent or minimal and the risks of timber theft from public forests are negligible, restrictions on cutting, transporting and selling of privately owned trees should be abolished.
- Import duties on wood and wood products should be raised to increase the competitiveness of domestic production.18
- Market mechanisms should be developed to ensure reasonable prices to private wood producers.
- Effective extension mechanisms should be developed through the establishment of model plantations, frequent technology promotion camps, distribution of attractive extension literature and extensive media publicity to support farmers and other landholders interested in growing trees.

The GoI is contemplating a massive people’s movement (known as “Greening India”) to raise the country’s forest cover to 33 percent by 2012. The recommended approaches include mass production of high-quality planting materials, and establishment of centralized hi-tech nurseries and a network of satellite nurseries throughout the country. Local forest officers at the district or division levels can be appointed as the Certification Authority to register, and exercise strict quality control of, government and private seed orchards, clonal orchards, plus-trees and hi-tech nurseries, tissue culture facilities and satellite nurseries.

Close collaboration with the Agriculture, Rural Development, Public Works, Irrigation and Panchayat Departments is needed to achieve the targeted coverage. At the same time, the “Greening India” initiative shall endeavour to develop and facilitate linkages between production systems and user groups. Creating awareness amongst people for tree planting in general, and quality materials in particular, will be an integral component of this programme. Non-governmental organizations and reputable village-level voluntary agencies will be involved in assessing and addressing the requirements for planting materials (quantities and species-mix), technology transfer, ecological rehabilitation of degraded sites and capacity building at all levels.

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18 Editors’ note: In general, increasing import tariffs does not enhance competitiveness but promotes inefficiencies.
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IMPACT OF INCENTIVES ON THE DEVELOPMENT OF FOREST PLANTATION RESOURCES IN INDONESIA, WITH EMPHASIS ON INDUSTRIAL TIMBER PLANTATIONS IN THE OUTER ISLANDS

P.H. Guizol¹ and A.L.P. Aruan²

INDONESIAN FORESTRY SECTOR POLICIES AND FOREST RESOURCES

Forestry is the largest non-oil export-oriented sector in Indonesia. For over 30 years, the wood-processing industry has been supplied with low-cost raw materials from the natural forests. However, deforestation and forest degradation have led the Indonesian Government to turn to forest plantations as an alternative source of wood.

Indonesia: A large country with declining rich natural resources

Indonesia’s population of 210 million is unevenly distributed across 17 000 islands. About half of the people live on Java, which constitutes only 6.9 percent of the country’s total land area. The natural forests of Indonesia are amongst the world’s most biologically diverse, and are characterized by three biogeographical zones:

- The western islands of Sumatra, Java and Kalimantan with their extensive dipterocarp forests;
- The intermediate zone comprising Sulawesi, Maluku and Nusa Tenggara with a variety of ebony, eucalypts and sandalwood (*Santalum album* or cendana) forests; and
- Papua in the east with less diverse dipterocarp forests containing valuable *Pometia* and *Agathis* spp.

The three largest islands – Sumatra, Kalimantan and Papua – were until recently covered by extensive forests that comprised approximately 80 percent of the total natural forests. The forest in Kalimantan and Sumatra is rich in hardwood species (mainly dipterocarps) and accounts for 75 percent of the commercial log production. Fertile volcanic soils and teak (*Tectona grandis*) plantations characterize the Javanese landscape.

At the end of the nineteenth century, the Outer Islands had a continuous forest cover while Java still possessed important forest areas. By 1950, Indonesia’s forest cover was estimated to be 162 million ha, or 84 percent of the total land area (Hannibal 1950, cited in FWI/GFM 2002).

Today, Indonesia has 120 million ha of forest land under permanent forest status (Ministry of Forestry Strategic Plan 2001-2005, cited in FWI/GFM 2002), although only 82 percent may actually be covered by forests (Fox *et al.* 2000, cited in FWI/GFM 2002). The deforestation rate continues to be as high as two million ha per annum (FWI/GFM 2002).

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The role of the forestry sector in the economy

Indonesia shifted from being a producer and exporter of tropical hardwood logs during the 1970s, to a major producer and exporter of processed forest products by the late 1980s. During the 1990s, it also became a major pulp producer.

**Indonesian strategy for the forestry sector: export orientation**

The forestry sector has a key role in Indonesia’s strategy for export-led development, which includes attempts to diversify exports beyond oil and gas (Madhur et al. 2000). The government has kept domestic wood prices much lower than international market prices. The vast forest resources were used for decades to attract foreign investment in wood processing and to boost economic development to generate revenues and employment, increase exports and improve the balance of payments. The comparative advantages of Indonesian wood-processing industries are competitive production costs due to low labour costs and cheap raw materials from the natural forests.

In the short term, the strategy has been successful in terms of forest product exports. However, it has also resulted in overcapacities in the processing sector and an inefficient industry that is unable to compete in the world market without subsidized wood prices. This has created an “irreversible” situation, in which the government has no choice but to continue supporting the industries by exploiting more natural forests (Karsenty and Piketty 1996).

**Employment in wood processing**

Data on employment are unreliable. Most employment is generated by the wood-processing sector. In the 1990s, formal employment in the primary wood-processing industries was about one million, and about 1.6 million including secondary processing. This corresponds to about two percent of the total national labour force (Fenton and Neilson 1998). Forests also provide jobs in the informal sector (such as fuelwood collection, handicraft and cottage industries, illegal logging). For example, each hectare of teak plantation in Java generates one to two jobs in the rural furniture industries, far more than plantation management itself. Plantations raised for the capital-intensive pulp industries generate far fewer jobs (0.1 to 0.2/ha in plantation management including harvesting).

**Forest product exports**

During the mid 1990s, the forestry sector provided about 17 percent of the total value of all export commodities (Chaumont 1999). Total exports reached a value of US$8.5 billion, with US$3 billion being attributed to pulp and paper, and US$2.5 billion to plywood. Today, pulp and paper products represent about half of Indonesia’s forest product exports in value. The Indonesian pulp industry has five main operating mills. Between 1988 and 2002, the country’s pulp production capacity expanded from 0.6 to six million tonnes/year. The importance of plywood, on the other hand, has been declining. The Indonesian plywood industry comprises 115 companies. Eighty percent of the plywood production is exported. While total installed capacity is about 12.0 million m³/year, annual production currently reaches only about 50 percent of capacity.

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3 In 1988, Indonesia became the leading exporter of tropical plywood (Madhuret al. 2000).
4 According to an estimated 5 m³/ha/year and results from Fauvreau and Laburthe (2002).
Overharvesting of natural forest

Annual raw material requirements by the wood-processing industries are about 48 million m\(^3\), with the pulp and plywood sectors taking the largest share (Figure 1). The officially recorded average annual log production has been around 22.5 million m\(^3\) over the last five years. In addition, an unrecorded amount of wood is unofficially processed by sawmills and a huge volume of logs is illegally smuggled across the country’s border.\(^5\)

![Figure 1: Total wood-processing capacity](image)


Current forest policies

**Role of forest categories**

According to the Basic Forestry Law (UUPK No. 5 1967, Article 4), about 50 percent of the total forest land has been declared as production forest, with the remainder set aside as protection and conservation forests. The New Basic Forestry Law\(^6\) re-affirmed this classification and divides the forest land into five subcategories:

- **Production forest** (29 percent of the forest land): Designated for timber production in which selective felling and clear-cutting followed by reforestation are permitted;
- **Limited production forest** (18 percent of the forest land): Designated for erosion prevention and timber production in which selective cutting is permitted;
- **Conversion forest** (seven percent of the forest land): Designated for conversion to agriculture such as oil-palm plantations or other uses;
- **Protection forest** (27 percent of the forest land): Designated for soil and water conservation; no exploitation is permitted;
- **Conservation forest** (parks and reservation forests, 19 percent of the forest land): Designated for nature and biodiversity conservation; no exploitation is permitted.

Logging is permitted within the production, limited production and conversion forests only. These three categories currently cover about 65 million ha, or 54 percent, of forest land (Ministry of Forestry Strategic Plan 2001-2005, cited in FWI/GFM 2002).

\(^5\) Official trade data show around 250 000 m\(^3\) of logs are exported annually; the volume of logs smuggled is unknown but could be as high as ten million m\(^3\)/year.

\(^6\) Article 6 Undang-Undang tentang Kehutanan No/4:1999.
Current main policy objectives and natural forest harvesting issues

The government has five immediate programmes for forestry development for the period between 2001 and 2004, namely:

- combating illegal logging;
- controlling forest fires;
- restructuring the forestry sector;
- developing forest plantations and reforestation; and
- decentralizing the forestry sector.

Numerous regulations imposed on the industry are intended to discourage excessive logging. However, most efforts seem to have little impact. Illegal logging and timber smuggling remain substantial problems. Since the start of the monetary and political crisis in 1997, illegal logging in protected forest areas has been widespread (FWI/GFM 2002). Environmental groups and some researchers are seeking to impose a moratorium on logging in all natural forests.

Forest management and decentralization

Indonesia is experiencing tremendous political changes. In 1999, a central government decision passed authority to district governments to allocate “forest harvest concessions” in areas classified as forest estates. District governments could issue small concessions of up to 100 ha for timber extraction in conversion forests or under certain conditions in production forests. Initial assessments showed that since authority has been decentralized, forest resources have declined at an unprecedented pace (McCarthy 2001a and 2001b; Kartawinata et al. 2001).

Governmental Regulation No. 33/1970 on Forest Planning set the criteria for determining state forest lands and their use. Logging activities (mainly by private forest concession holders or hak pengusahaan hutan (HPH) were based on a Long-term Forest Management Plan (Rencana Karya Jangka Panjang), followed by Five-year Management Plans (Rencana Karya Lima Tahun) and Annual Activity Plans (Rencana Kerja Tahunan). The Ministry of Forestry (MoF) was responsible for assessing and approving the annual plans based on selective cutting and replanting procedures. Following the decentralization of authority, provincial and district forest agencies are responsible for preparing the various plans.

The rationale of forest plantation policies

According to the Basic Forestry Law, State Forest Areas that are not covered by forests are to be reforested and kept as permanent forests. To supplement the diminishing wood supply from natural forests, plantations were viewed as viable alternatives especially since timber production from one ha of a productive forest plantation was estimated to be equivalent to that from 20 ha of natural forest (Davis 1989). Hence, increasing the supply of plantation-grown timber for domestic wood processors would release more timber from the natural forests for export (Davis 1989) and reduce pressure on the remaining natural forests.

FOREST PLANTATION DEVELOPMENT IN INDONESIA

To facilitate analysing and discussing the impacts of incentives, plantation development in Indonesia can be divided into four periods:

- Prior to 1980: Little interest in plantation development;
- 1980 to 1989: First efforts to develop industrial timber plantations, or *hutan tanaman industri* (HTI). Investments in plantations remained insignificant as natural forest exploitation held priority;
- 1990 to 1997: Supported by a variety of incentives, development of fast-growing plantations by the pulp industries flourished; and
- Since 1997: Investments in Indonesia have been affected by financial and political uncertainties.

Data on plantation areas for the years prior to 1980 were derived from the literature. From 1980 onwards, MoF data on annual plantings were used (Tables 1 and 2). However, it is widely accepted that the data are unreliable as they are based on information provided by private companies or state enterprises, and are usually unverified. Some plantations might not have been established at all or have virtually disappeared due to extremely high tree mortality rates. Thus, the figures used in the analysis must be considered as a theoretical maximum. Despite their weakness the available data indicate a trend, and help to illustrate how policies, laws and incentives have affected investor decisions.

### Table 1: Industrial timber plantations by ownership type (ha)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Private</td>
<td>102 080</td>
<td>741 339</td>
<td>263 279</td>
<td>1 106 697</td>
</tr>
<tr>
<td>Joint venture</td>
<td>5 211</td>
<td>882 975</td>
<td>191 901</td>
<td>1 080 087</td>
</tr>
<tr>
<td>Total</td>
<td>107 291</td>
<td>1 624 314</td>
<td>455 180</td>
<td>2 186 784</td>
</tr>
</tbody>
</table>

### Table 2: Industrial timber plantations by purpose and transmigration (ha)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulpwood</td>
<td>19 010</td>
<td>934 029</td>
<td>301 776</td>
<td>1 254 815</td>
</tr>
<tr>
<td>Non-pulpwood</td>
<td>88 281</td>
<td>415 009</td>
<td>72 107</td>
<td>575 396</td>
</tr>
<tr>
<td>Transmigration</td>
<td>0</td>
<td>275 276</td>
<td>81 297</td>
<td>356 573</td>
</tr>
<tr>
<td>Total</td>
<td>107 291</td>
<td>1 624 314</td>
<td>455 180</td>
<td>2 186 784</td>
</tr>
</tbody>
</table>

### Plantation categories

The term “plantation” is used in Indonesia for a variety of perennial crops (for example, rubber, cocoa and oil-palm). Including such estate crops, plantations cover a total area of about ten million ha. In the following discussion, reference is made only to forest plantations (excluding estate crops), which are divided into plantations in production forests and on critical lands.

### Plantations in production forests

The two main plantation types in production forests are the HTIs on the Outer Islands and the plantations in Java. They are predominantly managed by the HPHs and forest plantation companies to supply wood to the pulp and paper industries, under the supervision of the Directorate of Management of Development of Plantation Forest. The HTI transmigration scheme also falls

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8 Defined by Decree 320/Kpts-II 1986, the purpose of the HTI was to enhance the output of unproductive forest land and to produce raw material for the industries. HTI operators include HPHs, provincial forestry offices, state enterprises and private companies that are regarded and classified as able and appointed by the MoF.
under this category. HTIs on the Outer Islands consist of fast-growing species (rotation lengths range from seven to 12 years). They have been established since 1985 and are mainly managed by private companies or through joint-venture arrangements with state forest enterprises, such as Inhutani. According to private company data, the HTIs on the Outer Islands cover 2.1 million ha, although the actual area reaches only between 0.9 and 1.2 million ha. The total productive area in Java is about one million ha. Java’s teak, pine or mahogany (Swietenia macrophylla) plantations differ from those on the Outer Islands in the following characteristics:

- Rotations range from 20 to 80 years;
- Most were established in the early 1900s and management systems have changed little since then; and
- A single state enterprise (Perum Perhutani) manages these plantations.

**Afforestation or rehabilitation of critical lands: state initiatives**

Regreening or afforestation on non-forest lands in Java and the Outer Islands is supervised by the Directorate of Reforestation and Rehabilitation of the MoF jointly with other Directorates (for example Directorate of Soil Conservation) or ministries (for example Ministry of Public Works). The Directorate of Reforestation and Rehabilitation is also responsible for reforestation of forest land on the Outer Islands. Characterized by poor survival rates, most of these plantations were established for protective purposes. The same directorate also promotes agroforestry and social forestry. In addition, the MoF has promoted community-based forest management and plantations through out-grower schemes on the Outer Islands.

**Farm forestry and agroforestry: smallholders’ initiatives**

Farm forestry and agroforestry are well developed in Indonesia, especially on Java where millions of farmers manage trees in their gardens and community forests. Farm forestry and agroforestry provide, though often unrecorded, wood supplies for domestic consumption and raw materials to small- and medium-scale enterprises. In Java, the main species planted are Paraseriethes falcataria (sengon), mahogany and teak.

**Prior to 1980: Little interest in plantation development**

**Productive plantations**

Prior to 1980, forest plantations (of mainly teak) were almost exclusively located in Java; rehabilitation planting took place either on Java or on the Outer Islands. Indonesia experienced several successive waves of reforestation programmes, but they have left few traces. Forest plantation development on the Outer Islands was not a priority.

Since 1895, large-scale industrial plantations have been established on Java (Fenton and Neilson 1998). Teak, the principal species, was planted mainly in Central and East Java. By 1940, 266 000 ha had been planted with teak (Davis 1989). By 1980, the plantation area, including regreening and rehabilitation projects, had officially reached about 1.5 million ha, of which 800 000 ha were industrial teak plantations and 280 000 ha were planted with pine.

Due to the land scarcity on Java, agricultural crops (for example, maize, pineapple or Calliandra calothyrsus during the first few years after planting) were integral features in forest plantation establishment. Until recently, Perum Perhutani also provided employment to landless farmers. It

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9 Teak was planted in West and East Nusa Tenggara as well.
10 According to Perum Perhutani, the total area of teak plantations is 1.09 million ha; 0.8 million ha refers to the area of productive teak plantation.
has its own budget, which is supplemented by funds made available through presidential instructions for social forestry and reforestation activities. Perum Perhutani had full control over the plantations until the 1997 monetary and political crisis.\footnote{11 Today, rotations are shorter and teak plantations suffer from illegal logging.}

**Large government rehabilitation programmes of the 1950s and 1960s**

Prior to 1980, reforestation activities implemented by the government had little success. Most of the regreening and rehabilitation programmes were financed through special presidential instructions or projects funded by the Asian Development Bank.

Plantings (of mainly pines) in the 1950s and 1960s covered 400 000 ha in Sulawesi, 200 000 ha in Kalimantan, and up to 1.6 million ha in Sumatra. These figures do not account for losses incurred after the survival assessment (three years after planting) and are unreliable. By 1980, the survival rate at Year 9 was as low as six percent for regreening and 34 percent for reforestation (FAO 1980; cited in Davis 1989). These plantations might have been repeatedly burned or harvested and not replanted. Apparently, only about 67 000 ha established under the programmes have remained (Fenton and Neilson 1998).

**Private plantations in logging concessions on the Outer Islands**

Before 1969, commercial timber exploitation on the Outer Islands was insignificant. It was promoted by the initial Five-year Development Plans or *Repelitas* (1969/1970-1973/1974 and 1974/1975-1979/1980) and started to take off slowly in the early 1970s. The goal was to attract foreign and domestic investors. Logging concessions were leased initially for 20 years and could be extended to 35 years. Although regulations stipulated that the HPHs had to invest in forest plantations, most did not. In fact, only four percent of the companies followed the regulations (P.T. ITCI established 5 000 ha of plantations between 1974 and 1980 in Kalimantan); the government never prosecuted companies for non-compliance.

**Lessons learned prior to 1980**

As Indonesia’s natural forest resources were perceived to be indefinite, serious efforts in forest plantation establishment were lacking. Regulations did not control timber exploitation in natural forests effectively or trigger significant tree planting and forest rehabilitation. In fact, both were viewed as a formality or a target to be reached on paper only but not on the ground. They were phantom activities that generated income for the forest administration with few tangible accomplishments.

**1980-1989: Plywood and natural forest concession development**

**Forest policy: Support of domestic wood processing**

During the 1980s (the golden age of logging in Indonesia), HPHs enjoyed virtually unlimited freedom and extensive natural forest areas were degraded. At the same time, demand for industrial wood increased dramatically, induced by incentives from the government to develop domestic downstream wood processing. Roundwood exports were restricted to help the domestic industry compete with foreign wood processors (Decree MoF No. 317/Kpts/1980). Log exports were banned in 1985 and domestic wood prices were kept below world market prices to further assist the domestic industries, especially plywood producers.
Between 1980 and 1989, the number of plywood mills increased from 29 to 116 (Fenton and Neilson 1998). Within only one decade, Indonesia became the largest exporter of tropical timber products. Annual plywood production surged from one to nine million m$^3$, which created a huge domestic demand for timber.

**Main government decisions related to plantation development**

To mitigate the negative impacts of timber exploitation and generate alternative timber supplies, the government set up a reforestation fund and promoted large-scale industrial timber and pulp plantations of fast-growing species.

**The Reforestation Fund**

Prior to 1980, HPHs did not rehabilitate the logged-over forests within their concessions as expected. The first attempt to address this situation was the introduction of the Danan Jaminan Reboisasi (DJR), or Reforestation Fund, by Presidential Decree No. 35 in 1980. HPHs were required to pay US$4/m$^3$ for logs or US$0.5/m$^3$ of chipwood extracted from forests in Kalimantan and Sumatra. The payments, which were in the form of a bond, went into the DJR to guarantee sustainable forest management by the HPHs. The DJR was to finance seeds and seedlings, land clearing, planting, weeding and inventory of logged-over forest stands. According to DJR regulations, HPHs could reclaim the bonds once they had fulfilled their obligations. Most concessionaires chose not to plant, but rather to write off their contributions to the DJR, which consequently grew considerably.

In 1984, the DJR was changed to Dana Reboisasi (DR), which could provide direct incentives for plantation development inside as well as outside concession areas. The government could use the bonds from non-performing HPHs for other purposes (Decree MoF No. 327/Kpts-II/1988). The DR became a royalty and was increased from US$4/m$^3$ to US$7/m^3$ in 1989 to further support the development of HTIs.

**The development of HTIs**

In 1989, it was anticipated that wood demand would outstrip supply derived from natural forests. To counter the growing gap between supply and demand, the government planned the conversion of 4.4 million ha of unproductive land$^{12}$ to short-rotation plantations, to increase the plantation area from 1.6 million ha to six million ha by 2000.

**Research**

The government initiated research on fast-growing species to support the programme of rehabilitation of degraded lands and to create fuelwood plantations. Trials for pulpwood species were established on Java, Sumatra, Sulawesi and Nusa Tenggara. Research of private companies focused on *Acacia mangium* and eucalyptus species.

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$^{12}$ Unproductive lands were defined as *Imperata cylindrica* grasslands and shrub forests within production forests.
Limited impacts of the DJR and DR on the establishment of HTIs

Forest plantation development

Industrial plantation development was marginal between 1980 and 1989 (Figure 2). The first HTIs on the Outer Islands were established for non-pulp uses\textsuperscript{13} in 1985.\textsuperscript{14} About 55 000 ha had been planted by 1988. During 1989, around 19 000 ha of pulp plantations were established. In total, between 1984 and 1989, 107 000 ha of productive plantations were reportedly established, compared to an annual target of 300 000 ha (Figure 3).\textsuperscript{15} Following the changes since 1984, plantation development accelerated although it remained far behind the government’s expectations.

\textsuperscript{13} This excludes enrichment planting on the Outer Islands. Enrichment plantations refer to plantations of wild seedlings in areas where natural generation has failed. During this period, an average of 5 000 ha/year of enrichment plantations were established. However, survival rates were poorly recorded and it appears that many plantations exist on paper only.

\textsuperscript{14} From 1985 to 1990, some plantations were established in Java to supply small-scale enterprises. For example, 35 000 ha were set up to provide material for a pulp mill at Cilacap. Other industrial plantation projects planted \textit{Paraserianthes falcataria} and eucalyptus.

\textsuperscript{15} The target of Repelita IV (1984-1989) was set at 1.5 million ha over five years.

Natural forest logging: A disincentive for plantation development

The imposition of the log export ban discouraged plywood industries from investing in forest plantations. As large volumes of wood were available from the natural forests, investing in plantations was viewed as financially unattractive. By doing so, the government sent contradictory signals to industry with respect to forest plantation development and intentions to use the DJR for plantation development.

It was very naïve to rely on concessionaires’ goodwill for the rehabilitation of logged-over forests. In fact, concessionaires enjoyed enormous profits from exploiting natural forests while investing the proceeds outside the forestry sector. The interest rate for borrowing capital was about 20 percent in 1989, which was enough to discourage most investments in plantations.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Figure 3: HTI development for pulp and non-pulp uses

In the HPHs on the Outer Islands, 29 concessionaires and four state enterprises (Inhutani I, II and III and Perum Perhutani) were involved in HTIs between 1984 and 1989 (Davis 1989). The main species planted during that time were eucalyptus, *Acacia mangium* and *meranti* (*Shorea* spp.). Due to a general lack of interest by the concessionaires, plantations were poorly maintained after the first three years, and were burned in many cases.

1990-1997: the expansion of pulp plantations

**Context and main policies: oil-palm, pulp and paper development**

During this period the government embarked on a development policy for oil-palm. Its intention was to ensure adequate supplies of cooking oil for domestic consumers, promote industrial development and boost exports. Plywood production remained stable; the production and export of wooden components, furniture, and pulp and paper rose sharply.

The government continued to promote the establishment of large-scale industrial timber and pulp plantations. This was motivated by the anticipation of a raw material deficit by 2000, due to expanding domestic and export markets, and continuing deforestation and forest degradation. The target for production plantations by 2000 was five million ha. The plantation development target for Repelita V (1989-1994) was 1.5 million ha and it was slightly reduced for Repelita VI (1994-1999) to 1.25 million ha.

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a. Presidential Decree 35/1980 on DJR
b. Repelita IV 1984-1989
c. Decree MoF 320/1986 about HTI and DR
d. Land access facilitated by Decree MoF 327/1988 about incapable HPHs
e. Use of DR and Decree 495/1989 about *Ijin Permanfaatan Kayu* (IPK) or Wood Utilization Permit

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16 Annual plywood production was 8-9 million m³; it peaked in 1992 and 1993 at about ten million m³.

17 Investment needed for achieving the target of some five million ha of productive forest plantations outside Java was estimated to be up to US$5 billion (Davis 1989). The target of 25 million ha of plantations, including rehabilitation and protection plantations, was set for 2000.
Main incentives for industrial forest plantations

In 1990, the MoF decided to encourage private-sector investments in forest plantation development. Incentives targeted the Indonesian wood conglomerates, foreign investors, state enterprises and HPH holders. The main government schemes included:

- promotion of HTI development;
- joint ventures between private companies and state enterprises;
- modification of the reforestation funds; and
- HTI transmigration programme.

These schemes were inter-related. They provided HTI developers access to forest land, ready sources of capital and also cheap labour through the HTI transmigration scheme.

The HTI development policy

The official aim of promoting HTIs was to create wood resources on unproductive forest lands located in “productive forests”. However, in practice because of a lack of control and collusion, it triggered, in many places, clear-cutting of rich natural forests.

The HTI development policy was backed by a number of regulations throughout the 1990s. It was part of a development policy that recommended wood production within a 100-km radius around the pulp mills. In the early 1990s, prior to submitting proposals for investments in the pulp industry to the government, companies were required to demonstrate their capability to develop forest plantations by planting an area of 30 000 ha. A number of plantations were established for this purpose between 1990 and 1992.

The main incentive was access to unproductive forests (Government Regulation No. 7/1990). After 20 years of logging (with frequent re-entries), many old forest areas were severely degraded. Some of these areas were thus legally converted into HTIs.

Joint ventures with state-owned companies

A state-owned forestry company, Badan Usaha Milik Negara (BUMN), and Inhutani on the Outer Islands, together with a private company, were made responsible for the management of logged-over forests from revoked HPH concessions. Through such ventures, land, access to reforestation funds and, in some cases, advantages associated with transmigration projects, were integral features of the partnership.

HTI transmigration scheme

The Ministries of Forestry and Transmigration jointly introduced the HTI transmigration scheme in 1990. One objective of this scheme was to control population growth in densely populated regions (Java and Bali). Another purpose was to provide cheap labour to a variety of companies active on the Outer Islands. The scheme started with the Ministerial Decree No. 341/Kpts-II/1992. The decree effectively reduced labour costs and indirectly subsidized plantation development as well as the expansion of oil-palm plantations.

Modifications to the reforestation fund

In 1990, the DR became a royalty and was increased from US$7 to US$10/m³ for logs and set at US$1.50/m³ for chipwood and logging waste (Presidential Decree No. 29/1990). In 1996, the

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18 Christian Cossalter, CIFOR, personal communication.
“DR procedure for Government Capital Share and DR Loan for HTI Development” defined the
DR-related financing schemes for joint ventures. Plantation development could be financed as
follows: 14 percent Government Capital Share, 21 percent private capital share, 32.5 percent
loan from reforestation funds and the remainder of 32.5 percent by commercial loans. As official
figures for plantation establishment costs were usually inflated, capital provided through the
financing schemes frequently exceeded actual costs.

The loans from the DR were interest-free for private enterprises willing to invest in plantations.
They had to be repaid within seven years (the anticipated rotation length of Acacia mangium
plantations). Disbursements were made annually or half yearly, based on assessments by state
enterprises or consultants using a standard scoring system. The disbursements took into account
the previous year’s performance, the annual working plan, and corrections related to the previous
disbursements.

For “pure” private companies, 100 percent of the funds could come from commercial loans. The
government also supported companies borrowing establishment capital from banks or other
financial institutions (Barr 2000).

Other incentives
Research has focused mainly on fast-growing species for short-rotation fibre production
(for example, Acacia mangium, Pinus merkusii, Paraserianthes falcataria and Gmelina arborea).
In the drier areas, teak and mahogany were also tested. Besides the traditional research by
government bodies, private companies (pulp and paper) tested fast-growing species. The main
improvements were derived from Acacia mangium selection.19

The Wood Utilization Permit (IPK) was introduced, granting the right to use logging residues
from conversion or degraded forests in HTI concessions, which were joint ventures with Inhutani.20
Logs were supposed to be under 29 cm in diameter. The IPK allowed access to low-cost wood
for pulp mills. Controls in the field were difficult and, in some cases, the IPK resulted in
clear-cutting of rich natural forests. It encouraged plantation development to some extent, as it
reduced the cost of clearing land.

Impacts of cross-sectoral policies
The 1991 tight money policy
In early 1991, a rumour about the imminent devaluation of the rupiah increased the risk of
a double-digit inflation and an eventual devaluation. Faced by pressure to sell the rupiah, the
government initiated a tight money policy (TMP), or the Sumarlin Shock II. The TMP restricted
offshore loans and limited mega-projects. As a result, several plantation projects were cancelled
after October 1991.21

The oil-palm development policy
From 1994 to 1997, the oil-palm boom had a direct negative impact on forest plantation
development (Figure 4). During Repelita V (1990-1994), the government gave high priority to
the agricultural development of provinces outside of Java. This was successful for oil-palm
plantation establishment, which attracted many investors.

19 Before selection, the mean annual increment (MAI) was on average around 15 m³/ha. Improved varieties reached
more than 30 m³/ha. Rotation declined from 12 to seven years.
20 Wood Utilization Permit (IPK), MoF Decree No. 178/Kpts-II/1996.
21 For example, P.T. Rimbabelantara Pertiwi (C. Cossalter personal communication). See also Iljas (1998) and
The oil-palm sector enjoyed a variety of government incentives: government-funded infrastructure, easy land access and acquisition, credit for investors, subsidized interest rates, cheap labour as a result of transmigration projects, and policies conducive for attracting foreign capital (Potter and Lee 1998). These incentives accelerated the conversion of natural forests. Some companies also applied for oil-palm concessions in Kalimantan or Papua to harvest timber during land clearing. Such activities sometimes extended into production forests and even protected forest areas (Casson 2000).

The area of oil palm plantations reached 1.1 million ha in 1999 (Departemen Kehutanan dan Perkebunan, cited in Casson 2000). This expansion occurred mainly in Sumatra, and to a lesser extent in Kalimantan.

In some cases, oil-palm development competed directly with forest plantation development for land, as witnessed in the P.T. Finnantara (Stora-Enso) concession in West Kalimantan, and for financial resources, as in the case of the Sinar Mas (Indah Kiat-WKS) and APRIL (RAPP) groups.

**Impacts of incentives on plantation development**

During Repelita V (1990-1994), 900 000 ha of large-scale plantations were planted, amounting to 60 percent of the 1.5 million ha target. Overall, it was a period of rapid HTI expansion, although the annual target of 300 000 ha planted was only met in one year, that is 1993 (Figure 5).

From 1990 to 1993, “pure” private companies invested considerably in forest plantations to persuade the government to approve their pulp mill development plans. These plantations achieved a record growth of 170 000 ha in 1993. In 1994, most of the requests for pulp mills were granted. The joint-venture investments in forest plantations were high from 1992 to 1997. They peaked in 1992 when the HTI transmigration programme was initiated and in 1996 when access to the reforestation funds was facilitated by regulation MoF 375/Kpts/1996. The cartels, which held the HPHs-HTIs, however, soon turned to new investments, such as oil-palm plantations. As a result, investments in private forest plantations decreased drastically and annual plantation establishment has since then been below 100 000 ha.

**Impact of HTI transmigration scheme**

The HTI transmigration programme accounted for 20 percent of the reforestation fund disbursement. However, the HPH companies participating in the programme were rather
inexperienced in forest plantation development. In many cases, the plantations were unsuccessful. Some were located in remote areas too far from industries. The most successful ones were associated with large HTI projects, such as the joint venture with Barito Pacific in South Sumatra.

Impact on small-scale HTIs, smallholders and communities

Small-scale concession holders had no access to the reforestation funds. Small-scale plantations have generally remained undeveloped despite MoF Decree No. 69/Kpts-II/1995 that obliges HTIs to involve communities in forest plantations. The decree does not specify how management of the plantations and their benefits are to be shared. Few HTI-concession holders paid attention to the welfare of local communities. P.T. Finnantara was amongst the few that tried establishing partnerships between communities/smallholders and large companies during Repelita VI (1994-1999). This attitude changed only with the increase in social disputes over land rights and forest fires.

Sources: MoF (1989); MoF (1989-2000); Directorate of the Management of Forest Plantation (2000/2001)
a: Presidential Decree 35/1980 (bond for HPH rehabilitation)
b: Repelita IV (1984-1989), political decision to develop industrial plantations
c: Some impact due to Decree MoF 320/1986 (HTI and reforestation funds)
d: Land access facilitated by Decree MoF 327/1988 about non-performing HPHs and Decree MoF 495/1989 (IPK) on easier access to reforestation funds; impact on joint ventures
e: Beginning of the TMP; negative impact on pure private plantations
f: HTI transmigration scheme launched in 1992; impact on joint ventures
g: Reforestation fund regulation (MoF 375/Kpts/1996): impact on joint ventures
h: 1997 economic crisis; less HTI transmigration, extensive forest fires, decrease in joint ventures
i: End of reforestation funds; drastic decline in joint ventures

Figure 5: Annual plantation establishment
**Misuse of the reforestation fund**

From 1990 to 1994, access to land and capital were the major incentives for forest plantation development. However, procedures to access the reforestation fund were not transparent. Funds were mainly available to a select group of people with close ties to the political elite. Many investors sought to maximize their short-term profits and neglected the long-term future of their plantations. Most HPH holders were involved in HTIs only to extend their logging permits. In many cases, the MoF did not enforce its regulations and allowed companies to establish HTIs in rich natural forests. The state forest enterprises themselves were not always eager to develop HTIs, as logging in natural forests was considerably more profitable.

Few companies used the reforestation fund as stipulated despite guidelines to prevent misuse. Companies had to formulate proposals requesting the reforestation funds for HTIs. Once the proposals were approved and funds disbursed, companies established plantations on smaller areas than actually declared. There was a lack of independent monitoring and assessments, the main weakness of the system. Although the MoF was to conduct field assessments, it had limited resources for field inspections. In addition, information was not shared by the various divisions in charge, which exacerbated comparisons between field and disbursement data (Ernst and Young 1999).

Some companies have also been suspected of deliberately setting fire to plantations, especially if plantations were unsuccessful. This was one way to avoid repaying loans at the end of the seven-year term. Other companies minimized costs by using poor planting techniques, such as direct seeding, to divert funds to other activities.

The government itself used a large proportion of the reforestation fund for non-forest related projects. Between 1993 and 1998, US$5.25 billion was lost from the reforestation fund, due to poor enforcement (Down to Earth 2000). The reforestation fund disbursed US$950 million between 1990 and 1997 for forest plantation development (Kamil 2001). This should have been sufficient for establishing approximately five million ha, compared to the 0.9 million ha that were actually established using the fund.

**Lessons learnt and discussions**

The area under forest plantations increased more slowly than planned by the government. However, plantation development accelerated between 1990 and 1997. About 1.6 million ha of plantations were established, although doubts about the accuracy of this figure remain.

*Acacia mangium* was the predominant species. Direct incentives assisted joint-venture efforts to establish 0.9 million ha. Private companies established another 0.7 million ha without any direct incentives. This suggests that direct incentives are not necessarily needed to stimulate investments in short-rotation plantations.

The misuse of the reforestation fund was not surprising, considering the political and economic context during the Suharto era. With poor governance and control, channelling direct payments through the reforestation fund proved to be virtually impossible. The lack of independence and integrity of contractors evaluating the results, and the lack of reliable data and maps were key factors that led to the improper use of the funds.

Incentives for forest plantation development cannot be seen in isolation from other government decisions. The TMP and the oil-palm development policy had a significant influence on the willingness to invest in plantation development after 1992. Investors preferred commodities,

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22 For example, P.T. Musi Hutan Persada claimed 200 000 ha were planted, while independent estimates are in the order of only 100 000 ha.

23 Another evaluation (up to May 2002) found that 1.2 million ha were established under joint-venture arrangements (MoF Directorate General of BPK – Ministry of Forestry 2002).
such as oil-palm, with more rapid returns. In addition, the re-organization of the MoF and the appointment of a new Minister of Forestry in 1994 also delayed new forest plantation developments.

1998-2002: The forest sector during the Indonesian crisis

**The new political context and its impact on forest plantation development**

**General investment climate: lack of confidence**

The 1998 economic crisis and subsequent political changes in Indonesia kept investors away from Indonesia. Political instability on the Outer Islands and conflicts with local communities led to the failure of the transmigration programmes. The rapid development of the wood-processing sector of the previous decades resulted in an industrial overcapacity that could not be met by the annual wood production, and illegal logging filled the gap. Poor law enforcement reinforced the impact of the crisis on the forest plantation sector. The government did not even issue specific targets for HTI development in Repelita VII (1999/2000-2004/2005). Plywood exports fell from eight million m³ in 1998 to 6.3 million m³ in 2001.

**The decentralization process encourages logging**

The regional autonomy policy came into effect in 2001, allowing regional authorities to take charge of forest concession licensing. The provincial governors were authorized to issue forest concession permits for up to 100 000 ha. Small-scale logging concessions under 100 ha could be issued at the district level. Such arrangements caused considerable confusion since regional policies often differed from that of the central government. For example, the central government revoked a number of HPHs but local governments assigned new, smaller concessions. The outcome encouraged logging, legalized part of the ongoing illegal logging and gave industry access to wood resources at cheap prices.

**Incentives and disincentives: unclear messages to investors**

**The domestic wood price**

Two sets of measures were taken to bring domestic wood prices in line with world market prices, namely:

- A Letter of Intent (LOI) between the Indonesian Government and the International Monetary Fund, which paved the way for trade liberalization in the wood industry (the LOI revoked the ban on log exports); and
- Increased levies for wood from natural forests.

Logging companies operating legally must comply with replanting regulations and pay up to 13 forestry-related fees. Fees total about US$35/m³ of logs harvested from designated forest areas. Recent policy subjects logs to a ten-percent value added tax (VAT). However, illegal logging has upset these measures and no clear signals have been sent to investors. In fact, the government recently re-imposed the log export ban.

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24 MoF Decree No. 05.1/Kpts-II/2000 about Forest Utilization Permit and Forest Product Harvesting Permit in the Production Forest.
26 MoF Decree No. 510/1998 – Allow small log export.
27 MoF Decree No. 1132/Kpts-II/2001 – Ban of export logs/raw material for chips.
The suspension of reforestation fund disbursements

This period was characterized by a drastic reduction in the contributions from the reforestation fund. Bowing to international pressures, the management of the reforestation fund was transferred from the MoF to the Ministry of Finance in 1998, and an audit of the reforestation fund was conducted in 1999 (Ernst and Young 1999). The audit results have not been widely publicized. The reforestation fund was frozen from 1998 to 2002.

In 2002, a decision was made to resume using the reforestation fund, which stood at that time at around Rp7.8 trillion. The head of the district (Bupati) is to conduct field monitoring to control the use of the fund. The allocation system has remained unchanged, and the fund is to be managed by the MoF headquarters and the Bupati.28

A new trend: incentives to attract smallholders and communities

Policy for community involvement in plantations

MoF Decree No. 69/Kpts-II/1995 requires HPHs and HTIs to involve communities in forest development. Community involvement in forest management is also stressed in the Basic Forestry Law (No. 4/1999). Other decrees emphasize the rights of local communities and their access to credit. In addition, forest exploitation was opened to cooperatives soon after the departure of Suharto as president.

Private initiatives of community involvement

Indonesia’s pulp producers increasingly require wood from plantations. However, access to land and wood supplies were constrained due to land disputes between companies and local communities. As a result, some companies are testing new forms of partnerships with individuals or communities through cooperatives. P.T. Musi Hutan Persada, an HTI in South Sumatra linked to the Barito Pacific group, provides three types of incentives to encourage villagers to plant trees on community lands:

- wages for labour during the planting phase;
- management fees paid to local community organizations; and
- production fees after harvesting.

On private land, other incentives include:

- material inputs and technical advice from the company;
- financial support for owners; and
- sharing of revenues with landowners receiving 40 percent and the company 60 percent.

All other major HTI companies, such as Finnantara Intiga in West Kalimantan, RGM and P.T. Araba Abadi in Riau, and P.T. Wirakarya Sakti in Jambi, are offering similar incentives to communities and small-scale landowners.29 However, these attempts are still in their infancy: In 2001, the total cumulative area of such partnerships initiated by large pulp companies covered only about 30 000 ha.

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28 PP 35/2002 on reforestation fund.
29 For more information about Finnantara and the WKS outgrower scheme, see Nawir et al. (2002).
**Impacts of the crisis: fewer incentives, less plantations**

Annual forest plantation development decreased from 230,000 ha in 1997 to 78,000 ha in 2000, most being private plantations (Figure 6). This largely reflected the termination of the transmigration projects, loss of contributions from the reforestation fund, uncertain land tenure and the increasing attractiveness of oil-palm. Private investments were less affected than joint ventures from these developments.

Although wood production derived from plantations is not sufficient to meet the needs of the pulp industry, it is slowly increasing. Most large pulp producers are developing plantations to supply their mills despite considerable problems with land access and tenure, and escalating land disputes. The quality of plantations is improving, as the industry increasingly relies on plantation wood.

![Figure 6: Annual plantation development (1998-2002)](image)

**Lessons learnt and discussions**

Concession holders have learned that their authoritarian relationship with local people poses a risk for forest plantation development. The rapid expansion of plantations in the early to mid-1990s, during which large conglomerates benefited from the incentives, was unsustainable. The most equitable incentives since the late 1990s have been the efforts to support community forestry. Within the current policy context of Indonesia, plantation developers have realized that they must also invest heavily in infrastructure and social relationships.

Today, the key problems of the concessionaires and investors are poor law enforcement and security of their plantations. Developing partnerships and positive relations with communities is a long-term investment – much longer than a rotation of *Acacia mangium*. The duration of concession rights for HTIs follows that of HPHs. It is most suited for operators whose only interest is in logging but not for companies that invest heavily in forest management prior to harvesting.

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30 For example, Riau Andalan Pulp and Paper claims that supply from *Acacia mangium* plantations contributed up to 30 percent of their raw material needs in 2002 and is expected to reach 100 percent by 2008.
OBSERVATIONS AND FINDINGS

Links between policies and their impacts on plantation development are not straightforward. In fact, declarations, laws and guidelines are only indicators of the decision-making processes, which are affected by a variety of factors that cannot be completely identified. Policies also remain ineffectual if they are not implemented.

A major factor that cannot be directly observed is the political-economic context in which policy-making processes are taking place. Since the 1970s under the New Order Regime, the forests and non-renewable resources have been overexploited with a small elite profiting most (Dauvergne 1994; Durand 1994; Barr 2000).

While the effects of policies take time to become apparent, other decisions made by the government and other stakeholders also affect the magnitude of the potential impacts. It is thus difficult to identify the exact cause-and-effect relationships or to interpret the impacts.

Continuing deforestation in Indonesia

Even though most of the forest plantations were established during the 1990s, deforestation continued largely because of poor governance, given the political and economic situation in Indonesia (Barr 2000). The government approved the development of too many pulp mills. The excessive installed capacity necessitated the use of mixed dipterocarps as raw material. In many places, the pulp producers were enabled to establish plantations in rich natural forests without any sanctions. The HTI policy to rehabilitate overharvested production forests was actually being used to degrade natural forests.

Provision of cheap raw material for the wood industry

The policy of providing cheap raw material for the wood processing industry has proven to be a major disincentive for forest plantation investors. Wood stumpage prices dropped and developing plantations became financially unattractive. Measures to increase wood stumpage prices and reduce access to natural forest resources would likely be a more efficient way to promote forest plantation development.

Incentives, market prospects and land security

In the early 1990s, forest plantations mushroomed in response to the perception of an ever-increasing demand in Asia for pulp and paper products, and government incentives. The requirement for an industrial plantation to be established before being granted a permit to set up a processing plant also triggered private and joint-venture initiatives in tree planting.

In fact, the boom-and-bust cycle was similar to developments in the plywood sector during the 1980s when the installed processing capacity outpaced the wood output from Indonesia’s forests. The plywood industry continued to expand without proper investment in sustainable forest management and plantation development, eventually leading to the problems the plywood industry and the entire forestry sector face today.

Reforestation fund irregularities

According to the most recent assessment by the MoF (based on company declarations), the reforestation fund has helped to establish 1.2 million ha of joint-venture plantations, an area that is only one-fifth of what it should be if the fund had been used properly. Even then, in some cases, the area established was exaggerated or inferior planting stock and techniques were used
to minimize the costs. Many incentives had been abused and this was largely due to a lack of control by independent bodies.31

Private plantations established without assistance from the reforestation fund were doing as well as joint-venture establishments supported by the fund. This suggests that the reforestation fund or direct subsidies may not be needed for the development of plantations that rely on fast-growing species.

Cross-sectoral impacts

Developments in other sectors have also had a major impact on forestry development in Indonesia. For instance, the 1991-1994 TMP or the 1994-1998 boom of oil-palm plantations significantly slowed down the HTI development. Land-use conflicts between different sectors also posed problems for plantations. In some cases, concessions for agricultural development in areas around paper mills were issued, such as in Riau, or they overlapped with forest plantation concessions, such as in West Kalimantan. In Riau, two huge complexes of pulp and paper industries were established in the same area, increasing wood-supply problems and land-use pressures.

Non-involvement of the local population

Rapid plantation development during the early 1990s rarely considered the interests of the local population. It was thus unsustainable and often created more long-term problems. It is now generally accepted that the involvement of local communities is necessary to ensure the success of plantations.

RECOMMENDATIONS

Direct subsidies should be reserved for long-term investments

Subsidizing short-rotation plantations is usually neither necessary nor useful. Instead incentives should be provided for long-term rotation plantations that have the potential of producing more raw materials to supply future timber and pulp industries. These plantations also provide more environmental services.

Land-use planning, land-tenure resolution, social forestry and social welfare are issues that must be addressed by the government. The private sector is not in a position to deal with such issues effectively. Government support is also needed to encourage private investments in long-term forestry projects.

Control of pulp and paper mill supplies should be tightened

Deforestation in Indonesia is currently out of control due to:

- illegal logging and poor governance;
- low salaries of MoF employees;
- conflicts of interests amongst various ministries; and
- other problems (for example, debts, poverty, transition to decentralized authorities, extortion, corruption).

31 In late 2002, the Ministry of Forestry revoked the timber concessions of 15 companies due to their failure to develop required industrial timber plantations. Companies had been awarded a total area of 989 079 ha, but developed only 188 950 ha, despite the government providing them with loans for the purpose (Jakarta Post, 12 November 2002).
The government should strongly discourage pulp industries from using mixed-tropical hardwoods, but persuade them instead to utilize plantation-grown or imported wood. Eventually, the Indonesian wood industry will have to rely on sources other than the natural forests to meet raw material requirements. Wood prices at the mill gate need to be on par with world market prices. Currently, the main disincentive for plantation establishment is the low stumpage price. Past experience has shown that direct incentives for forest plantation development (such as soft-loans, grants) are likely to be abused. An efficient stimulus would be to increase the mill gate price for wood as early as possible.

**Capacity of state forestry officers should be strengthened**

Indonesia needs to create a new generation of state forestry officers who are dedicated to sustainable forest management. Foresters need to be well paid and equipped in order to be independent of the industry and concessionaires whom they are to monitor and control. To be totally transparent, MoF employees and NGOs should jointly monitor and control natural forest management, plantation developments and the wood-processing sector.

Taken, together, these measures could be more effective for forest plantation establishment in Indonesia than the provision of direct incentives.

**LITERATURE CITED**


IMPACT OF INCENTIVES ON THE DEVELOPMENT OF FOREST PLANTATION RESOURCES IN SABAH, MALAYSIA

Chan Hing Hon and Chiang Wei Chia

INTRODUCTION

This paper presents a case study of a private enterprise involved in forest plantation development in Sabah, Malaysia. It is intended to provide a private sector perspective of the investment climate and environment in Sabah. The experience of this relatively large private company, with its ultimate objective of maximizing returns to its shareholders, is likely to be different from that of the public sector and smallholder investors in the forestry sector.

Malaysia

Malaysia is a federation of 13 states and two federal territories. With a total area of 330,113 km², it is made up of two distinct geographical regions: Peninsular Malaysia (131,566 km²) sharing borders with Thailand in the north and Singapore in the south, and the eastern states of Sabah and Sarawak and the Federal Territory of Labuan (198,547 km²) on Borneo Island. The two regions are about 540 km apart, separated by the South China Sea.

The economy of Malaysia has seen some rapid changes in the past two decades. The manufacturing sector, especially for electrical and electronic products, has overtaken agriculture as the engine of growth. However, the nation is still a major exporter of such natural products as oil-palm, rubber, timber, tin, petroleum and natural gas. Currently, Malaysia is moving rapidly from the industrial into the information age and it has targeted the year 2020 for achieving the status of a developed nation.

Sabah

Sabah, the most eastern state of Malaysia, is located on the northern tip of Borneo. Its immediate neighbours are Brunei, the Malaysian state of Sarawak, and Kalimantan (Indonesia) and the Philippines. Sabah has a total land area of 7.36 million ha. The population of Sabah stood at 2.72 million in 2001, with a density of 37 people/km². This represents almost a threefold increase from 1980 (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total population (million)</th>
<th>Average annual population change (%)</th>
<th>Population density (km⁻²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>0.93</td>
<td>–</td>
<td>12.6</td>
</tr>
<tr>
<td>1985</td>
<td>1.25</td>
<td>6.4</td>
<td>17.0</td>
</tr>
<tr>
<td>1990</td>
<td>1.47</td>
<td>4.4</td>
<td>20.0</td>
</tr>
<tr>
<td>1995</td>
<td>2.32</td>
<td>17.0</td>
<td>31.5</td>
</tr>
<tr>
<td>2001*</td>
<td>2.72</td>
<td>6.6</td>
<td>37.0</td>
</tr>
</tbody>
</table>

Source: Department of Statistics (2002)

* provisional

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1 Senior Manager, Innoprise Corporation Sdn Bhd, Kota Kinabalu, Sabah, Malaysia.
2 Director, Sabah Softwood Sdn Bhd, Kota Kinabalu, Sabah, Malaysia.
The state is endowed with extensive forest land. Forests cover 4.45 million ha (about 61.81 percent) of its total land area. Six major vegetation types can be distinguished (Table 2).

Table 2: Vegetation types in Sabah in 2000

<table>
<thead>
<tr>
<th>Vegetation type</th>
<th>Area (ha)</th>
<th>% of total land area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mangrove forests</td>
<td>341 377</td>
<td>4.63</td>
</tr>
<tr>
<td>Transitional and freshwater swamps</td>
<td>118 513</td>
<td>1.61</td>
</tr>
<tr>
<td>Undisturbed mixed dipterocarp</td>
<td>286 838</td>
<td>3.89</td>
</tr>
<tr>
<td>Montane forests</td>
<td>700 000</td>
<td>9.50</td>
</tr>
<tr>
<td>Others (immature, disturbed, and regenerating forests)</td>
<td>2 961 400</td>
<td>40.17</td>
</tr>
<tr>
<td>Plantations</td>
<td>154 600</td>
<td>2.01</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4 562 728</strong></td>
<td><strong>61.81</strong></td>
</tr>
</tbody>
</table>

Source: Forestry Department (2002a)

Sabah’s economy is basically agrarian and natural resource-based. It depends on the production and export of several commodities, the main ones being timber, petroleum, oil-palm, cocoa and marine products. The agricultural sector consists of mainly oil-palm (one million ha), cocoa (52 000 ha), rubber (90 000 ha) and to a much smaller extent, coconut and paddy. Ownership of the oil-palm plantation is roughly divided equally between government-sponsored land development schemes and private owners of smallholdings and large estates. Cocoa plantations are principally privately owned, by smallholders mostly. Rubber plantations are almost entirely owned by smallholders.

Timber processing and exports have been important contributors to Sabah’s economic development. In fact, it was the leading foreign exchange earner until 1998. The timber industry was traditionally oriented towards the export of round logs, with minimal downstream processing. In the 1970s, the government started to promote downstream processing, and by the mid-1990s it decided to ban the export of round logs, which triggered unprecedented investments in the wood-based processing sector. This is clearly reflected in the significant increase in the export values of wood products, especially those of plywood and blockboard, when the log export ban took effect between 1994 and 1996 (Table 3).

Table 3: Export values of wood products of Sabah, 1990-2000 (RM million)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Logs</th>
<th>Sawntimber</th>
<th>Veneer</th>
<th>Plywood</th>
<th>Blockboard</th>
<th>Moulding</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1 074</td>
<td>1 187</td>
<td>151</td>
<td>117</td>
<td>1</td>
<td>45</td>
<td>253</td>
</tr>
<tr>
<td>1991</td>
<td>935</td>
<td>1 208</td>
<td>276</td>
<td>146</td>
<td>9</td>
<td>156</td>
<td>179</td>
</tr>
<tr>
<td>1992</td>
<td>882</td>
<td>1 345</td>
<td>354</td>
<td>283</td>
<td>10</td>
<td>118</td>
<td>179</td>
</tr>
<tr>
<td>1993</td>
<td>52</td>
<td>2 100</td>
<td>373</td>
<td>836</td>
<td>14</td>
<td>119</td>
<td>84</td>
</tr>
<tr>
<td>1994</td>
<td>*</td>
<td>1 852</td>
<td>248</td>
<td>1 277</td>
<td>17</td>
<td>116</td>
<td>210</td>
</tr>
<tr>
<td>1995</td>
<td>*</td>
<td>1 571</td>
<td>203</td>
<td>1 405</td>
<td>81</td>
<td>116</td>
<td>314</td>
</tr>
<tr>
<td>1996</td>
<td>*</td>
<td>1 142</td>
<td>218</td>
<td>1 883</td>
<td>127</td>
<td>95</td>
<td>191</td>
</tr>
<tr>
<td>1997</td>
<td>62</td>
<td>1 025</td>
<td>209</td>
<td>1 697</td>
<td>181</td>
<td>95</td>
<td>205</td>
</tr>
<tr>
<td>1998</td>
<td>134</td>
<td>826</td>
<td>172</td>
<td>1 256</td>
<td>93</td>
<td>66</td>
<td>244</td>
</tr>
<tr>
<td>1999</td>
<td>317</td>
<td>955</td>
<td>407</td>
<td>1 174</td>
<td>98</td>
<td>39</td>
<td>222</td>
</tr>
<tr>
<td>2000</td>
<td>156</td>
<td>966</td>
<td>341</td>
<td>1 163</td>
<td>105</td>
<td>56</td>
<td>233</td>
</tr>
</tbody>
</table>

Source: Forestry Department (2001)
+ exchange rates of US$1.00 = RM2.50 prior to the third quarter of 1998; subsequently, US$1.00 = RM3.80
* log export ban
The relative importance of the major export commodities in 2000 and 2001 is indicated in Table 4. The agriculture sector led in importance in 2001, followed closely by petroleum, while the wood-based sector ranked third.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>2000 (RM million)</th>
<th>%</th>
<th>2001*(RM million)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural products</td>
<td>3 605.3</td>
<td>33.0</td>
<td>3 859.5</td>
<td>38.5</td>
</tr>
<tr>
<td>Palm oil</td>
<td>3 019.8</td>
<td></td>
<td>3 325.9</td>
<td></td>
</tr>
<tr>
<td>Cocoa bean</td>
<td>87.6</td>
<td></td>
<td>110.1</td>
<td></td>
</tr>
<tr>
<td>Rubber</td>
<td>62.3</td>
<td></td>
<td>46.0</td>
<td></td>
</tr>
<tr>
<td>Palm kernel oil</td>
<td>435.6</td>
<td></td>
<td>377.5</td>
<td></td>
</tr>
<tr>
<td>Crude petroleum</td>
<td>3 673.7</td>
<td>33.7</td>
<td>3 319.2</td>
<td>33.1</td>
</tr>
<tr>
<td>Wood-based products</td>
<td>2 864.4</td>
<td>26.3</td>
<td>2 018.5</td>
<td>20.1</td>
</tr>
<tr>
<td>Round logs</td>
<td>156.0</td>
<td></td>
<td>28.7</td>
<td></td>
</tr>
<tr>
<td>Sawntimber</td>
<td>988.0</td>
<td></td>
<td>627.0</td>
<td></td>
</tr>
<tr>
<td>Veneer</td>
<td>374.7</td>
<td></td>
<td>143.1</td>
<td></td>
</tr>
<tr>
<td>Plywood</td>
<td>1 219.5</td>
<td></td>
<td>1 136.2</td>
<td></td>
</tr>
<tr>
<td>Moulding</td>
<td>97.2</td>
<td></td>
<td>60.0</td>
<td></td>
</tr>
<tr>
<td>Plantation logs</td>
<td>29.0</td>
<td></td>
<td>23.5</td>
<td></td>
</tr>
<tr>
<td>Methanol</td>
<td>244.3</td>
<td>2.2</td>
<td>295.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Hot briquette iron</td>
<td>281.5</td>
<td>2.6</td>
<td>285.6</td>
<td>2.9</td>
</tr>
<tr>
<td>Printing &amp; writing paper</td>
<td>243.9</td>
<td>2.2</td>
<td>251.3</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>10 913.1</td>
<td>100.0</td>
<td>10 029.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Sources: Department of Statistics (2002); Forestry Department (2001)
* provisional

The State Development Planning Committee formulated the Land Capability Classification in Sabah in 1973. It was based on earlier work undertaken in Peninsular Malaysia, which classified the land according to economic uses. The various natural resource groups were split into the following five capability classes:

Class I: High potential for mineral development and therefore best suited for mining.

Class II: High potential for agriculture and therefore best suited for diversified forms of agriculture.

Class III: Moderate potential for agriculture with a limited range of crops and therefore best suited for restricted form of agriculture.

Class IV: Commercial forest potential varying from high to marginal but with a very restricted or zero agricultural potential and therefore best suited for forestry.

Class V: No potential for mining, agriculture or forest exploitation and generally best suited for conservation or other recreational purposes.

The land use in Sabah is thus committed to various end uses. The amount of land still uncommitted, which remains as state land, is about 6.5 percent or around 0.475 million ha. Slightly less than half of the total land area (48.8 percent) is classified as forest reserve (Table 5).
Table 5: Land-use classification in Sabah

<table>
<thead>
<tr>
<th>Category</th>
<th>Area (million ha)</th>
<th>% of total land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest reserves</td>
<td>3.594</td>
<td>48.8</td>
</tr>
<tr>
<td>Alienated land</td>
<td>1.888</td>
<td>25.6</td>
</tr>
<tr>
<td>Other reserves</td>
<td>1.124</td>
<td>15.3</td>
</tr>
<tr>
<td>Mining/prospecting</td>
<td>0.279</td>
<td>3.8</td>
</tr>
<tr>
<td>Total committed</td>
<td>6.885</td>
<td>93.5</td>
</tr>
<tr>
<td>Uncommitted state land</td>
<td>0.475</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7.360</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>


Under the Constitution of Malaysia, power to govern certain matters, for example land and forestry, is vested with the states. Thus all the states have control over their land and its development. The principal law governing land administration in Sabah is the Sabah Land Ordinance\(^3\) (Cap. 68) together with its subsidiary rules and regulations.

The aim of the Land Ordinance is to regulate the alienation and occupation of state lands. State land in Sabah may be alienated or leased by the state government to (i) an individual person or persons and (ii) a company, corporate body or registered society having power under its constitution to hold land. The right of any landowner is not absolute, as there are conditions attached to the land titles. A condition of issuance of a land title is normally for a specific duration (normally 99 years) and for a specific crop (such as rubber or oil-palm). A typical condition would read: “The said land is demised herein expressly and only for the purpose of the cultivation of coconut and trees bearing edible fruits.” This is further strengthened by a related condition that reads: “Only materials approved by the Director of Agriculture shall be planted or cultivated on the said land.”

Timber trees, with the exception of rubber, are not considered agricultural crops and specific approval has to be obtained from the Land and Survey Department to change this condition. Modification to this ruling is a matter of policy decision. Both the Land and Survey Department and the Agriculture Department are reportedly strict in upholding the policy to reserve alienated land for agricultural use. One argument against any change is that the ratio of agricultural land to non-agricultural land would be upset, as tree plantations are extensive. Moreover, some individuals argue that there are already sufficient forest reserves set aside for forestry use. Tree plantations are considered to be better confined to forest reserves.

**FORESTRY**

**Forest reserves**

Similar to land matters, forestry is fully controlled by the states as enshrined in the Federal Constitution. The principal law governing forestry in Sabah is the Forest Enactment (1968) and its subsidiary Forest Rules (1969). The Forestry Department of Sabah is the principal government agency in charge of the administration of all forest reserves in the state. It does not have any jurisdiction over private lands apart from the collection of royalty on timber from such land.

In 1984, the state government successfully regazetted 3.35 million ha of forests as Permanent Forest Estates or Forest Reserves. By 1997, the total area had been expanded and redesignated to 3.59 million ha. The forest reserves are classified into different categories, each serving a specific function (Table 6). Commercial forest harvesting is only allowed in Class II areas.

\(^3\) State laws are known as Enactment or Ordinance while federal laws are known as Acts.
Table 6: Classes of forest reserves

<table>
<thead>
<tr>
<th>Class</th>
<th>Categories</th>
<th>Area (ha) 1984</th>
<th>Area (ha) 1997</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Protection forest reserve</td>
<td>99,977</td>
<td>342,216</td>
<td>Conservation for ecological and environmental protection</td>
</tr>
<tr>
<td>II</td>
<td>Commercial forest reserve</td>
<td>2,674,576</td>
<td>2,685,119</td>
<td>Commercial production of timber and other forest products</td>
</tr>
<tr>
<td>III</td>
<td>Domestic forest reserve</td>
<td>7,355</td>
<td>7,355</td>
<td>As above for local consumption</td>
</tr>
<tr>
<td>IV</td>
<td>Amenity forest reserve</td>
<td>20,767</td>
<td>20,767</td>
<td>Provision of recreational and other attractions</td>
</tr>
<tr>
<td>V</td>
<td>Mangrove forest reserve</td>
<td>316,457</td>
<td>316,024</td>
<td>Supply of mangrove timber and other related products</td>
</tr>
<tr>
<td>VI</td>
<td>Virgin jungle reserve</td>
<td>88,306</td>
<td>90,382</td>
<td>Conservation for biodiversity and research</td>
</tr>
<tr>
<td>VII</td>
<td>Wildlife reserve</td>
<td>141,203</td>
<td>132,653</td>
<td>Conservation for wildlife</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3,348,641</td>
<td>3,594,516</td>
<td></td>
</tr>
</tbody>
</table>

Source: Forestry Department (1998)

Forest management units

In 1997, the Commercial Forest Reserves were divided into 27 Forest Management Units (FMUs), each approximately 100,000 ha in size. The FMUs are essentially forest administrative units for which long-term licenses are issued to corporate bodies. These agreements take two forms: Tree Plantation and Forest Management Agreement, and Sustainable Forest Management License Agreement. Both agreements are valid up to 100 years. Of the two types of licenses, the second is predominant.

Both license agreements provide long-term tenure security that is so vital in sustainable forest management. The significance of FMUs to Sabah cannot be overemphasized. In the past three decades or so, the forests of Sabah have been indiscriminately logged through a system of short-term annual licenses. Primary forests have dwindled from 2.7 million ha in 1970 to approximately 0.3 million ha in 2000, or a mere 11 percent of the Class II Forest Reserve (Mannan and Yahya Awang 1997). This represents an annual loss of 80,000 ha.

As a result of the initial overexploitation of natural forests in most of the FMUs, extensive rehabilitation activities are necessary. This requirement is also reflected in the strategic plan of the Sabah Forestry Department for forest resource development as follows (Forestry Department 1998):

- Encourage licensees to conduct forest rehabilitation in logged areas as required under the Sustainable Forest Management License Agreement;
- Intensify rehabilitation measures in forest reserves of low productivity through enrichment planting and appropriate silvicultural treatments. On poor and degraded forest areas, plantation forestry should be introduced;
- Promote forest plantation development through the active participation of the private sector; and
- Provide appropriate incentives to create a conducive investment environment to encourage developers to venture into forest plantation.
FOREST AND AGRICULTURE PLANTATIONS

Forest plantation

Forest plantation development in Sabah started in 1922 with a trial planting of teak (*Tectona grandis*) by a Dutch company for pole production. However, most research focused later on natural forests. Systemic research on forest plantation began only in 1965 when the Forestry Department created its Plantation Research Section. Its main objective was to identify suitable species for commercial plantation establishment in Sabah. To date, a total of 170 species, of which more than half are indigenous species, have been tested (Rahim Sulaiman 2001). From these trials, four hardwoods (*Paraserianthes falcataria, Acacia mangium, Gmelina arborea* and *Eucalyptus deglupta*) and four softwoods (*Pinus merkusii, P. caribaea, Araucaria cunninghamii* and *A. hunsteinii*) were identified as potential species for commercial forest plantation in Sabah. These species were adopted by the private sector in small-scale planting throughout Sabah. All the softwood species were later abandoned for various reasons (for example, seed availability problems and high establishment and maintenance costs). Over time, the species list was complemented by high-value timber species, such as mahogany and teak, and some indigenous species for forest rehabilitation.

Approach to tree planting

Traditionally, tree planting is similar to planting any agricultural crop. Land that is under private holding is usually first logged for commercial timber, then cleared of any remaining vegetation before planting takes place. In the case of forest reserves, policy dictates that the natural forest must be replenished and maintained as far as possible to conserve biological diversity. In this case, a good mix of indigenous species is planted to enrich the logged-over forests. Complete site clearing and planting can be used in a forest reserve only when either the forest is licensed specifically for large-scale tree planting or where the land is seriously denuded or devoid of trees. This type of planting is confined to the “forest reserve” category. Selected species are usually indigenous, principally dipterocarps.

A third method of planting is confined to private land when the owners opt to enhance the value of the land by introducing timber species on their agricultural holdings. Trees are either interplanted with agricultural crops or planted along perimeters. However, this method of planting, although common, covers only a small area.

Plantation species

Both indigenous and exotic species are being used in plantation development in Sabah. For forest rehabilitation, common species used are the four main genera of the Dipterocarpaceae family (that is, *Shorea, Parashorea, Dipterocarpus*, and *Dryobalanops*). For industrial tree plantations, popular species include exotics such as acacias (principally *A. mangium*, hybrids of *A. mangium* and *A. auriculiformis*, and *A. crassicarpa*), and teak, while local species consist principally of *Octomeles sumatrana* and *Anthocephalus chinensis*. Table 7 provides a breakdown of the species composition of the forest plantation in Sabah as of 2001. Over the years, some 146,311 ha of plantation have been established in Sabah (Tables 8 and 9).
Table 7: Forest plantation species’ composition in Sabah, December 2001

<table>
<thead>
<tr>
<th>Species</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree species</strong></td>
<td></td>
</tr>
<tr>
<td><em>Acacia mangium</em></td>
<td>76 620</td>
</tr>
<tr>
<td><em>Paraserianthes falcataria</em></td>
<td>10 122</td>
</tr>
<tr>
<td><em>Eucalyptus grandis</em></td>
<td>9 058</td>
</tr>
<tr>
<td><em>Tectona grandis</em></td>
<td>5 969</td>
</tr>
<tr>
<td><em>Gmelina arborea</em></td>
<td>4 766</td>
</tr>
<tr>
<td><em>Acacia crassicarpa</em></td>
<td>2 169</td>
</tr>
<tr>
<td><em>Hevea brasiliensis</em></td>
<td>2 030</td>
</tr>
<tr>
<td>Mixed acacia &amp; eucalyptus</td>
<td>1 528</td>
</tr>
<tr>
<td><em>Eucalyptus deglupta</em></td>
<td>1 477</td>
</tr>
<tr>
<td><strong>Others</strong></td>
<td>1 818</td>
</tr>
<tr>
<td><em>Eucalyptus urophylla</em></td>
<td>460</td>
</tr>
<tr>
<td><em>Pinus caribaea</em></td>
<td>348</td>
</tr>
<tr>
<td><em>Acacia auriculiformis</em></td>
<td>274</td>
</tr>
<tr>
<td><em>Azadiracta excelsa</em></td>
<td>191</td>
</tr>
<tr>
<td><em>Peronema canescens</em></td>
<td>67</td>
</tr>
<tr>
<td><em>Eucalyptus camaldulensis</em></td>
<td>56</td>
</tr>
<tr>
<td><em>Swietenia macrophylla</em></td>
<td>46</td>
</tr>
<tr>
<td><em>Pterocarpus spp.</em></td>
<td>30</td>
</tr>
<tr>
<td><em>Acacia auriculiformis</em></td>
<td>25</td>
</tr>
<tr>
<td><em>Acacia arborea</em></td>
<td>25</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>117 079</td>
</tr>
<tr>
<td>Rattan spp.*</td>
<td>14 044</td>
</tr>
<tr>
<td>Enrichment planting**</td>
<td>15 189</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>146 312</td>
</tr>
</tbody>
</table>

Source: Adapted from Anuar Mohamad (2002)
* mainly *Calamus caesius, C. manan and C. subinermis*
** mainly species of the dipterocarp family

Table 8: Forest plantation development in Sabah, 1980-2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Accumulated total area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>9 800</td>
</tr>
<tr>
<td>1985</td>
<td>34 960</td>
</tr>
<tr>
<td>1990</td>
<td>62 400</td>
</tr>
<tr>
<td>1995</td>
<td>112 700</td>
</tr>
<tr>
<td>2000</td>
<td>154 600</td>
</tr>
<tr>
<td>2001</td>
<td>146 311</td>
</tr>
</tbody>
</table>

Sources: Anuar Mohamad, 2002, personal communication; Forestry Department (2002a)
### Table 9: Forest plantation in Sabah, December 2001

<table>
<thead>
<tr>
<th>Organizations</th>
<th>Fast growing plantation (ha)</th>
<th>Rattan plantation (ha)</th>
<th>High value timber plantation (ha)</th>
<th>Enrichment planting (ha)</th>
<th>Total area (ha)</th>
<th>Land ownership/type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAFODA*</td>
<td>25 891</td>
<td>2 119</td>
<td>383</td>
<td>0</td>
<td>28 393</td>
<td>Government land</td>
</tr>
<tr>
<td>SAFODA’s Smallholder (smallholders)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sabah Forest Industries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sdn. Bhd. ^ (SFI)</td>
<td>36 676</td>
<td>0</td>
<td>0</td>
<td>197</td>
<td>36 873</td>
<td>Forest reserve**</td>
</tr>
<tr>
<td>SFI’s Tree Farming Scheme (smallholders)</td>
<td>1 913</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 913</td>
<td>Private land</td>
</tr>
<tr>
<td>Innoprise Corp. Sdn. Bhd (ICSB)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ICSB – Luasong</td>
<td>0</td>
<td>11 653</td>
<td>812</td>
<td>0</td>
<td>12 465</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>ICSB – Infapro Project</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9 808</td>
<td>9 808</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>ICSB – INIKEA Project #</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2 678</td>
<td>2 678</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>ICSB – Sabah</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Softwood Bhd.</td>
<td>32 272</td>
<td>0</td>
<td>244</td>
<td>0</td>
<td>32 515</td>
<td>Private land</td>
</tr>
<tr>
<td>CSB – Benta Wawasan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sdn. Bhd.#</td>
<td>5 500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5 500</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Boonrich Sdn. Bhd.</td>
<td>759</td>
<td>0</td>
<td>384</td>
<td>0</td>
<td>1 143</td>
<td>Private land</td>
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<tr>
<td>Lek Sdn. Bhd.</td>
<td>489</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>489</td>
<td>Private land</td>
</tr>
<tr>
<td>Freehold Greenland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sdn. Bhd.</td>
<td>0</td>
<td>0</td>
<td>190</td>
<td>0</td>
<td>190</td>
<td>Private land</td>
</tr>
<tr>
<td>Kebun Singa Sdn. Bhd.</td>
<td>121</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>121</td>
<td></td>
</tr>
<tr>
<td>Forestry Department</td>
<td>895</td>
<td>70</td>
<td>220</td>
<td>1 298</td>
<td>2 483</td>
<td>Government land</td>
</tr>
<tr>
<td>KTS Plantation Sdn. Bhd.</td>
<td>5</td>
<td>0</td>
<td>2 044</td>
<td>1 036</td>
<td>3 085</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Ladan Tabung Haji (Keningau)</td>
<td>0</td>
<td>0</td>
<td>1 483</td>
<td>0</td>
<td>1 483</td>
<td>Private land</td>
</tr>
<tr>
<td>Tabung Haji – (Bongaya)</td>
<td>0</td>
<td>0</td>
<td>1 500</td>
<td>0</td>
<td>1 500</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Empat Bersaudari Sdn. Bhd.</td>
<td>0</td>
<td>114</td>
<td>0</td>
<td>0</td>
<td>114</td>
<td>Private land</td>
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<tr>
<td>Bugaya Forests Sdn. Bhd.</td>
<td>0</td>
<td>0</td>
<td>347</td>
<td>163</td>
<td>510</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Total Degree</td>
<td>0</td>
<td>0</td>
<td>1 473</td>
<td>0</td>
<td>1 473</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Sabah Cattle Farming</td>
<td>0</td>
<td>0</td>
<td>121</td>
<td>0</td>
<td>121</td>
<td>Private land</td>
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<tr>
<td>Timberwell Bhd.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>150</td>
<td>150</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>TSH Forestry</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>Forest reserve</td>
</tr>
<tr>
<td>Dukawan Sdn. Bhd.</td>
<td>200</td>
<td>46</td>
<td>0</td>
<td>0</td>
<td>246</td>
<td>Private land</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>107 771</strong></td>
<td><strong>14 002</strong></td>
<td><strong>9 209</strong></td>
<td><strong>15 330</strong></td>
<td><strong>146 312</strong></td>
<td></td>
</tr>
</tbody>
</table>

Sources: Anuar Mohamad (2002) and adjustments from plantation companies

* SAFODA = Sabah Forest Development Authority

** Forest reserves where Sustainable Forest Management Licences Agreement are issued.

*** Sdn. Bhd. = Sendirian Berhad (Private Limited)

# adjusted from company records

Forest plantations were not considered important in the 1980s when natural forests were still abundant. It was only in the 1990s that the forest industry realized that the timber resource base was dwindling due to excessive logging. In response, interest in establishing plantations increased.
Main players in plantation forestry

Yayasan Sabah and Innoprise Corporation Sdn. Bhd.

Yayasan Sabah, or the Sabah Foundation, is a statutory body established in 1966 to improve the quality of life of Sabahans, particularly in education, welfare and social services.

In 1988, Innoprise Corporation Sdn. Bhd. (ICSB) was established as the investment arm of the Sabah Foundation and the holding management company in diverse business interests. In 1984, the already large concession of the Foundation was expanded to a single block of 972 804 ha – about one-seventh of the landmass of Sabah. This area was later divided into two main portions, the concession proper and Benta Wawasan Sdn. Bhd., a wholly-owned company of ICSB, which is to embark on a large-scale industrial tree plantation. These, together with Sabah Softwood Bhd., another ICSB majority-owned subsidiary, make ICSB Sabah’s biggest forest management company, with a total forest area of over one million ha.

ICSB is involved in the following planting activities:

- The Forests Absorbing Carbon Dioxide Emission (FACE) Foundation Project, which aims to plant sufficient trees to offset the equivalent of the carbon dioxide emissions from one large power station over 25 years (FACE 1991).
- The Inikea Project, which aims to restore around 14 000 ha of degraded forest in the Kalabakan Forest Reserve within the Sabah Foundation concession area.
- Luasong Forest Centre, which is located in the Sabah Foundation concession area, serving as a centre and an operating base for numerous forestry activities including a major rattan-planting programme.
- Benta Wawasan Sdn. Bhd., a wholly-owned subsidiary of ICSB, which is developing a forest plantation of up to 306 000 ha.
- Sabah Softwood Bhd. (SSB), a joint venture between the Sabah Foundation and the North Borneo Timbers Bhd.

Sabah Forest Development Authority (SAFODA)

SAFODA was established in 1976 as a semi-government body to:

- Convert wasteland and marginal agricultural land into productive forests;
- Supplement the production of natural forest products with products derived from man-made forests;
- Encourage and promote the active participation of the rural population in afforestation and reforestation; and
- Raise the living standard of the rural people through forest settlement and agroforestry development schemes.

A total of 108 243 ha of land parcels have been allotted to SAFODA through a gazette notification. Most of it is considered wasteland or lalang (Imperata cylindrica) grassland and non-commercial forest land, which have been classed as unsuitable or marginally suitable for agriculture (Stanley 1992). As of December 2001, 25 891 ha have been planted with tree species and 2 119 ha with rattan.


The Sabah Forest Industries Sdn. Bhd. was established in June 1982, as a wholly-owned company of the state of Sabah, to expedite the industrialization programme (Sabah Forest Industry 1993). The coastal town of Sipitang in the southern part of Sabah was chosen as the mill site for a 150 000 tonne capacity pulp and paper mill. The Sabah Forest Industries was allocated 288 623 ha of natural forest to support the mill. The company is now privatized with the Lion
Group of Malaysia holding the majority of the share while the state government holds a minor interest.

While the mill currently takes in residual timber from forest clearing, plantations of fast-growing tree species have been established to supply the mill in the future with raw materials. As of December 2001, more than 36 676 ha have been planted with acacias.

**KTS Plantation Sdn. Bhd.**

KTS Plantation is a member of the KTS Holdings Sdn. Bhd. It has entered into an agreement with the Sabah Government to manage a forest concession of 57 247 ha at Segaliud Lokan Forest Reserve in the Sandakan area. A major part of the area is being rehabilitated with dipterocarps, rubber (*Hevea brasiliensis*), and some other indigenous species.

**Agricultural plantations**

In the 1970s, Sabah experienced a steady expansion of cocoa and oil-palm plantations. The cocoa boom in the late 1970s saw the rapid development of cocoa plantations, both by smallholders and large estates. However, the collapse of the cocoa price in the mid-1980s, coupled with cocoa pod borer infestations, has dampened the interest in cocoa cultivation.

Unlike cocoa prices, crude palm oil (CPO) experienced continuous price increases. The CPO prices peaked at an average of RM2 377/tonne (US$625.50) in 1998 (PORLA 2002). The corresponding fresh fruit bunch (FFB) prices of oil-palm fruits reached a high of RM500/tonne (US$131.60) in Sabah. At this price level, oil-palm production is extremely lucrative. As a result, large areas of oil-palm have been developed, reaching more than one million ha in 2000 (Table 10). Some landowners have converted from cocoa to oil-palm. The current CPO prices have dropped to around RM1 400/tonne (US$368.42/tonne) with a corresponding FFB price of RM280/tonne (US$73.68/tonne).

<table>
<thead>
<tr>
<th>Year</th>
<th>Oil-palm (ha)</th>
<th>Cocoa (ha)</th>
<th>Total (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>93 967</td>
<td>57 984</td>
<td>151 951</td>
</tr>
<tr>
<td>1985</td>
<td>161 500</td>
<td>172 713</td>
<td>334 213</td>
</tr>
<tr>
<td>1990</td>
<td>276 171</td>
<td>179 648</td>
<td>455 819</td>
</tr>
<tr>
<td>1995</td>
<td>518 133</td>
<td>113 691</td>
<td>631 824</td>
</tr>
<tr>
<td>2000</td>
<td>1 000 777</td>
<td>52 177</td>
<td>1 052 954</td>
</tr>
</tbody>
</table>

Sources: Malaysian Cocoa Board (2002); PORLA (2002)

**Economics of plantation development**

**Comparative costs of establishment of forest and agricultural plantations**

The main cost components of agricultural and forest plantations are similar, and include mainly:

- Administration: salary, wages, Employee Provident Fund, office expenses, vehicle maintenance;
- Direct planting cost: road and culvert construction, site preparation, seedlings, lining, hoiling for and planting seedlings, boundary survey, climber cutting, weeding;
- Maintenance: boundary, roads, weeding, shade adjustment;
- Capital expenditure: buildings, vehicles, nursery establishment; and
- Training, research and development.

\[\text{At US$1.00} = \text{RM3.80}\]
The main differences relate to plantation management. For example, oil-palm plantations require higher labour inputs than forest plantations due to their intensive management. One labourer in an oil-palm plantation is able to take care of only four ha of land, while for a forest plantation this amounts to 30 to 50 ha. As a result, the cost (up to maturity) of establishing an oil-palm plantation is around RM7 200/ha for the first four years, whereas it is only RM3 500-4 000 for the first seven years for an *Acacia mangium* plantation.

The costs of marketing also differ. For example, there is no royalty and cess tax on timber produced from forest plantations. On the other hand, since 1999, the state government has put a levy of RM56/tonne on the production of CPO if the CPO price is above RM1 000/tonne. Similarly, the federal government also imposes a “windfall” levy when the CPO price exceeds RM2 000/tonne.

**Economics of forest plantations**

Various analyses have been carried out on the financial viability of large-scale industrial forest plantation in Sabah over the years. The studies are based on various assumptions related to, *inter alia*, the mean annual increment, length of rotation and prices of the end products. Invariably, results of financial analyses differ, although they all show a positive internal rate of return (IRR).

Examples include:

- A weighted average IRR of 6.7 percent, based on planting of 50 percent *Acacia mangium* (eight-year rotation), 30 percent *Paraserianthes (Albizia) falcata*aria (12-year rotation) and 20 percent *Gmelina arborea* (15-year rotation), excluding interest on capital (Golokin and Cassel 1987).
- IRRs of 5.9 and 5.1 percent for two scenarios. Scenario 1: 50 percent *Acacia mangium* and 50 percent *Gmelina arborea*, both for chip production with a rotation of eight years. Scenario 2: 40 percent *Acacia mangium* and 20 percent *Gmelina arborea*, both for chip production with a rotation of eight years, and 20 percent *Paraserianthes falcata*aria with a rotation of ten years for sawlog production. Prices of RM80/m³ for logs of 20 cm diameter and above and RM50/m³ for logs of 14-19 cm diameter (Ti and Tangau 1991).
- IRR of 19.2 percent for the Compensatory Plantation Project in Peninsular Malaysia. Major assumptions are: average mean annual increment of 20 m³, non-commercial thinning at years 4 to 5, second commercial thinning at years 8 to 9 with a yield of 67 m³/ha (stumpage value of RM23/m³), production at final harvest at year 16 of 180 m³/ha (stumpage value of RM126/m³) (Johari Baharudin 1987).
- IRR of 13 percent with *Paraserianthes falcata*aria (12-year rotation), *Acacia mangium* and *Gmelina arborea* (both 15-year rotation), all for sawlog production at prices of RM80/m³, RM90/m³ and RM100/m³, respectively (Rahim Sulaiman 1990).
- IRRs of 7.3 to 17.3 percent for four species: *Tectona grandis*, *Azadirachta excelsa*, *Hevea brasiliensis* and *Acacia mangium* under various assumptions such as rotation of 15 years for the monocrop and 20 years for *Hevea* with a latex production. Price assumptions are RM95/m³ at 15 years and RM115/m³ at 20 years for *Hevea* wood, RM600/m³ for teak, RM150/m³ for acacia and RM450/m³ for sentang (*Azadirachta excelsa*) at 15 years (Krishnapillay and Abdul Razak Mohd. Ali 1998).
- IRRs of 12.8 percent for rubberwood alone, and 13.7 percent for rubberwood with latex production commencing at year 8, on a rotation of 15 years (Mohamad Johari Mohd. Hassan 2002).

**Economics of oil-palm plantations**

Oil-palm is by far the most important economic agricultural (estate) crop in Sabah. In general, the returns on oil-palm are very sensitive to CPO prices (Table 11). Since 1994, CPO prices fell below RM1 000/tonne only in 2000 and 2001 (Table 12). At normal price levels, the IRR is
expected to exceed 20 percent. High prices that exceeded RM1 500/tonne have brought considerable profits to the oil-palm industries.

**Table 11: Internal rate of return of oil-palm production**

<table>
<thead>
<tr>
<th>CPO price (RM/tonne)</th>
<th>900</th>
<th>1 000</th>
<th>1 200</th>
<th>1 500</th>
<th>2 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRR (before taxation)</td>
<td>10</td>
<td>15</td>
<td>23</td>
<td>32</td>
<td>44</td>
</tr>
</tbody>
</table>

**Table 12: Crude oil-palm prices, 1991-2000**

<table>
<thead>
<tr>
<th>Year</th>
<th>CPO prices (RM/tonne) (local delivered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>836.50</td>
</tr>
<tr>
<td>1992</td>
<td>916.50</td>
</tr>
<tr>
<td>1993</td>
<td>890.00</td>
</tr>
<tr>
<td>1994</td>
<td>1 283.50</td>
</tr>
<tr>
<td>1995</td>
<td>1 472.50</td>
</tr>
<tr>
<td>1996</td>
<td>1 191.50</td>
</tr>
<tr>
<td>1997</td>
<td>1 358.00</td>
</tr>
<tr>
<td>1998*</td>
<td>2 377.50</td>
</tr>
<tr>
<td>1999</td>
<td>1 449.50</td>
</tr>
<tr>
<td>2000</td>
<td>996.50</td>
</tr>
<tr>
<td>2001</td>
<td>894.50</td>
</tr>
<tr>
<td>2002</td>
<td>1 363.50</td>
</tr>
<tr>
<td>2003</td>
<td>1 544.00</td>
</tr>
</tbody>
</table>

* Prior to the third quarter of 1998, US$1.00 = RM2.50; subsequently, US$1.00 = RM3.80
Note: In March 2004, the CPO price rose above RM2 000 again.

**SABAH SOFTWOODS BERHAD (SSB)**

SSB, incorporated in late 1973 under the Companies Act (1965) as a private limited company, was converted into a public limited company on 23 May 2000. It is a subsidiary of ICSB. It was originally established to plant logged-over areas with fast-growing commercial timber species and to develop commercial forest plantations. In 1977, SSB entered into a 60-year lease agreement with Sapangar Sdn. Bhd. for an area of 60 618 ha, which was partitioned into two main blocks of approximately 20 000 and 41 000 ha at Kalabakan and Brumas, respectively (Figure 1).

By December 2000, SSB had planted fast-growing forest trees on 34,024 ha of the leased land. Another 11,843 ha were planted with oil-palm and cocoa (95 percent and five percent of the land, respectively). Some of the forest plantations are in their third rotation. The oil-palm has not yet matured.

Since its incorporation, the shareholders of SSB have invested about RM200 million (US$52.6 million) in the company. To date, SSB has yet to declare a dividend or repay shareholder advances. By 2000, the retained profits of the company amounted to about RM85 million (US$22.4 million), which had been used to finance new plantations.

Plantation development expenditures have been the major cost of SSB, amounting to RM254 million in 2000 (that is, RM160 million for forest plantation and RM94 million for agricultural crops). The net profits after taxes were RM14.3 million (US$3.8 million) and RM18.7 million (US$4.9 million) in 1999 and 2000, respectively. Most profits can be attributed to the sales of plantation timber and woodchips.

Compared to the returns on alternative investments, SSB’s forest plantations have achieved limited success over the last 26 years. Since harvesting commenced in 1982, the accumulated retained profit of RM85 million (US$22.4 million) over a period of 18 years averaged RM4.7 million (US$1.2 million) per annum, or an internal rate of return of about 2.4 percent. The return on assets (profit/forest plantation assets) in 1999 and 2000 was only around 7.5 and 9.8 percent, respectively. This is considered low compared to other investments, especially taking into account the long investment period.

SSB is a pioneer in forest plantation development but it made some unfortunate mistakes in the early years of development (such as unsuitable species), which certainly depressed the company’s profits. To capitalize and increase SSB’s returns from the forest plantations, a woodchip mill using plantation-grown wood was established in 1998.

**SSB’s forest plantations**

SSB has identified *Acacia mangium* and acacia hybrids, *Paraserianthes falcataria* and, to a lesser extent, *Gmelina arborea* as species with the highest potential for Sabah’s climatic and topographic conditions. The three species are planted regularly, as their establishment costs are low, they grow faster and can be used for a wide range of end products. Species such as *Eucalyptus deglupta* and *Pinus caribaea*, which have poor growth characteristics and are commercially less economical, have not been used since 1986 and are currently being replaced by the other three species. In total, the five species have been planted (and replanted) on 73,300 ha between 1974 and 2001 (Table 13). SSB’s current objective is to fully plant the 40,000 ha designated for tree plantations with the three main species.
### Table 13: Annual planting of Sabah Softwood Bhd., 1974-2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Acacia mangium</th>
<th>Albizia falcatoria</th>
<th>Gmelina arborea</th>
<th>Eucalyptus deglupta</th>
<th>Pinus caribaea</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>0</td>
<td>12.53</td>
<td>4.65</td>
<td>15.75</td>
<td>21.03</td>
<td>19.36</td>
<td>73.32</td>
</tr>
<tr>
<td>1975</td>
<td>0</td>
<td>543.05</td>
<td>37.56</td>
<td>450.39</td>
<td>143.46</td>
<td>459.3</td>
<td>1,633.76</td>
</tr>
<tr>
<td>1976</td>
<td>0</td>
<td>1,456.58</td>
<td>273.31</td>
<td>787.23</td>
<td>743.89</td>
<td>613.69</td>
<td>3,874.70</td>
</tr>
<tr>
<td>1977</td>
<td>9.27</td>
<td>2,242.06</td>
<td>476.29</td>
<td>2,361.87</td>
<td>218.28</td>
<td>34.89</td>
<td>5,342.66</td>
</tr>
<tr>
<td>1978</td>
<td>22.33</td>
<td>2,499.69</td>
<td>663.04</td>
<td>2,220.76</td>
<td>8.09</td>
<td>50.16</td>
<td>5,464.07</td>
</tr>
<tr>
<td>1979</td>
<td>79.30</td>
<td>1,430.02</td>
<td>90.24</td>
<td>926.76</td>
<td>0</td>
<td>202.47</td>
<td>2,728.79</td>
</tr>
<tr>
<td>1980</td>
<td>171.34</td>
<td>175.75</td>
<td>357.24</td>
<td>2,381.82</td>
<td>2.13</td>
<td>35.95</td>
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<td>1,106.99</td>
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<td>4.92</td>
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<td>638.61</td>
<td>847.30</td>
<td>844.74</td>
<td>4.20</td>
<td>0</td>
<td>186.6</td>
<td>2,520.45</td>
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<td>1983</td>
<td>1,315.13</td>
<td>98.02</td>
<td>563.85</td>
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<td>0</td>
<td>41.31</td>
<td>2,017.31</td>
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<tr>
<td>1984</td>
<td>178.20</td>
<td>466.98</td>
<td>957.69</td>
<td>0</td>
<td>1.19</td>
<td>2.15</td>
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<td>1985</td>
<td>0</td>
<td>226.20</td>
<td>1,241.71</td>
<td>97.00</td>
<td>0</td>
<td>0</td>
<td>1,564.91</td>
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<tr>
<td>1986</td>
<td>37.22</td>
<td>722.86</td>
<td>7.37</td>
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<td>0</td>
<td>1.32</td>
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<tr>
<td>1987</td>
<td>0</td>
<td>1,012.78</td>
<td>18.79</td>
<td>0</td>
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<td>0</td>
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<td>814.84</td>
<td>502.09</td>
<td>0</td>
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<td>0</td>
<td>2,196.68</td>
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<tr>
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<td>0</td>
<td>0</td>
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<tr>
<td>1990</td>
<td>467.78</td>
<td>1,321.31</td>
<td>314.91</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,104.00</td>
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<tr>
<td>1991</td>
<td>731.49</td>
<td>956.79</td>
<td>40.01</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>1,618.78</td>
</tr>
<tr>
<td>1993</td>
<td>779.22</td>
<td>1,412.78</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>2,192.00</td>
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<tr>
<td>1994</td>
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<td>1,258.65</td>
<td>126.68</td>
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<td>0</td>
<td>0</td>
<td>3,544.30</td>
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<tr>
<td>1995</td>
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<td>1,031.90</td>
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<td>0</td>
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<tr>
<td>1996</td>
<td>954.99</td>
<td>871.50</td>
<td>803.17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,629.66</td>
</tr>
<tr>
<td>1997</td>
<td>1,536.01</td>
<td>513.05</td>
<td>250.92</td>
<td>0</td>
<td>0</td>
<td>20.00</td>
<td>2,319.98</td>
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<tr>
<td>1998</td>
<td>4,263.62</td>
<td>0</td>
<td>281.53</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4,545.15</td>
</tr>
<tr>
<td>1999</td>
<td>1,844.66</td>
<td>89.97</td>
<td>747.87</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,682.50</td>
</tr>
<tr>
<td>2000</td>
<td>1,911.50</td>
<td>179.23</td>
<td>383.8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,474.53</td>
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<tr>
<td>2001</td>
<td>2,546.51</td>
<td>195.22</td>
<td>78.55</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,820.28</td>
</tr>
<tr>
<td>Total</td>
<td>25,250.64</td>
<td>22,637.26</td>
<td>11,632.06</td>
<td>10,929.89</td>
<td>1,142.99</td>
<td>1,706.65</td>
<td>73,299.49</td>
</tr>
</tbody>
</table>

Between 1982 (when harvesting commenced) and 2000, SSB harvested more than four million m$^3$ of plantation-grown timber (Table 14). The current annual production is estimated at 400,000 m$^3$. 
Table 14: Production of plantation timbers from Sabah Softwoods Bhd., 1982-2001 (m³)

<table>
<thead>
<tr>
<th>Year</th>
<th>Albizia</th>
<th>Eucalyptus</th>
<th>Gmelina</th>
<th>Acacia</th>
<th>Pinus</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1982</td>
<td>10 217</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>10 217</td>
</tr>
<tr>
<td>1983</td>
<td>42 829</td>
<td>0</td>
<td>86</td>
<td>0</td>
<td>0</td>
<td>42 915</td>
</tr>
<tr>
<td>1984</td>
<td>70 546</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>70 546</td>
</tr>
<tr>
<td>1985</td>
<td>77 403</td>
<td>0</td>
<td>501</td>
<td>0</td>
<td>0</td>
<td>77 904</td>
</tr>
<tr>
<td>1986</td>
<td>142 469</td>
<td>1 757</td>
<td>758</td>
<td>774</td>
<td>0</td>
<td>145 758</td>
</tr>
<tr>
<td>1987</td>
<td>162 574</td>
<td>10 624</td>
<td>778</td>
<td>0</td>
<td>0</td>
<td>173 976</td>
</tr>
<tr>
<td>1988</td>
<td>147 331</td>
<td>19 423</td>
<td>10 253</td>
<td>541</td>
<td>0</td>
<td>177 548</td>
</tr>
<tr>
<td>1989</td>
<td>185 740</td>
<td>51 762</td>
<td>8 502</td>
<td>9 893</td>
<td>0</td>
<td>255 897</td>
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<tr>
<td>1990</td>
<td>129 707</td>
<td>57 719</td>
<td>30</td>
<td>7 712</td>
<td>0</td>
<td>195 168</td>
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<tr>
<td>1991</td>
<td>199 755</td>
<td>33 591</td>
<td>533</td>
<td>7 268</td>
<td>0</td>
<td>241 147</td>
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<tr>
<td>1992</td>
<td>159 020</td>
<td>34 665</td>
<td>1 483</td>
<td>2 999</td>
<td>12 128</td>
<td>210 295</td>
</tr>
<tr>
<td>1993</td>
<td>118 294</td>
<td>38 702</td>
<td>12 574</td>
<td>1 174</td>
<td>62 002</td>
<td>232 746</td>
</tr>
<tr>
<td>1994</td>
<td>136 887</td>
<td>125 503</td>
<td>21 844</td>
<td>120</td>
<td>2 196</td>
<td>286 550</td>
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<tr>
<td>1995</td>
<td>104 280</td>
<td>91 516</td>
<td>31 137</td>
<td>7 287</td>
<td>408</td>
<td>234 628</td>
</tr>
<tr>
<td>1996</td>
<td>142 481</td>
<td>22 792</td>
<td>64 448</td>
<td>11 044</td>
<td>0</td>
<td>240 765</td>
</tr>
<tr>
<td>1997</td>
<td>138 838</td>
<td>11 029</td>
<td>182 907</td>
<td>3 974</td>
<td>46 397</td>
<td>383 145</td>
</tr>
<tr>
<td>1998</td>
<td>68 271</td>
<td>1 365</td>
<td>35 230</td>
<td>166 864</td>
<td>1 211</td>
<td>272 941</td>
</tr>
<tr>
<td>1999</td>
<td>68 474</td>
<td>3 803</td>
<td>116 488</td>
<td>143 615</td>
<td>0</td>
<td>332 380</td>
</tr>
<tr>
<td>2000</td>
<td>81 904</td>
<td>2 067</td>
<td>145 235</td>
<td>**209 576</td>
<td>0</td>
<td>438 782</td>
</tr>
<tr>
<td>2001</td>
<td>86 085</td>
<td>760</td>
<td>75 096</td>
<td>288 656</td>
<td>0</td>
<td>450 597</td>
</tr>
<tr>
<td>Total</td>
<td>2 273 105</td>
<td>507 078</td>
<td>707 883</td>
<td>861 497</td>
<td>124 342</td>
<td>4 091 188</td>
</tr>
</tbody>
</table>

Source: Sabah Softwood Bhd. internal reports
* including 44 953 bone-dry tonnes (or 103 841 m³) for chipping
** including 85 271 bone-dry tonnes (or 196 976 m³) for chipping

SSB’s agricultural plantations

In response to high CPO prices in 1997 and 1998, SSB increased its oil-palm plantation from 2 300 ha in 1997 to 14 000 ha by 2001. Most of the new plantations are not yet productive and it is premature to comment on the actual return on investment. However, SSB envisages that oil-palm and oil-palm-related activities would contribute positively to its future income. The remaining agricultural cropping area of 560 ha is planted with cocoa. By December 2000, a total of 46 767 ha had been cultivated with different crops (Table 15).

In conjunction with the oil-palm plantation programme, SSB proposed to set up a CPO mill. The construction was expected to commence in 2002 and be completed by 2003.
### Table 15: Tree and agricultural crops of SSB, December 2000

<table>
<thead>
<tr>
<th>Species</th>
<th>Area (ha)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>A. mangium</em></td>
<td>18 118</td>
<td></td>
</tr>
<tr>
<td><em>P. falcataria</em></td>
<td>9 538</td>
<td></td>
</tr>
<tr>
<td><em>G. arborea</em></td>
<td>5 147</td>
<td></td>
</tr>
<tr>
<td><em>E. deglupta</em></td>
<td>1 607</td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>514</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>34 924</td>
<td>74.7</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
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<td></td>
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<tr>
<td>Oil-palm</td>
<td>11 283</td>
<td></td>
</tr>
<tr>
<td>Cocoa</td>
<td>560</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>11 843</td>
<td>25.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>46 767</td>
<td></td>
</tr>
</tbody>
</table>

Source: Sabah Softwood Bhd. internal records

### TAX INCENTIVES IN MALAYSIA

#### Historical development

During the 1970s, the potential long-term role of forest plantations in the forestry sector and the national economy was not recognized. As a result, no direct incentives were offered to encourage plantation development until the 1980s. As time progressed and the natural forest dwindled, the government introduced various incentives to promote forestry and forestry-related activities. A chronological order of the changes to tax legislation and incentives, directly or indirectly affecting forest industry in Malaysia, is given hereunder:

- **Until 1979**: Tax legislation and incentives did not specifically favour forest plantation activities.
- **1987**: Further changes in definitions so that replanting costs could qualify for revenue deduction. Timber retained its qualification as an approved crop.
- **1991**: Income exemption based on statutory income instead of adjusted income.
- **1992**: Introduction of tax incentives for research and development activities.
- **1994**: Forest plantations treated as industry of national and strategic importance with enhanced tax incentives.

- Additional incentives for investments in Eastern Corridor States of Peninsular Malaysia, Sabah and Sarawak.

Today, there is a wide range of tax incentives available to the plantation sector in Sabah. The forest plantations have been accorded more incentives than the traditional agro-crops such as oil-palm and rubber, as reforestation has been regarded as an industry of national and strategic importance since the Sixth Malaysia Plan (1991-1995). As a result, special tax incentives under Section 4A of the Promotion of Investments Act (PIA) are available to the forest plantation
sector. The two principal incentives available to the forest plantation sector but not to the agricultural sector are Pioneer Status and Investment Tax Allowance.

In 2002, the government included forest plantations as an “Approved Agriculture Project” under Schedule 4A (see Annex 1 for details) of the Income Tax Act, in response to the disappointing impact of the previous tax incentives and requests by the private sector for additional support. Schedule 4A was originally formulated for food and fruit cultivation only. Under Schedule 4A certain capital expenditures, ordinarily claimable over a period of time, can be treated as current year deductions. Some people are hopeful that this change may provide a boost to forest plantation development.

As a result of the 1997/1998 regional financial crises in Asia and the surging value for imported food products – RM11 billion (US$2.9 billion) in 1998 – the government first introduced “group relief” as a further incentive to encourage investment in approved food production projects in 1999. As the cost of importing food products continues to increase, emphasis is placed on urging agro-based companies to diversify into food production. The government has since removed some of the rather restrictive definitions and conditions of “group relief”.

The current incentives available under Section 4A of PIA, the Income Tax Act and other support fall into two categories, that is, direct and indirect incentives:

**Direct incentives**

Direct incentives can be made available according to “Pioneer Status” or “Investment Tax Allowance” under Section 4A of the PIA. The latest inclusion of forest plantations under the “Approved Agriculture Project” also supports investments. The common feature of the first two incentives is that the untaxed profit can be transferred to an account from which tax-exempted dividends can be declared. In contrast, Schedule 4A of the Income Tax Act allows all the qualifying expenditures to be offset against the current year’s income from other sources, thus reducing the current year’s taxable income.

**Pioneer Status**

Forest plantation developers are granted a 100 percent tax exemption on statutory income for ten years (as compared to five years in the past), commencing from the “production day”, which has been set as the date of first harvest. Normally, a company that is granted Pioneer Status enjoys tax exemption of 70 percent on its statutory income for a period of five years. Effectively a company granted Pioneer Status would have an effective tax rate of 8.4 percent (30 percent \[\text{taxable income}\] x 28 percent \[\text{current tax rate}\]).

**Investment Tax Allowance (ITA)**

The ITA allows an eligible investor an additional deduction, over and above normal entitlement, for capital costs incurred on qualifying planting expenditures including roads and bridges, farm buildings, plant and equipment that are directly used in plantation development. The costs must be incurred within a period of five years commencing from the date of approval.

The ITA for forest plantation developers has been increased to 100 percent of the qualifying expenditures (instead of the normal rate of 60 percent) for other promoted sectors and enhanced to 100 percent deduction (instead of the normal 70 percent) from statutory income for each year of assessment. Effectively, the eligible company can claim up to 200 percent of its qualifying expenditures incurred during the initial five years.
**Schedule 4A of Income Tax Act**

Since a forest plantation is now recognized as an “Approved Agriculture Project” under Schedule 4A of the Income Tax Act, an investor who is currently deriving profits from other sources benefits from having all the qualifying forest plantation expenditures offset against current income. Previously, the planting costs could only be claimed under Schedule 3 of the Income Tax Act\(^5\) as annual capital cost allowance and not against other income.

As the Pioneer Status, ITA and Schedule 4A of the Income Tax Act are mutually exclusive, an investor has to decide on the most appropriate incentive. An investor who expects to profit soon after the commencement of harvesting will logically opt for Pioneer Status. However, becoming profitable soon after harvesting is unlikely to happen. The ITA, on the other hand, allows unutilized allowances to be carried forward indefinitely. This seems to favour forest plantation development, which incurs high initial capital costs and no returns in the first few years of operation. On the other hand, Schedule 4A of the Income Tax Act is suitable for a company that enjoys profits from various other sources as it reduces taxable income for the current year.

**Indirect incentives**

According to the ITA for approved in-house and other research activities, an additional 50 percent of capital expenditures incurred within ten years from the date of approval can be deducted. For approved research and development (R&D) activities, double deduction for expenses incurred and double deduction for cash contribution to approved research institutions or R&D companies are granted.

Other double deduction incentives are also accorded to expenditures such as approved training, freight charges for exporting rattan and wood-based products (excluding sawntimber and veneer), insurance (with a Malaysian incorporated company) on imported and exported cargo, export credit insurance premiums and cost of export promotion.

**Experience of SSB**

**Tax incentives**

SSB, as a pioneer in forest plantation since the early 1970s, does not qualify for Pioneer Status or ITA. Nevertheless, SSB has suffered from initial tax losses in its early years of operation. These losses and some unabsorbed plantation development allowances are being used to offset current taxable profit. It is estimated that SSB is unlikely to be taxable for another ten years.

**Other incentives**

Grants and subsidies in any form, soft loans, technical assistance, training and marketing assistance are not available to SSB. In addition, SSB develops its infrastructure without much governmental assistance. Water and electricity supply to the plantation area and the woodchip mill are also provided by the company without any external assistance.

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\(^5\) Initial development expenditures, which are considered capital in nature, are not tax deductible. However, annual capital allowances for capital expenditures incurred are granted under Schedule 3 of the Income Tax Act. The annual capital allowances for agriculture and reforestation are between ten and 50 percent on the various types of expenditures, and they are deducted from the company’s adjusted business income to determine the statutory business income (See Annex 2 for definitions of the types of incomes).
Non-tax incentives for SSB

To facilitate the reforestation project, the Sabah Government alienated an area of about 60,618 ha to Sapangar Sdn. Bhd. This was alienated with minimum charge on land premium and low annual rental rates during the initial stage of plantation development. The land was subsequently subleased to SSB for 60 years. The allocation of land of such a size and the waiving of the normal terms and conditions of land alienation are the most significant government incentives provided to the joint-venture company.

Compared to other companies, SSB enjoyed a very low land premium and annual rent (Table 16). This has significantly reduced the initial costs of its plantation development. The Net Present Value (at five percent interest) of the land premium and annual rents over 30 years for SSB is only RM216 compared to RM1,403 for other companies. At ten percent interest, the respective figures are RM63 for SSB and RM1,230.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>SSB</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land premium (one-time payment)</td>
<td>RM0.016</td>
<td>RM1 235.00</td>
</tr>
<tr>
<td>US$ equivalent</td>
<td>US$0.0043</td>
<td>US$325.00</td>
</tr>
<tr>
<td>Annual rent first 3 years</td>
<td>RM2.47</td>
<td>US$0.65</td>
</tr>
<tr>
<td>US$ equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual rent second 3 years</td>
<td>RM9.88</td>
<td>US$2.60</td>
</tr>
<tr>
<td>US$ equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual rent balance 93 years</td>
<td>RM14.82</td>
<td>US$3.90</td>
</tr>
<tr>
<td>US$ equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual rent first 15 years</td>
<td>RM0.02</td>
<td>US$0.0052</td>
</tr>
<tr>
<td>US$ equivalent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual rent next 45 years</td>
<td>RM27.22</td>
<td>US$7.16</td>
</tr>
</tbody>
</table>

The subsequent annual rent (US$7.16) may appear high. However, the amount is still considered reasonable because the state government imposes no other royalty or cess tax on the plantation-grown timber. This exemption improves the competitiveness of plantation-grown timber against the small-diameter logs from the natural forests in the market.

DISCUSSION

Despite the government’s efforts to encourage forest plantation development through several tax incentives, investments in forest plantation development are being manifested only slowly. This is clearly reflected in the fact that the current ratio of oil-palm plantations to forest plantation is about 6:1. Between 1995 and 2000, oil-palm plantations have increased annually by 18.6 percent; forest plantations are a distant second at 7.5 percent. There are several reasons for this discrepancy.

Land availability

Land availability, though an age-old issue, is a fundamental constraint to forest plantation development (Rahim Sulaiman 2001). There is relatively little uncommitted state land and most is located in remote areas or is unsuitable for plantation development due to unfavourable terrain or soil conditions. Alienated land, on the other hand, is abundant. However, land can only be alienated for agricultural purpose. Also, land rents and premiums are too high, rendering forest plantations less competitive than alternative land uses.
Since 1997, forest land suitable either for rehabilitation or reforestation has been made available through Sustainable Forest Management Licence Agreements for 27 FMUs. More tree planting has taken place in some of the licensed areas, notably those of ICSB. Whether this will become a long-term development, remains to be seen.

**Land-use competition**

Aside from the question of land tenure, landowners generally prefer agricultural crops, especially oil-palm, for the following reasons:

- Shorter gestation period (oil-palm starts to produce four to five years after planting);
- Ease of marketing despite volatile CPO prices, because of an established market system;
- Higher returns due to high CPO prices in the past and currently (early 2003);
- Less risk (for example, less incidence of fire, pests and diseases);
- Single species, which improves the availability of high-quality planting stock and R&D information; and
- Potential additional income from residues, such as empty fruit bunches that can be used to generate energy or as raw material for industrial products (for example, paper and fibreboard).

In comparison with oil-palm, forest plantations are viewed as more complicated, especially if more than one species are selected. Marketing, technical and scientific support, and planting stock availability are also more problematic. The biggest disadvantage, or most significant impediment, is perhaps the long gestation period. Tree planting, especially over large areas, incurs substantial initial capital costs. This makes investments in forest plantations particularly unattractive. It is therefore not surprising that agricultural development in Sabah has outstripped forest plantations by a large margin over the past two decades.

**Deficiencies of tax incentives**

Even though direct and indirect incentives have been enhanced and much flexibility is provided, certain deficiencies remain, especially when the long-term nature of investing in forest plantations is considered. The Pioneer Status and ITA incentives are primarily designed for industrial and commercial projects with short gestation periods (Thorton 1987). Although these incentives have given extended periods, they do not adequately address the cash-flow problems of investors. Furthermore, Pioneer Status incentives are considered unattractive for the following reasons:

- Mandatory offset of pioneer losses against pioneer income;
- Inability to offset pioneer losses against non-exempted income of the pioneer company during the holiday and postholiday periods;
- Inability to carry forward unutilized pioneer losses to the postpioneer period;
- The ten-year holiday period is suitable only for fast-growing species, but does not suit high-value timber species that require longer rotations; and
- Unutilized plantation development allowances that are common in reforestation projects cannot be offset against income from another business source even if carried out by the same company.

In the case of the ITA, although the standard allowance rate of 60 percent has been enhanced to 100 percent, resulting effectively in a 200-percent claim for qualifying expenditures incurred, the qualifying period remains at the first five years. This suits industries where most capital expenditures are incurred early after commencement; forest plantations are subjected to costs for silvicultural treatment throughout the rotation until the final harvest.
However, the recent amendment of Schedule 4A of the Income Tax Act is an attempt to address the interim cash-flow problem of an investor in forest plantation. Of significance in this amendment is the inclusion of a list of tree species that qualify for an “Approved Agriculture Project”. This list comprises both exotic and indigenous species that are commonly used for planting including important dipterocarps for rehabilitating logged-over forest.

**Possible improvements to the incentive schemes**

Some incentives that may alleviate the cash-flow problem in the early years of planting are:

- **Grants and subsidies**
  Support should be provided in the form of replanting grants, cost refund grants (subsidy), grants for prescribed R&D and grants for a variety of capital costs incurred. Any form of grants and subsidies would enhance considerably an investor’s cash flow in the early years after plantation establishment.

- **Special/soft loans**
  It is not a common practice for most of the Malaysian financial institutions to extend any loan beyond ten years’ maturity. Access to long-term and inexpensive financing is important for forest plantation development. Special loan schemes for long-term investments should be arranged at preferential rates.

- **Group relief**
  Companies incorporated in Malaysia are limited by shares. The liability of the shareholders is limited to the amount of the paid-up capital of the companies. Corporate taxes are based on the annual return of each individual company. The company may not claim any relief that is accorded to its parent company or subsidiary company. Group relief is not permitted except for the food and fruit cultivation sector with certain conditions.

  As the initial planting costs are now treated as an operating cost and are fully deductible from current year revenue, they can be offset against any other company income immediately without having to wait until the final harvest. This may reduce profits or incur losses.

  Having allowed the offset of initial planting costs by transforming them into losses, the unabsorbed amounts of losses could be used immediately to offset them against the income of another company within the group if group relief is available. The group relief incentive, if permitted, would allow major investments in forest plantations.

- **Non-taxation of income derived during land clearing**
  Despite the ruling of the Privy Council on a controversial tax case (*Makmor Sdn. Bhd. vs Director General of Inland Revenue, 1983*), it is still uncertain whether indigenous timber cut during land clearing is taxable. The income from the sale of such timber, if non-taxable, would alleviate the negative cash flow during the first years after plantation establishment.

- **Effect of unutilized Schedule 3 allowances**
  According to the current system of granting tax exemption for ten years, statutory income is determined only after the accumulated Schedule 3 plantation development allowance has been offset. Considering that timber plantations would have accumulated substantial plantation development allowances, in view of its long gestation period, the tax holiday may be of academic interest if there is little or no statutory income after the mandatory offset of agricultural and other Schedule 3 allowances. It would be extremely advantageous if the tax exemption could revert to the old basis at adjusted income stage (before Schedule 3 allowances being offset), leaving the unutilized allowance untouched for future offsets and at the same time enhancing the tax exempt credits being created for franking dividends.
- **Effect of unutilized pioneer losses**

Similarly, the current basis of treating companies with Pioneer Status is to offset pioneer income against pioneer losses. This diminishes and caps the extent of benefits otherwise available with a higher level of exempted income. Furthermore, should unrelieved pioneer losses remain unutilized, they are not carried forward to the postpioneer period, effectively making a pioneer company worse off than a company operating without such incentive. The inability to offset pioneer losses during the pioneer period against non-pioneer income also unduly punishes a pioneer company that incurs losses.

The effect of the unutilized Schedule 3 allowances and pioneer losses, which were generated by the tax reform in 1991, severely punishes long-term and risky investments such as forest plantation development. If losses are incurred, a pioneer company is rendered weaker than a non-pioneer company.

**CONCLUSIONS**

Tax incentives alone had only a minor impact on forest plantation development in Sabah in the past. To effectively promote tree planting, incentives need to be more suitable and better targeted. They should take into account the cash-flow requirement of investments with long gestation periods. In addition, the forest plantation sector needs to be supported by non-tax incentives such as land at reasonable premiums and annual rents.

The amendment of Schedule 4A of the Income Tax Act in early 2002 is seen as a major step forward since 1994 when forest plantations were treated as an industry of national and strategic importance. It is designed to address the cash-flow problem that has been lamented by the industry for too long. Enrichment planting in logged-over forests is given appropriate attention, as most of the species commonly used in rehabilitation are included in the amendment.

Although the effect of the amendment is not known yet, it is hoped that it will encourage some of the major oil-palm companies to consider planting trees as an alternative to oil-palm and investors to rehabilitate the vast area of forest land made available under the Sustainable Forest Management Licence in Sabah.

**LITERATURE CITED**

- **FACE Foundation.** 1997. *Annual report, 1996*. Arnheim, the Netherlands, FACE.


# ANNEX 1: COMPARISON OF INCENTIVES

<table>
<thead>
<tr>
<th>Incentives</th>
<th>Forestry</th>
<th>Traditional agriculture: rubber, oil-palm, cocoa</th>
<th>Other promoted agricultural activity/produce, fruit &amp; food cultivation, floriculture/ aquaculture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replanting costs claimed as revenue items</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Schedule 3 agricultural allowance for capital expenditures</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Promoted activity (for tax incentives such as Pioneer Status and ITA)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>(including bamboo and cane)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approved agriculture product qualifying for Schedule 4A option as revenue write-offs</td>
<td>Yes</td>
<td>No</td>
<td>Yes (aquaculture, food crops, floriculture)</td>
</tr>
<tr>
<td>Group relief for losses incurred</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Strategic industry of national importance qualifying for 10 year pioneer &amp; 100 percent ITA</td>
<td>Yes</td>
<td>No</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Re-investment allowance (additional 60 percent claim on capital expenditures for qualifying agricultural projects)</td>
<td>On application</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Additional incentive for promoted area (Eastern Corridor)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Infrastructure allowance (100 percent allowances for capital expenditures on roads and bridges: jetties and other permanent structures in promoted areas)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R&amp;D incentives:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double deductions for expenditures on approved R&amp;D projects</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>cash contribution to approved R&amp;D institutes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>payments for use of R&amp;D centres</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pioneer Status/ITA incentives for companies carrying out:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>contract research companies (5 years Pioneer Status/100 percent ITA)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R&amp;D for group and other companies (ITA 100 percent)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>In-house research for related companies (ITA 50 percent)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Duty exemption for imported machinery/materials for agricultural and R&amp;D activities</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Capital allowance and ITA assets used for R&amp;D</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
ANNEX 2: DERIVATION OF ADJUSTED AND STATUTORY INCOME

GROSS INCOME

Less: Allowable expenses
Less: Double deduction of expenses
Less: Special deductions (S36(6) of the ITA 1967)

ADJUSTED INCOME

Add: Group relief – current year adjusted loss surrendered by a “surrendering company” (Y/A 2000 onwards – Sch 4C of the ITA 1967)
Less: Re-investment allowance (Y/A 1996 and prior)
Less: Industrial adjustment income
Add: Balancing charges
Less: Capital allowances and balancing allowances (part of Schedule 3 allowances)

STATUTORY INCOME

Less: Exemption of income for pioneer companies/investment tax allowance (for application received on or after 1.11.91)
Less: Re-investment allowance
Less: Previous year’s business losses
Add: Statutory income from other sources
Add: Recoveries of abortive prospecting expenditure
Add: Recoveries of expenditure on approved agricultural projects (Schedule 4A of the ITA 1967)

AGGREGATE INCOME

Less: Current year’s business losses
Less: Prospecting expenditure
Less: Expenditure on approved agricultural projects (Schedule 4A of the ITA 1967)
Less: Pre-operational business expenditure (Schedule 4B of the ITA 1967)
Less: Proportion of permitted expenses for investment holding companies (Y/A 1993 onwards – S60F of the ITA 1967)
Less: Trust annuity (S64(5) of the ITA 1967)
Less: Approved donations (S44(6), 44(6A), 44(8), 44(9), 44(10) & 44(11) of the ITA 1967)
Less: Group relief – current year adjusted loss transferred from a “surrendering company” (Y/A 2000 onwards – Schedule 4C of the ITA 1967)

TOTAL INCOME

Less: Personal relief for resident individuals

CHARGEABLE INCOME
INTRODUCTION

Geographic and economic backgrounds

New Zealand comprises two main islands (North Island and South Island) and several small islands, totalling 27.1 million ha in area. About 25 percent of the land area is less than 200 metres above sea level; steep hills and mountain ranges that approach 3 754 metres often form a backdrop to this low-lying land. New Zealand experiences a maritime, temperate and windy climate. It has a population of 3.8 million people. The economy is based largely on export-oriented primary production, with agricultural products accounting for about 35 percent of total overseas trade (by value). Some economic indicators of New Zealand are presented in Table 1.

Before initial Māori (Polynesian) settlement in New Zealand about 800 years ago, most areas below the natural treeline were forested. Over 100 natural forest types covered around 85 percent of the country. Between the fourteenth and sixteenth centuries in particular, large areas of forest were burnt as the population expanded. In 1840, when the Māori population was about 115 000 and European settlers numbered approximately 2 000, the Treaty of Waitangi was signed between the British Crown and Māori chiefs to record the consent of the Māori to New Zealand becoming a British colony.

European settlement commenced in earnest from this time, when indigenous forests covered about 53 percent of the land area. The European settlers and their descendants saw forests as both an obstacle to agriculture and an inexhaustible source of timber. Pasture increased from less than 70 000 ha in 1861 to 4.5 million ha in 1901. By 1920, most of the current 11.9 million ha of agricultural land had been cleared. This was the primary cause of the decrease in natural forest cover to the current 6.3 million ha or 23 percent of New Zealand’s land area (Ministry for the Environment 1997).

Table 2 details current land uses, while Figure 1 shows the distribution of plantation and indigenous forests. Approximately 16.8 million ha of the total land area is under private ownership and 10.3 million ha belong to the government.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Table 1: New Zealand economic indicators (year ended 31 March 2001)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population density (people/km²)</td>
<td>14.16</td>
</tr>
<tr>
<td>GDP (NZ$ million)*</td>
<td>112 316</td>
</tr>
<tr>
<td>GDP per capita (NZ$)</td>
<td>29 271</td>
</tr>
<tr>
<td>Forest industry contribution to GDP (%)</td>
<td>4.0</td>
</tr>
<tr>
<td>Total NZ merchandise trade – re-exports (NZ$ million)**</td>
<td>30 793</td>
</tr>
<tr>
<td>Forest industry contribution to total NZ merchandise trade by value (%)</td>
<td>11.5</td>
</tr>
<tr>
<td>Net international debt (NZ$ billion)</td>
<td>84.3</td>
</tr>
<tr>
<td>Annual percentage change in GDP</td>
<td>+2.5</td>
</tr>
<tr>
<td>Inflation (%)</td>
<td>+3.0</td>
</tr>
<tr>
<td>Labour force (million)</td>
<td>1.915</td>
</tr>
<tr>
<td>Forest industry employment as percentage of labour force</td>
<td>1.3</td>
</tr>
<tr>
<td>Unemployment rate (percentage of labour force)</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Sources: Statistics New Zealand; Ministry of Agriculture and Forestry
* GDP = Gross domestic product; on 1 August 2002, NZ$1.00 = US$0.47.
** Year ended June 2001 (provisional).

Table 2: Current land uses in New Zealand

<table>
<thead>
<tr>
<th>Land use</th>
<th>Area (million ha)</th>
<th>Percentage of total area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indigenous forest</td>
<td>6.3</td>
<td>23.2</td>
</tr>
<tr>
<td>Shrubland</td>
<td>2.7</td>
<td>10.0</td>
</tr>
<tr>
<td>Plantation forest</td>
<td>1.8</td>
<td>6.6</td>
</tr>
<tr>
<td>Pastoral, horticulture &amp; arable</td>
<td>11.9</td>
<td>43.9</td>
</tr>
<tr>
<td>Tussock grassland</td>
<td>2.0</td>
<td>7.4</td>
</tr>
<tr>
<td>Other land*</td>
<td>2.4</td>
<td>8.9</td>
</tr>
<tr>
<td><strong>New Zealand total land area</strong></td>
<td><strong>27.1</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Forestry (2001)
* Mostly land with no potential for sustainable production, towns, lakes, rivers and unclassified areas.

Role of the forest industry in the economy

New Zealand is geographically isolated from major world markets, so innovations to increase productivity and competitiveness are cornerstones to survival and growth, including plantation forest development. Fertile soils, abundant rainfall in most areas and few temperature extremes, provide ideal conditions for growing trees. In addition, no part of the country is very far from a seaport.

Timber has always played a significant role in the New Zealand economy, and in the early development of the country it was the principal export. Many of New Zealand’s small towns started as lumber camps. As European settlement increased, a strong local timber market developed with wood required for housing, fuelwood, fencing, gold mining, construction and, in due course, railway sleepers. The indigenous timber industry reached a production peak in 1907 and then declined as the prized kauri (Agathis australis) forests were logged to near extinction. The development of a plantation-based forest industry began with the establishment of a State Forest Service in 1919. There are now 1.8 million ha of plantation forests. Plantations cover seven percent of New Zealand’s land area and comprise 29 percent of the total forest area.
In the year ended March 2002 (provisional figures):

- An estimated 20.9 million m³ of wood were harvested from New Zealand’s forests (99.7 percent of which came from the plantation forests);
- The average recovered volume from plantations was 482 m³ per ha harvested, and the average age of the harvested radiata pine was 27 years;
- 13.5 million m³ were processed domestically by New Zealand’s industry mix of four pulp and paper companies, eight panelboard companies, more than 350 sawmillers and approximately 80 manufacturers;
- The estimated roundwood equivalent of 14.3 million m³ were exported, in raw and processed forms, earning NZ$3.6 billion and ranking forestry third in terms of commodity exports;
- The estimated roundwood equivalent of 1.7 million m³ of forest products (December 2001) were imported (largely paper and paperboard); and
- Forestry directly provided jobs for 24 300 people or 1.3 percent of the total number of people employed (as at February 2001).
New Zealand accounts for 1.1 percent of the world’s total supply of industrial wood. This generates 1.3 and 8.8 percent of the world and Asia-Pacific trade in forest products, respectively. However, the New Zealand forest industry has huge potential. Looking forward to 2010, the industry based on plantation forests could:

- Cover 2.2 million ha or eight percent of New Zealand’s total land area (at a planting rate of 40 000 ha per year);
- Supply 31 million m$^3$ of wood per year;
- Account for 1.9 percent of the world’s industrial roundwood (based on current total world production);
- Invest up to NZ$3 billion in new wood processing facilities if most of the predicted annual production of 31 million m$^3$ was processed domestically;
- Add NZ$5 billion to current export earnings; and
- Provide employment for an additional 20 000 people.

**Role of public and private sectors in forestry**

From 1919 to March 1987, the government’s commercial forestry operations were administered by one agency, the New Zealand Forest Service. In the mid-1980s, New Zealand underwent radical reforms moving from a regulated to a market-based economy, and there was significant re-organization of government agencies. In 1987, the government announced its intention to sell its entire plantation forest estate. This involved 550 000 ha, or about half of New Zealand’s plantation forest resource at the time. The Department of Conservation manages the government’s indigenous forest estate. The Ministry of Agriculture and Forestry has policy, sustainable development, forest health and protection (quarantine) functions. Forest research is carried out under contract to government and private enterprise.

Generally, New Zealand has enjoyed stable and transparent governments with sound legal, policy, planning and institutional frameworks in all sectors. This played a significant role in encouraging overseas investment in forest assets. Central government now controls a mere three percent of the country’s plantation forests. State-owned enterprises and local government control another three percent each. Through the sales process, the face of New Zealand forestry has become more diverse and international. There are 20 companies that each manage more than 10 000 ha of forest. Small-scale growers are increasing their presence. Increased competition and greater exposure to international market fundamentals have enhanced the industry’s competitiveness and its contribution to the New Zealand economy.

**Current forest production and conservation policies**

The government’s focus has shifted from direct involvement in the industry to promoting economic and regulatory environments in which the forest industry acts for itself wherever possible – to seize economic opportunities, protect and enhance the environment and, in the process, to advance New Zealand’s social goals. New Zealand has no national forest policy at the moment. The Resource Management Act 1991 sets the legislative framework for the sustainable use, development and protection of land, air and water resources. It is implemented primarily at the regional and district government levels. A 1993 amendment to the Forests Act 1949 requires indigenous forests on private land to be managed under approved sustainable forest management plans or permits where timber is to be harvested, and sawmills processing indigenous timber to be registered. The amendment also introduced further controls on the export of indigenous timber products.
GENERAL OVERVIEW OF PLANTATION FOREST DEVELOPMENT

As early as the 1870s, concern was developing over the rapid rate of indigenous forest depletion. Some leading politicians recognized that the indigenous forests were not inexhaustible and future demands would have to be satisfied by imports or plantation forests. The first forestry legislation was passed in 1874 in an attempt to limit deforestation. It did not endure against the dominating view that forests impede the development of agriculture. Further legislation in 1885 set aside state forests, established a school of forestry, and appointed forestry staff. The interest shown in forestry at that time was again short-lived.

Apart from early European settlers’ efforts to provide shelter or beautify some treeless areas, tree planting took place only from 1871, encouraged mainly by local governments. Central government afforestation took place from the late 1890s under the Lands Department, and about 16 000 ha were planted by 1919.

In 1913, a Royal Commission on Forestry identified some of the main forestry and timber problems, and predicted that the growing demand for timber would exhaust the supply from the indigenous forests in approximately 50 years. The First World War delayed implementation of the Commission’s recommendations, but also highlighted the importance of adequate timber supply. In 1919, the newly established State Forest Service incorporated exotic forestry, indigenous forestry and indigenous forest regeneration under its responsibilities. Further and enduring legislation was passed in 1921 and 1922. These initiatives provided a boost to forest management and afforestation.

The assessments of indigenous timber resources and future domestic timber demand, and the concern that the indigenous forests would be depleted, led to the adoption of large-scale afforestation by the government. This was accompanied and supported by technological developments that significantly improved the economics of forestry and lowered the risks. Growth and yield performance led to radiata pine becoming the species of choice. Between 1925 and 1936, about 288 000 ha were planted. Initially this was a government undertaking, but once the financial rewards and technologies were firmly established, the private sector quickly responded and contributed significantly to the planting boom. The largest afforestation company (New Zealand Perpetual Forests Ltd.) planted 68 000 ha during this 12-year period.

From 1936 to about 1960, little planting was undertaken. Initially this reflected a review of Forest Service Policy that noted the prominence given to exotic plantations in the preceding years. A more balanced approach was subsequently pursued to complete the establishment of existing forests, rather than focus on the silvicultural treatment of indigenous forests.

Another important factor was the 1937 discovery of a remedy (cobalt) for so-called “bush sickness” on the pumice lands of the central North Island that had severely restricted the development of agriculture. This land was ideal for forestry and was where most of the large-scale afforestation had taken place. With the discovery of a cure, the prospects for further large-scale afforestation diminished. Mistakes were also made in these early plantings with poor siting in particular leading to extensive failures of radiata pine and other species. A major fire and an insect epidemic over a large area were other factors that caused foresters to reflect upon appropriate management practices.

The 1940s and 1950s were also times of great change for processors and end-users who had been accustomed to high quality, indigenous timbers, but were now increasingly faced with non-durable pine from untended early plantings, which contained many defects. The State Forest Service devoted considerable attention to utilization issues.

With the significant production and demonstrated returns from plantations, the building of a processing sector utilizing plantation-grown timber, plus a re-assessment of future demand and the desire to create an export industry, the government initiated a second wave of planting in the early 1960s. This time the circumstances were somewhat different – the government also
needed to provide political support and financial incentives apart from demonstrated returns and adequate information.

Since 1960, the government progressively introduced a range of support measures to accelerate tree planting on private land. As with the first planting boom, this expansion was driven by the Forest Service. Again, the planting was largely with radiata pine. The ever-increasing amount and complexity of the government incentives to forestry characterized this period from the early 1960s to the mid-1980s. The plantation estate grew from 352 000 ha in 1960 to over one million ha by 1984, of which nearly half was on private land.

Deregulation in 1984 changed the New Zealand economy from one of the most controlled to perhaps the most open economy in the world. Direct incentive schemes were terminated, extension services became cost-recoverable and significant changes were made to the taxation regime that applied to forestry. The government’s commercial forestry activities were initially corporatized, then privatized in the early 1990s. This combination of events resulted in a dramatic drop in new planting. By 1992, the bulk of the government’s plantation forest assets had been sold. Further changes to the taxation regime were introduced and the government actively promoted forestry investment, mainly through the provision of information. Development of the supporting infrastructure, such as ports, railways and bridges, in most regions was another key facilitating factor. Declining agricultural product prices and land values also had an important influence on the competitiveness and profitability of forestry. Agricultural landowners recognized the value of forestry in diversification and sustainable management. Most importantly, a global price spike for logs in 1993 and 1994 drew unprecedented interest in forestry. These factors buoyed private investment and were important in attracting foreign investors and forest managers, who brought capital, plantation development expertise, technology and crucial access to foreign markets. As a result of these influences, new plantings surged to record levels during the mid-1990s. The last few years have seen planting decline to a perhaps more sustainable long-term rate as log prices returned to more traditional levels.

Having progressed successfully from public plantation development and ownership to private corporate ownership and expansion, the industry has now moved into another phase where the majority of the new planting is on small woodlots and plantations by private landowners and partnerships. A further sign of the maturation of the industry is the presence of professional organizations and sector associations in the processing and marketing arenas, as well as the constructive working relationships that have been built up over time with key stakeholders – the government, research organizations, civil society and environmental groups.

The enduring nature of the newly created forest plantation prompted the following observation 30 years ago that still holds true today:

In numerous localities where the indigenous timbers, first the kauri, and later those outside the kauri country became exhausted all that remained as a reminder of once flourishing sawmilling centers were ghost settlements and often not even that. With our predominantly radiata exotic plantations, however, we now seem to have somewhat of a paradox – new and apparently permanent prosperous towns the economy of which is based entirely on these plantations (Simpson 1973).

The history of plantation forestry development in New Zealand has run in parallel with a gradual change in the mindset regarding tree planting. From being appropriate just for “waste” land (i.e. land unsuitable for agriculture) and marginal land, plantation forestry is now being actively pursued as a profitable enterprise able to compete for land with any other activity and contribute to sustainable land management. New Zealand’s plantation forests of 1.8 million ha continue to grow at around 30 000 to 40 000 ha per annum, and are 91 percent privately owned. Radiata pine (Pinus radiata) accounts for 89 percent of the plantation area, Douglas fir (Pseudotsuga menziesii) another six percent, other softwoods (mainly Pinus spp.) two percent and hardwoods (mainly Eucalyptus spp.) three percent. The plantations are managed
primarily for industrial roundwood production, although some smaller areas are maintained for soil conservation purposes. An accord signed between the industry and environmental groups in 1991 recognized commercial plantation forests as an essential source of perpetually renewable fibre and energy, offering an alternative to stop the depletion of the natural forests. At the same time, it also acknowledged the importance of protecting the existing native biodiversity.

Figure 2. Annual government and private new planting

PLANTATION FOREST DEVELOPMENT PRIOR TO 1870

Until 1840, the New Zealand timber industry depended on the harvesting of Māori-owned indigenous forests. The provincial government in the Canterbury region of the central South Island was the first to encourage tree planting by passing the Planting of Trees Ordinance in 1858. This was mainly to develop on-farm wood resources on leased land in significant treeless areas. The ordinance permitted tenants to plant trees on their land and reimbursed them for the trees if the leases were terminated (see Annex 1 for summary of developments during this period).

INITIAL RECOGNITION OF PLANTATION FORESTRY AND THE BEGINNING OF THE LEARNING CURVE (1870-1918)

By 1870, increasing concerns about the depletion of the indigenous forests led some politicians to acknowledge that future demands for industrial wood from these sources would have to be supplemented by imports or plantation forests. However, the government’s primary objective of promoting European settlement and rapid economic development took precedence over any concerns about the rate of deforestation. Most of the land clearance by Europeans took place between 1870 and 1920.

Legislation

Two reports submitted to the government in 1870 recommended incentives for the planting of trees and provided the initiative for the Forest Trees Planting Encouragement Act 1871. This was particularly targeted at the treeless Canterbury Plains and Central Otago in South Island, where trees were needed for building materials, railway sleepers, fuel and shelter for stock and
crops. Under the provisions of the Act, farmers were entitled to a free land grant of two acres\(^3\) of wasteland for every acre of freehold land planted with suitable trees. The government also encouraged tree planting on state land by reducing the rents of tenants who planted trees on their leaseholds. The Act was never fully implemented, nor was it particularly popular with the farmers. By 1877, only 622 acres were planted in Canterbury compared to 1 300 acres that had been planted independent of the Act on private land by 1871.

The first Forests Act (1874) was an attempt to halt the indiscriminate destruction of indigenous forests and establish a forest department specifically focused on ensuring a long-term supply of (indigenous) timber. It provided £10 000\(^4\) for ten years to be spent on forest management, which included planting. However, the first forest conservator, appointed in 1893, saw only a small role for the government in plantation forestry. Government forestry was also seen to be in conflict with settlement aspirations, and the legislation failed after three years.

Under the State Forests Act of 1885, the revenue from harvesting indigenous forests was placed in a dedicated “State Forests Account” from which the costs of plantation forestry could be drawn. The legislation also offered subsidies to local government for establishing plantations. Once again, however, the brief interest in forestry did not endure and the State Forest Department was dismantled in 1887.

**Local-level afforestation assistance**

Since 1871, large grants of government land were made available to district councils for afforestation purposes. In return, the councils were expected to provide seedlings and funds, and undertake forest establishment, which was difficult to achieve. It was eventually agreed that planting should be gradual and that the areas where planting was deferred could be leased to provide revenue to defray some of the costs. Provincial governments also sought to increase private planting by issuing a land order of £4 to anyone who successfully planted one acre with any type of tree. This scheme lasted for 20 years. It was particularly popular in Canterbury and Otago where the establishment of shelterbelts to provide protection from the prevailing northwest winds was valuable to farmers. Some of these plantations were up to 200 or 300 acres of largely radiata pine or *Cupressus macrocarpa*. Continuous, small-scale planting, partly funded in this way, provided the foundation for the Canterbury Plantation Board to become New Zealand’s first plantation forest management agency.

Tree planting subsidy schemes had stopped in the early 1890s. By this time, planters had identified species with superior yield potential including several pine species, Douglas fir, eucalypts, cypresses and, in particular, larch (*Larix* spp.).

**Government leadership and national coordination**

A turning point for plantation development came in 1896 when the government convened a national timber conference, bringing together timber industry representatives, conservationists and farmers. The conference concluded that, because of the demand for timber, attempts to conserve indigenous forest would be futile without the establishment of plantations. The recommendations, listed hereunder, were well received and adopted:

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\(^3\) One acre is approximately 0.4 ha.

\(^4\) The New Zealand currency was pounds, shillings and pence until 1967 when dollars and cents were introduced at the rate of £1 to US$2.
- It is desirable to commence the planting of lands unfit for agricultural or pastoral purposes immediately;
- Experimental grounds should be established for the raising of various trees and the supply of trees at nominal cost to those willing to make plantations for timber purposes only; and
- Advice and direction should be afforded by the government to assist private planting for forestry purposes.

**Government afforestation**

The government responded in 1896 by establishing an afforestation branch within the Lands Department, and the first government-organized afforestation commenced. The government implemented an annual planting programme that focused on land in the central North Island volcanic plateau, considered deficient for farming. The first tree nurseries were also established. Fifty-four acres were planted in 1898 and numerous trials were established to compare indigenous with exotic species and determine the most suitable trees for plantations. Initially, labour constraints hindered the expansion of plantation forestry, but tree-planting prisons were established and convict labour was used until 1920. By 1904, afforestation was up to approximately 1,000 acres of new planting per year. Planting was targeted at government land near railway lines where there was little existing adjacent forest.

By 1908, 9,465 acres of plantations were established. These plantings illustrated that exotic plantations were technically feasible, although the cost of establishment was high. The average figure was £20/acre (approximately NZ$5,970/ha in December 2001 values).

**Government supply and demand analysis**

In the early 1900s, the quality and quantity of indigenous timber were diminishing rapidly. It was estimated that the supply was likely to be exhausted in less than 70 years (Kensington 1907). Demand for wood was also growing quickly. Between the turn of the century and 1908, imports had increased fivefold despite indigenous timber production doubling over the previous ten years. A Royal Commission on Forestry set up in 1913 recognized the limitations of the indigenous forest to meet future timber supply, the unsatisfactory fragmentation of forestry administration and a lack of interest in afforestation by the administrators. The Commission suggested that indigenous species, and even the most commonly planted exotic at that time – larch, were unsuitable for plantation purposes, but did note that *Pinus radiata* was being raised in quite insufficient numbers. The strong performance of pine species in New Zealand was becoming evident. Its roles in controlling erosion and stabilizing sand dunes were also recognized.

**Government support and indigenous timber controls**

In 1908, the government responded to industry lobbying by introducing reduced rail freight rates for timber, which cost the government between £25,000 and £35,000 (approximately NZ$3.0 to 4.2 million in December 2001 values). Forestry was given a considerable stimulus when the government began supplying seedlings to settlers at cost price for farm planting as early as 1916, and assisted further through the provision of extension.

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5 All inflation-adjusted figures in this paper are based upon a Consumer Price Index (CPI) (All Groups) regular survey that commenced in 1914. Where the original figure predates 1914, the inflation adjustment for the intervening period is based upon an estimate of CPI trends from a 1912 Royal Commission report that detailed food and rent prices in New Zealand’s four main centres from 1891.
The repatriation of 1914-1918 soldiers, an increase in the number of marriages, higher wage rates and a general feeling of prosperity, all led to a high demand for construction timber. This situation was fuelled by substantial government housing subsidies for returned soldiers. During, and for some years after the war, discharged soldiers were also eligible for grants of forest trees for farm purposes.

The growing concern over the fate of New Zealand’s indigenous forests resulted in the introduction of wide-ranging regulations in 1918 to control timber milling and exports. The Minister of Forestry was empowered to set the maximum production at each sawmill, require millers to report their activities and impose a system of export and domestic price controls. Later, export quotas were introduced and permits required for timber exports to control domestic prices with the aim of “conserving New Zealand timbers for New Zealand use”.

**Period summary and conclusions**

The period was notable for the gradual change from viewing indigenous timber supply as inexhaustible to a realization that existing forest resources were inadequate to meet the country’s future needs. Accordingly, increasing government involvement in the forestry sector took place.

Development and implementation of forest policy and legislation were severely constrained by the European pioneering attitude that saw forests as obstacles to settlement and agricultural development. While land settlement reached its peak around the turn of the century, forestry continued to be perceived only as an alternative where agriculture was uneconomical. The government attempted to address these issues many times, but overall political support was weak until the end of the period. Land grants were the principal direct means of encouragement for plantation forestry. Initial steps by the government to develop a viable industry and knowledge on afforestation, and the gradual refinement of cost-effective planting techniques, provided some indirect incentives. By 1918, a toehold of some 13 000 ha of plantations had been established, most of it encouraged, but not owned, by the government.

The government also impacted on the timber industry through duties and tariffs, adjusting rail freight rates and establishing new wage bargaining procedures. These were generally ad hoc responses either to crises in the timber industry, rising production costs, or increasing competition from imported timbers. The First World War led to the introduction of export price controls and quotas in an attempt to provide low-cost raw materials for postwar construction. Whilst this policy achieved its objectives, it also meant that even greater incentives were required to persuade private individuals to grow trees. Annex 1 summarizes incentives for plantation forestry development provided during this period. Conclusions about these incentives are:

- A fundamental and long-term need for wood was accepted;
- Plantations could readily substitute natural forests to nearly satisfy this need;
- To implement plantation strategies, incentives are required because of the time lag between establishment and maturity;
- In an environment dominated by short-term objectives, the New Zealand Government had an important role in demonstrating and developing the management for a new land use – plantation forestry (based on exotic species);
- Incentives are ineffective where they are at odds with the prevailing attitudes, and their success is significantly impeded if other policies are inconsistent with the objectives of the incentives; and
- Fragmentation in government administration hinders the development and implementation of effective policy for land use and industry.
LARGE-SCALE GOVERNMENT PLANTING (1919-1938)

In 1919, the State Forest Service was formed, and experienced, trained, professional foresters were appointed to senior positions. The Forest Service initially adopted a new policy direction away from afforestation, export restrictions and price controls, and towards a more comprehensive government forestry programme focused on sustainable management of indigenous forests. It was believed that this would be enough to assure future supplies of timber for the country.

The first national forest inventory, carried out between 1921 and 1923, revealed that five million ha, or around 20 percent of the country, could be classified as forest land, of which only 45 percent (2.24 million ha) was merchantable. Furthermore, the 1925 annual report of the Forest Service estimated the total economically available indigenous softwoods at around 60 million m³, and the per capita consumption of the 1.35 million inhabitants of New Zealand at a little over 0.5 m³ per annum. Based on population trends and the expansion of industry, particularly agriculture, it was further calculated that by 1965, the national demand for sawn timber would be 1.6 million m³, and that New Zealand’s virgin softwood supplies would be exhausted by 1970.

These results forced a policy rethink. Timber product substitution was not considered feasible, and increasing reliance on imports was perceived as costly and creating an unwelcome dependence on overseas supplies. Despite the uncertainties of large-scale afforestation, it was viewed as the only solution, and from 1925 onwards afforestation became a central plank of forest policy. Thus, the conclusions of 20 years earlier were reaffirmed and the afforestation solution was pursued with renewed vigour. This became the rationale for the extensive government forest planting and the incentives to encourage private companies, local authorities and private individuals that followed.

An official report calculated that about 238 000 ha of radiata pine planted over a 34-year period would be needed to supply expected demand, assuming no remaining indigenous forest resources. A new afforestation strategy was announced, which recommended that the 5 200 ha of government plantations that existed in 1925 be increased to 120 000 ha by 1935 to meet New Zealand’s timber needs from 1965 onwards. The early learning phase had provided much of the groundwork that allowed planting on this scale to be contemplated.

Research

An improved seed collection service was introduced in 1923 to counter the impacts of poor, and inconsistent, tree-form characteristics. Silvicultural research efforts had focused on ascertaining the most appropriate time to plant, spacing, maintenance of soil fertility, shade requirements and fertilizer response. A separate stream of research was concerned with insect pests and fungal diseases of trees. Forest product research, including kiln-drying, physical and mechanical properties of various timbers, timber treatment and preservation, and pulp and paper potential, began in 1921. By 1925, when the first planting boom occurred, there were already some five or six years of useful results from government-conducted research to draw from. Dedicated forestry schools were also established in Canterbury in 1925 and Auckland in 1926, although both closed in the early 1930s.

Government support

From 1921 to the end of 1930, the sale of seedlings at cost price from government nurseries for private planting was also given considerable emphasis, and resulted in a significant number of trees being planted. In 1927 alone, some 4.8 million trees were supplied from government nurseries to individual landowners. Much of this planting was for shelter and on-farm uses, rather than for commercial returns. The government ceased to supply seedlings in 1930 after submissions from the Nurserymen’s Association that considered it to be unfair competition.
From 1921 to 1930, the State Forest Service employed a North Island and a South Island officer whose role was to travel the country giving addresses and dispensing advice on tree planting. This was supported by extensive Forest Service research into the growth, yield and potential of various exotic species, although a forest research institute was not established until 1947.

**Improving the economics**

Improvements in afforestation and planting techniques, particularly between 1921 and 1924, reduced the cost of establishing plantations from £26.18/acre in 1918 to less than £2/acre in 1925. This eliminated one of the principal objections to afforestation – that it was uneconomical. The goal of 120 000 ha by 1935 became a national policy. Direct sowing of tree seeds and wider spacing between planted seedlings were also introduced. By the mid-1930s, the cost of planting in the central plateau, where half of the planting was taking place, remained at around £2/acre (approximately NZ$408/ha at December 2001 prices).

**Provision of labour**

Convict labour comprised the bulk of the labour force used in government afforestation up until 1921. This was supplied free-of-charge to the Forest Service at first, but for about six years until 1921 the Forest Service (and its predecessor) was charged the actual cost of maintaining the convicts, which illustrates the true cost to government. From 1921 onwards, the Forest Service no longer used convict labour, and workers were drawn instead from the ranks of the unemployed.

During the Great Depression, subsidized work relief programmes gave considerable stimulus to the government’s afforestation programme. Tree planting under public works’ relief schemes was widespread during the 1930s and the target of 120 000 ha by 1935 was exceeded by 25 percent in 1934. Another government response during the Depression was to provide a subsidy for construction of houses equivalent to 33.3 percent of wages up to a maximum of total construction cost. This had obvious linkages to the timber industry. Freight rate concessions were also available.

**Government plantation forestry**

Government plantation establishment was financed by loans with compounding interest, rather than annual appropriations. Combined with forest revenues that could be applied to non-planting purposes, annual receipts were consequently insufficient to meet accumulated debts. In one of the worst cases, the expected yield from Dumgree Forest established in 1903 was less than five percent of the accumulated debt, largely due to compounding interest.

Between 1927 and 1932, exotic pine production increased from 17 500 to 32 000 m³, although still only representing six percent of total production. Twenty percent of this exotic production came from government forests and was typically used domestically for poles, sleepers, mine props, posts, battens and fuel.

A new forest policy in 1934 de-emphasized the importance of expanding the plantation estate, and large-scale forest planting ceased. Exotic plantations were seen as “supplementary forest resource capital”. In view of subsequent events, the reasons are worth noting. Firstly, halting large-scale plantings was perceived to be appropriate because it was considered that plantation resources were sufficient to supplement indigenous forests for the next century. In addition, surplus exotics were envisaged to be export oriented and therefore would not be competitive in the international market.

Diversification was also emphasized so that no species would form more than 30 percent of the total resource. This strategy had been given impetus by outbreaks of the wood wasp (*Sirex noctilio*) and fungal infections. A more limited afforestation programme continued, partly
to reduce the proportion of radiata pine from its 40 percent level in 1934 to the 30 percent target, and partly to improve the age class distribution.

**Private afforestation**

Concurrent with the government forestry expansion was a private forest-planting boom, although for very different reasons. Initial work by the Forestry Branch of the Lands Department and subsequent research undertaken by the Forest Service provided knowledge on species suitability, growth rates and planting techniques. Consistent with research results on the performance of the government’s exotic species plantations, the harvest of some older private exotic forests and shelterbelts resulted in attractive returns. The investment potential of plantation forestry had been demonstrated. In response, several private companies were formed after 1923. These new afforestation companies benefited from the government’s experiences, and were speculating on reaping the financial rewards of the new industry.

Besides special-purpose afforestation companies, other enterprises with an interest in securing a long-term supply of timber were attracted to the government’s tree-planting efforts. These included some sawmilling companies and other wood users. Capital was raised by means of bond sales\(^6\) through public offerings. Combined with the government’s efforts to encourage plantation forestry, significant new private plantings took place.

When the Great Depression commenced in 1929, the New Zealand timber industry was already in recession. From 1928 to 1934, timber prices fell due to oversupply from the indigenous forests and competition from imports, even though the government withheld timber from sale to support the private industry. New Zealand timber was increasingly displaced by imported timber such as Douglas fir, cedar and redwood, despite increasing import duties on timber. This trend eventually spelt the end for many companies, and new plantings by surviving companies fell steadily during the early 1930s (Figure 3), mirroring the fall in the government plantings, but for different reasons.

Abuse of the bond-selling system\(^7\) by private companies eventually led to its abolishment and to changes in the legislation governing companies in 1934. This accentuated the decline in private planting.

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\(^6\) A bond entitled the purchaser to an acre of land on which the issuing company would plant and manage trees for a specified period.

\(^7\) Concern developed over the methods of promotion, inflated claims about financial returns, inappropriate expenditure and dubious transactions.
Period summary and conclusions

The formation of the State Forest Service, an inventory of the natural forest resource and assessment of the country’s future timber demand laid the foundations for plantation forestry in New Zealand. The Forest Service’s main objective was to ensure an adequate, long-term timber supply. Substantial areas of government and private plantations were established.

Throughout the 1920s and 1930s, the government implemented forest policies that provided both direct and indirect incentives for the development of the forest industry. In addition to a government afforestation programme, these measures included a government extension service, the development of forest management techniques, research, unemployment relief, housing subsidies and price controls.

This was very much an experimental phase. A number of extensive planting failures occurred where radiata pine was planted on inappropriate sites. Afforestation was concentrated on land not suitable for agriculture and, in a number of cases it was also poor for commercial forestry. Some plantations were destroyed by fire.

The inadequate age class distribution was another concern. Eighty percent of the Forest Service’s radiata pine forests and 50 percent of the private forests were established between 1927 and 1931. This posed significant management problems. Importantly, though, for the development of the plantation forest industry, the government bore the bulk of the costs associated with this experience. By 1938, both government and private planting had effectively ceased, and most of the plantation estates were between nine and 13 years old.

A summary of incentives and disincentives during this phase is available in Annex 1. The conclusions from this period with respect to incentives for plantation forestry are:

- Integrated forestry administration was important for the development and implementation of a cohesive forestry policy;
- A well-funded research programme on all aspects of plantation forest management was essential;
- A good understanding of forest resources and likely future demand for wood were fundamental components of an enduring afforestation policy;
- A good understanding of the product, its management and end uses were essential for commercial viability;
- A wide range of direct and indirect incentives for plantation forestry existed, and different interest groups responded according to their various motivations for planting;
- Government demonstration of the commercial viability of plantation forestry attracted private investment, particularly from companies; and
- With experience and research, new opportunities became available, such as the emergence of viable export products.

CONSOLIDATION AND FOCUS ON UTILIZATION (1939-1958)

Afforestation, particularly private planting, was limited during the 1940s and 1950s. Meat and wool farming were especially buoyant during this period and tree plantings on farms were unable to compete when, at the same time, the government was maintaining timber price controls. In addition, the government’s focus moved away from plantation development to processing. From 1939 to 1958, the total area planted reached only 55 000 ha. Private planting picked up only during the latter part of this period and accounted for 16 000 ha (29 percent) of the total.

The planting of radiata pine during the 1920s and 1930s in concentrated areas provided large quantities of relatively uniform raw materials in the late 1940s. The advantages gained – low logging and transport costs, and bulk marketing – were important to the development of the
processing industry, and outweighed the disadvantages of poorer wood quality from untended radiata pine stands.

### Table 3: Estimated roundwood removals from New Zealand's forests between 1939 and 1958 (000 m³)

<table>
<thead>
<tr>
<th>Year ended 31 March</th>
<th>Indigenous forest</th>
<th>Plantation forest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of 1936 to 1939a</td>
<td>1 387</td>
<td>226</td>
</tr>
<tr>
<td>1948</td>
<td>1 455</td>
<td>829</td>
</tr>
<tr>
<td>1950</td>
<td>1 624</td>
<td>934</td>
</tr>
<tr>
<td>1955</td>
<td>1 610</td>
<td>1 845</td>
</tr>
<tr>
<td>1959</td>
<td>1 573</td>
<td>2 394</td>
</tr>
</tbody>
</table>

Sources: New Zealand Forest Service (1986); Ministry of Agriculture and Forestry (2001)

### Subsidized processing and associated infrastructure

The Forest Service’s involvement in commercial logging and processing was very important in consolidating the economics of plantation forestry and expanding the demand for products from the developing plantation resource. In 1939, the government commissioned a large sawmill near Rotorua, adjacent to the major central North Island plantings. Another major government sawmill, Conical Hill, began operating in South Island in 1948. These sawmills served as demonstration and development units for production and marketing techniques for the sale of exotic plantation-grown timber, and in having radiata accepted as construction timber. The industry was quick to follow with a major private company (NZ Forest Products Ltd.) commissioning an integrated sawmill-structural board plant in 1941 that utilized radiata pine.

Research was required to develop grades and to determine seasoning, preservation practices, strengths and physical properties of plantation-grown timber. In 1948, the Forest Experiment Station (now Forest Research) at Rotorua was established by the government as the base station for a national indigenous forest inventory, but its work soon extended into exotic species. The value of a centralized research institution was quickly illustrated during a sudden epidemic of the Sirex wood wasp in the late 1940s.

The first commercial pulping of radiata pine commenced in 1939 by Whakatane Board Mills. In 1943, as part of a “National Pulp and Paper Scheme”, the government approved the establishment of a newsprint and pulp and paper mill. A change of government in 1949 resulted in a policy shift favouring private over public ownership. In 1952, the government signed an agreement with the Tasman Pulp and Paper Company, and a pulp and paper mill was established at Kawerau in central North Island. An important aspect of this arrangement was the degree to which the government, as the owner of the wood resource, made the venture as attractive as possible by selling a very large volume of wood at low stumpage prices, effectively subsidizing the mill’s profits. Weighing the benefits of establishing a plantation industry – with associated downstream processing facilities – against the cost of selling the logs at below-market value would have been a difficult exercise and was very much a political decision. In essence, “The direct and secondary benefits to the community are, politically, close to being irresistible, while below-market pricing of logs is practically invisible under most systems of Government accounting” (Kirkland and Berg 1997).

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\(^a\) Annual statistics for roundwood removals prior to 1948 are not readily available.
The government also agreed to: (i) construct many miles of new roads and a modern port facility at nearby Tauranga; (ii) supply energy from hydroelectric power stations and (iii) establish railway lines to link the plant with the existing rail network and new port. It constructed over 700 rental houses and 550 one-man huts for the workforce, plus all necessary town services. The £14 million cost (approximately NZ$511.8 million at December 2001 prices) to the government for providing this support represented almost 50 years’ gross revenue under the terms of the sale agreement. This was before the additional cost of the low stumpage price was factored in. Furthermore, the contract was effective for 75 years and thus locked the government into providing wood from yet unplanted forests.

By comparison, NZ Forest Products Ltd. initiated parallel development of an integrated sawmill and pulp and paper mill in 1949 without direct government participation. This was based on its almost equally extensive exotic forests in central North Island and commenced operation in 1953.

In 1957, the first log shipment in 50 years went offshore, this time of radiata pine. Exotic sawntimber production exceeded indigenous production for the first time in March 1960.

**Tax relief**

Tax relief was provided from 1949 to farmers who had forest plantations. This allowed expenditure incurred in planting, protecting and maintaining shelterbelts and woodlots, to be charged against income for tax purposes. In addition, farmers were able to spread income from the sale of farm trees over five years to mitigate the impact of higher marginal tax rates. The standing value of trees did not increase the assessment for land valuation and local tax rates. Little planting by farmers was undertaken, however.

**Price controls**

In 1936, the government had established a Timber Price Committee due to demand exceeding supply following the end of the Depression. The Committee set standard timber prices through negotiations with sawmill representatives.

Demand was further increased by the start of the Second World War and the government assumed even greater powers by appointing a Timber Controller with authority to undertake the sale, purchase and cutting of any trees. After the war, demand for new housing outstripped supply until the mid-1950s. Building permits for dwellings rose from 1,634 in 1943 to 10,356 in 1945 and 1946. Government price controls were continued to address a significant backlog of construction needs, and to ensure affordable housing. They applied to both indigenous and exotic timbers, and kept stumpage payments low. These controls slowed down the anticipated shift from indigenous to exotic timber, as did the continued access by sawmillers to private indigenous forests. A government scheme introduced in 1946 that allowed sawmillers to provide subsidized housing to attract workers into the countryside was also likely to have benefited the indigenous forest industry more than plantation forestry.

Under the price controls, valuable indigenous timbers were available at the same prices as radiata pine, with minimal price differences across timber grades. Throughout the 1950s, the Forest Service and private forest companies argued that such price controls needed to be removed if exotic plantation timber was to have any chance of substituting indigenous timber. Price controls were considered a significant disincentive to tree planting. The government, however, was more concerned with ensuring low-cost timber for housing and employment opportunities, and timber price controls were not removed until 1965. The government also regulated the supply of timber.
National forest survey

A major new national forest survey of the indigenous resource (1946 to 1955) provided high quality information on the resources and composition, condition and ecology of the forests. Only 0.8 million ha of the estimated 5.8 million ha of indigenous forest were considered suitable for timber utilization. The results confirmed that timber supplies from indigenous forests could be sustained at the current rate of harvest for only a few more decades. The government consequently accepted that sales of timber from indigenous forests should be reduced.

Period summary and conclusions

The focus of this period was on the utilization of the maturing plantation trees, with only limited further plantation development. Notably, a new Director of the Forest Service appointed in 1939 was a forest product engineer. The impacts of the earlier planting were significant as a very large volume of poorly and rapidly grown wood, mostly radiata pine, began to replace the high-quality native timbers that had been used so successfully for the previous hundred years. Access to large, concentrated volumes of uniform plantation wood that could be harvested easily overcame the disadvantage of poorer quality relative to wood from indigenous forests.

In some respects, New Zealand’s extensive plantation forests had been grown speculatively, and this was the period of developing a better understanding of their management, the wood properties and their utilization potential. The government responded by providing significant subsidized development of the infrastructure necessary for processing the wood.

Annex 1 highlights the incentives and disincentives available during this period. The conclusions drawn with respect to incentives for plantation forestry are:

- Development of infrastructure by government paved the way for large-scale processing initiatives based on plantation-grown timber;
- Government ownership of extensive plantation forests enabled the provision of low-cost wood to facilitate the development and success of new, large-scale processing;
- Logging, sawing and marketing techniques developed by the Forest Service played a significant role in ensuring the development of exotic plantation forestry;
- The real cost to the government for the incentives was not documented, but it was considerable and unlikely to have been justified purely on its financial merits. Some developments might have taken place anyway (and indeed did);
- The contributions to broader economic development and social goals could be sufficient to make the financial costs politically acceptable;
- Price controls inevitably depressed further expansion of plantation forestry, and revealed how the implementation of other policies could significantly reduce the impact of incentives; and
- Taxation incentives on their own were insufficient to persuade farmers to adopt plantation forestry.

PLANTING IN PARTNERSHIP AND DEVELOPING AN EXPORT INDUSTRY (1959-1984)

The large increase in plantation wood in the mid-1950s from the first planting boom gave rise to strong growth in the industries and trade. The anticipated demand from these new industries triggered perceptions of further future wood shortages. Another assessment of New Zealand’s future wood supply needs was undertaken for the government. Its report in 1959 predicted a deficit of 5.4 million m³ in 2000. This assessment stimulated a second major afforestation

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8 This was based on the population being over five million by that time, whereas the current population is only 3.8 million.
effort. Much of the planning was also based on developing an export capacity. From 1959 onwards, the Japanese log trade increased significantly. It was delivering prices well in excess of what was available in the domestic market, and made forestry a more competitive and profitable form of land use.

A threefold increase in planting was proposed and in 1960 the government approved a new planting programme of 400 000 ha by 2000, principally aimed at creating a major export industry. Annual planting targets were steadily increased from 9 000 ha/year in 1959 to 28 000 ha/year in 1972.

Unoccupied land available for either agriculture or forestry was limited and it was recognized that the government (through the Forest Service) could only contribute to part of the target. It was envisaged that the government and the farming community would need to contribute equally to achieve the required level of new planting. This meant winning the support of a farming community that was, in general, wary of any further plantation expansion. Initially, the targets of the planting programme could not be met because the government had difficulties in purchasing sufficient land for planting, and because of the farmers’ limited interest. Price controls, still in effect until 1965, were another obstacle to afforestation.

A small farm forestry movement had been initiated in the late 1950s and achieved some success in promoting small-scale forestry and the use of a more diverse range of exotic species. Despite the government’s promotional efforts, however, these efforts were not enough to encourage sufficient numbers of farmers to plant trees. Similarly, the exemption of the timber value of trees from estate duty in 1960 had little effect. Moreover, financial institutions were reluctant to provide loans to forestry enterprises because of their inexperience with such investments. More direct incentives were considered necessary, and were quickly and increasingly brought into play. In 1972, planting by the private sector exceeded that of the government for the first time since 1939.

**Government promotion**

For the first time, forestry was actively promoted by the Forest Service as a legitimate land use in its own right, and began to compete with agriculture for more productive land. The Forest Service devoted considerable time and resources to promote the benefits of forestry as a land development option that complemented agriculture. It also supported research on the relative profitability of farming compared with forestry, and provided technical advice through a nationwide extension service. However, impediments to expansion remained, the most important being prevailing attitudes and the legislative environment.

The increased rates of tree planting in the 1970s resulted in a vigorous “farming versus forestry versus the environment” debate. Although afforestation was concentrated on cutover indigenous forest and poorer quality farmland, many in the agriculture (livestock) industry still strongly viewed plantation forestry as a waste of good land. This was particularly focused on large-scale plantation forestry undertaken by private corporations and the government.

Other arguments against plantation forestry focused on the disruption of existing rural communities by a new land use that changed the social structure and supporting services. Typically, forest workers were younger, often single, and were concentrated in fewer and larger towns. Large-scale plantation forestry did not involve family ownership and land management. It was blamed for increasing urban migration and thus the consequential loss of education, health, transport and other social services in rural areas. Farmers expressed fears of becoming surrounded and isolated by plantations because they could not compete with the corporate sector in purchasing land. However for those who sold their land, forestry provided an additional and welcome exit opportunity in many cases.
The situation was compounded by a general disinterest in forestry among the agricultural community. There was little interaction between the forestry school (established in 1970) and the agricultural universities. Courses in agroforestry were only introduced into the agricultural universities in the 1980s. Consequently, farm advisers, trained in livestock production techniques, had little experience or interest in promoting trees.

The farming versus forestry debates also continued in the statutory planning arena, particularly under the Town and Country Planning Act (1977), and polarized the parties involved. The Act listed the protection of land having actual or potential value for food production as a matter of national importance. This was supposed to control urban development on high-quality agricultural land, but the provision became a convenient mechanism for local authorities to justify the control of plantation expansion. Throughout the 1980s, this restriction had a significant, although unquantifiable, impact on the development of plantation forestry while agriculture remained largely free of any controls.

**Loans and grants schemes**

**Forestry Encouragement Loans 1962**

Prior to 1962, farmers found it difficult to obtain finance for forestry purposes. The government introduced Forestry Encouragement Loans under the Farm Forestry Act (1962). Landowners could borrow money for up to 20 years at an annual interest rate of five percent (inflation at the time was three percent *per annum*), including a provision for insurance up to the amount borrowed. Loans could be sought for the establishment (£25/acre or approximately NZ$1 871/ha in December 2001 values) and tending (£15/acre or approximately NZ$1 123/ha in December 2001 values) of areas from five to 100 acres (2-40 ha), over a five-year period. The amount was intended to cover the full cost of establishing a small forest or farm woodlot. Half of the loan and half of the interest were refundable after 20 years if the plan was implemented satisfactorily. Priority was given to areas with high timber demand, close to population centres, and where forest industries were present or expected to develop.

Despite these measures, the area planted remained significantly below target. In 1965, the Farm Forestry Act was modified and renamed the Forestry Encouragement Act. With this amendment, local governments could take advantage of the terms and request loans for up to 40 years. The rate of interest payable on new loans was reduced to three percent, with interest only charged on the non-refundable half of the loan. Another option was provided to compound interest up to the point where the forest began earning income. The limit of 100 acres (40 ha) as the maximum area able to be planted over a five-year period was removed to enable greater areas to be planted with the approval of the Ministers of Forests and Finance.

In 1962 and 1963, 57 planting loans and 11 tending loans were provided. This rose to 100 and three respectively by 1966/1967, but still the area planted remained considerably below target (Table 4). Amendments to the Forestry Encouragement Loans were made virtually every three years, when the maximum loan finance and interest rates were varied to account for inflation.

It is unclear why the areas planted were such small proportions of the area for which loans had been granted. The economics showed the planting under the loan scheme to be considerably cheaper than that carried out by the Forest Service.
Table 4: Area planted during the first five years under the loan scheme (ha)

<table>
<thead>
<tr>
<th>Year ended 31 March</th>
<th>Area granted (ha)</th>
<th>Area actually planted (ha)</th>
<th>Value of loans (NZ$)</th>
<th>Approximate value of loans in December 2001 values (NZ$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1963</td>
<td>1 236</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>1964</td>
<td>680</td>
<td>364</td>
<td>27 308</td>
<td>406 000</td>
</tr>
<tr>
<td>1965</td>
<td>1 086</td>
<td>518</td>
<td>61 198</td>
<td>878 000</td>
</tr>
<tr>
<td>1966</td>
<td>3 113</td>
<td>462</td>
<td>62 324</td>
<td>865 000</td>
</tr>
<tr>
<td>1967</td>
<td>2 716</td>
<td>1 097</td>
<td>112 228</td>
<td>1 516 000</td>
</tr>
</tbody>
</table>

Sources: Reports of the Director-General of Forests (1964 to 1968); Poole (1968)

**Forestry Encouragement Grants 1969**

In 1969, the government concluded that the rate of planting under the loan scheme was unlikely to ever reach the target. Regulations providing for Forestry Encouragement Grants were introduced in 1970 to gradually replace the loan scheme. Under the new plan, individuals, trusts, partnerships and smaller companies whose qualifying expenditures did not exceed NZ$200 000\(^{10}\) per year (approximately NZ$2 185 000 in December 2001 values) were entitled to receive annual cash grants equal to 50 percent of the qualifying costs of establishing new forests. A maximum of NZ$750/ha (approximately NZ$8 194 in December 2001 values) was payable and the minimum area eligible was two ha. Such incentives seemed to balance the tax exemptions enjoyed by the larger forest companies.

**The two encouragement schemes**

The Forest Encouragement Loan scheme was retained for local authorities only. A maximum loan of NZ$1 200/ha was available for establishment and tending of plantations of at least two ha. Interest was charged at seven percent per year (the inflation rate in 1970 was 6.6 percent), of which 0.5 percent was to provide fire insurance.

The loan and grant schemes were amended twice. In 1977, a single interest rate of 4.5 percent was introduced for new loans and the 50 percent loan refund provision was revoked. Farmers with existing loans, and whose planted forests were up to an acceptable standard, had the option to retain their loans, or cancel their existing debts fully and claim a proportion of their future qualifying costs under the grant scheme. The maximum grant amount was increased from NZ$300 to 450 (approximately NZ$1 506 to 2 260 in December 2001 values) per hectare. The Forest Service reported that the area of new plantings was falling because the grants covered only one-third of the establishment costs instead of the intended 50 percent.

In 1980, the financial limits on annual expenditure under the grant scheme were removed. Protection/production grants were introduced and targeted at farmers who wished to work on their properties that needed stabilization themselves. The scheme provided grants of up to two-thirds of the establishment costs, together with half of all subsequent costs.\(^{11}\)

---

\(^{10}\) New Zealand “decimalized” in 1967. The currency changed from pounds, shillings and pence to dollars and cents, and units of area changed from acres to hectares.

\(^{11}\) Less than three percent of the area approved by the Forest Service for assisted planting in 1982/1983 qualified under the protection/production scheme.
**Forestry Encouragement Grants 1982**

In 1982, the government introduced the Forestry Encouragement Grants to provide equitable assistance to all landowners (Box 1). From 1 April 1983, all previous forestry incentives were withdrawn. They were replaced by a flat rate grant of 45 percent of qualifying costs. The new grants were extended for the first time to the larger companies. At the same time, the right to deduct current forestry expenditure from taxable income, which had been available to the forestry companies since 1965, was removed. The effect was to increase the government’s tax revenues and create a large new expenditure item concurrently. In view of the large planting areas involved, the grants were to be controlled clerically, by random financial audits of annual claims, rather than by field inspections of forestry operations.

With the introduction of the Forestry Encouragement Grants, the Forestry Encouragement Loans ended in 1983. Loan holders could choose to maintain their loans, or terminate them and receive grants for further expenditures. Many opted for the grant payments, but most local authorities continued with their loans for cash flow reasons.

The Forestry Encouragement Grants scheme was ended in the 1984 budget, and replaced by full deduction of plantation establishment costs against current income for tax purposes. Transitional loans, to complete the development of existing plantations, were available to previous grant holders through the Rural Bank. Protection/production grant holders remained eligible for grants of up to 39.4 percent of qualifying costs until 1990/1991.

**Box 1: Activities qualifying for Forestry Encouragement Grants**

- Clearing and preparing of land
- Cost of trees, planting, blanking and release cutting
- Pruning and thinning
- Chemicals and fertilizers, and their application
- Establishing access and temporary roads, and associated culverts and bridges
- Repairs and maintenance
- Disease and pest control
- New fencing for crop protection
- Fire protection and suppression (not including capital items)
- Temporary (only) forest huts
- Hiring or leasing plants or equipment for forestry development
- Professional forest services or advice
- Work carried out under contract
- Subscriptions to forestry associations
- Administration expenses and directors’ fees
- Rent, rates, land tax, insurance or “other like expenses”
- Interest on money borrowed and employed as capital or for forestry development
- Depreciation on plants and machinery
- Value of the owner’s labour

Repayments on individual farmer loans (last loans approved in 1970) could last until 2010. Local authority repayments (last loans approved in 1970) could last up until 2023. The current total value of outstanding loans is NZ$34 million, including NZ$19.5 million of capitalized interest.

**Achievements of the loans and grants schemes**

Nearly 200 Forestry Encouragement Loans were approved over the 20 years of the scheme’s operation. The total area planted under the scheme was 20 000 ha. More than 3 000 Forestry Encouragement Grants were made over the scheme’s 13 years of operation. The total area planted under this scheme was 100 000 ha (Table 5).
### Table 5: Private sector forest plantings 1963/1964 to 1983/1984
under loan and grant schemes (ha)

<table>
<thead>
<tr>
<th>Year ended 31 March</th>
<th>Total new private planting (a)</th>
<th>Loans scheme planting (b)</th>
<th>Grants scheme planting (b)</th>
<th>Combined scheme</th>
<th>Total cost of scheme (NZ$000) (c)</th>
<th>Approx. cost in December 2001 values (NZ$000) (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1964</td>
<td>4 000</td>
<td>364</td>
<td>0</td>
<td>364</td>
<td>27</td>
<td>406</td>
</tr>
<tr>
<td>1965</td>
<td>5 000</td>
<td>518</td>
<td>0</td>
<td>518</td>
<td>61</td>
<td>878</td>
</tr>
<tr>
<td>1966</td>
<td>5 000</td>
<td>462</td>
<td>0</td>
<td>462</td>
<td>62</td>
<td>865</td>
</tr>
<tr>
<td>1967</td>
<td>6 000</td>
<td>1 097</td>
<td>0</td>
<td>1 097</td>
<td>112</td>
<td>1 516</td>
</tr>
<tr>
<td>1968</td>
<td>7 000</td>
<td>1 702</td>
<td>0</td>
<td>1 702</td>
<td>160</td>
<td>2 038</td>
</tr>
<tr>
<td>1969</td>
<td>8 000</td>
<td>1 080</td>
<td>0</td>
<td>1 080</td>
<td>93</td>
<td>1 136</td>
</tr>
<tr>
<td>1970</td>
<td>8 000</td>
<td>(e) 1 162</td>
<td>0</td>
<td>1 162</td>
<td>121</td>
<td>1 408</td>
</tr>
<tr>
<td>1971</td>
<td>11 000</td>
<td>1 003</td>
<td>1 012</td>
<td>2 015</td>
<td>227</td>
<td>2 480</td>
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<tr>
<td>1972</td>
<td>16 000</td>
<td>198</td>
<td>3 656</td>
<td>3 854</td>
<td>371</td>
<td>3 672</td>
</tr>
<tr>
<td>1973</td>
<td>16 000</td>
<td>1 039</td>
<td>3 757</td>
<td>4 796</td>
<td>558</td>
<td>5 165</td>
</tr>
<tr>
<td>1974</td>
<td>23 000</td>
<td>1 420</td>
<td>5 620</td>
<td>7 040</td>
<td>752</td>
<td>6 435</td>
</tr>
<tr>
<td>1975</td>
<td>23 000</td>
<td>–</td>
<td>–</td>
<td>7 915</td>
<td>844</td>
<td>6 500</td>
</tr>
<tr>
<td>1976</td>
<td>23 000</td>
<td>–</td>
<td>–</td>
<td>6 764</td>
<td>1 216</td>
<td>8 166</td>
</tr>
<tr>
<td>1977</td>
<td>27 000</td>
<td>–</td>
<td>–</td>
<td>7 760</td>
<td>1 702</td>
<td>9 776</td>
</tr>
<tr>
<td>1978</td>
<td>19 000</td>
<td>–</td>
<td>–</td>
<td>(e) 7 596</td>
<td>1 767</td>
<td>9 873</td>
</tr>
<tr>
<td>1979</td>
<td>22 000</td>
<td>–</td>
<td>–</td>
<td>7 211</td>
<td>2 046</td>
<td>9 177</td>
</tr>
<tr>
<td>1980</td>
<td>26 000</td>
<td>–</td>
<td>–</td>
<td>6 544</td>
<td>2 182</td>
<td>8 608</td>
</tr>
<tr>
<td>1981</td>
<td>21 000</td>
<td>–</td>
<td>–</td>
<td>5 717</td>
<td>(f) 2 245</td>
<td>7 560</td>
</tr>
<tr>
<td>1982</td>
<td>23 000</td>
<td>–</td>
<td>–</td>
<td>7 225</td>
<td>(f) 2 894</td>
<td>8 447</td>
</tr>
<tr>
<td>1983</td>
<td>30 000</td>
<td>–</td>
<td>–</td>
<td>7 203</td>
<td>(f) 4 731</td>
<td>11 887</td>
</tr>
<tr>
<td>1984</td>
<td>31 000</td>
<td>–</td>
<td>–</td>
<td>(g) 31 000</td>
<td>(f) 71 953</td>
<td>168 427</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>354 000</strong></td>
<td><strong>(h) 20 000</strong></td>
<td><strong>(h) 100 000</strong></td>
<td><strong>119 509</strong></td>
<td><strong>94 031</strong></td>
<td><strong>273 420</strong></td>
</tr>
</tbody>
</table>

**a** Sources: New Zealand Forestry Statistics (2000); Ministry of Agriculture and Forestry (2001).

**b** Data for loans and grants from annual reports of the Director-General of Forests unless otherwise stated.

**c** Sources: Poole (1968); O’Brien (1982). Costs include planting and tending.

**d** Area planted under grant and loan schemes expressed as percentage of total new private planting.

**e** Source: O’Brien (1982).


**g** This is an anomaly as grants temporarily replaced the previous taxation provisions for forestry companies.

**h** Totals for loans and grants from McKenzie (1997).

### Taxation

In the early 1960s, the government did not see forestry companies as significant actors in the afforestation programme. The tax regime at that time deterred shareholders from re-investing their dividends and profits into second rotations. Being ineligible for the 1960 loans, the companies were provided with a more favourable tax regime in 1965 that made afforestation more attractive to them. This change might have been influenced by the inability to achieve planting targets through more direct incentives to farmers.

Under the Income Tax Act, new forest establishment was encouraged by allowing companies to make current year deductions from assessable income of expenditures incurred directly and indirectly in tree planting. While individuals did not enjoy the same benefit, they could accumulate the costs and deduct them from tax payments at the time of felling. This was known as the “cost of bush”.
Companies that were unable to obtain an immediate tax-saving benefit could receive a tax
credit refund of 45 cents to the dollar, in line with an export taxation incentive available at the
time. This benefit was not available to companies that already had a Forest Encouragement
Grant on the same lands.

To encourage regional investment, forestry and sawmilling were eligible for up to 20 percent
depreciation on any plant and machinery used primarily and directly in these activities. The exact
level of depreciation was dependent on the priority status of the region as determined by the
government in relation to the region’s development needs.

A number of incentives under the Income Tax Act were available for establishing plantations to
offset the long gestation period associated with forestry, such as:

- Spreading income from the sale of timber over a period of up to five years, including the
  year of sale. This concession was available only to farmers who planted the trees for
  agricultural or pastoral purposes, or a woodlot owner whose trees were planted, or
  maintained, under a forestry encouragement loan.
- Individuals depositing forestry income into an “equalization reserve account”. This money
  then earned interest at three percent and was only taxed when it was withdrawn from the
  account.
- Companies depositing money from thinning operations into an account to be carried forward
  free of tax.

A number of the tax incentives offered to companies were the same as those that had been
offered to individuals in 1949. For several reasons, this time the uptake was considerably better.
Firstly, the tax benefits were more important to, and better able to be utilized by, investors than
landowners. Secondly, in the 1940s and 1950s, meat and wool farming were very buoyant and
timber price controls provided a considerable disincentive. Finally, in the mid-1960s, a range of
other incentives also supported the tax benefits.

Māori leased land

Another option the government selected to facilitate afforestation was land lease arrangements
with the Māori. The Forest Service established and managed forests on Māori land, and profits
were to be shared between the government and the landowners. From 1967 to 1985, a number
of leases involved a total of 71 000 ha of Māori land, with around 51 000 ha planted with trees.
From the government’s perspective, the forests were a means of utilizing Māori land that was
otherwise unlikely to be used as productively. The initial leases were for 99-year terms, with the
landowners receiving a share of stumpage in lieu of rent. The leases provided for consultation
with the landowners and safeguards relating to wahi tapu (sacred) areas. Subsequent leases
were for shorter terms with annual rental payments in response to Māori wishes for greater
control. Following this initiative, the private forest industry also entered into lease arrangements
with Māori landowners.

National forestry development conferences

In 1969, the government convened a Forestry Development Conference to assess forest resources
and associated industries, and make recommendations for their expansion. The conference served
to establish a common commitment to and belief in forestry as a long-term contributor to the
economy, and created a sense of partnership between the government and the private sector,
both large and small. At this point, the private companies took a much more significant role in
afforestation. The conference considered immediate, medium- and long-term perspectives, and
reported on efficiencies that could be achieved. Industry, government, the Forest Service and
universities were all brought together to contribute to the planning. Export targets were doubled
to over 3.7 million m³ by 1973.
Further forestry conferences followed in 1974/75 and 1981. The 1974/75 conference addressed land-use policy, regional development, indigenous forest policy, forest legislation, forest industry, afforestation, short-term wood supply and recreational use of forests. The 1981 conference also addressed a wide range of issues including management practices, utilization, transport, landscape, social and environmental matters.

During the 1970s, public concern over the utilization of indigenous forests grew steadily. The primary concern was clear-felling and burning of indigenous forest to enable conversion to faster growing plantations. A number of new environmental groups emerged. The Maruia Declaration was the largest petition in New Zealand with 341,159 signatures. It opposed an indigenous forest utilization and conversion proposal and was presented to parliament in 1977. The petition received little support from the government, but indigenous forestry became a major political issue. The environmental movement was generally not favourably disposed towards plantation forestry. The conferences were part of the government’s efforts to try to include all relevant stakeholders, including environmental and community groups, in the planning process and to achieve a shared vision for plantation forestry development. The 1981 conference re-affirmed the expansion in the plantation estate achieved and recommended a continuation to 1990 at 43,800 ha per year to complete the goal of an estate with balanced age class distribution.

General export incentives

Two export-focused incentives (not targeted specifically at forestry) – the Market Development Expenditure Scheme and Increased Exports Taxation Incentive (IETI) – were introduced under the Income Tax Act in the early 1960s. Under the IETI, assessable income from the increase in free-on-board (f.o.b.) value of exports over total sales can be reduced. The increase was based on the average of the first three of the last four years’ trading figures. Companies unable to take advantage of the benefit could elect to convert it to a tax credit at the rate of 45 cents to the dollar.

Changes were made to the IETI in 1966 to deduct 15 percent of the increase in export sales over total sales based on the first three of the last five years, and again in 1972 to increase the deduction to 20 percent from the first three of the last six years. Further changes were made in 1975 to raise the deduction to 25 percent and the base to the first three of the last seven years. Export Development Grants were introduced in 1975 allowing 40 percent tax-free payments towards export development expenditure. A New Market Increased Export Taxation Incentive was also introduced. This allowed a further deduction of 15 percent of the increase in f.o.b. value of export sales if these sales were to new markets. This could be a new product to an existing market, or an existing product to a new market.

An Export Performance Incentive (EPI) was introduced in 1979 under the Income Tax Act. For four years this ran concurrently with the other two export incentive schemes described above, although it was a mutually exclusive situation with potential recipients having to choose either the EPI or the other schemes. The EPI provided an incentive that was related to the total f.o.b. value of goods exported, based on their level of domestic content. The scheme comprised seven bands that ranged from the highest level of incentive (11.9 percent) for a value-added component of 80 to 100 percent, down to a rate of 1.4 percent for those goods with 0 to 20 percent added value. On average, these rates were equivalent to 14 percent of the domestic value added in each foreign exchange earned. The incentive was distributed as a tax credit. Most forest products fell into band B (70 to 80 percent), which attracted an incentive of 10.5 percent. In 1983, the EPI replaced the other two export incentive schemes.
Other export incentive schemes from the early 1980s were:

- An Export Market Development Incentive introduced in 1980 under the Income Tax Act. This allowed certain expenditure related to the cost of promoting New Zealand goods and services abroad, and incurred outside New Zealand, to be eligible for a tax refund of 67.5 cents to the dollar.

- A programme of Export Grants introduced in 1980 to replace the New Market Development Grants and Services Export Development Grants. This was aimed at encouraging the development of new markets and provided a non-taxable rebate, available in advance, of 64 percent of eligible promotion expenditure in designated target markets.

- An Export Manufacturing Investment Allowance under the Income Tax Act allowed, in addition to the normal 25 percent depreciation in the first year, up to a further 20 percent of the cost of investment in plant and machinery to be deducted from assessable income. The exact amount that could be deducted depended on the proportion of the output that was destined for export. In addition, under certain circumstance, machinery used primarily for the production of export goods was eligible for Sales Tax exemption.

- Export Suspensory Loans allowed an exporter to borrow at commercial interest rates up to NZ$100 000 (approximately NZ$337 000 in December 2001 values) in loan finance for intensive export investment projects. Thereafter, those exporters who managed to meet a set export target for three consecutive years during a five-year period were eligible to have their loans converted to grants. Once converted, the amount was then treated as taxable income over the following three years.

**Research and education**

Prior to the early 1960s, long-term silvicultural research by the Forest Research Institute was limited to growth studies based on sample plots with a range of multiple thinnings. Other research was limited to short-term projects. In 1961, an Economics of Silviculture group was established with three objectives:

- Produce predictive yield tables for thinned and unthinned stands;
- Determine the effects of initial spacing, pruning, thinning and size of final crop trees on yields and grades of sawntimber and pulpwood produced; and
- Provide financial forecasts for different silvicultural regimes.

In 1978, the problems of analysis of the large and growing database, and effective communication of the results to forest managers were considered. As a result, the accrued knowledge was incorporated into a stand model that would simulate the entire growing, harvesting and conversion processes.

At the same time, the Forest Service was becoming concerned with the proliferation of silvicultural regimes throughout New Zealand. The Radiata Pine Task Force, established at the Forest Research Institute, developed a model that simulated the growth of one hectare of tended radiata pine and then simulated the harvesting, transporting and sawing of the wood from that stand (Sutton 1984).

The Forest Research Institute’s services were generally provided free-of-charge to forest growers and processors until the mid-1980s. In 1980, the institute’s budget was NZ$12 million (approximately NZ$40.4 million in December 2001 values), entirely funded by the government. In 1998/1999, the government invested NZ$25.4 million (approximately NZ$26.7 million in December 2001 values) in forest research (distributed among all research organizations covering indigenous and plantation forestry) and the industry invested NZ$32.6 million.
After the closure of the two university forestry schools in the 1930s, New Zealand foresters were trained overseas. It was not until 1970 that a new School of Forestry opened at the University of Canterbury, offering Bachelor of Forestry Science and postgraduate study for New Zealand and overseas students.

The Forest Service had a programme of sponsoring trainees for university education. It was generally accepted that some foresters trained by the Forest Service would be enticed to work for private forestry companies. Similarly, the Forest Service established forest “ranger” and “woodsman” training schools, and some trainees also went on to work in the private industry. This supply of trained personnel was another important indirect incentive that assisted the development of the plantation industry.

The National Exotic Forest Description

The purpose of the National Exotic Forest Description (NEFD) is to maintain an authoritative, publicly available, high quality, quantitative database of New Zealand’s plantation forests. The principal components of the NEFD are the forest area, age class information, yield tables and national and regional wood supply forecasts. Area and age class information is updated annually, while yield tables are revised, and wood supply forecasts are produced periodically (about every five years). Information is readily available through printed publications and the Internet.

Since its inception in 1982, the NEFD has operated as a partnership between the government’s forestry department and private industry. A wide range of forestry stakeholders, including central government, relies on the NEFD for monitoring, policy-making, wood supply forecasting and planning. It also plays an important role in investment analysis by the forest industry, domestically and internationally, as well the financial sector.12

The Forestry Rights Registration Act 1983

In 1983, the Forestry Rights Registration Act was passed to facilitate the use of joint ventures for the development of plantations. The Act provided for a forestry right to be granted by the owner or lessee of land to another person to establish, maintain and harvest, or just to maintain and harvest, a crop of trees on that land. It also incorporated rights of access and provisions for payments, royalties, or a division of the crop or the proceeds from the crop. The Act also permitted the registration of a forestry right against the title of the land in question, but without the high standard of survey normally required for registering instruments against land titles. Nonetheless, companies and private investors did not invoke the Act frequently.

Period summary and conclusions

In contrast to the earlier planting boom based on expectations of a domestic wood shortage, the second major wave of planting was initiated to meet an estimate of increased domestic needs and the development of exports. The annual planting targets were revised several times as export goals steadily grew. From the mid-1970s, the bulk of the planting was destined for export products. This time the government envisaged that these targets would be met in partnership with private forest growers. Of the initial 21 000 ha per year target, for example, the Forest Service was authorized to plant 14 500 ha per year.

From 1962 to 1984, the government provided forestry loans, forestry grants and a more favourable tax regime to encourage private sector planting. Key legislation included the Farm Forests Act 1962, the Forestry Encouragement Act 1965 and the Land and Income Tax Act 1965. The target groups for these measures were farmers, local authorities, and private forestry companies. From

12 See http://www.maf.govt.nz/statistics/primaryindustries/forestry/forest-resources/index.htm
mid-way through this period, the rate of private planting overtook government planting (Table 6). Figure 4 shows the increasing trend of private plantings.

Table 6: Trends in new planting from 1960/1961 to 1983/1984 (ha)

<table>
<thead>
<tr>
<th>Year ended 31 March</th>
<th>Government</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961</td>
<td>4 000</td>
<td>2 000</td>
<td>6 000</td>
</tr>
<tr>
<td>1966</td>
<td>8 000</td>
<td>5 000</td>
<td>13 000</td>
</tr>
<tr>
<td>1971</td>
<td>15 000</td>
<td>11 000</td>
<td>26 000</td>
</tr>
<tr>
<td>1976</td>
<td>22 000</td>
<td>23 000</td>
<td>45 000</td>
</tr>
<tr>
<td>1981</td>
<td>17 000</td>
<td>21 000</td>
<td>38 000</td>
</tr>
<tr>
<td>1984</td>
<td>20 000</td>
<td>31 000</td>
<td>51 000</td>
</tr>
<tr>
<td><strong>Total new plantings 1960/1961 to 1983/1984</strong></td>
<td><strong>354 000</strong></td>
<td><strong>361 000</strong></td>
<td><strong>715 000</strong></td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Forestry (2001)

Over a 21-year period, the various grants and loans contributed greatly to new private forest plantings. Setting aside the 1983/1984 year when grants temporarily replaced the previous taxation provisions for forestry companies, the combined area planted under the grant and loan schemes was 88 509 ha. This made up a significant 28 percent of all new private plantings throughout the duration of the schemes, given that this was initially targeted at owners of small landholdings. Furthermore, the area planted was in addition to that encouraged by a range of other incentives. The impact of the grants was more considerable than the loans. For the four years where the grants and loan statistics were separated, the ratio of subsidized planting attributable to grants versus loans is in the order of 4:1.

Source: Ministry of Agriculture and Forestry (2001)

**Figure 4: Private planting as a percentage of total planting between 1961 and 1984**

Higher subsidies were necessary to increase the annual planting rates. From about 1973 through to 1983, and despite ongoing changes being made, the contribution of the grant and loan schemes to new private sector planting remained relatively constant. Taxation measures and a range of export incentive schemes played a major role in the continued development of plantation forestry and processing industries. The dramatic increase in the level of afforestation led to greater competition for land and further debate regarding the merits and roles of forestry and agriculture.
A summary of incentives for plantation forestry in this period is found in Annex 1; conclusions drawn are listed hereunder:

- A comprehensive understanding of the wood resource, future domestic demand and the potential for an export-oriented industry were fundamental to the development of an afforestation strategy;
- Where plantation forestry was a new land use, the expectation should be for a gradual uptake, not an overnight adoption;
- Financial incentives to small-scale forest growers had a significant impact on their contribution to achieving the strategy when combined with concurrent information support on silviculture and economics;
- Individual landowners might be more influenced by ready access to good information, advice and tree planting stock than financial assistance;
- A range of taxation measures and export incentive schemes undoubtedly lifted the contribution from the larger-scale, corporate forest growers;
- Major advances in research made a considerable contribution;
- The Forest Service provided important training for potential employees of private companies; and
- Competition for land, acrimonious debate between the farming and forest industries, and land-use controls probably limited forestry development in some districts of New Zealand.


General economic reforms

In 1984, a new government was elected and confronted with low economic growth, high inflation and an uncompetitive export sector. The policies and actions that resulted had a dramatic impact on private and public enterprises and the population at large, as a highly regulated economy moved quickly to a market-led economy.

An initial 20 percent devaluation was followed in 1985 by a float of the New Zealand dollar. Export assistance, domestic subsidies, and price controls that existed on some products were removed, tariffs were lowered, and the extensive import licensing system was dismantled. Investment and land development concessions were withdrawn, the taxation law was amended and cost recovery for previously free government services was introduced. A number of government-owned businesses, including commercial forestry, were corporatized and later privatized.

The rates of afforestation fell to very low levels in the late 1980s and early 1990s, then quickly rose to record levels subsequent to privatization, with further amendments to the taxation regime, and influence from an international price spike for wood.

These fundamental changes to the economy created an environment that increased the relative attractiveness of forestry. Once embedded, they were a powerful stimulant to further plantation development.

Government plantation forestry

Concurrently, a number of converging factors suggested that it was time for the government to rethink how it managed its indigenous and plantation forest assets:

- The environmental movement was seeking to ensure that the government considered a wider range of sustainable indigenous forest management issues, and not to focus on wood supply only;
There was a forecasted surge in the supply of wood from plantation forests and a more commercial operating environment was regarded as necessary to maximize returns to the country;

The government’s economic policy was to deregulate industries and expose businesses to nationally and internationally competitive environments to promote efficiency; and

Government policy was also to clarify the organizational objectives of its departments and improve transparency and accountability.

In 1987, the government dissolved the Forest Service and corporatized its commercial functions under a state-owned enterprise, the New Zealand Forestry Corporation. This was a limited liability company, established to manage the government’s 550,000 ha of plantation forests, 142,000 ha of indigenous forest, two sawmills, nurseries and other assets. The non-commercial functions of the Forest Service were transferred to a new Department of Conservation that managed the bulk of the government’s indigenous forests, and a new Ministry of Forestry that assumed forest policy, forest health and protection, and forest research functions. The Department of Conservation has no commercial wood production function. Subsequent changes saw the Forest Research Institute become an autonomous Crown research institute, and the Ministry of Forestry merge with the Ministry of Agriculture.

In the same year, the government announced a privatization strategy aimed at reducing public debt substantially. The government was not seen to be the most appropriate entity to run commercial forestry businesses where management decisions were too easily influenced by political objectives. The strategy was to sell state-owned corporations, unless there were strong economic or social reasons to retain ownership. The government’s 1988 budget included its commercial forest assets (with the exception of the small area of indigenous forest) among the businesses to be sold. The forest assets were intended to be sold (by open tender) in 90 units ranging from 51 to 132,112 ha in area, but some units were withheld from sale as a result of contractual, environmental and other concerns. Each unit was assigned tradable property rights (Crown Forestry Licences) containing individual terms and conditions of sale. Only the forests were sold, not the land upon which they stood. The sales left the government with less than seven percent of the national plantation forest estate. Subsequent settlements of claims under the Treaty of Waitangi have seen forest land, and some of the remaining forests and land, pass to Māori ownership so that today the government owns about three percent of the plantation resource.

Amendments to the taxation regime

In the government’s 1987 budget, a significant change to the taxation legislation applicable to forestry was announced. This resulted in the removal of the provision that allowed immediate deduction of forest establishment costs against current taxable income. Most of the costs that previously qualified for deduction were to be capitalized and deducted against future income from the forest in a “cost of bush” account. The capitalized costs were not indexed to inflation. The change was part of a business taxation reform aimed at standardizing the tax treatment of business expenditure. The key issue was whether the long-term nature of forestry investment, and in particular the impact of inflation over time, should be taken into account in the tax regime. While the forest industry accepted the need for a “neutral” taxation system, it was highly critical of the “cost of bush” account and attributed much of the downturn in afforestation to this legislation.13

13 In 1991, another amendment re-introduced immediate deductibility
The Resource Management Act (1991)

The Resource Management Act replaced the Town and Country Planning Act (1977) and a range of resource management legislation. It is now the principal statute for the management of land, subdivisions, water, soil resources, the coast, and air and pollution control. The legislation is primarily implemented by New Zealand’s local government authorities through local plans that contain policies, rules and performance standards associated with resource use.

The widely varying approaches to the implementation of the Resource Management Act have resulted in considerable criticisms from the forest industry and other resource managers. Plantation forestry remains subject to inconsistent forms of control, including consent requirements, over much of New Zealand’s rural land under these plans. The main impact on the forest industry has been the high cost and lengthy time incurred in seeking consents, particularly for wood-processing initiatives.

The internationalization of New Zealand plantation forestry

Prior to the sale of the government’s plantation forest assets, the government owned 52 percent of the resource. The remainder was largely held by a small number of domestic corporations. An Australian company (Elders Resources) that had entered the scene in the mid-1980s was the only significant foreign investor in the industry.

One major outcome of the sale was the internationalization of New Zealand’s plantation forests. Many companies from Asia and the United States of America have purchased plantation forest assets in the country. Subsequently, other overseas investors have also committed funds to the plantation forestry. The seven largest forest owners are currently held or controlled by foreign companies, and many other major forest owners are overseas-based enterprises. This has facilitated access to export markets and resulted in significant investment in Douglas fir plantations.

Environmental accords

Discussions from 1990 between the New Zealand Forest Owners’ Association (which represents owners of the large majority of plantations by area) and the principal environmental groups in New Zealand (with the exception of Greenpeace) culminated in the New Zealand Forest Accord in 1991. Essentially, forest owners agreed that they would not clear any land or disturb any area with naturally occurring indigenous vegetation (subject to definition) in return for recognition by the environmental groups that commercial plantations were an essential source of perpetually renewable fibre and energy, offering an alternative to halt the depletion of indigenous forests.

This Accord marked the beginning of a greatly improved working relationship between the plantation forest owners and the environmental movement. It has subsequently been complemented by a set of Principles for Commercial Plantation Forest Management in New Zealand, agreed in 1995. At the ten-year anniversary of the signing of the Accord, the parties gathered and re-affirmed the document.

Government extension services

The Forest Service had provided free forestry extension services. The Ministry of Forestry initially assumed this role, but the government required it to charge for its services and introduce a 100 percent cost recovery system over several years. In 1989, the government decided to exit from a service that was seen to be competing with private forestry consultants. This marked the end of one-on-one forestry advice from the government’s forestry agency to private landowners.

14 See http://www.nzfoa.nzforestry.co.nz/pfm_principles.asp
In the early to mid-1990s, the Minister of Forestry focused efforts to raise the profile of forestry and facilitate investment. The Ministry of Forestry subsequently adopted an information brokerage role and produced a range of publications on plantation forestry and investment opportunities. These publications provided information sought by forestry managers and investors, including foreign direct investors.  

**Price as an incentive**  
A global price spike for wood in 1993/1994 saw some log grade prices more than double (in New Zealand dollars). This undoubtedly drove the unprecedented interest in plantation forestry in the mid-1990s despite the fact that the fast returns for the new plantings would be dependent on a price some 30 years into the future. Non-corporate private investment surged through direct investment, partnerships and the purchasing of shares. Much of the investment was superannuation motivated.  

The price spike also drove a dramatic increase in log exports and led to calls for government to intervene to secure supply to domestic processors, increase domestic employment opportunities and prevent a perceived overcutting of the wood resource. The government did not intervene, however.  

**Support to wood-processing industries**  
The government approach to commercial forestry throughout the 1990s was to create appropriate investment and regulatory environments, but not be directly involved in the industry. A new government elected in 1999 softened the hands-off, free market approach. The forest industry was again identified as a key contributor to economic development, particularly in some underdeveloped regions. It also became apparent that the necessary planning and infrastructure development had not been undertaken in crucial forestry growth regions to the required extent. A joint whole-of-government (coordination of all relevant government agencies) and industry Wood Processing Strategy was initiated in 2000 to address the main issues associated with biosecurity, climate change, investment promotion, labour/skills/safety, national certification, research/science/technology, the Resource Management Act, trade access, trade enhancement and transport.  

The broad goal is to formulate and implement integrated response strategies targeting identified development barriers to boost investment in New Zealand’s value-added wood processing. The corporate forestry sector responded positively to this government initiative. In particular, the direct participation of both the Deputy Prime Minister and the Minister of Forestry in the discussions was viewed as a sign of the government’s commitment to the partnership approach. Funding has targeted such items as research and road construction. This financial assistance has been an important incentive, but it is clear that re-assurance by the government that it places a high value on the forest industry has been no less of an incentive, particularly to those companies with foreign ownership.  

**Indigenous forest management**  
Indigenous forest management, a highly political issue in the late 1970s, received special attention from the government in the late 1980s. The transfer of the bulk of the government’s indigenous forest resource to the new Department of Conservation in 1987 led conservation groups to shift their focus to private indigenous forest management. The announcement of new policy initiatives

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15 See references listed under Ministry of Forestry, and Ministry of Forestry in association with other agencies, for key examples.  
in 1990 resulted in further export controls, and an amendment in 1993 to the Forests Act (1949). The amended legislation required the registration of sawmills cutting indigenous logs and the commercial harvesting of indigenous forest on private land to be under government-approved sustainable forest management plans or permits.

The 142 000 ha of government-owned indigenous forest managed for timber production were mostly under a Deed of Appointment with the Crown. In 2000, the government announced that harvesting of indigenous forests from all but 12 000 ha of government-owned land would cease by March 2002.

The ever-increasing restrictions on harvesting of the indigenous forest, and the development of what are effectively two distinct forest management categories, have encouraged the continuing development of the plantation industry.

**Climate change**

In April 2002, New Zealand announced a preferred policy package for the domestic implementation of the Kyoto Protocol, which it ratified in December 2002, focusing on:

- A price on carbon dioxide emissions, applied at first through an emission charge on carbon fuels. It will approximate the international price but will be capped at NZ$25 a tonne of carbon dioxide equivalent, to be effective from 2008;
- Provision of government incentives such as funds or the allocation of emission units for projects that deliver defined reductions in greenhouse gas emissions in any sector of the economy, and are additional to business-as-usual;
- Negotiated greenhouse agreements for sectors and industries that would have difficulty in adjusting to a full price on emissions in the first commitment period (2008-2012). This would involve a contractual commitment by the sector or industry to achieve international best practice in managing emissions in return for exemption from an emissions charge;
- Government retention of the sink credits and associated liabilities allocated to New Zealand under the Protocol in recognition of the carbon sink value of post-1990 forest plantings; and
- Exemption for the agricultural industry from any price measures in the first commitment period, provided the industry is willing to invest, in partnership with the government, in research to identify options for reducing agricultural emissions.

This package is subject to further public consultation. As proposed, it has the potential to affect the forest industry principally through the charge on carbon fuels from 2008. The forest industry has expressed a number of concerns about the policy.

**International issues**

Major environmental issues in a number of Pacific Rim countries have resulted in significant areas of their forest resources being withdrawn from commercial forest management. In particular, harvesting restrictions to protect the habitats of the northern spotted owl in the United States Pacific Northwest region and logging bans in a number of Asian countries (Durst *et al.* 2001) have led to enhanced market opportunities for the New Zealand forest industry.

International trade negotiations have seen the reduction of tariff barriers in some markets, although escalating tariffs remain a key issue in New Zealand’s principal Asian markets. As tariff barriers have been reduced, non-tariff barriers have taken their place. Examples include the requirement for environmental certification, phytosanitary prerequisites, and technical barriers such as building standards.
Period summary and conclusions

The period from 1984 to 2000 witnessed huge variations in the rate of new plantation forest establishment (Table 7), influenced by a range of factors. Previous governments that had provided a wide array of incentives were replaced in 1984 by a government that emphasized the role of the free market. The Treasury also viewed central planning and target setting as inappropriate. Notwithstanding this, the Forest Service managed to hold to its target plantings until the organization was corporatized in 1987. Thereafter new planting by the government decreased significantly and ceased in 1991. Over the same period, the private sector was also within five percent of its suggested contribution, despite the removal of incentives.

Table 7: Government and private new plantings from 1984/1985 to 2001/2002 (ha)

<table>
<thead>
<tr>
<th>Year ended 31 March</th>
<th>Government</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>20 000</td>
<td>36 000</td>
<td>56 000</td>
</tr>
<tr>
<td>1986</td>
<td>18 000</td>
<td>30 000</td>
<td>48 000</td>
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<tr>
<td>1987</td>
<td>15 000</td>
<td>25 000</td>
<td>40 000</td>
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<td>1988</td>
<td>10 000</td>
<td>20 000</td>
<td>30 000</td>
</tr>
<tr>
<td>1989</td>
<td>3 000</td>
<td>17 000</td>
<td>20 000</td>
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<td>1990*</td>
<td>2 000</td>
<td>19 000</td>
<td>21 000</td>
</tr>
<tr>
<td>1991</td>
<td>0</td>
<td>16 000</td>
<td>16 000</td>
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<tr>
<td>1992</td>
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<td>15 000</td>
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<tr>
<td>1993</td>
<td>0</td>
<td>50 000</td>
<td>50 000</td>
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<tr>
<td>1994</td>
<td>0</td>
<td>62 000</td>
<td>62 000</td>
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<tr>
<td>1995</td>
<td>0</td>
<td>98 000</td>
<td>98 000</td>
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<tr>
<td>1996</td>
<td>0</td>
<td>74 000</td>
<td>74 000</td>
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<tr>
<td>1997</td>
<td>0</td>
<td>84 000</td>
<td>84 000</td>
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<tr>
<td>1998</td>
<td>0</td>
<td>64 000</td>
<td>64 000</td>
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<tr>
<td>1999</td>
<td>0</td>
<td>51 000</td>
<td>51 000</td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>40 000</td>
<td>40 000</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>34 000</td>
<td>34 000</td>
</tr>
<tr>
<td>2002 (p)</td>
<td>0</td>
<td>31 000</td>
<td>31 000</td>
</tr>
<tr>
<td><strong>Total new planting</strong></td>
<td><strong>68 000</strong></td>
<td><strong>766 000</strong></td>
<td><strong>834 000</strong></td>
</tr>
</tbody>
</table>

Source: Ministry of Agriculture and Forestry (2001)

* Total figure is available, statistics for state and private planting have been estimated.

p = provisional

The termination of all subsidies and export incentives was just a part of a dramatic overhaul of the New Zealand economy to which all businesses had to adjust. There was substantial re-organization and rationalization undertaken by private enterprises (as well as government businesses) that resulted in sales and exchanges of plantation forests among companies. The sales changed the face of plantation forest ownership in New Zealand and over a period of six years essentially saw the government exit from the industry.

The “cost of bush” taxation account had been highly contentious and was widely viewed as having severely depressed new plantings. By 1991, new plantings had dropped to 15 000 ha, the lowest level since 1966. Replanting following harvesting was the standard practice and this accounted for the majority of the planting taking place each year. A new government elected in late 1990 implemented a pre-election policy to remove the “cost of bush” account and re-introduce immediate deduction of qualifying costs against income from any source in 1991. The new government saw forestry as a major contributor to sustainable economic development, and the Ministry of Forestry adopted a strong focus on information brokerage and overcoming impediments to forestry development.
An unprecedented log price spike, in association with the conclusion of the bulk of the asset sales and changes to the taxation regime, drove record new plantings in 1994. A generally weak New Zealand (and international) share market through the early 1990s prompted private investors to seek alternative investments. The log price spike allowed forestry investment schemes to predict very high comparative returns. It is not possible to quantify the impact of each event. Due to the removal of subsidies and export incentives, about 1.5 million ha became regarded as marginal or uneconomic for agricultural production. New land uses were required and forestry was often one of the favoured options. Woodlots and plantations also became more generally accepted as having a role in sustainable “farm” management. The removal of subsidies also depressed rural land prices and in turn raised the profitability of afforestation based on purchased land.

Consequently, the majority of new plantings through the 1990s was undertaken by a variety of small-scale investors, rather than the government or major forestry companies. Today, 91 percent of the plantation forest resource is in private ownership and the plantation forest estate contributes 99.7 percent of New Zealand’s total wood harvest.

A summary of incentives during this period is available in Annex 1, and conclusions for its plantation forestry incentives are presented hereunder:

- Government involvement in plantation forest ownership had played a major role in the development of an internationally competitive industry, but once established, continued involvement was not necessary;
- Regardless of the government’s involvement in plantation forest ownership, it retained a role in ensuring appropriate planning and infrastructure development;
- Corporate forest investment was motivated by financial returns and subsidies were not required, provided a neutral investment environment was in place;
- Smaller-scale forest investors were often influenced by the media and might have been motivated by a range of financial, environmental and social factors, so incentives should be carefully targeted;
- Taxation regimes had a significant impact on investment in plantation forestry, and a stable and equitable regime was important;
- Direct financial incentives masked the real viability of plantation forestry and other businesses;
- Access to independent and objective information about plantation forestry was a valuable incentive for encouraging new investors; and
- Profitability ultimately determined the level of investment, i.e. it was pointless trying to encourage plantation forestry where it was not inherently viable.

**CONCLUSIONS**

The history of forest plantation development in New Zealand is one of long-term vision, targeted government policies, use of direct and indirect incentives during its development phases, and the ability to quit government involvement once its role had been fulfilled (Figure 5). In the early stages of development, policies, legislation and incentives were focused on establishing a largely government-owned plantation resource to reduce the pressure on indigenous forest. In 1987, after over 60 years of such involvement, the government decided to relinquish its hold on plantation forestry. Direct incentives to forest planting were removed and a government-owned corporation was established to manage government plantations. By 1993, the government sold the bulk of its 0.5 million ha of plantation forests to domestic and overseas bidders.
Once direct government incentives had been removed during the reforms of the 1980s in an even-handed way across the economy, within a relatively short time the industry neither expected nor wanted the assistance. Indeed, the replacement of, at times, unpredictable government policy with free-market signals was seen by a mature industry as more sustainable. It was apparent that any move to restore subsidies or other market distorting mechanisms would be firmly opposed.

Just as direct incentives played a central role in the establishment of New Zealand’s plantation forest industry, the absence of direct incentives was equally important in ensuring that a mature, export-oriented industry remained efficient and internationally competitive, and flourished.

The government and the forest industry recognize the continuing importance of certain indirect incentives. These focus on the provision and funding (in part) of infrastructure, biosecurity, research, market access initiatives and information, particularly independent and authoritative plantation resource data. Also critical have been the establishment and maintenance of neutral investment and environmental regulatory regimes within which all industries operate on an equal footing.

A wide range of direct and indirect incentives have featured in the development of New Zealand’s plantation forestry. The effectiveness of incentives is dependent on a clear understanding of their objectives (short, medium and long terms), the phase of development of the industry (new, developing, and mature), the key participants and their motivations. It is not possible to quantitatively assess the impact and effectiveness of individual incentives because:

- They have been used in conjunction with each other and cannot be isolated;
- The plantation forest industry comprised a number of interest groups that are motivated by diverse objectives and therefore by different incentives;
- The impact of the incentives changes with the stage of development of the industry;
- Cost details for most individual incentive mechanisms are not readily available; and
- Indirect incentives are generic and not specific to plantation forestry.

The history of plantation forest ownership in New Zealand has seen dominance by the government replaced by dominance of the corporate sector. If the recent new planting trend continues, there could be dominance by small-scale plantation forest owners over the next couple of decades.
The various types of owners have been motivated by different objectives. The government initially wanted to ensure a sustainable wood supply to meet the nation’s future needs, and then desired economic development based on an export-oriented industry. The corporate enterprises had to deliver financial returns to their shareholders, while small-scale investors were motivated by a combination of factors (Table 8).

### Table 8: Motivations of small-scale investors to establish plantations

<table>
<thead>
<tr>
<th>Farmers’ motivations:</th>
<th>Individual investors’ motivations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• sustainable land use</td>
<td>• diversification of their investment portfolios</td>
</tr>
<tr>
<td>• economic diversification</td>
<td>• financial return</td>
</tr>
<tr>
<td>• financial return</td>
<td>• taxation advantages</td>
</tr>
<tr>
<td>• on-farm wood supply</td>
<td>• superannuation requirements</td>
</tr>
<tr>
<td>• shelter for livestock, crops and buildings</td>
<td>• a personal interest in trees and specialty timbers</td>
</tr>
<tr>
<td>• a personal interest in trees and specialty timbers</td>
<td>• a strong belief in the future market outlook for wood</td>
</tr>
<tr>
<td>• aesthetics</td>
<td></td>
</tr>
</tbody>
</table>

**Plantation forestry as a new industry in New Zealand**

The key incentives influencing the successful establishment of a new plantation forest industry in New Zealand were:

- The understanding by the government of the importance of a secure wood supply, knowledge of the limitations of the indigenous forests to satisfy future supply and clear and generally consistent policies (focused on afforestation) to address these issues, which provided the foundation upon which the industry has been built; and
- Government-led afforestation to demonstrate the biological and commercial successes of this new land use with exotic species on a long production cycle (thus developing the knowledge base and reducing the risks for private enterprises).

**Plantation forestry as a developing industry in New Zealand**

The key incentives influencing the successful development of a young plantation forest industry in New Zealand were:

- An established government-owned resource base that private industry could build upon to develop regionally significant, and eventually export-oriented, plantation forest industries;
- Government-led development of new, large-scale sawmilling and marketing to utilize the plantation wood resource. This was a critical step because plantation-grown wood has very different physical properties to the indigenous wood resource traditionally used in New Zealand;
- Government-led planning and development of infrastructure in the key central North Island region that formed the heart of the plantation forest industry;
- Government-funded research that increased the understanding of silvicultural management of plantation forests and the utilization of plantation-grown wood;
- A period of government subsidies and extension services to encourage the uptake of small-scale plantation forestry by farmers, other landowners and local authorities; and
- A commitment to train professional foresters and forest management personnel.
Debates and acrimony between the agriculture and forest industries, and the environmental movement and the forest industry, in the 1970s and 1980s, were the major disincentives. These resulted in statutory land-use controls, a poor public perception of the forest industry, and constrained development to some degree.

**Plantation forestry as a mature industry in New Zealand**

The key incentives influencing the transition to a mature plantation forest industry were:

- Deregulation of the economy and the withdrawal of direct subsidies to ensure that plantation development became more efficient, market-led and internationally competitive;
- The introduction of neutral and stable economic and regulatory environments to ensure that land uses and industries competed on their merits and did not face risks from changing and conflicting political directions;
- The opportunity for private investors to purchase government-owned plantation forest assets and secure access to significant wood resources;
- Majority funding of research by private industry to ensure it focused on end-user requirements;
- Development of effective working relationships between the forest and agriculture industries, and the forest industry and environmental groups that led to better understanding and varying degrees of support for the objectives of each group; and
- Publication of high-quality forest industry statistics, wood-supply forecasts and other information, often through joint initiatives by the government and private sector, that is essential for good policy development, short-, medium- and long-term planning, and monitoring.

A major, but short-term (1987-1991) disincentive was a taxation regime that might have been theoretically neutral, but failed to recognize the long gestation periods, and depressed new planting during its existence.

**FUTURE DIRECTIONS**

The focus of New Zealand’s plantation development strategy over the last 15 years has been on managing economic fundamentals (inflation, interest rates and the costs of business undertakings), encouraging enterprises and innovations, and avoiding, remedying or mitigating adverse environmental effects. There is no expectation of, or desire for, change to this approach. Built around an open and market-led economy, the New Zealand plantation forest industry has matured sufficiently to ensure continuing growth and vigour.

Nevertheless, there are issues that impinge on the development of the industry. Through the joint Wood Processing Strategy initiative, the government and forest industry have identified these issues as:

- Biosecurity and the protection of the forest resource;
- Climate change and the impacts on industry by the ratification of the Kyoto Protocol;
- Investment in wood processing with a rapidly increasing wood supply;
- Availability of skilled labour;
- Market development and certification of sustainably grown plantation wood;
- Research, science and technology and increasing the focus on markets, end uses and new products;
- Inconsistency in the implementation of the Resource Management Act (1991), and the cost and time required for obtaining agreements;
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

- Trade access and the elimination or reduction of tariffs and non-tariff barriers;
- Development of infrastructure in some forestry growth regions;
- Future energy needs of, and availability to, the wood-processing industry; and
- Improvements in occupational health and safety.

The delivery of strategies to address these issues and other supporting functions will continue to require government border control, forest policy and research agencies with appropriately trained staff. A growing and diverse industry will continue to coordinate its input to issue resolution through sector associations and an integrated Forest Industries Council.

At the farm forestry level, development will continue to depend on the relative profitability of farming and forestry, the perception of forestry (often gained through the media), the development of certification, and the perception of long-term commercial and non-commercial values associated with trees and wood.

The ongoing success of the current strategy and new initiatives will be monitored primarily through:

- Annual estimates of new planting and the expansion of the plantation forest estate;
- Statistics reporting roundwood removals from plantation forests;
- Estimates of investment in new wood-processing facilities;
- Trade statistics reporting the volume and value of exported forest products;
- Statistics reporting the volume of logs exported versus the volume processed domestically;
- Comparisons of wood supply forecasts with estimates of actual harvest volumes;
- Monitoring of trends in domestic and international log prices and price indices for forest products;
- Reporting on incursions of new pests and diseases entering the country and their controls; and
- Economic statistics reporting the contribution of forestry to the GDP.

CONCLUDING COMMENT

Lessons can be learned from the successes and failures of incentives in other countries, but ultimately the appropriate combination of policies, strategies and supporting incentives should reflect individual country circumstances, and the national needs and objectives. Consideration must be given to the factors that motivate people to invest in planting trees. Forestry is a long-term investment, and long-term visions and strategies – based on reliable information of resource, product, market supply and demand – are required. There is no universal model for success. New Zealand’s approach has been highly successful. Much of the impetus provided by the New Zealand Government has been through indirect incentives, particularly research. Such an approach may or may not be successful elsewhere.
BIBLIOGRAPHY


New Zealand Forest Owners’ Association website: http://www.nzfoa.nzforestry.co.nz/


Statistics New Zealand website: http://www.stats.govt.nz

# ANNEX 1: SUMMARY OF PLANTATION FORESTRY INCENTIVES AND DISINCENTIVES IN NEW ZEALAND

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to 1870</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1858</td>
<td>Reimbursement of costs if lease terminated</td>
<td>On-farm wood supply</td>
<td>Regional government</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>1870-1918: Incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1871</td>
<td>Grants of land, reduced rentals, or land orders</td>
<td>Local timber supply and shelter</td>
<td>Central and regional governments</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>1870s</td>
<td>Grants of government land</td>
<td>Regional timber supply</td>
<td>Central government</td>
<td>District government</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
<tr>
<td>1896</td>
<td>Establishment of afforestation branch of Lands Department</td>
<td>Conservation of indigenous forests via plantations</td>
<td>Central government</td>
<td>Central government</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>1986</td>
<td>National conference</td>
<td>Develop strategy</td>
<td>Central government</td>
<td>All stakeholders</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>1915</td>
<td>Seedlings provided at cost price</td>
<td>Promote afforestation</td>
<td>Central government</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
<tr>
<td>1918</td>
<td>Indigenous timber controls</td>
<td>Limit depletion of native forest</td>
<td>Central government</td>
<td>Indigenous industry</td>
<td>Zero</td>
<td>Low</td>
</tr>
<tr>
<td>1870-1918: Disincentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1874</td>
<td>Focus on indigenous forest management with some afforestation</td>
<td>National timber supply</td>
<td>Central government</td>
<td>Lands Department</td>
<td>£10 000 for 10 years</td>
<td>Low</td>
</tr>
<tr>
<td>1870 to early 1900s</td>
<td>Lack of political commitment to forestry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Annex 1 cont.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1919-1938: Incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1919</td>
<td>Government forestry department</td>
<td>Professional forest management</td>
<td>Central government</td>
<td>Central government</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>Early 1920</td>
<td>National forest inventory and strategic planning</td>
<td>Sustainable wood supply</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>1920s</td>
<td>Research on species, establishment and products</td>
<td>Successful afforestation</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>1920s</td>
<td>Sale of seedlings at cost price</td>
<td>Encourage planting</td>
<td>Central government</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
<tr>
<td>1920s</td>
<td>Forestry extension</td>
<td>Encourage planting</td>
<td>Central government</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>Mid-1920s to mid-1930s</td>
<td>Bond sales</td>
<td>Capital for land purchase, planting and maintenance</td>
<td>Private industry</td>
<td>Small private investors</td>
<td>Unknown</td>
<td>High initially, later negligible</td>
</tr>
<tr>
<td>Early 1930s</td>
<td>Subsidized tree planting</td>
<td>Employment</td>
<td>Central government</td>
<td>Unemployed</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
<tr>
<td>1930s</td>
<td>Construction subsidies</td>
<td>Development of affordable housing</td>
<td>Central government</td>
<td>Construction industry</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
</tbody>
</table>

### 1919-1938: Disincentives

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1928-1934</td>
<td>Oversupply from indigenous forests</td>
<td>Medium</td>
</tr>
<tr>
<td>1928-1934</td>
<td>Competition from imports</td>
<td>Medium</td>
</tr>
<tr>
<td>Early 1930s to 1934</td>
<td>Abuse of bond sales</td>
<td>Medium</td>
</tr>
</tbody>
</table>
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Annex 1 cont.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1939-1958: Incentives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Late 1930s and 1940s</td>
<td>Government development of harvesting practices and wood utilization</td>
<td>Consolidating viability of plantations and demonstrating utilization and marketing of new products</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>1948</td>
<td>Dedicated forest research institute</td>
<td>Research</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Medium (in this period)</td>
<td></td>
</tr>
<tr>
<td>1949</td>
<td>Tax deductions</td>
<td>Encourage afforestation</td>
<td>Central government</td>
<td>Landowners</td>
<td>Indirect</td>
<td>Low</td>
</tr>
<tr>
<td>1950s</td>
<td>Direct financial assistance plus supply of wood at low cost</td>
<td>Establish large-scale processing</td>
<td>Central government</td>
<td>Private company</td>
<td>£14 million setup plus 50% of other costs</td>
<td>Medium</td>
</tr>
<tr>
<td>1950s</td>
<td>Infrastructure development</td>
<td>Facilitate processing and forestry development</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>1946 to 1955</td>
<td>National forest survey</td>
<td>Assess indigenous resource and merchantable area</td>
<td>Central government</td>
<td>Central government</td>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>

**1939-1958: Disincentives**

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-1930s to 1950s</td>
<td>Price controls</td>
<td>Low-cost timber for housing</td>
<td>Forest industry</td>
<td>Construction industry and citizens</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>1930s to 1960s</td>
<td>Supply of subsidized indigenous wood</td>
<td>Maintain domestic supply</td>
<td>Central government</td>
<td></td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>Late 1950s (refer to next period)</td>
<td>Tax legislation</td>
<td></td>
<td>Central government</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>Medium on replanting</td>
</tr>
</tbody>
</table>
Annex 1 cont.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959-1984: Incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1959</td>
<td>Wood demand and supply analysis</td>
<td>Ensure national wood supply needs</td>
<td>Central government</td>
<td>Central government</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>1959</td>
<td>Log exports</td>
<td>Increase returns to growers</td>
<td>Indirect</td>
<td>Private companies</td>
<td>Indirect</td>
<td>Medium</td>
</tr>
<tr>
<td>1965</td>
<td>Taxation incentives</td>
<td>Encourage forestry</td>
<td>Central government</td>
<td>Landowners</td>
<td>Unknown</td>
<td>Low</td>
</tr>
<tr>
<td>1960s to 1980s</td>
<td>Forestry extension</td>
<td>Encourage private forestry</td>
<td>Central government</td>
<td>Landowners</td>
<td>Varied (see table)</td>
<td>Medium</td>
</tr>
<tr>
<td>1962 to 1984</td>
<td>Loans and grants schemes</td>
<td>Encourage private forestry</td>
<td>Central government</td>
<td>Māori</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>1969 to 1981</td>
<td>Government – industry planning</td>
<td>Establish common goals and commitment</td>
<td>Central government</td>
<td>Forest and industry government</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
<tr>
<td>1960s to 1980s</td>
<td>Research</td>
<td>Analysis of databases and communication of results</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Government Institute’s budget was NZ$12 million in 1980</td>
<td>High</td>
</tr>
<tr>
<td>1970s and 1980s</td>
<td>Training</td>
<td>Create skilled workforce</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>High</td>
</tr>
<tr>
<td>1959-1984: Disincentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970s and 1980s</td>
<td>Forestry conflict with farming and environmental movement</td>
<td></td>
<td></td>
<td></td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>1977 to 1991</td>
<td>Land-use planning legislation</td>
<td>Protection of land with high value for food production</td>
<td>Central government</td>
<td>Land developers/landowners</td>
<td>Unknown</td>
<td>Medium</td>
</tr>
</tbody>
</table>
### Annex 1 cont.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
<th>Purpose</th>
<th>Funding</th>
<th>Target source</th>
<th>Cost group</th>
<th>Impact on plantation development</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-2002: Incentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-1980s</td>
<td>General economic reform</td>
<td>Establish a market-based and enabling economy</td>
<td>Economy wide</td>
<td>High social costs initially</td>
<td>Negative initially, then</td>
<td></td>
</tr>
<tr>
<td>Mid-1980s</td>
<td>General removal of direct incentives</td>
<td>Create “level playing field” and international market-based economy</td>
<td>Economy wide</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1988 to 1996</td>
<td>Sale of government plantation forests</td>
<td>Reducing public debt</td>
<td>New Zealand and international investors</td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>Removal of extension service</td>
<td>Remove government competition with private consultants</td>
<td>Ministry of Forestry</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991</td>
<td>New Zealand Forest Accord</td>
<td>Establish common understanding between industry and environmental groups</td>
<td>Industry and environmental groups</td>
<td>Unknown</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>New indigenous harvesting legislation</td>
<td>Sustainable ecosystem management</td>
<td>Central government</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>Low-medium</td>
</tr>
<tr>
<td>2001 to 2002</td>
<td>Wood Processing Strategy</td>
<td>Remove barriers to domestic processing</td>
<td>Central government and industry</td>
<td>Forest industry</td>
<td>Unknown</td>
<td>Full impact yet to be determined</td>
</tr>
<tr>
<td>1984-2002: Disincentives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>Requiring costs to be capitalized instead of deducted against taxable income when incurred</td>
<td>Establish neutral taxation regime with respect to other land uses</td>
<td>Forest industry</td>
<td>Strongly negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1991 to 2002</td>
<td>Implementation of the Resource Management Act</td>
<td>Sustainable management of resources</td>
<td>Landowners and managers</td>
<td>Low-medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>Climate change policy</td>
<td>Reduce CO₂ emissions</td>
<td>Economy wide</td>
<td>Yet to be determined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table above outlines the role of incentives in forest plantation development in Asia and the Pacific. It includes the year, description, purpose, funding, target source, cost group, and impact on plantation development for each incentive. The incentives are categorized into two periods: 1984-2002: Incentives and 1984-2002: Disincentives. The table highlights the economic and policy changes that have influenced forest plantation development in the region.
INTRODUCTION

The Philippines: country information

The Philippines is an archipelago composed of about 7,100 islands and islets that extend more than 1,850 km from north to south. It is bound by the South China Sea to the west and the Pacific Ocean to the east. The country is divided into three major island groupings – Luzon in the north, Mindanao in the south, and the Visayas Islands in the centre. There are 16 administrative regions and 76 provinces.

The total land area of the Philippines is about 30 million ha, including inland water bodies. The islands are volcanic in origin and are, for the most part, mountainous with many active volcanoes. The mountain ranges generally run along the main axis of the islands, parallel to each other and close to the coasts. The largest lowlands are in Luzon and Mindanao with other large plains in Panay and western Negros in the central islands.

Social and economic indicators

Table 1 shows the Philippines’ major social and economic indicators.

Table 1: Some social and economic indicators, 2002

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (millions)</td>
<td>76.5</td>
</tr>
<tr>
<td>Population growth rate, projected 2000-2005 (%)</td>
<td>1.99</td>
</tr>
<tr>
<td>Poverty incidence (% of population)</td>
<td>28.4</td>
</tr>
<tr>
<td>Average annual family income (peso)</td>
<td>144,039</td>
</tr>
<tr>
<td>Gross national product growth rate, const. 1985 (%)</td>
<td>7.2</td>
</tr>
<tr>
<td>Gross domestic product growth rate, const. 1985 (%)</td>
<td>5.8</td>
</tr>
<tr>
<td>– agriculture</td>
<td>6.1</td>
</tr>
<tr>
<td>– industry</td>
<td>5.1</td>
</tr>
<tr>
<td>– services</td>
<td>6.1</td>
</tr>
</tbody>
</table>

US$1.00 = PHP1.73 (2002)

THE PHILIPPINE FORESTRY SECTOR

The forestry sector and the economy

From the 1950s until the late 1970s, the forestry sector was one of the mainstays of the Philippine economy, particularly the logging and wood-processing industries. Between 1975 and 1980, forestry’s contribution to the gross national product (GNP) ranged from 1.5 to 2.17 percent (at 1972 prices). Logs were a major part of the Philippines’ international trade, together with primary products (such as sawnwood, veneer and plywood). However, by 2001 the forestry sector’s contribution to the GNP had declined to only 0.09 percent (1985 prices) (Table 2).

1 Director, Forest Management Bureau, Department of Environment and Natural Resources, Quezon City, Philippines
Table 2: Gross national product and gross value added (GVA) in forestry (million pesos)

<table>
<thead>
<tr>
<th>Year</th>
<th>GNP at constant prices</th>
<th>GVA in forestry</th>
<th>% GNP</th>
<th>GNP at current prices</th>
<th>GVA in forestry</th>
<th>% GNP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001**</td>
<td>1 051 157</td>
<td>913</td>
<td>0.09</td>
<td>3 853 301</td>
<td>2 323</td>
<td>0.06</td>
</tr>
<tr>
<td>2000</td>
<td>1 016 131</td>
<td>1 372</td>
<td>0.14</td>
<td>3 496 803</td>
<td>3 383</td>
<td>0.10</td>
</tr>
<tr>
<td>1999</td>
<td>969 333</td>
<td>1 704</td>
<td>0.18</td>
<td>3 136 168</td>
<td>4 055</td>
<td>0.13</td>
</tr>
<tr>
<td>1990</td>
<td>716 929</td>
<td>7 320</td>
<td>1.02</td>
<td>1 071 433</td>
<td>8 907</td>
<td>0.83</td>
</tr>
<tr>
<td>1985</td>
<td>551 428</td>
<td>706</td>
<td>0.13</td>
<td>551 428</td>
<td>10 865</td>
<td>1.97</td>
</tr>
<tr>
<td>1980</td>
<td>92 532</td>
<td>1 386</td>
<td>1.50</td>
<td>264 532</td>
<td>6 743</td>
<td>2.55</td>
</tr>
<tr>
<td>1975</td>
<td>68 284</td>
<td>1 265</td>
<td>1.85</td>
<td>114 438</td>
<td>2 833</td>
<td>2.48</td>
</tr>
</tbody>
</table>

Source: National Statistical Coordination Board, cited in FMB (2001)
** as of May 2002

FOREST RESOURCES

According to the Philippine Master Plan for Forest Development, the forest cover decreased from 17 million ha in 1934 to 6.7 million ha in 1990 (DENR/FMB 1991). Official forestry statistics are based on projections from the first national forest inventory in 1969 and the second inventory in 1989. According to the projections, the Philippines currently has 5.4 million ha of forests (Table 3).

Table 3: Forest cover of the Philippines, 2000

<table>
<thead>
<tr>
<th>Area (thousand ha)</th>
<th>% of total land area</th>
<th>% of forest land²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dipterocarp forest</td>
<td>3 536.02</td>
<td>11.8</td>
</tr>
<tr>
<td>– old growth</td>
<td>804.90</td>
<td>2.7</td>
</tr>
<tr>
<td>– residual</td>
<td>2 731.12</td>
<td>9.1</td>
</tr>
<tr>
<td>Pine</td>
<td>227.90</td>
<td>0.8</td>
</tr>
<tr>
<td>– closed canopy</td>
<td>123.90</td>
<td>0.4</td>
</tr>
<tr>
<td>– open canopy</td>
<td>104.00</td>
<td>0.4</td>
</tr>
<tr>
<td>Submarginal forest</td>
<td>475.10</td>
<td>1.6</td>
</tr>
<tr>
<td>Mossy forest</td>
<td>1 040.30</td>
<td>3.5</td>
</tr>
<tr>
<td>Mangrove forest</td>
<td>112.40</td>
<td>0.4</td>
</tr>
<tr>
<td>Total forest</td>
<td>5 391.72</td>
<td>18.1</td>
</tr>
</tbody>
</table>

Source: FMB (2000)

Various sources indicate different rates of deforestation in the Philippines. The Philippine Master Plan for Forest Development estimated forest cover reduction of about 100 000 ha per annum (DENR/FMB 1991). Other assessments ranged between 50 000 and 70 000 ha per annum, while FAO provided a figure of 89 000 ha per annum (FAO 2000; 2003). The lower figures reflect the assumption that since the natural forests are now relatively inaccessible, the forest conversion rate has slowed compared to the rates of the 1950s and 1970s.

The Natural Resources Accounting Project (NRAP) estimated that timber resources in old-growth dipterocarp forests decreased at an annual rate of 52 million m³ between 1980 and 1989, equivalent to an annual asset depreciation rate of PHP41.6 billion in constant 1985 prices. Volume in second-growth dipterocarp forests, on the other hand, increased by an average of

² Forest land refers to lands that are to be used primarily for forestry purposes; these are not necessarily covered by forests at present.
12.3 million m$^3$ for the same period, translating to an annual appreciation of PHP11 billion, representing an annual volume growth and real increase in stumpage values of 1.5 and 3.7 percent, respectively (DENR/NRAP 1991).

Furthermore, the net depreciation that resulted from changes in the physical stocks of both old-growth and second-growth dipterocarp forests averaged PHP30.6 billion per annum (from 1970 to 1989). The depreciation was highest in the 1970s followed by lower rates in the 1980s. Important factors that contributed to the depreciation of the dipterocarp forests were conversion, ineffective protection of the residual growing stocks and logging damage (DENR/NRAP 1991).

The NRAP attributed an average annual appreciation of PHP1.7 billion to the increase of about 26,800 ha of plantations per annum. However, it warned that “this rate is not substantial enough to compensate for losses in dipterocarp forest...” Similar asset depreciation rates were estimated for pines, mangroves and rattan resources (Table 4).

<table>
<thead>
<tr>
<th>Table 4: NRAP estimates of annual forest resource depletion, 1970-1989</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual averages</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Dipterocarp</td>
</tr>
<tr>
<td>– old growth</td>
</tr>
<tr>
<td>– residual</td>
</tr>
<tr>
<td>Plantation</td>
</tr>
<tr>
<td>Pines</td>
</tr>
<tr>
<td>Rattan (million</td>
</tr>
<tr>
<td>lineal m)</td>
</tr>
<tr>
<td>&lt;2 cm (diameter)</td>
</tr>
<tr>
<td>&gt;2 cm (diameter)</td>
</tr>
<tr>
<td>Mangroves</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: DENR/NRAP (1991), Table 37 of Main Report

INCENTIVES AND FOREST PLANTATION DEVELOPMENT

Prior to 1980

The need to actively pursue the development of industrial forest plantations was realized in the early 1970s. Previously, the focus had been on converting the natural forests into “managed forests” based on the principle of “sustained yield management” and through the silvicultural methods prescribed under the Philippine Selective Logging System. Although policies were already enunciated to encourage planting of trees, these were mainly focused on rehabilitating denuded lands and grasslands with the primary goal of forest restoration and not necessarily wood production.

The enactment of Republic Act No. 115 in 1947 can be regarded as the first major government effort to restore the forest cover. This Act created a Reforestation Fund from charges levied on timber harvested on state forest lands, in addition to the regular forest charges. This fund was used exclusively by the then Bureau of Forestry to finance reforestation projects.

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3 Forest charges are royalties collected by the government from timber concessionaires based on the net timber volume extracted from the forests. During the time the Reforestation Fund (1950s to late 1960s) was in effect, the forest charges were about US$0.50-1.00/m$^3$ of timber, depending on species, at the then exchange rate of PHP4.00 = US$1.00.
To accelerate tree planting, the Reforestation Administration was created in 1963 according to Republic Act No. 2706. Its mandate was to hasten the reforestation of barren and denuded public lands. All reforested areas were declared permanent forest reserves. Until the 1970s, the so-called “regular reforestation projects” that were developed from the Reforestation Fund and administered by the Reforestation Administration were the only evidence of significant forest plantation development.

By 1973, government forestry administrators recognized that the natural forest was not an inexhaustible resource, and that there was a need to augment timber resources through industrial forest plantations. As a result, the Presidential Letter of Instruction (LOI) No. 145, issued in November 1973, directed the Presidential Committee on Wood Industries Development to submit a programme “to promote the development of industrial plantations and tree farms, to help ensure wholesome ecological balance and broaden the resource base of the (forest-based) industries” (Domingo 1983).

This approach was encouraged to help rehabilitate denuded watersheds and use barren public forest land for the production of commercial wood and fruits. It was obvious, even then, that the immediate reforestation of barren lands needed to take precedence over timber production. Even fruit trees were considered eligible for development of “forest plantations”. This notion that “reforestation” and “forest plantation development” were synonymous would filter down through generations of forest administrators, and would significantly impact the formulation of forest plantation development policies, strategies and programmes.

The reforestation policy and LOI 145 were subsequently embodied in the Forestry Reform Code (Presidential Decree 389) of 1974, and eventually in the Revised Forestry Reform Code (Presidential Decree 705) of 1975. Presidential Decree 1559 of 1979, amending the Revised Forestry Reform Code, reiterated the “establishment or development and maintenance of forest tree plantations”. In 1980, LOI 423 sanctioned the establishment of industrial tree plantations to “intensify and accelerate forest ecosystem management”, thus leading to the creation of the Program for Forest Ecosystem Management (ProFEM) (Domingo 1983).

ProFEM was to have re-established forest cover nationwide, calling on all government agencies to undertake “tree planting” in watersheds, along roads and in parks. Substantial funds were infused into the Bureau of Forest Development’s reforestation projects. In reality, much of the tree planting was ceremonial and cosmetic in nature – plantings by agency personnel during holidays or agency anniversaries – and often in easily accessible areas such as roadsides and parks. In most cases, there was no follow-up or maintenance, and many “plantings” were conducted in the same places year after year. The statistics on areas planted under this programme are therefore unreliable in the absence of a good georeferenced monitoring system.

A vital element missing from ProFEM was a clear definition of ownership of the land on which the plantings were conducted and of intermediate and final products. While the areas planted, especially in the so-called “critical watersheds”, were legally state lands, these areas were under de facto control of upland farmers and land claimants who regarded the government-mandated tree planting as a threat to their hold on the land. To protect their interests, these farmers and claimants often burned areas planted when the opportunity arose.

Throughout this period, the underlying objective of forest plantation development was environmental considerations and not wood production, despite official pronouncements on the need to augment the wood supplies through plantations. The Timber License Agreement (TLA) holders were mainly interested in harvesting natural forests. The plantations that they established

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4 In local terms, these were projects funded by general government appropriations, as differentiated from “foreign-assisted project” funded by official development assistance loans and grants.

5 During the martial-law years starting from 1972, legislation was in the hands of the President and was enacted through Presidential Decrees, Presidential Proclamations, or Letters of Instruction.
were only a token gesture to comply with the reforestation requirements of the law and their license agreements. Although a few forestry companies established forest plantations because it was in their long-term interests, most private enterprises focused only on extracting timber from old-growth forests.

In summary, forest plantation development before 1980 was mandated by command-and-control, rather than through economic or financial incentives. Also, the bulk of plantation development was funded by direct public investments through annual appropriations to government agencies, primarily the Bureau of Forest Development. The emphasis was on planting seedlings and reporting hectares planted, with little or no quality control or planning for sustainable long-term plantation timber supplies.

1980 to 1985

Between 1980 and 1985, forest plantation development was accelerated through the Industrial Tree Plantation (ITP) programme. Presidential Executive Order No. 725 of 1981 mandated the establishment of plantations in open, denuded, brushland and poorly-stocked areas.6 TLA holders were given six months from the promulgation of the Executive Order to:

- Apply for an ITP lease agreement over suitable areas not exceeding 30 percent of their respective TLA areas; and/or
- Implement an approved seven-year reforestation plan within their TLA areas.

To encourage and facilitate the establishment of industrial tree plantations, the government founded the National Industrial Tree Corporation, a subsidiary of the government-owned National Development Company, offering incentives such as:

- A nominal application fee of PHP0.50/ha;
- Exemption from land rental for the first 25 years of the lease. Upon renewal of the lease for another 25 years, the rent would be PHP0.50/ha/year for the first five years, and thereafter, PHP1.00/ha/year;
- No rent from a lessee who, upon verification, substantially met the development schedule of the plantation, tree farm or agroforestry farm, as prescribed in the approved plans;
- Reduced taxes on plantation timber – only 25 percent of the regular forest charges on timber from natural forests;
- Exemption from certain internal revenue taxes;
- Tax deductible plantation development expenses; and
- Long-term low-interest loans from government financing institutions, such as the Development Bank of the Philippines.

During this period, 155 000 ha of state forest lands were granted to the private sector for tree plantation development, with tenurial arrangements of 25 years, renewable for another 25 years (Table 5). Most of these areas had been (fully or partially) under timber concession agreements, which were converted to tree plantation leases7 pursuant to Executive Order 725. Notable among the concessionaires that made use of the order were better-performing TLA holders with long-term forest management and development programmes. Several concessionaires took advantage of the lease-conversion incentive to:

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6 The focus on “open and denuded” lands as priority areas for reforestation (and plantation development) recurs in all administrative issuances until today, and reflects the mindset that “reforestation” and “forest plantation development” are synonymous.

7 In this paper, the terms agreements, licenses and leases are used interchangeably, although in the Philippine legal system, they have different terms and conditions.
Strengthen their tenure with the expectation that the government was about to shift production focus from natural forests to forest plantations;
- Access forthcoming technical and financial support from the National Industrial Tree Corporation and government financing institutions; and
- Convert the plantations they had established under their timber license agreements so that they could claim them instead of handing them over to the government.8

Table 5: Award of industrial forest plantations (IFP) to the private sector

<table>
<thead>
<tr>
<th>Period of issuance</th>
<th>No. of industrial forest plantations awarded</th>
<th>Area (ha)</th>
<th>Average size per IFP (ha)</th>
<th>Smallest area awarded (ha)</th>
<th>Largest area awarded (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1980</td>
<td>1</td>
<td>1 070</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980-1985</td>
<td>29</td>
<td>155 003</td>
<td>5 345</td>
<td>100</td>
<td>45 560</td>
</tr>
<tr>
<td>1986-1992</td>
<td>20</td>
<td>187 064</td>
<td>9 353</td>
<td>100</td>
<td>38 848</td>
</tr>
<tr>
<td>1993-1998</td>
<td>126</td>
<td>127 436</td>
<td>1 011</td>
<td>110</td>
<td>20 000</td>
</tr>
<tr>
<td>1999-2001</td>
<td>7</td>
<td>64 754</td>
<td>9 251</td>
<td>529</td>
<td>16 167</td>
</tr>
</tbody>
</table>

Source: FMB (1997-2001)

Others, such as provincial electric cooperatives and a few pioneer entities, also saw a long-term business prospect in the programme. However, actual plantation establishment was far below the total area covered by the ITP agreements (Table 6). Of the 155 000 ha placed under ITP lease, only 20 600 ha were reported to have been established as industrial wood plantations. While the TLAs reportedly planted 111 300 ha during this period, not all of the areas could be considered as timber plantations for the following reasons:
- The quality of these plantations as potential economic sources of industrial wood was questionable; and
- It was common knowledge that the extent of plantings reported was exaggerated by as much as a factor of two or more.

The reported government planting of about 180 000 ha was mainly due to regular government reforestation for watershed rehabilitation and environmental purposes. Thus, they could not be considered as a dependable source of industrial wood.

A significant development during this period was the Integrated Social Forestry (ISF) Program, established through Presidential Proclamation 1260 in 1982. At that time, it was a radical departure from the traditional Philippine forestry doctrine in several aspects, by:
- Acknowledging that a substantial portion of the rural population was occupying and living on state forest lands, albeit in economically marginal conditions;
- “Decriminalizing” occupancy of state forest lands which, before then, was punishable by fines or imprisonment;
- Introducing the concept of resource stewardship by forest land-dependent families and communities, a privilege which, for decades, had been exclusive to corporate entities with strong political and economic linkages; and
- Being such a socially- and politically-revolutionary programme introduced during a regime of dictatorship and cronyism.

8 TLA holders were required to replant one hectare for every hectare of natural forest they logged. Technically, these areas were on state-owned forests.
<table>
<thead>
<tr>
<th>Period</th>
<th>Government (includes contract reforestation from 1989 onwards)</th>
<th>TLA reforestation compliance(^a)</th>
<th>Industrial wood planting</th>
<th>Planting for environmental purposes(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before 1980</td>
<td>184 029</td>
<td>67 689</td>
<td>6 634</td>
<td>15 358</td>
</tr>
<tr>
<td>1980-1985</td>
<td>179 389</td>
<td>111 300</td>
<td>20 681</td>
<td>18 653</td>
</tr>
<tr>
<td>1993-1998</td>
<td>147 609</td>
<td>95 138</td>
<td>18 901</td>
<td>27 048</td>
</tr>
<tr>
<td>1999-2001</td>
<td>69 799</td>
<td>8 893</td>
<td>3 421</td>
<td>4 561</td>
</tr>
</tbody>
</table>


The processes and institutions developed under the ISF Program were to shape the community-based forest management (CBFM) strategy about two decades later. The programme introduced a family-approach to reforestation (contracting of reforestation work to upland families), land-tenure recognition to former illegal forest occupants through a 25-year Certificate of Stewardship Contract (CSC), forestry extension services to upland farmers, agroforestry technology, soil and water conservation measures and a host of support mechanisms to address poverty and forest resources degradation in the uplands simultaneously. The stewardship agreement required participating farm-families to plant forest tree species on at least 20 percent of the land allocated to them.

The ISF Program affirmed that the tenure of poor upland farmers to land and forest resources was a vital element of forest management. It would have contributed significantly to the expansion of the wood-resource base through smallholder woodlots, but the expected massive reforestation by upland communities was constrained by several policies, technical problems and market-related flaws. It was unclear from the start how the timber produced on ISF farms was to be treated at harvest age. It was implicit, and rightfully assumed by the farmers, that they owned the trees they planted. In the absence of precise administrative pronouncements, law enforcers on the ground required documentation from farmers before the trees could be harvested, transported and marketed. Harvesting permits from the local government forestry offices were required even for minuscule volumes from individual woodlots; farmers had to prove not only to the local forest rangers but even to the local police that the timber they had harvested really came from their woodlots and not from government plantations.\(^{11}\)

Furthermore, forestry extension services provided poor technical advice on plantation stock quality control and plantation management, resulting in low-quality plantations, low volume per hectare, and thus unattractive revenues. The wood-processing facilities were not structured properly to process the small-dimension timber economically. The continued availability of cheap illegal timber from natural forests further depressed the prices for plantation wood. Other market distortions resulted from the emergence of cartels of middlemen who introduced oligopolistic practices in the sale of timber from small woodlots. Nevertheless, the ISF Program remained the main management programme for the populated forest lands well into the late 1990s.

\(^{9}\) These plantings are those referred to in Footnote 5.
\(^{10}\) These refer to roadside plantings, urban and municipal tree parks, and similar amenity plantings, and are not considered as potential sources of industrial wood.
\(^{11}\) This mindset of enforcers to make tree farmers prove that their timber is not poached from government plantations is still pervasive, and serves as a major disincentive to the development of tree plantations on private lands. It has been argued that the burden of proof should be on the government, not the private tree planter. However, law enforcers continue to ask for proof of “legality” of the timber, resulting in high transaction costs and unethical practices.
1986 to 1992

The political and economic transitions that ended the Marcos dictatorship of more than 20 years marked the period between 1986 and 1992. Opposition to the Marcos martial rule involved a wide range of ideologists who formed the core of a robust civil society movement in the country. The more organized and “legal” (in contrast to the more revolutionary armed “underground”) supporters of Corazon Aquino during the ouster of Marcos were, at one time or another and in various forms, at the forefront of the environmental movement. A new Philippine Constitution was promulgated in 1987, and many natural resource conservation advocates became the new political and economic leaders. Malayang (1998) describes the transition as a process of “political ecology”, which was to have a profound effect on the re-orientation of Philippine forestry in the post-Marcos era.

The spirit of the civil society movement also permeated discussions on the Philippine forest policy and management of the state’s forests. Resistance to large-scale forest plantations and timber concessions was rife because of the extensive cronyism practised during the Marcos years. Other reasons for opposition included:

- loss of biodiversity of the native Philippine forest;
- threats to the rights of access of forest-dependent communities and indigenous peoples to forest resources; and
- control of forest resources being dominated by the economic elite and foreign investors.

Despite evidence to the contrary (Brown et al. 2001), a total commercial logging ban (or a more drastic total ban on all forms of tree-felling) is regarded by a significant segment of environmental advocates as the only rational way to conserve the Philippines’ forest resources.

A major feature of the transition period was the redefinition of the modes of access to natural resources. Before 1987, the privileges for the use, management, development and utilization of natural resources were granted through leasehold arrangements. In forestry, the main form was the TLA system. Under the 1987 Constitution, this arrangement was terminated and replaced by product-sharing, co-management, or joint-venture arrangements between the state (as owner of the resources) and the private sector.

The forest plantation programme thus had to be redesigned to comply with the constitutional requirement. While the TLAs and ITP leases issued prior to 1987 would remain legally in force until their expiration, subsequent agreements had to be consistent with the Constitution. In 1991, however, TLAs were told to cease logging in old-growth forests and to shift harvesting operations to mature second-growth forests. The Industrial Forest Management Agreement (IFMA) replaced the ITP lease agreement.

The IFMA was among several institutional reforms designed to support the “democratization of access to natural resources”. Its primary objective was to encourage private sector participation in developing forest resources, and to spread the benefits from these resources. Forestry programmes were planned to address the different needs of stakeholders – *inter alia* forest-dependent families and communities, local governments, indigenous peoples and forestry corporations.

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12 The IFMA was later renamed *Integrated* Forest Management Agreement to legally accommodate other non-plantation forestry activities within forest lands, such as management of natural forests.
In 1991, DENR Administrative Order No. 42 provided the following incentives:

- reduced payment of forest charges (25 percent of regular forest charges on plantation products);
- exemption from payment of certain internal revenue taxes;
- permanence of the boundary and status of the IFMA area;
- tax deductible plantation development expenses;
- credit assistance; and
- entitlement to fair compensation.

In addition, adequately-stocked secondary forests could be included in IFMA areas, and could be logged when plantations were established. Apparently, this was the most attractive incentive for the private sector.

About 187,000 ha were granted to the private sector under the new programme and tenurial arrangements. The area was slightly larger than the area granted for the same purpose during the Marcos regime. The difference, however, lay in the thinking of the people and investors at the early stages of this political transition period.

In terms of actual plantation establishment, the private sector accounted for only 28,803 ha, not a significant increase from the previous period. There are two reasons for this continuously slow progress:

- The current and previous ITP lease agreement/IFMA awardees were just speculating on the new government’s move to privatize public assets; and
- The incentives offered were insufficient and thus of little effect.

During the period of change, the forest plantation area reportedly surged to an all-time high of more than 0.5 million ha (see Table 6). However, most plantings (425,800 ha) were the result of massive infusion of funds through loans from the Asian Development Bank/Overseas Economic Cooperation Fund for contract reforestation by families, rural communities, local governmental units and non-governmental organizations (NGOs) under the Forestry Sector Program.13 Despite pressure to balance both production and protection, most plantations were established to rehabilitate watersheds. The relics of these plantations still exist, but they cannot serve as an important supply source for industrial wood.

1993 to 1998

This period was characterized by renewed government efforts to improve the policy for forest plantation development. The implementing rules and regulations for IFMAs were rewritten twice, causing confusion, and consternation, for the private sector.

IFMAs covering 127,400 ha were awarded to 126 corporate entities for plantation development during this period (Table 5). Many awardees were TLA holders whose leases were expiring, or who were using this chance to obtain a new 25-year tenure on state forest lands.

Plantation establishment by the private sector remained behind expectations. Access to, and harvesting of, natural forests as part of IFMA operations were still key factors in the establishment of forest plantations. Most of the IFMA holders cited unrest, opposition to large-scale plantations by local people, or simply a perceived unfavourable investment climate as reasons for the dismal performances.

13 The Forestry Sector Program was a landmark for Philippine forestry because it, together with concurrent initiatives, resulted in significant policy and institutional reforms in the sector.
In 1993, the rules and regulations for IFMAs were revised and DENR Administrative Order No. 60 provided the following incentives:

- IFMA holders were allowed to interplant agricultural crops between rows of trees within areas designated for IFP in their IFMA areas;
- All planted trees and other crops established according to an IFMA, or transferred from the Department of Environment and Natural Resources (DENR), belonged to the IFMA holder who had the right to harvest, sell and utilize products at the time specified in the approved Comprehensive Development and Management Plan;
- No restriction on the export of logs, lumber and other forest products harvested from IFMA plantations was placed on an IFMA holder. However, logs or unprocessed lumber from indigenous trees growing naturally in an IFMA area could not be exported;
- All plantation products derived from an IFMA area were exempted from forest charges, but all products derived from indigenous trees and/or other plants growing naturally in an IFMA area and from plantations established in compliance with TLA reforestation obligations were subjected to the usual forest charges;
- Minimal land rentals were charged;¹⁴ and
- IFMA holders were entitled to all relevant incentives provided for under the Omnibus Investment Code.

The 1993 order liberalized the IFMA administrative system by:

- Categorizing the IFMAs into two types: Type I covered open, denuded and grassland areas to be set aside only for plantation establishment; Type II included secondary forests that could be harvested during plantation development operations;
- Increasing the maximum area per IFMA from 20,000 ha to 40,000 ha;
- Allowing TLAs to be converted to IFMAs;
- Providing for the protection of affected rural communities’ and indigenous people’s interests;¹⁵
- Enabling the DENR to actively identify and plan for IFMA areas even prior to any application by a private entity;
- Prescribing the procedures for bidding on IFMA areas by the private sector;
- Prescribing the rate of plantation establishment, such that any IFMA should be fully developed after 12 years;
- Permitting a maximum of ten percent of the IFMA area to be planted with permanent agricultural crops to generate cash flow before the first rotation; and
- Allowing the IFMAs to be transferred to enhance their marketability as an investment venture.

Further amendments were made mainly as the result of three factors. Firstly, the new administrators of the DENR emphasized environmental protection and community-based natural resource management. Secondly, in 1995, Presidential Executive Order No. 263 declared that CBFM was to be the main strategy for sustainable forest management. Finally, perhaps the most significant

¹⁴ Land rent is prescribed in the Forestry Reform Code of 1975 as: “No rental shall be collected during the first five (5) years from the date of the lease; from the sixth year to the tenth year, the annual rental shall be fifty centavos (Peso 0.50) per ha; and thereafter, the annual rental shall be one peso (Peso 1.00) per ha. Provided, that lessees of areas long denuded, as certified by the Director and approved by the Department Head, shall be exempted from the payment of rental for the full term of the lease which shall not exceed twenty-five (25) years; for the first five (5) years following the renewal of the lease, the annual rental shall be fifty centavos (Peso 0.50) per ha; and thereafter, the annual rental shall be one peso (Peso 1.00) per hectare.”

¹⁵ The DENR Administrative Order No. 2 in 1993 provided guidelines to recognize indigenous people’s ancestral claims, at the time when the Indigenous People’s Rights Act was not yet enacted by Congress.
development at this stage, it was recognized that the IFMAs were being used as fronts for unauthorized or excessive logging in the natural forests. Thus, the 1997 DENR Administrative Order No. 4 stipulated the following conditions:

- IFMA holders could interplant between trees within areas designated for IFP in their IFMA areas, provided that there would be no adverse impacts on biodiversity, as indicated in a prior environmental impact assessment;
- All trees, except those for environmental protection purposes, planted by the IFMA holders belonged to the IFMA holders who had the right to harvest, sell and utilize them;
- The IFMA holder could export logs, lumber and other forest products harvested from the IFMA plantation, in accordance with the government allocation system;
- All plantation products derived from an IFMA area were exempted from forest charges; and
- No restriction was placed on the use and improvements of the IFMA as collateral for obtaining loans for further development of the IFMA area, provided that prior approval from the DENR was obtained.

Previous fiscal and credit incentives remained but the privilege of IFMA holders to harvest in natural forests was withdrawn. These were to be managed as protection, and not production, forests. In addition, the IFMAs were to be covered by the environmental impact assessment procedures of the DENR.

Judging by the slow rate of forest plantation development until 1998, it is obvious that the incentives were ineffective. The major constraint appeared to be the limited financial resources for extensive plantings. With no substantial credit support from governmental or financial institutions, the only alternative was to generate revenues from the natural forests to finance plantation development. This, however, was strongly opposed by both governmental and non-governmental environmental advocates, which from the investors’ perspective provided a major disincentive to plantation development.

1999 to the present

With a change of government in mid-1998, new administrators favouring the corporate forestry sector were appointed to lead the DENR. In 1999, the rules on IFMA were once again revised ostensibly to encourage private sector investment in forestry. The 1999 Administrative Order No. 53 entitled IFMA holders to:

- Interplant secondary crops between trees;
- Harvest, sell and utilize all planted trees and other crops in whatever marketable form(s) and in whatever legal manner(s);
- Export logs, lumber and other forest products derived from the IFMA area without any restriction, although timber from natural forests could not be exported;
- Be exempted from forest charges on plantation products;
- Claim all relevant incentives under the Omnibus Investment Act;
- Transfer plantations that are at least three years old to (rural) cooperatives upon fair compensation or payment to the IFMA developer, or through a financing institution, or be open for investments;
- Use plantation crops that are at least three years old as collateral for loans from government development banks, financial institutions, or government-owned and controlled corporations; and
- Secure access to an additional area, or a new IFMA, if the IFMA holder has satisfactorily complied with the terms and conditions of the original IFMA.
The role of incentives in forest plantation development in Asia and the Pacific

Any TLA can be automatically converted to an IFMA if the TLA holder has proven to be a capable forest manager. Therefore, TLA holders can renew, for another 25 years, their tenure over state forest land. The order also restores the privilege of harvesting in adequately-stocked secondary forests. It allows for the sale of timber felled in areas prepared for plantation establishment. Again, the substantial deviation from the previous order was the issue of harvesting in natural forests.

A significant recent development was the identification and proclamation of a 600,000 ha “timber corridor” in Northeastern Mindanao, together with a 200 ha “wood-based economic zone” for an integrated wood-processing facility, to attract foreign and local forestry investors. About 170,000 ha of this corridor have been awarded to a consortium of companies with foreign capital, with the endorsement of two foreign governments that are major players in the international forest products trade, through a new Co-Production Sharing Agreement. However, the allocation to the consortium is being questioned.

The impeachment of the President in January 2001 brought about a new government, and the DENR again had a change of leadership, which is currently reviewing the policies and the economic environment in forestry.

Conclusions

The development of private industrial forest plantations has not progressed well in the Philippines. Despite the incentives provided, and the prescriptions of the Philippines Forestry Master Plan, no substantial wood resources are likely to be forthcoming from either private or government plantations in the near future unless the policy and institutional environments are thoroughly revamped. Government involvement in plantation development is decreasing as international donor assistance and major loans to forestry draw closer to their termination. TLA reforestation is also slowing down as the last of the TLAs are about to be closed, and plantation development through IFMAs and CBFM is not picking up substantially.

Many factors constrain the development of forest plantations in the Philippines. These factors are interlinked, thus aggravating the situation and effectively hindering the establishment of viable plantations. Generally, the major consideration is the financial viability of plantation investments. Unless attractive financing and credit arrangements are set up for forest plantations, investors will continue to favour other sectors (for example, real estate, information and communications). The government has to offer secure land tenure to investors. This issue could be addressed by ensuring that investors have complete control over the land for at least two rotations, and that personnel changes in government agencies do not undermine the previous agreements between investors and the government.

For the last several decades it has become clear that the interest of the private sector in establishing plantations is closely linked to harvesting rights in natural forests. On this issue, policies have shifted with each new leadership, as can be seen hereunder:

- 1991 DENR Administrative Order No. 42: Secondary forests are allowed to be included in IFMA areas; selective logging in natural forests allowed but only after all open areas have been planted;
- 1993 DENR Administrative Order 60: Provides for simultaneous plantation development and harvesting of natural forests;
- 1997 DENR Administrative Order No. 4: No cutting whatsoever in natural forests; and
- 1999 DENR Administrative Order No. 53: Reverted back to the 1993 order allowing simultaneous establishment and harvesting.

The frequent reversals of government policy have seriously eroded investor confidence. On the other hand, there is sufficient evidence that many “investors” were not interested in plantation development per se, but only wished to gain access to the remaining natural forests under the
guise of “integrated forest management”. Such behaviour seriously erodes the credibility of the private forestry sector and creates suspicions by the government forestry administrators and civil society.

Despite the historical political and institutional instabilities and uncertainties in the Philippines, the current investment climate for forest plantation development appears to be attractive. Incentives seem acceptable to the private sector; companies continue to file applications for tracts of state forest land under the Integrated Forest Management Program. The main barriers relate to security of tenure, and consistency in forest policy and operating guidelines.

The current contentious debate between “protectionists” and “productionists” has delayed the passage of a new forestry law, which has been pending in Congress for more than ten years. In the absence of such a law, the seriously outdated Revised Forestry Code of 1975 applies and an appropriate institutional, policy and investment infrastructure for industrial plantation development is not in place (Brown et al. 2001).

In general, direct incentives failed to achieve the objectives of the various Administrative Orders. There has been no substantial increase in the rate of plantation establishment except in areas where companies are dependent on a sustained long-term supply of plantation wood. The private sector has continuously pointed out their constraints:

- The tenure of 25 years, renewable for an additional 25 years is insufficient for long-term investments. The private sector is advocating for tenure security akin to private ownership, or even complete privatization of state forest lands;
- Tax incentives and the tariff-free import of inputs have not significantly improved the attractiveness of plantation investments; similar incentives are granted to other pioneer industries that, in the view of investors, yield more secure and higher returns.
- Despite the constant urging of the government, financing institutions do not provide concessional loans to investors in plantation development. Banks are unconvinced of the commercial viability relative to alternative investment opportunities. The collateral value of state forest lands and established plantations is low in the financing institutions’ valuations because these lands are state lands and would be difficult to foreclose in case of creditor default. In addition, banks perceive plantation development as a high-risk venture due to outbreaks of fire, pests and diseases.

The potential role of CBFM in forest plantation development has not been recognized adequately. Full rationalization of forestry rules and greater devolution of forest management functions to communities and people’s organizations should be pursued. Research and development and extension support to CBFM should be enhanced. Strengthening the financing and market links between corporate forestry entities and CBFM organizations is necessary. The corporate sector has the technical expertise in manufacturing and marketing forest products, including access to financial resources, while the CBFM organizations can offer low-cost management and operations.

The present ban on the export of logs and rough lumber from the natural forests needs to be re-evaluated. The objectives of the bans have not been achieved; in fact the bans have had the opposite effect of causing further forest degradation (Brown et al. 2001). While there is no ban on the export of plantation wood and products, the ban on export of logs and lumber from natural forests is creating a market imperfection; the economic value of wood from natural forests is not realized, and the value of forest assets in the hands of the private sector is depressed. The foregone export earnings could have been re-invested into forest resources development, including tree planting.

There is a persistent clamour from forest plantation developers for the government to fully deregulate the harvesting, transport and trade of plantation timber. The current regulations are too restrictive and serve as significant disincentives to plantation development; they also encourage corruption and rent-seeking behaviour, particularly by forest law enforcement staff. The reason put forward by those opposed to deregulation is that the government should protect its forest
assets and, in so doing, needs to ensure that the wood for sale has not been poached from government forests. This is a weak argument as the government has the mandate and resources to take appropriate steps to physically secure its forest assets. It is the government, not the private tree farmer of trader, which should prove that the wood being traded did not come, or have come from, government forests. The burden of proof should lie with the government, not with the private sector.

The problems facing Philippine forestry are numerous and complex, but not insurmountable. The Philippine Government can begin by unequivocally declaring: (a) production forestry, particularly plantation forestry, is recognized as a strategic base for rural development and poverty reduction; (b) that the government recognizes, and will support, the important role of private capital and community forest managers in forestry; and (c) serious and consistent efforts to remove the disincentives and the unfavourable policy and institutional environments that curtail plantation development.

LITERATURE CITED


DENR/FMB. 1991. Philippine master plan for forest development. Quezon City, Department of Environment and Natural Resources.


INTRODUCTION

Thailand covers an area of 51.3 million ha and shares borders with Myanmar, Lao PDR, Cambodia and Malaysia. Administratively, Thailand is divided into five regions, comprising the Northern, Northeastern, Central, Eastern and Southern regions. The country is further divided into 76 provinces (chang wad) and 716 districts (amphur). Since 1931, the capital has been Bangkok (Krung Thep Maha Nakhon).

The country’s climate is influenced by the southwestern and northeastern monsoons. There are three distinct seasons, namely the wet season from late May to late November, the cold season from early December to late February and the dry season from March to May. Average temperatures range from 25.0-28.5°C and annual rainfall is 600-3 800 mm.

The population of Thailand is approximately 62 million. Population growth was above three percent during the 1960s, slowed to 1.8 percent during the 1980s and dropped to below one percent in recent years. The average population density of Thailand is about 121 persons/km² and about 20 percent of the population lived in urban areas in 1999.

In 2001, the Gross National Income per capita was US$1 930. The value of exports decreased from US$68.0 billion in 2000 to US$63.2 billion in 2001, while the value of imports decreased from US$62.4 billion to US$60.7 billion. The main source of revenue is from the tourism sector, estimated at US$4.4 million in 2001. Between 1970 and 1999, the contribution of the forestry sector to the Gross Domestic Product (GDP) declined markedly at first in relative terms and since the imposition of the logging ban in 1989 also in absolute terms. The relative importance of agriculture decreased from 28.9 percent in 1970 to 11.5 percent in 1999 (Table 1).

<table>
<thead>
<tr>
<th>Agricultural subsectors</th>
<th>1970a</th>
<th>1980b</th>
<th>1989b</th>
<th>1999b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crops</td>
<td>29 086</td>
<td>120 417</td>
<td>209 063</td>
<td>201 977</td>
</tr>
<tr>
<td>Livestock</td>
<td>3 899</td>
<td>15 431</td>
<td>28 582</td>
<td>30 735</td>
</tr>
<tr>
<td>Fishery</td>
<td>2 608</td>
<td>8 107</td>
<td>21 252</td>
<td>49 671</td>
</tr>
<tr>
<td>Forestry</td>
<td>2 330</td>
<td>8 347</td>
<td>7 482</td>
<td>2 591</td>
</tr>
<tr>
<td>Other</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>44 646</td>
</tr>
<tr>
<td>Total</td>
<td>37 923</td>
<td>152 302</td>
<td>266 379</td>
<td>329 620</td>
</tr>
<tr>
<td>Other sectors</td>
<td>93 365</td>
<td>429 984</td>
<td>1 509 599</td>
<td>2 530 443</td>
</tr>
<tr>
<td>GDP</td>
<td>131 288</td>
<td>582 286</td>
<td>1 775 978</td>
<td>2 880 063</td>
</tr>
</tbody>
</table>

Sources: a) Office of National Economic and Social Development Committee (2000); b) Office of Agricultural Economics (2000)

1 Private Reforestation Division, Reforestation Office, Royal Forest Department, Bangkok, Thailand.
2 Further information is available at http://www.fpo.mof.go.th/scripts/content
Role of the forestry sector in the economy

Significant periods in the development of the forestry sector

Thailand’s forestry sector has developed in four distinct stages:

- **Early exploitation phase:** Logging for commercial purposes began with the signing of the Bowring Treaty in 1855. In the following years, Thailand entered a number of trade agreements with France and the U.S.A. in 1856, Denmark in 1858, Portugal in 1859, Holland in 1860, Prussia in 1862 and Norway and Sweden in 1868. Teak was in high demand, and the governor of each municipality authorized logging without any involvement by the central government until the Royal Forest Department (RFD) was established in 1896. The RFD had the mandate to regulate forest exploitation, particularly of the teak forests of the north.

- **Forest production and management phase:** From the mid-1890s to the early 1960s, forestry contributed significantly to Thailand’s economic development. Forest production generated foreign exchange, government revenue and contributed to the opening of the frontier for agricultural development. Forest management was not guided by a formal forest policy, but was generally supervised by RFD officials. The country was an absolute monarchy until 1932. With the democratic reforms of the 1930s, politicians became closely linked to forest management. Their main efforts were directed at converting natural forests to agricultural land for the rural people. The RFD, as the government agency responsible, attempted to regulate forest production by enacting a number of important forestry laws and training foresters who were to enforce the law. In 1947, the Forest Industry Organization (FIO) was established under the umbrella of the RFD. Its tasks included expanding logging activities, increasing income to facilitate redemption payments to the allies of the Second World War and rehabilitating the country in the aftermath of the war. In 1956, the FIO became a state enterprise under the umbrella of the Ministry of Agriculture and Cooperatives. Its new areas of responsibility included technical support to the main forestry activities, including logging, wood processing, furniture manufacturing and wood preservation.

- **Peak exploitation phase:** From the 1960s to the mid-1980s, timber harvesting peaked, export-oriented agriculture expanded and national economic development gained momentum. At the same time, concern for the country’s natural forest was growing. To decelerate deforestation and forest degradation, a number of policies were introduced to slow the progress of logging by five percent per year and to set aside 50 percent of the total land area as reserved forest. Other measures included:
  - encouraging the private sector to rehabilitate degraded forest lands after the completion of logging operations;
  - establishing forest protection units;
  - establishing a Forest Policy Division;
  - revising the Forest Law;
  - promulgating the Wild Animal Reservation and Protection Act (1960) and the National Park Act (1961); and
  - enacting the National Reserve Forest Act (1964).

- **End of forest exploitation phase (dawning of a new forestry era):** Starting in the late 1980s, the country entered a fourth stage, which is characterized by an increased awareness of the adverse effects of forest exploitation and the search for a new approach to forest management. Forest resources had declined to a point where the nation had to emphasize forest conservation rather than further forest exploitation. Consequently, timber imports increased significantly and the government looked for ways to involve the private sector in generating alternative wood supplies after the logging ban was imposed in 1989.
Role of the public and private sectors in forestry

From the late 1900s until recently, the RFD managed most activities in the national forests alone, particularly forest harvesting, nature conservation, watershed management, forest protection and forest plantations. The FIO was also involved in forest harvesting and forest plantation development. Other government agencies (for example, the Department of Agricultural Promotion and the Land Department) had limited involvement in forestry. Consequently, a number of conflicts arose among the different state organizations regarding the utilization of forest lands. The situation was further aggravated by unstable and vague policies, poor law enforcement, forest encroachment by poor as well as influential people, strong opposition to forest plantation development by non-governmental organizations (NGOs) and poor administration by government organizations. The results of the RFD’s and FIO’s monopoly were twofold. First, it led to a steady decline in forest cover (Table 2). Second, it crowded out the private sector, which in turn steered clear of investment in forest plantations for decades.

Table 2: Changes in forest areas and agricultural land, 1961-1998

<table>
<thead>
<tr>
<th>National Economic and Social Development Plans</th>
<th>Area (ha/person)</th>
<th>Population (million)</th>
<th>Forest area</th>
<th>Agricultural area</th>
</tr>
</thead>
<tbody>
<tr>
<td>First (1961-1966)</td>
<td>2.42</td>
<td>27.18</td>
<td>27.20</td>
<td>10.32</td>
</tr>
<tr>
<td>Second (1967-1971)</td>
<td>1.58</td>
<td>32.45</td>
<td>24.75</td>
<td>13.26</td>
</tr>
<tr>
<td>Third (1972-1976)</td>
<td>1.36</td>
<td>37.62</td>
<td>22.59</td>
<td>16.72</td>
</tr>
<tr>
<td>Fourth (1977-1981)</td>
<td>1.18</td>
<td>43.44</td>
<td>18.67</td>
<td>18.21</td>
</tr>
<tr>
<td>Fifth (1982-1986)</td>
<td>1.06</td>
<td>48.49</td>
<td>15.68</td>
<td>19.78</td>
</tr>
<tr>
<td>Sixth (1987-1991)</td>
<td>0.96</td>
<td>53.42</td>
<td>14.61</td>
<td>20.99</td>
</tr>
<tr>
<td>Seventh (1992-1996)</td>
<td>0.89</td>
<td>57.37</td>
<td>13.50</td>
<td>21.14</td>
</tr>
<tr>
<td>Eighth (1997-2001)</td>
<td>0.84</td>
<td>61.20</td>
<td>12.96</td>
<td>21.20</td>
</tr>
</tbody>
</table>

Source: Office of Agricultural Economics (2000)

Even before the imposition of the logging ban, the 1987 National Economic and Social Development Plan incorporated private sector involvement in forest plantation development. To mitigate forest degradation, community participation in forest management is also widely accepted, especially because about 12 million people occupy the national reserve forest. The role of the private sector and communities is highlighted in the new Constitution, promulgated on 11 October 1997. It promotes and encourages public participation in natural resource management, including forests (Box 1).

Current forest production and conservation policies

The National Forest Policy (1989) stipulated that 40 percent of the total land area should be covered by forests, of which at least 25 percent was to be designated as conservation forests and 15 percent as production forests. This target was reaffirmed in the Seventh National Economic and Social Development Plan (1992-1997).

The Agricultural Development Plan, a component in the Ninth National Economic and Social Development Plan (2002-2006), stresses the conservation and rehabilitation of 30 percent of the total area of the country. The Plan also promotes productive forest plantations, private plantations and community forestry covering an area of 5.12 million ha.
Box 1: Relevant sections from the New Constitution of the Kingdom of Thailand

Section 46. Persons so assembling as to be a traditional community shall have the right to conserve or restore their custom, local knowledge, arts or good culture of their community and of the nation and participate in the management, maintenance, preservation and exploitation of natural resources and the environment in a balanced fashion and persistently as provided by law.

Section 56. The right of a person to give to the State and communities participation in the preservation and exploitation of natural resources and biological diversity and in the protection, promotion and preservation of the quality of the environment for usual and consistent survival in the environment which is not hazardous to his or her health and sanitary condition, welfare or quality of life, shall be protected, as provided by law.

Section 79. The State shall promote and encourage public participation in the preservation, maintenance and balanced exploitation of natural resources and biological diversity and in the promotion, maintenance and protection of the quality of the environment in accordance with the persistent development principle as well as the control and elimination of pollution affecting public health, sanitary conditions, welfare and quality of life.

Consumption and production of wood products

No data are available on consumption or production of wood products from 1906 to 1960. Timber production from natural forests gradually declined during the 1980s and dropped to very low levels during the 1990s. Between 1980 and 1989, the domestic consumption of timber fluctuated. The increase particularly in the late 1980s and early 1990 coincided with high economic growth rates (Colaco 1998). Consumption peaked in 1989 at 3.4 million m³. Timber production declined rapidly after the imposition of the logging ban and timber imports surged until 1997 when economic activity declined due to the Asian financial crisis. Exports remained poor throughout the period. (Figure 1).

![Figure 1: Wood consumption, exports, imports and production in Thailand, 1980-2001](source: RFD (2001))
Table 3 shows the breakdown of imports to Thailand between 1997 and 2000, and the serious extent to which the nation is dependent on importing roundwood and wood products.

<table>
<thead>
<tr>
<th>Type of goods</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundwood</td>
<td>650.08</td>
<td>214.25</td>
<td>294.7</td>
<td>366.12</td>
</tr>
<tr>
<td>Timber</td>
<td>194.17</td>
<td>51.11</td>
<td>95.59</td>
<td>128.52</td>
</tr>
<tr>
<td>Wood</td>
<td>449.64</td>
<td>162.42</td>
<td>197.69</td>
<td>235.18</td>
</tr>
<tr>
<td>Other wood</td>
<td>6.27</td>
<td>0.72</td>
<td>1.42</td>
<td>2.42</td>
</tr>
<tr>
<td>Wood product</td>
<td>67.13</td>
<td>34.89</td>
<td>33.3</td>
<td>43.99</td>
</tr>
<tr>
<td>Plywood</td>
<td>24.28</td>
<td>10.36</td>
<td>7.05</td>
<td>12.82</td>
</tr>
<tr>
<td>Veneer</td>
<td>15.60</td>
<td>9.81</td>
<td>11.28</td>
<td>13.33</td>
</tr>
<tr>
<td>Other products</td>
<td>27.25</td>
<td>14.78</td>
<td>14.17</td>
<td>17.84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>717.21</strong></td>
<td><strong>249.14</strong></td>
<td><strong>328.0</strong></td>
<td><strong>410.11</strong></td>
</tr>
</tbody>
</table>

Source: Department of Customs (2001)

In 2002, five pulp factories using eucalyptus produced on average 925 000 tonnes/year. The annual demand for eucalyptus wood for pulp production is estimated at 4.2 million tonnes, requiring a plantation area of about 56 000 ha (to be cut every five years).

While wood production from natural forests and teak plantations declined, supplies from rubber plantations increased dramatically (Figure 2). In 1982, rubberwood (*Hevea brasiliensis*) was valued at 120 baht/tonne. It increased to 550 baht/tonne in 1993 and 900 baht/tonne in 2002. Presently, rubberwood is valued at 156 250 baht/ha. Once processed, the rubberwood fetches 375 000 baht/ha. Moreover, the rubberwood supply is continuous and generated in large volumes every year, encouraging investments in the processing industries.


**Figure 2: Production of rubber, teak and other wood in Thailand (selected years)**

**PLANTATION DEVELOPMENT IN THAILAND**

The first forest plantation was established by the RFD in 1906 using teak (*Tectona grandis*). After 1910, the teak plantations were developed for wood production and forest restoration after logging. In 1939, the RFD created the Forest Plantation Division. By 1960, forest plantations covered about 6 000 ha. Private sector involvement in plantation development was insignificant, although mangrove plantations have been established since 1932 to meet demand for charcoal.
Forest plantation development has been mentioned in all the National Economic and Social Development Plans and the RFD promoted forest plantations particularly for watershed protection between 1965 and 1975. Between 1975 and 1978, *Eucalyptus* spp. and *Acacia auriculiformis* were introduced to rehabilitate the national reserve forest lands. In addition, the global energy crisis drew attention to the need to promote fast-growing trees to produce fuelwood. Between 1978 and 1987, many community forestry plantations were established throughout Thailand. Towards the end of this period, the government intended to increase the area of forest plantations by about 80,000 ha per year, while at the same time decreasing the area deforested annually from 768,000 ha to 80,000 ha. Forest plantation development was highlighted in the Fourth National Economic and Social Development Plan. However, the total area planted annually averaged only about 43,400 ha.

The promotion of private sector participation in forest plantations on national reserve forest lands and private lands increased in subsequent National Economic and Social Development Plans between 1981 and 1996. On the national reserve forest lands, a shortage of available land limited the planting target to 48,000 ha per year. In the late 1980s, eucalyptus became the favoured species for private plantations. Opposition by local villagers and NGOs against the use of eucalyptus grew when environmentalists declared that “commercial eucalyptus plantations are incompatible both with forest conservation and with village livelihood(s)” (Lohmann 1990, p. 9; see also Lang 2002). Despite this opposition to eucalyptus and commercial plantations, the RFD maintained a strong interest in agroforestry and community forestry throughout this period.

After 1993, the use of forest plantations for environmental conservation was recognized. In 1994, two important projects supporting private sector involvement in forest plantation development were initiated. The Private Reforestation Promotion Project offered farmers 18,750 baht/ha over five years. By 2001, a total of 390,032 ha had been planted under the project. The second initiative, the Fast-growing Tree Reforestation Project, provided free seedlings and fertilizers to farmers to replace cassava and rice with fast-growing trees. About 98,152 ha were reforested under the project before it terminated in 1997. By 2001, 656,540 ha of forest plantations had been planted by the RFD (Table 4).

### Table 4: Forest plantations established by the RFD between 1961 and 2001 (ha)

<table>
<thead>
<tr>
<th>National Social and Economic Development Plan</th>
<th>Area of forest plantation establishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>First plan (1961-1966)</td>
<td>22,800</td>
</tr>
<tr>
<td>Second plan (1967-1971)</td>
<td>27,491</td>
</tr>
<tr>
<td>Third plan (1972-1976)</td>
<td>45,577</td>
</tr>
<tr>
<td>Fifth plan (1982-1986)</td>
<td>105,468</td>
</tr>
<tr>
<td>Sixth plan (1987-1991)</td>
<td>122,360</td>
</tr>
<tr>
<td>Seventh plan (1992-1996)</td>
<td>76,512</td>
</tr>
<tr>
<td>Total (1961-2001)</td>
<td>656,540</td>
</tr>
</tbody>
</table>

The FIO has been involved in forest plantation development since 1967. By 2001, it had planted an area of 77,643 ha and taken over the management of an additional 75,529 ha established by the RFD and the Provincial Forest Logging Company. The Thai Plywood Company Ltd. started planting in 1967 and covered an area of 3,907 ha by 2001.

Until the mid-1990s, the RFD was the main engine of plantation development, with the exception of rubber plantations. This changed briefly in the aftermath of the imposition of the logging ban and the passing of the Re-afforestation Act of 1992. However, when the Asian financial crisis drastically reduced budgets for incentive schemes investor interest was quickly dampened (Figure 3).
Phase I: National forest abundance (between 1906 and 1960)

Between 1906 and 1960, Thailand had substantial areas of natural forest cover. The RFD was strongly focused on managing forest production and the revenue generated from logging activities. In 1941, the Forest Act was promulgated to control forest harvesting, timber transport, wood processing and wood marketing. The Act made no reference to forest plantations and little attention was paid to their development. As long as timber was plentiful in the natural forest, neither the government nor the private sector paid much attention to forest plantation development. This also meant that no direct incentives were offered. By 1960, the private sector had planted only a modest area of about 8,500 ha (about 70 percent of which was teak).

Phase II: Forest exploitation until the imposition of the logging ban (between 1960 and 1989)

The three decades between 1960 and 1990 witnessed the rapid decline of Thailand’s natural forest resources. Annual deforestation rates peaked at almost six percent in the late 1970s and were still as high as 1.5 percent one year before the logging ban was imposed in 1989. Official data indicated that forest cover decreased from about 53 percent of the total land area to 25-28 percent, although critics of the official statistics put the figure below 20 percent.

Aware of Thailand’s dwindling natural forests, successive governments promulgated policies and regulations to address the problem. In 1964, the National Reserve Forest Area Act was enacted. Its objectives included the protection of 50 percent of the country as natural forest, conservation of natural resources and support of agricultural and economic development. To achieve the 50-percent target, forest plantations were promoted within the reserve forest. Article 20 permitted villagers to utilize degraded reserved forest areas that could not be restored to natural forest, by managing the forest or planting trees under conditions and duration stipulated in license agreements.

In 1969, the Ministry of Agriculture and Cooperatives endorsed the unlimited use of reserved forest land for forest plantations. Ten years later regulations were passed to allow reserved forest land to be rented for establishing plantations. The National Forestry Policy of 1985 attempted to address several forestry-related problems. The policy contained 20 sections on natural resource management issues, conservation, utilization, rehabilitation and administration. It dealt for the first time comprehensively with the need to expand and promote large-scale industries and stipulated that community forestry should be implemented (Faichampa 1990). Ten sections promoted reforestation by the private sector and provided the following guidance:
Role and responsibility sharing among various government agencies and the private sector in forest management and development shall be promoted;

Forty percent of the country shall be kept under forests. The forest area shall be divided as follows:

*Protection forest:* 15 percent of the country shall be kept as protection forests for nature conservation, recreation and environmental quality protection;

*Production forest:* 25 percent of the country shall be designated as production forest to produce timber and other forest products.

The public and private sectors together shall develop and manage the forest to achieve the objective of providing perpetual direct and indirect benefits to the country;

The state shall establish a forest development plan as part of the natural resource development plan in the National Social and Economic Development Plan to harmonize the utilization of forests and other natural resources;

Efficiency in timber production shall be increased through appropriate forest management techniques using both selection and clear-cutting systems. After clear-cutting, replanting should commence immediately;

The state shall promote reforestation by the public and private sectors for domestic industrial consumption. Export of wood and wood products shall be encouraged. Community forestry such as reforestation on public land by the private sector, tree planting on marginal agricultural land and establishment of woodlots for household consumption shall also be promoted;

The state shall encourage integrated wood-processing and pulp and paper industries to realize the whole-tree utilization concept;

Forest Acts shall be amended to support efficient forest resource conservation and utilization;

Wood energy as a substitute of fossil fuel shall be promoted through energy plantations; and

Human resources and rural settlement planning must conform with national natural resource management and conservation plans.

Despite this strong statement of intent, lack of competent government officials stifled further progress towards involving the private sector. A forest development plan was prepared by the Danish Cooperation for Environment and Development (DANCED) but was never approved by the government. Little progress was made regarding energy plantations. In 1990, the Thai Forestry Sector Master Plan was prepared by the RFD, the Finnish International Development Agency (FINNIDA) and the United Nations Development Programme (UNDP) but again it was not approved by the government.

In 1987, the Cabinet passed an Economic Land Policy to classify the land into two categories, that is, private land and forest land. The policy encouraged the private sector to participate in forest plantation development, a key component of the economic development of the forestry sector. The Land Policy both endorsed and strengthened the National Forest Policy. Recently, the government has also considered adopting a progressive land tax policy to encourage the conversion of uncultivated land to productive land.

**Scale of private sector involvement**

Primary data on the scale of private sector plantations are weak. However, some insights can be obtained from the areas rented. Based on the number of rental agreements, a total of 146 plantations – comprising 81 plantations by private individuals, 44 plantations by companies, and 21 state enterprise plantations – were established. Individuals rarely planted areas larger than 320 ha each and the highest number of plantations was in the 80-160 ha bracket (Figure 4).
By 1989, the total area of plantations on rented land in reserved forests amounted to 33,536 ha (Table 5). Due to the concern over forest conversion and escalating land-use conflicts, the approved rental area decreased after 1990. The scheme also suffered from high cost and bureaucratic procedures in seeking approval, which explained to some extent the private sector’s disinterest.

Role of research and development, and extension

In 1964, the RFD established a research station in Chiang Mai to focus on using pine and other fast-growing tree species for pulp production. In 1967, it set up a Nursery Centre to study the genetics of teak and pine in Lampang Province, and to produce and distribute seedlings to selected community groups and the general public. The Silvicultural Research Division was also strengthened and mandated to conduct research on forest plantations, silvicultural systems and watershed improvement in 1972. Three years later, a new policy was introduced to support forest plantation development and communities living in forest areas. At the same time, the National Reserve Forest Land Division, the Wildlife Conservation Division and the Watershed Conservation Division were established. A Nursery Section under the Silvicultural Research Division was also initiated to produce seedlings for reforestation and afforestation. In 1982, the Central Forestry Research Laboratory and Training Centre were created to conduct research on forest plantations in northeast Thailand.

In 1986, the RFD set up the Office of Private Reforestation and Extension to support the private sector in establishing commercial forest plantations. Its responsibilities included assistance in sourcing financial support through cooperatives, marketing, wood processing and long-term plantation management. In accordance with the government policy to reforest logged-over areas, the FIO expanded its mandate to cover reforestation in 1974.
Table 5: Area of plantations on rented reserved forest land, 1978-1994

<table>
<thead>
<tr>
<th>Year</th>
<th>Private individuals</th>
<th>Private companies</th>
<th>State enterprises</th>
<th>Government departments</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>ha</td>
<td>No.</td>
<td>ha</td>
<td>No.</td>
</tr>
<tr>
<td>1978</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>160.00</td>
<td>–</td>
</tr>
<tr>
<td>1979</td>
<td>–</td>
<td>–</td>
<td>1</td>
<td>160.00</td>
<td>–</td>
</tr>
<tr>
<td>1981</td>
<td>3</td>
<td>121.92</td>
<td>3</td>
<td>3 348.80</td>
<td>–</td>
</tr>
<tr>
<td>1982</td>
<td>1</td>
<td>264.96</td>
<td>1</td>
<td>408.32</td>
<td>–</td>
</tr>
<tr>
<td>1983</td>
<td>2</td>
<td>560.00</td>
<td>4</td>
<td>825.12</td>
<td>–</td>
</tr>
<tr>
<td>1984</td>
<td>22</td>
<td>2 464.80</td>
<td>3</td>
<td>312.96</td>
<td>13</td>
</tr>
<tr>
<td>1985</td>
<td>6</td>
<td>177.44</td>
<td>3</td>
<td>526.56</td>
<td>–</td>
</tr>
<tr>
<td>1986</td>
<td>18</td>
<td>684.48</td>
<td>5</td>
<td>718.88</td>
<td>1</td>
</tr>
<tr>
<td>1987</td>
<td>26</td>
<td>796.32</td>
<td>12</td>
<td>5 578.24</td>
<td>2</td>
</tr>
<tr>
<td>1988</td>
<td>4</td>
<td>201.12</td>
<td>13</td>
<td>2 228.80</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>5 271.04</td>
<td>46</td>
<td>18 235.84</td>
<td>20</td>
</tr>
</tbody>
</table>

Types and impacts of direct incentives

Renting of reserved forest land

Since 1960, support for forest plantation development included the renting of reserved forest areas by the private sector, and the production and distribution of free seedlings to communities and the general public.

Most private sector representatives indicated that they needed few direct incentives to establish and expand plantation and wood-processing activities (PACMAR Inc. 1989). Apparently, prices for wood products in domestic and international markets were sufficiently attractive to trigger investments. However, company representatives recommended that the government consider lease agreements to both private firms and occupants of forest land to increase land availability and resource security.

The 1969 regulation that permitted the unlimited use of reserved forest land for forest plantations was revised in 1979 to enable the private sector to rent the reserved forest land. Renting an area of up to 1 600 ha required the approval of the Director-General of the RFD. With support from the Board of Investment Promotion and approval from the Ministry of Agriculture and Cooperatives, private investors could lease areas larger than 1 600 ha for up to 30 years. The rental period depended on species planted and expected rotation lengths. The regulation was subsequently modified several times (Table 6). In 1987, the maximum area that could be rented was reduced to 320 ha and in 1992 to eight ha. The main reason for this drastic reduction was that large tracts of land encouraged forest conversion, which led to land-use conflicts. According to the Thailand Development Research Institute (TDRI 1989, p. 68) unsettled land disputes became “the single major obstacle to large-scale plantations, not the shortage of investment funds, not the lack of government policy.”

---

1 The rental rate between 1992 and 2001 was 62.5 baht/ha/year. In 2002, rents were increased to 625 baht/ha/year in the first rental period and 1 250 baht/ha/year for an extension. In February 2002, about 180 farmers rented land from the RFD area covering 36 510 ha. Large-scale areas rented by the private sector covered another 2 500 ha.
### Table 6: Changes in policies on renting degraded national reserve forest land

<table>
<thead>
<tr>
<th>Year</th>
<th>Plantation area and lease period</th>
<th>Policy or Act</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>1969</td>
<td>Unlimited</td>
<td>Permission on forest plantations (1969)</td>
<td>To permit the private sector to establish forest plantations on National Reserve Forest land</td>
</tr>
<tr>
<td>1976</td>
<td>(1) &lt;1,600 ha; up to 30 years</td>
<td>Permission on forest plantations in National Reserve Forest (1979).</td>
<td>To promote forest plantations in degraded National Reserve Forest land</td>
</tr>
<tr>
<td></td>
<td>(2) &gt;1,600 ha; requires Board of Investment Promotion support; up to 30 years.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>&lt;320 ha; up to 30 years</td>
<td>Permission on forest plantations in National Reserve Forest (1987)</td>
<td>(1) To permit the private sector establish forest plantations and tree plantations in degraded National Reserve Forest land</td>
</tr>
<tr>
<td>1990</td>
<td>Permit for the private sector to rent the National Reserve Forest areas for forest plantations revoked</td>
<td>Cabinet agreement on 15 May 1990</td>
<td>(1) Many private sector companies were destroying National Reserve Forest land for potential utilization in the future</td>
</tr>
<tr>
<td>1992</td>
<td>&lt;8 ha</td>
<td>Cabinet agreement on 8 September 1992</td>
<td>To decrease the pressure on the demands about rental of National Reserve Forest land</td>
</tr>
</tbody>
</table>

### Supplying tree seedlings for plantations

In 1978, the RFD started to produce and distribute free tree seedlings to the general public. Farmers could obtain 50 seedlings at one time, and in some cases even up to 500 seedlings. Seedling production was high between 1977 and 1980 (Figure 5) to enhance people’s interest in public forest plantation projects that established 45,794 ha in 1977, 15,489 ha in 1978, 8,645 ha in 1979 and 1,069 ha in 1980 in 38 provinces. The RFD continued to produce seedlings for the Year of National Trees (from 1984 to 1988) and the Northeastern Green Project (between 1987 and 1991).

Besides forest plantation development, the government also supported the growing of rubber trees. In 1960, the Rubber Replanting Aid Fund (RRAF) was set up to assist farmers in rubber production. Jurisdiction over the rubber plantations was handed to the Committee of National Rubber Plantations which monitored rubber plantations covering 1.92 million ha. Financial support for the fund was generated from taxes on rubber exports. Through the RRAF, planters could receive cash payments for up to 2.4 ha. The payments were increased over the years (Table 7) and are still in effect today.

By 1962, about 1.16 million ha had been replanted using better quality planting stock on private land. In 1975, the RRAF had also offered incentives to farmers for tree species other than rubber. Since 1987, farmers who do not own rubber plantations can also obtain financial support to plant rubber of high-yielding stock in the Rubber Plantation Extension Zone. By 2000, the area under rubber had reached 7.2 million ha. Between 1960 and 2001, the owners of 843,561 farms had replanted about 1.25 million ha with rubber trees.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Figure 5: Number of seedlings produced by the RFD between 1975 and 1989

Table 7: RRFA's payment rates for replanting with rubber and other trees species (1965 to 2002)

<table>
<thead>
<tr>
<th>Years</th>
<th>Replanting with rubber</th>
<th>Replanting with other trees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Payment rate (baht/ha)</td>
<td>Period of assistance (year)</td>
</tr>
<tr>
<td>1965-1966</td>
<td>9 375</td>
<td>5.5</td>
</tr>
<tr>
<td>1966-1968</td>
<td>11 563</td>
<td>5.5</td>
</tr>
<tr>
<td>1968-1976</td>
<td>12 500</td>
<td>5.5</td>
</tr>
<tr>
<td>1976-1980</td>
<td>17 500</td>
<td>5.5</td>
</tr>
<tr>
<td>1980-1982</td>
<td>24 375</td>
<td>5.5</td>
</tr>
<tr>
<td>1982-1986</td>
<td>30 000</td>
<td>5.5</td>
</tr>
<tr>
<td>1986-1989</td>
<td>30 000</td>
<td>7.5</td>
</tr>
<tr>
<td>1989-1992</td>
<td>42 500</td>
<td>7.5</td>
</tr>
<tr>
<td>1992-1997</td>
<td>42 500</td>
<td>7.5</td>
</tr>
<tr>
<td>1997-2002</td>
<td>42 500</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Lessons learned

The years between 1960 and 1989 are characterized on the one hand by unprecedented deforestation rates and on the other by the slowly growing concern for the future of Thailand’s forests. A number of significant policies were drafted, among them the National Forest Policy (1985) and the Land Policy (1987), to address the problems. However, it was not until the mid-1980s that firm steps were taken to initiate forest plantation development. The main incentives offered were free seedlings and the renting of degraded reserved forest land at low cost for planting trees. Both incentives were insufficient to significantly attract the private sector to tree planting (Figure 6). In fact, the rental agreements led to disputes over land use and resource security, and resulted in some cases in the destruction of plantations. Although some circles blamed the conflicts between different stakeholders on species’ choice (eucalyptus), land availability, illegal encroachment of reserved forest land and land speculation were more important impediments to a more organized plantation expansion.
In comparison to the slow progress in plantation development, the RRAF, which offered generous financial grants to rubber growers, was largely responsible for stimulating the planting of more than 40 000 rubber plantations *per annum* throughout the 1980s. The rubber promotion scheme in Thailand is interesting because it demonstrates the effectiveness of financial grants in stimulating the planting of rubber trees, particularly because most grants are financially more attractive and provide more flexibility than the free seedlings that were offered to farmers.

**Figure 6: Forest plantation development in Thailand, 1960-1989**

**Phase III: After the logging ban (1989-present)**

Devastating floods and landslides, which took the lives of 400 people in Nakorn Srithammarat Province in November 1988, had a major impact on Thailand’s forestry sector. The most significant one was a nationwide logging ban imposed in January 1989. Following the imposition of the ban, attention was firmly focused on how Thailand could obtain adequate wood supplies required for domestic consumption. The concern over raw material shortages as well as surging wood imports was reflected in a flurry of legislation, policies and cabinet resolutions passed after 1990, of which the most important and relevant to forest plantation development was the Re-afforestation Act (1992).

The main purpose of this Act was to support reforestation of restricted tree species (for example, teak and dipterocarps) by the private sector on private land. The Act described the types of land on which forest plantations might be registered and established. Under the Act, any individual or entity owning a forest plantation could register with the RFD, and thus would receive formal approval for felling the trees. This registration was particularly important for owners of teak and dipterocarp plantations so that they would not be apprehended for illegal logging. Sections 10 to 13 covered the harvesting and transport of wood. Section 14 stipulated the waiver of all royalty fees. Although the Act was to support private sector plantation development, some passages were rather restrictive. For example, the Act referred to only restricted tree species; no reference was made to other economically important plantation species, such as eucalyptus, neem (*Azadirachta indica*), rosewood (*Pterocarpus macrocarpus*) and ironwood (*Hopea* spp.).
In addition to the Re-afforestation Act, several resolutions that concerned forest plantation development had been passed by the Council of Ministers, including:

- Establishment of rubberwood sawmills (24 January 1989)
  The Cabinet agreed to permit the establishment of rubberwood sawmills throughout the country. There had been restrictions in some provinces since 1960. In early 1994, operators were allowed to set up sawmills processing wood belonging to a group of 13 plantation species.

- Classification of the National Reserve Forest Area (10 and 17 March 1992)
  The Council of Ministers agreed on land-use zoning of the National Reserve Forest area. According to the zoning, 27.56 percent of the total land area was set aside as conservation forests, 16.16 percent as production forests and 2.21 percent was available for land reform.

- Renting of degraded forest lands (not exceeding eight ha each) by the private sector (14 September 1993)
  The Minister of Agriculture and Cooperatives became responsible for the rental agreements that enabled degraded forest land to be leased by the private sector for the purpose of planting trees.

- Re-organization of the FIO (1 April 1997)
  The FIO should play a role in encouraging the private sector to invest in forest plantations.

Unfortunately, resolutions were passed that constrained private reforestation. For example, on 15 May 1990, the Cabinet temporarily suspended the renting of degraded forest land. On 8 September 1992, it prohibited the use of the National Reserve Forest lands for private forest plantations apart from those meeting the following criteria:

- The land area for plantations must not exceed eight ha;
- Planters must grow tree species specified in the Forest Plantation Act (1992);
- Planters must occupy the land for more than five years; and
- Planters must have converted the land from agricultural production to forest plantation or agroforestry.

While the government continued to strengthen forest conservation and initiated various reforestation projects, the pulp industry, composed of five main producers (Table 8), started to encourage farmers to grow trees for pulp production.

### Table 8: Pulp production in Thailand, 1999

<table>
<thead>
<tr>
<th>Company</th>
<th>Production (tonnes)</th>
<th>Raw material used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advance Agro Co. Ltd.</td>
<td>427 000</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td>Phoenix Pulp and Paper Co. Ltd.</td>
<td>210 000</td>
<td>Eucalyptus, bamboo</td>
</tr>
<tr>
<td>Siam Pulp and Paper Co. Ltd.</td>
<td>123 000</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td>Panjapal Pulp Industry Co. Ltd.</td>
<td>110 000</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td>Siam Cellulose Co. Ltd.</td>
<td>60 000</td>
<td>Eucalyptus</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>930 000</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Scale of private sector involvement**

Primary data on the scale of private sector plantings are limited. The registration of forest plantations under the Re-afforestation Act (1992) can offer some insights, but it provides only a partial overview of the ownership of forest plantations (Table 9).
A number of factors account for the low numbers of registered plantations. The Re-afforestation Act did not stipulate the registration of forest plantations for tree species other than *Tectona grandis* and *Dipterocarpus alatus*. Potential planters were unfamiliar with the Re-afforestation Act. The registration process was extremely slow and it was not necessary to register until a decision was made to fell trees.

**Table 9: Number of forest plantations registered with the RFD in Thailand, 2000**

<table>
<thead>
<tr>
<th>Plantation ownership</th>
<th>Number registered</th>
<th>Area (ha)</th>
<th>Number of trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers</td>
<td>6 760</td>
<td>14 308</td>
<td>20 416 078</td>
</tr>
<tr>
<td>Companies</td>
<td>912</td>
<td>3 853</td>
<td>4 895 316</td>
</tr>
<tr>
<td>Government agencies</td>
<td>4</td>
<td>19</td>
<td>15 772</td>
</tr>
<tr>
<td>State enterprise (FIO)</td>
<td>189</td>
<td>53 906</td>
<td>30 365 503</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>7 865</strong></td>
<td><strong>72 086</strong></td>
<td><strong>55 692 669</strong></td>
</tr>
</tbody>
</table>

Source: RFD (2001)

It is difficult to obtain data for the area of eucalyptus plantations in the country, as the RFD has not developed a standard reporting procedure and most plantations belong to the private sector. Data for only some years are available from different studies (Table 10).

**Table 10: Eucalyptus plantations in Thailand, 1986, 1995 and 1997**

<table>
<thead>
<tr>
<th>Region</th>
<th>Area of eucalyptus plantations (ha)</th>
<th>1986*</th>
<th>1995**</th>
<th>1997***</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td></td>
<td>8 136.32</td>
<td>23 259.52</td>
<td>55 996.00</td>
</tr>
<tr>
<td>Northeast</td>
<td></td>
<td>24 358.72</td>
<td>169 906.24</td>
<td>207 785.12</td>
</tr>
<tr>
<td>East</td>
<td></td>
<td>8 196.52</td>
<td>119 371.20</td>
<td>125 975.84</td>
</tr>
<tr>
<td>Central &amp; West</td>
<td></td>
<td>5 017.12</td>
<td>14 033.60</td>
<td>48 530.40</td>
</tr>
<tr>
<td>South</td>
<td></td>
<td>7 816.80</td>
<td>22 356.48</td>
<td>236.32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>53 524.48</strong></td>
<td><strong>348 927.04</strong></td>
<td><strong>438 523.68</strong></td>
</tr>
</tbody>
</table>

Sources: * Data came from RFD (2001), although the methodology was unclear
** Forestry Research Centre (1997)
*** Sunthorn-Hao (1999)

Based on data from 57 062 farmers who joined the Private Reforestation Extension Project (PREP) between 1994 and 1996, the average size of forest plantation area was three ha. This is confirmed by a sample of 3 604 farmers who participated in the PREP (Figure 7). They had an average farming area of 9.87 ha, with 2.96 ha being devoted to plantations. Most farmers (62.5 percent) owned farming areas between 0.16 and 6.40 ha each. Only nine percent owned farms greater than 16 ha.
Role of research and extension

Since the RFD’s reorganization in October 1992, the Silvicultural Research Division has been responsible for research on tree improvement, seed tree management, forest plantations and forest soils, and the Forest Product Research Division for research on forest products. The new Private Reforestation Office has to prepare plans and promote tree planting as an alternative to agriculture, and to disseminate information, provide financial support, analyse markets and assist in registration. It is divided into five sections:

- administration section;
- private reforestation fund;
- reforestation extension section;
- private reforestation management section; and
- marketing and wood utilization section.

The regional, provincial and district forest offices support the RFD’s research and extension activities. The district offices are mainly responsible for liaising with the farmers.

Types and impacts of direct incentives

The early 1990s saw the development of numerous incentive schemes that were mainly administered via projects. In addition, the RFD continued to provide seedlings and lease degraded reserved forest lands to the private sector. Affected by the eight ha areal restriction, private companies decided to offer incentives to farmers to encourage them to produce raw material for the wood-processing (many pulp) industries.

Government support

Since 1991, the RFD and the Bank of Agriculture and Agricultural Cooperatives have initiated four projects or schemes to support private sector involvement in plantation development:

- Reforestation and Extension Project in the Northeast of Thailand (REX), initiated in 1991;
- Private Reforestation Extension Project (PREP), initiated in 1994;
- Fast Growing Trees Reforestation Project, initiated in 1994; and
- Overseas Economic Cooperation Fund (OECF) for forest plantations, initiated in 1998.
The Reforestation and Extension Project in the Northeast of Thailand (REX)

Under the REX, the RFD was responsible for carrying out reforestation and providing extension services to assist in the Green Northeast Programme. Reforestation activities were to be carried out by local people. Over a period of eight years, the RFD produced and distributed 89 million seedlings (Figure 8).

Source: RFD (1999)

**Figure 8: Number of seedlings produced and distributed by the RFD, 1991-1998**

The Private Reforestation Extension Project (PREP)

In 1994, the government initiated the PREP, through which the RFD provides funds to smallholders interested in planting trees. The farms of eligible farmers should not exceed 16 ha per family which has property rights to the land, or the land should be rented from the RFD. The PREP’s main objectives are to:

- Encourage farmers to grow trees on their land;
- Produce wood for domestic use and to decrease dependence on wood imports;
- Generate employment in rural areas; and
- Decrease forest destruction.

The PREP is expected to continue until 2005 and involves about 795 full-time and 2 610 temporary staff. From 1994 to 1998, farmers participating in the PREP received 18 750 baht/ha over five years in installments of 5 000 baht/ha in the first year, and 4 375 baht/ha, 3 750 baht/ha, 3 125 baht/ha and 2 500 baht/ha in the following four years. Trees had to be planted on at least 0.16 and up to 16 ha. The maximum size was increased in 1998 to 32 ha because the RFD was concerned that the target of 1.28 million ha within eight years would not be reached. The RFD also realized that larger farms were more suited for investments in tree planting.

Farmers were advised to plant at least 1 250 trees/ha and selected species had to be one of 46 species listed by the RFD. The number of seedlings to be planted was reduced in 1999 to 625 trees/ha to cut costs and introduce agroforestry. The RFD also calculated that only 219-250 trees/ha would remain for the final harvest and viewed dense planting as unnecessary. The number of potential species was reduced to 38 because silvicultural knowledge and marketing opportunities for eight species were limited. Besides, farmers showed little interest in many species. The farmers were responsible for the overall management and had to ensure that survival rates did not drop below 85 percent in the first year after establishment. Between 1994 and 2001, the funds used by the PREP to support farmers reached 5.1 billion baht.

The target of planting 160 000 ha with trees per year was very ambitious and was reduced as early as 1996. By 2000, only 168 437 farmers had participated in the PREP and the area planted had reached only 390 032 ha (Table 11). Initially, the PREP was plagued by the inexperience of
project administrators, forestry officers and farmers alike. Some farmers only joined the project because they felt compelled to do so. As a result, a considerable number eventually abandoned the project. In 2001, only 78,019 farmers were still with the project, accounting for a total of 165,484 ha. Over the years, the operation of the project improved, monitoring and evaluation provided insights into its progress and costs were cut by reducing planting densities. Unfortunately, the PREP suffered from the effects of the financial crisis in Thailand. Budget reductions were introduced in 1999. Since 2002, no additional funds have been made available, which may negatively affect the government’s credibility regarding its commitment to support the private sector in forest plantation development.

Table 11: Farmer participation in the PREP, 1994-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Project plan (ha)</th>
<th>No. of farmers joining the project</th>
<th>Area planted (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>160,000</td>
<td>49,600</td>
<td>115,004</td>
</tr>
<tr>
<td>1995</td>
<td>160,000</td>
<td>65,596</td>
<td>151,558</td>
</tr>
<tr>
<td>1996</td>
<td>89,232</td>
<td>27,537</td>
<td>65,806</td>
</tr>
<tr>
<td>1997</td>
<td>85,000</td>
<td>17,177</td>
<td>38,512</td>
</tr>
<tr>
<td>1998</td>
<td>16,000</td>
<td>2,807</td>
<td>6,644</td>
</tr>
<tr>
<td>1999</td>
<td>4,800</td>
<td>2,218</td>
<td>5,156</td>
</tr>
<tr>
<td>2000</td>
<td>8,000</td>
<td>3,502</td>
<td>7,352</td>
</tr>
<tr>
<td>Total</td>
<td>523,032</td>
<td>168,437</td>
<td>390,032</td>
</tr>
</tbody>
</table>

The Fast Growing Trees Reforestation Project

The RFD initiated the Fast Growing Trees Reforestation Project in 1994. Through the project, it provided incentives for the conversion of cassava and rice fields to fast-growing trees (for example, Azadirachta indica, Eucalyptus camaldulensis and Acacia mangium). The support included free fertilizer (62.5 kg/ha) and seedlings (1,250/ha), in addition to long-term, low interest loans (1.75 percent for up to 12 years) through the Bank of Agriculture and Agricultural Cooperatives for establishment and management activities. Between 1994 and 1997, the total area supported reached 98,152 ha (Table 12), which was considerably higher than the target of 68,800 ha. Most fields were planted with eucalyptus.

A second phase of the project was envisioned to convert an additional 240,000 ha of cassava and rice fields over a five-year period. However, the project was terminated in 1998, although technical support continued until 2001. Despite the absence of empirical evidence, it appears that farmers were encouraged not so much by the incentives, but more by expected higher returns from planting trees compared to cassava and rice on marginal lands.

Table 12: Area planted and the number of participating farmers in the Fast Growing Trees Reforestation Project, 1994-1997

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of participating farmers</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>4,271</td>
<td>8,986</td>
</tr>
<tr>
<td>1995</td>
<td>11,328</td>
<td>23,023</td>
</tr>
<tr>
<td>1996</td>
<td>15,745</td>
<td>34,419</td>
</tr>
<tr>
<td>1997</td>
<td>12,659</td>
<td>31,724</td>
</tr>
<tr>
<td>Total</td>
<td>44,003</td>
<td>98,152</td>
</tr>
</tbody>
</table>
Overseas Economic Cooperation Fund (OECF)

The Bank of Agriculture and Agricultural Cooperatives established the OECF for forest plantations in 1998. It provided 984 million baht in loans to farmers who intended to plant trees (with the exception of eucalyptus). Through the Fund, interest on loans was reduced by 1.75 percent. The amount that could be borrowed by a family was between 10,000 and 15 million baht, and must be repaid within 15 years. According to the plan, 984 farmers nationwide – 246 farmers in the north, 256 in the northeast, 216 in the central region and east, and 266 in the south and west, were to receive the loans.

Additional loans for forest plantations totalling 365 million baht and for agroforestry totalling 790 million baht were made available between April 1999 and 31 March 2001, once again excluding the planting of eucalyptus. Other conditions remained the same but interest was decreased by two percent.

Seedling distribution to the general public

By 1975, the RFD had established 13 nursery centres nationwide to produce seedlings for free distribution to the general public. The number was increased to 41 and 57 centres in 1988 and 1994, respectively. Of these, 13 centres produced the bulk required by the Private Reforestation Extension Project and the Royal Golden Jubilee Forest Rehabilitation Project between 1994 and 1997 (Figure 9). In total, the centres produced and distributed more than 970 million seedlings between 1989 and 2001.

![Figure 9: Number of seedlings produced and distributed by the RFD, 1990-2000](source: RFD (2001))

The role of the private sector in providing incentives

For a number of reasons, it is difficult to gain an adequate understanding of the role companies play in promoting forest plantations. Most company representatives hesitate to provide data about their operations and policies. However, it is clear that several companies operate out-grower schemes as they find it difficult to acquire sufficient land by themselves for the production of raw materials.4

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4 An exception is Agro Lines Co. Ltd., which purchases land directly from farmers.
Phoenix Pulp and Paper Co. Ltd.

Phoenix Pulp and Paper Co. Ltd. was established in 1979 in Nam Phong District, Khon Kaen Province, Northeast Thailand. Estimated raw material requirements were 1 000 tonnes of bamboo and one million tonnes of eucalyptus in 2002. Most bamboo and all eucalyptus are supplied by local farmers. Other raw material sources include Phoenix Coopers which collaborates with the Royal Thai Army to establish plantations at selected sites controlled by the military. Raw Material Development Co. Ltd., a Phoenix subsidiary, was set up to secure additional raw material supplies for pulp production. About 24 million eucalyptus seedlings have been distributed to farmers since the firm was established.

Thai Plywood Co. Ltd.

Thai Plywood Co. Ltd. is a state enterprise established in November 1953 under the Ministry of Agriculture and Cooperatives. The company started a fast-growing tree plantation extension project in Lan Sak District, Uthai Thani Province, in western Thailand in 1989. As part of the project, the company had contracts with farmers to provide them with seedlings and fertilizers. The farmers had to cover these expenses incurred by the company only after the final harvest. Technical advice was provided free-of-charge and the company provided buy-back guarantees. The project was terminated in 1998 because of the farmers’ diminishing interest (Table 13).

Table 13: Number of farmers involved in the project by Thai Plywood Co. Ltd. and area planted, 1989-1998

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of farmers</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>24</td>
<td>74</td>
</tr>
<tr>
<td>1990</td>
<td>36</td>
<td>158</td>
</tr>
<tr>
<td>1991</td>
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<td>88</td>
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<tr>
<td>Total</td>
<td></td>
<td>1 717</td>
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</tbody>
</table>

Source: Thai Plywood Co. Ltd., personal communication

Siam Forest Tree Co. Ltd.

The Siam Forest Tree Co. Ltd. is part of the Siam Cement Group of companies. It has promoted eucalyptus plantations to support the Siam Pulp and Paper since 1992 and provides improved eucalyptus seedlings and technical assistance to farmers. The company plans to support plantation establishment on 1 600 ha/year, and had achieved 22 173 ha by 2001 (Table 14).
Table 14: Area of eucalyptus plantations supported by Siam Forest Tree Development Co. Ltd., 1992-2001

<table>
<thead>
<tr>
<th>Year</th>
<th>Area (ha)</th>
</tr>
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<tr>
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<td>3 327</td>
</tr>
<tr>
<td>1998</td>
<td>1 153</td>
</tr>
<tr>
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<td>1 190</td>
</tr>
<tr>
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<td>1 747</td>
</tr>
<tr>
<td>2001</td>
<td>2 621</td>
</tr>
<tr>
<td>Total</td>
<td>22 173</td>
</tr>
</tbody>
</table>

Source: Siam Forest Tree Development Co. Ltd., personal communication

Lessons learned

Three events had a significant effect on forest plantation development in Thailand during the 1990s and early twenty-first century – imposition of the logging ban in 1989, the global price hike for timber in 1993/1994 and the financial crisis since the middle of 1997.

The influence of the logging ban, both in economic and psychological terms, cannot be underestimated. Virtually overnight, the country was faced with securing new timber supply sources. Imports were one alternative, the other was heavy investments in plantations. The Re-afforestation Act of 1992 was specifically designed to support plantation development by the private sector. Various projects were initiated by the government. The results were mixed. While inexperience slowed down progress to some extent, the considerable funds that were made available and the attractive timber prices encouraged the private sector to plant more trees during the mid-1990s (Figure 10). However, the surge in plantation expansion was short-lived. The financial crisis that hit Thailand particularly hard in 1997 and the following years reduced the government’s ability to continue providing grants for plantation establishment. While falling timber prices had reduced interest in forest plantations, the crisis further dampened investor sentiments. These external developments make it difficult to assess the impact of the government incentives offered to farmers for growing trees and to judge the value of lessons that were learned in the 13 years since the imposition of the logging ban.

CONCLUSIONS

Between the establishment of the RFD in 1896 and the late 1970s, forest management in Thailand was strongly focused on timber exploitation. The RFD was responsible for overseeing the activities of logging concessionaires and generating revenue from the vast forest resources. Since the early 1960s, agriculture was expected to support and finance industrial development. Agricultural expansion was accelerated and supported by public investments, especially in transport and irrigation (Sugunnasil 1991). As a result, the increase in cultivated land was higher than population growth between the 1960s and late 1970s (Onchan 1990). Between 1960 and 1990, the agricultural population grew by 14 million people. During the same period, almost 15 million ha of forests were converted to farmland (Panayotou and Parasuk 1990).
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Although the National Reserve Forest Area Act of 1964 was promulgated in an effort to maintain 50 percent of the country under forest cover, it became apparent in the late 1970s and early 1980s that overharvesting and forest conversion had led to unprecedented high deforestation rates. By 1980, the forest cover had dropped to below 35 percent. In the late 1970s, Thailand became a net importer of timber. Efforts to increase wood supplies through forest plantation development were negligible, although procedures were prepared for renting out degraded reserved forest land for tree planting in 1979. This had little effect; timber exploitation and forest conversion continued, albeit at a slower pace.

Concern over the continuing loss of Thailand’s natural forest grew during the 1980s; there was little effect on forest plantation development. The turning point in Thailand’s forestry sector was the imposition of the logging ban in 1989. In late 1992, the RFD was formally directed to shift its focus from forest exploitation to forest conservation. Over the following years, the government offered direct incentives – through various projects – to the private sector to accelerate forest plantation development.

Due to the absence of monitoring, it is difficult to review the response to the direct incentives offered. However, a number of proxy indicators show that forest plantations increased considerably. For example, eucalyptus plantations expanded from 53 524 ha in 1986 to 438 524 ha in 1997. The number of registered plantations also grew to 7 865, planting over 72 000 ha in 2000. More than 390 000 ha were established through support from the PREP between 1994 and 2000. The Fast Growing Trees Reforestation Project supported plantings on nearly 100 000 ha between 1994 and 1997.

Although the numbers appear impressive, assessing their significance and the contribution of direct incentives to the developments during the 1990s remains problematic for a number of reasons. First, not all the investors remained with the projects they signed up for. For example, 168 437 farmers joined PREP during the 1990s. However, only 78 019 remained in 2001. Second, there was very little information about project costs in general, and the costs of incentives, in particular. Between 1994 and 2001, PREP support amounted to 5.1 billion baht. This translates into about 13 077 baht/ha (for the 390 000 ha established), which is surprising as the support was supposed to be 18 750 baht/ha. Third, it is unclear to what extent investor sentiment was influenced by the global price hike for timber in the early 1990s. At the same time, Thailand’s economy and those of many other Asian countries were booming, which increased demand for wood products. Marginal farmland became available as increasing numbers of rural people found employment in the manufacturing and service sectors. There was an expectation that the “good” times would continue for many years to come.
The years of booming economic growth came to an abrupt halt in the middle of 1997, when Thailand became the first victim of the Asian financial crisis. This development had two immediate effects and one long-term consequence. First, government spending was drastically reduced, which affected all plantation projects. Most activities were scaled down or completely terminated (for example, the Reforestation and Extension Project in the northeast). Direct government planting also decreased after 1999 and the number of seedlings produced by the RFD fell from about 20 million in 1996 to below five million in 1998. Second, investors responded to future uncertainties and declining forest product demands by delaying investment decisions. Further plantings were deferred or abandoned.

The long-term effect of the financial crisis in Thailand was seen in the return of many rural people, who had lost their off-farm jobs, to work in their fields again. Thus, the area that was available for trees in the early 1990s quite quickly shrank and tree cover reverted back to annual crops.

The short-lived history of private sector involvement in forest plantation development is defined by two crises:

- The flash floods of 1988 that led to the imposition of the logging ban and subsequently the government’s commitment to forest plantation development; and
- The financial crisis that drastically curtailed government budgets, reduced – at least temporarily – wood product demands and dampened investors’ interest.

While the political events and changes in the economic conditions undoubtedly influenced investments in forest plantations, direct incentives accelerated a process that would have taken place at a slower pace in their absence. On the other hand, developments could have been faster and lasted longer if some of the impediments to forest plantation development had received more attention.

**IMPEDEMENTS AND FUTURE DIRECTIONS**

**Lack of clear policy statement on forest plantations**

Although the Re-afforestation Act of 1992 was designed to support private reforestation, there is no clear strategy for forest plantation development, which can be regularly reviewed and amended according to the general economic climate and the needs of both large- and small-scale investors. To rectify the situation, the RFD should prepare a strategy in consultation with representatives from key stakeholders in the private sector and civil society.

A clear and inherently consistent strategy should also address the removal of disincentives and legislative flaws including:

- The current Re-afforestation Act and supporting provisions are restrictive, as they do not cover all tree species;
- Restrictions on establishing new wood-processing industries in many provinces remain;
- The maximum area of degraded reserved forest land that can be rented for growing trees is limited to only eight ha. Many conditions for renting are very restrictive;
- Ownership and use of chainsaws are prohibited; and
- Timber of some species cannot be exported.

The following conditions are required to create a more attractive environment for forest plantation development:

- The Re-afforestation Act should be amended and cover all tree species. Plantation-grown timber should be exempted from taxes, premiums and fees. All plantations should be registered with the RFD and procedures for obtaining harvesting permits need to be simplified;
The Forest Act of 1941 should be amended to allow for the unrestricted use of non-timber forest products derived from forest plantations. Restrictions regarding the establishment of new sawmills need to be revised;

- The National Reserve Forest Act 1964 should be revised to provide greater flexibility in the renting of degraded reserved forest lands. In particular, size restrictions should be lifted;

- Plantation owners and registered personnel should be allowed to own and operate chainsaws;

- Regulations on the export of timber should be lifted and export taxes reviewed; and

- Tax deductions for land used for forest plantations should be considered.

**Research, extension, monitoring and capacity building**

Since 1992, the Silvicultural Research Division has been responsible for research on tree improvement, seed tree management, forest plantations and forest soil. The Forest Product Research Division focuses its activities on forest product development. In 1996, the RFD established the Office of Private Reforestation and Extension to support the private sector in developing commercial forest plantations. Although these efforts are laudable and indicate government commitment to forest plantation development, research has made no significant impact and extension activities have not improved the knowledge of stakeholders involved in tree planting. Government officials and many investors have a poor grasp of relevant regulations and policies, and their inadequate knowledge of plantation establishment, management practices and economics continue to impede progress. Monitoring is weak and there is currently no database on forest plantations, annual wood supplies and demand by the processing industries. The problem is exacerbated by a common disinterest in providing proper services to the general public and interested small- and large-scale investors. There appears to be a serious problem with attitudes that is difficult to change in the short term.

Proposed solutions include: training to improve knowledge of policies and legislation concerning forest plantations; capacity building in plantation establishment and management at all levels; and wood utilization, and forest economics, including a comprehensive evaluation of the cost-effectiveness and efficiency of incentives in fostering plantation development. To facilitate monitoring, a thorough review of past developments and the creation of a database on forest plantations are required. Pilot models for effective extension should be developed. Most importantly, incentive systems need to be devised for government officials, which reward effective research and extension.

In addition, small-scale investors and farmers should be encouraged to organize themselves, form cooperatives and nominate representatives to liaise with government officials. Finally, access to improved planting material needs to be enhanced and assistance should be provided in marketing plantation-grown wood.

**Providing balanced information and raising awareness**

Since the late 1980s, forest plantation development has been negatively affected by environmental and social concerns over monoculture plantations. Eucalyptus was especially targeted and its promotion opposed by environmentalists. In some cases, this led to the destruction of nurseries and equipment (Puntasen et al. 1992). Although the discussion about the negative impacts of eucalyptus and the contributions that forests plantations can make is not as emotional as it was ten years ago, plantations still project a negative image.

The promotion of forest plantation development needs to be accompanied by the dissemination of balanced information on the potentials of tree growing, and the positive and negative impacts they can have in certain localities. The concerns of environmental groups and civil society should be taken seriously and addressed through open discussions.
Providing justified and adequate support to investments in forest plantations

There is great diversity among potential investors in tree growing. Farmers and small-scale investors have very different needs from large-scale commercial investors. In certain cases, growing trees may not be inherently unprofitable, which raises the question, “Under what circumstances are incentives in fact justified?” This is especially important as government budgets have declined in recent years and it is questionable whether the financial support that was provided in the early 1990s can be made available again at similar levels in the future.

Applied economic analysis that comprehensively weights the costs of providing incentives against the perceived societal benefits, needs to be conducted to determine whether a particular level of support is justified. Any analysis should be of a comparative nature and incorporate assessment of alternative land uses.

If deemed necessary, incentive schemes should be tailored to the needs of different groups of investors. Small-scale investors, as individuals or as cooperatives, are probably best supported by direct cash payments as practised in some of the projects throughout the 1990s. Procedures for obtaining support should be as flexible and non-bureaucratic as possible, and could follow the model of the RAF. Large-scale commercial investors are probably best served by indirect incentives including supportive policies and legislation, enhanced tenure security, the lifting of export and processing restrictions and deductions on land taxes.

LITERATURE CITED


RFD. 1996. *The 100-year anniversary of the Royal Forest Department*. Bangkok, Royal Forest Department.


INTRODUCTION

In 2000, the population of the United States of America (U.S.A.) stood at 281 million people, with a population density of 31 persons/km². In the last half century, the population grew at an average rate of 1.25 percent annually. In 1990, about 25 percent of the population lived in rural areas, compared to 60 percent in 1900 (Table 1).

The country’s gross domestic product (GDP) in 2000 was about US$9,963 billion and per-capita income was US$30,069 (U.S. Bureau of Census 2001). The service sector (including trade, financial and other services) accounts for 56 percent of the GDP; agriculture, construction, manufacturing and transportation contribute 31 percent; and the remaining 13 percent comes from the government sector.

The total land area of the U.S.A is 2,263 million acres (916 million ha), of which 33 percent or 747 million acres (302 million ha) are forest land (Smith et al. 2001; Figure 1). Another 35 percent is classified as rangeland, 21 percent as cropland and the rest are residential, commercial and industrial lands (Cubbage et al. 1993). About 40 percent of the total land area is federal and state government land; the rest is privately owned (U.S. Bureau of the Census 1991, p. 201).

Forest land is further classified into timberland, reserved forest land and other forest land. Timberland covers 504 million acres (203 million ha) or 67 percent of the total forest land and is the primary source of timber production (Smith et al. 2001). To be classified as timberland,
areas must be able to produce at least 20 cubic feet of industrial wood per acre annually (or 1.41 m³/ha/year) and have not been withdrawn from timber production for legal and administrative reasons. Reserved forest land covers 52 million acres and is managed as parks and wilderness areas for non-timber use. Other forest land (191 million acres) is land not capable of producing industrial wood on a commercially viable scale, but is important for watershed protection, wildlife habitat and other uses. About half of the country’s “other forest land” is located in Alaska.

The forestry sector has four components: forestry, wood products, paper and allied industry and wood furniture industry. Combined, these contribute about two percent to the GDP. While the forest product manufacturing facilities are exclusively private enterprises, the owners of forest land include federal, state and municipal governments, and private industrial and non-industrial entities. In 1997, about 58 percent of the United State’s forest land was privately owned, but its share of timberland was 71 percent (13 percent industrial and 58 percent non-industrial private properties) (Smith et al. 2001).

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Table 1: Population and economic indicators of the U.S.A., 1790-2000

<table>
<thead>
<tr>
<th>Year</th>
<th>Total population</th>
<th>Annual population change (%)</th>
<th>Rural population</th>
<th>Rural in total population (%)</th>
<th>Population density (per km²)</th>
<th>GDP (billion in 1996 US$)</th>
<th>Per capita GDP (in 1996 US$)</th>
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GDP data are from the U.S. Bureau of Economic Analysis web page: http://www.bea.doc.gov/bea/dn/gdplev.xls.

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Timber production rose rapidly during the second half of the nineteenth century from 76.8 million m³ in 1850 to 342 million m³ in 1900, and rising to 368 million m³ in 1910 (Figure 2). The shift to coal and oil for fuel, more efficient use of wood and use of wood substitutes, however, led to a slow decline in production that lasted until after the Second World War (Clawson 1979; Powell et al. 1993). By the 1940s, wood production was about 20 percent lower than in the early 1900s. After the war, great demand for housing and paper products resulted in increased timber production until 1990 when it reached a historical high of 530 million m³.
The total consumption of industrial forest products has increased steadily since the Great Depression during the 1930s. The U.S.A. has been a net importer of industrial forest products since 1915 (Figure 3). While the volume of net industrial forest product imports increased in the last half-century, the share of net imports in total consumption varies widely. Historically little fuelwood is imported or exported.

The government encourages wood production to meet forest product demand and to conserve forest resources. As more emphasis has been placed on recreation and environmental services on public forests in recent years, the share of timber production from private forests has increased dramatically (Table 2, Figure 4). In 1997, timber production from public forests only accounted for 11 percent of total production, down from 25 percent in 1970. In the same period, timber production from non-industrial private forests increased from 48 percent to 60 percent, while that from forest industry lands remained nearly constant at about 30 percent.

Current policies and regulations regarding timber production and conservation on public lands are primarily governed by the 1976 National Forest Management Act (which superseded the 1897 Organic Administration Act), the 1964 Multiple Use and Sustainable Yield Act, the 1969 National Environmental Management Act and 1973 Endangered Species Act. The main policies regarding timber production and conservation on private lands are the 1980 reforestation tax incentive, capital gain tax treatment for timber income, various federal and state cost-share programmes for tree planting, the 1973 Endangered Species Act, the Clean Water Act and various state and local forest practice regulations.

Figure 2: Domestic production of forest products in the U.S.A., 1800-1999

The government encourages wood production to meet forest product demand and to conserve forest resources. As more emphasis has been placed on recreation and environmental services on public forests in recent years, the share of timber production from private forests has increased dramatically (Table 2, Figure 4). In 1997, timber production from public forests only accounted for 11 percent of total production, down from 25 percent in 1970. In the same period, timber production from non-industrial private forests increased from 48 percent to 60 percent, while that from forest industry lands remained nearly constant at about 30 percent.

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As of 1997, the U.S.A. had about 54 million acres (22 million ha) of plantation forests, which accounted for 11 percent of timberland or 7.3 percent of forest land (Smith et al. 2001). Two earlier estimates show that there were 13.5 million ha of plantation forests in 1985 (Postel and Hiese 1988) and 18.4 million ha in 1995 (Pandey 1997). The difference of 3.6 million ha between 1995 and 1997 could partly be attributed to different assumptions and estimation techniques used in the two studies. Intensive monitoring of forest plantations in the U.S.A. was not practised prior to 1990, but has recently been incorporated into nationwide forest inventory surveys, which are conducted every five to ten years based on fixed plots.

Table 2: Timber harvesting and forest land ownership in the U.S.A., 1952-1997

<table>
<thead>
<tr>
<th>Year</th>
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<th>Other public</th>
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<th>NIPF</th>
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<td>6.2</td>
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Forest land area (million acres) %

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Sources: USDA Forest Service (1964); Ulrich (1990); Howard (2001)
INCENTIVES AND PLANTATION DEVELOPMENT

Forest plantation development in the U.S.A. can be roughly divided into three phases: initiation, acceleration and steady growth. The initiation phase corresponded with the period from the Colonial Americas to 1945. At the beginning of this period, tree planting was not economical and was rarely pursued by the government. In the later stages, tree planting became a voluntary and private initiative, strongly promoted by government policies and programmes.

The acceleration phase stretched from 1946 to 1976. Tree planting activities – fuelled by strong market demand and high prices for forest products, favourable tax policies and various government cost-share programmes – escalated during this period. Private tree-planting increased ninetyfold from an annual area of 6 336.6 hectares in 1946 to 572 000 hectares in 1976, representing an increase of 16 percent per year.

The steady growth phase covered 1977 to 1999. Private tree planting still expanded but at a much lower annual rate of 2.4 percent. In 1999, the private tree planting area was about 968 000 hectares, 69 percent higher than in 1976. Population and demand for forest products continued to grow, and changing public attitudes towards the environment resulted in several policies that affected tree plantations, such as the capital gains tax treatment for timber income and reforestation tax incentives.

Plantation development from colonial Americas to 1945: initiation phase

Overview

Timber harvesting and utilization of forest resources were the main forestry issues in the first four centuries of early American history (Clawson 1979). In 1630, forests covered about 46 percent of the land area that eventually became U.S.A. territory. Although aimed at conservation (and possibly production), the early forest regulations – such as the 1681 Governor (of Colonial Pennsylvania) William Penn’s proclamation that for every five acres of forest land cleared, one acre should be kept – did not call for tree planting on private or public lands. Land was cleared for agriculture throughout the country in tandem with population growth.

Despite this absence of tree planting efforts, the country had abundant natural forest resources to meet the great demand for forest products prior to 1900. When certain species (for example,
spruce and white pine for making newsprint in the late nineteenth century) were becoming scarce, the U.S.A. turned to Canada’s abundant natural forests for these species.

In the first half of the nineteenth century, rapid deforestation occurred in several locations. Some prominent citizens (such as Henry David Thoreau, a writer, and J. Sterling Morton, a journalist) began to advocate tree planting. Morton’s proposal for a tree-planting holiday, to be called “ Arbor Day,” was officially proclaimed in Nebraska in 1874. All other states followed and proclaimed their own Arbor Day over the following 30 years. In 1907, President Theodore Roosevelt called on schoolchildren in the country to “give a day or part of a day to special exercises and perhaps to actual tree planting, in recognition of the importance of trees to us as a Nation.”

These efforts generated some results. About one million trees were planted on the first Arbor Day in Nebraska. Other states also had successful tree-planting campaigns. For example, Minnesota planted 26 million trees in 1876 (Hodge 1879, p. 108). However, tree-planting activities were confined mainly to the Midwest region. The total area planted with trees through afforestation and reforestation was relatively insignificant before 1900.

Reforestation continued to be of little importance until 1930 despite warnings of timber famine and the call for regulating private timber harvesting by prominent foresters and conservationists, such as Gifford Pinchot. Nonetheless, the conservation movement that started in the 1890s led to the 1897 Organic Administration Act, which accorded custodial management directions for the Division of Forestry (later the United States Department of Agriculture [USDA], Forest Service) to establish and harvest forests within the boundary designated by the President.

It was not until early in the 1930s that 13 states passed seed-tree laws to ensure the continued productivity of forest lands. The laws mandated that trees must be left standing after a harvest. In the early 1970s, several states started to pass comprehensive state forest practice laws to promote reforestation. Now 14 states have such regulations.

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The per capita industrial wood consumption declined slightly in the first half of the twentieth century as a result of the use of wood substitutes. Nonetheless, the rapid increase in timber consumption caught up with the country’s capacity to produce timber. In 1915, the U.S.A. became a net importer of forest products (see Figure 3). Large-scale tree planting experiments started in 1919/1920, one of which successfully reforested 12 700 acres in Louisiana using four major southern pine species (USDA Forest Service 1980).

**Incentives**

Perhaps the most significant incentive for developing private tree plantations is the United States Constitution that:

- requires the government respects and protects private property rights and adopts free-market capitalism; and
- limits the power of the government with respect to private property.

The Fifth Amendment of the Constitution states that private property shall not be taken for public use without just compensation. This amendment essentially eliminates, or at least alleviates, the worry and fear of private entities about government expropriation of their properties and investments. With relatively secure property rights (see Box 1), landowners are more willing to invest in long-term projects, such as plantations, under conducive market conditions.

The rising real prices – typically represented by the consumer price index – of timber and forest products are a market incentive for developing private plantations. Long-term price increases can stem from demand for products exceeding supply, reduced land area, declining resource quality, exceptionally rapid increase in labour costs or production capital. On the other hand, wood substitutes, technological improvements, discovery of new resources or reduction of input costs can keep prices at lower levels.
In the U.S.A., the most significant factors influencing the development of plantation resources were timber prices, government policy and technological advances. Figure 5 shows the real lumber and stumpage price indices. The lumber price index covered the period from 1800 to 1999, while the stumpage price indices are from 1910 and relate to national forests only. The real lumber price increased from 1800 to 1945 at an annual rate of 2.2 percent, indicating that lumber had become scarcer relative to demand. The rise in the prices of lumber and other forest products increased the stumpage value of the standing trees. Douglas fir and southern pine stumpage in national forests were rising. Not surprisingly, some forest industry firms found that natural forests were diminishing in size; costs of extracting natural forests were increasing (partly due to higher transportation costs); and regeneration and extraction of timber from forest plantations was becoming more economical. Private landowners began to plant trees in response to market demand. For example, Weyerhaeuser Company, one of the U.S.A. largest forest product firms, started reforesting its lands around 1904.

### Box 1: United States Constitution and security of property rights

"...[No person] shall be deprived of life, liberty, or property, without the due process of law; nor shall private property be taken for public use, without just compensation." (The Fifth Amendment of U.S. Constitution)

"...No State shall make or enforce any law which shall abridge the privilege or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws." (The Fourteenth Amendment of U.S. Constitution).

These two amendments have established a doctrine that when private property is taken, it must be for public use and the owner of the property must be fairly compensated. However, the ruling becomes contentious when the government changes the status of a private property and reduces its value. The development of case laws in the last century has resulted in a full-or-nothing doctrine: Compensation is due when all economic use of a property is destroyed by regulation; and no compensation is due when the property is partly devalued by regulation. The later scenario can be a source of property right insecurity in the U.S.A..

More importantly, property owners have the rights to use or manage, generate income and dispose of their properties according to their own discretion. Government regulations can alter these rights, and taxation laws can also greatly influence owners' decisions on how to use or dispose of their properties.

The very first government incentive for promoting tree planting was the Timber-Culture Acts of 1873 and 1874 (amended in 1876 and 1877). Under this “Act to encourage the growth of timber on Western Prairies,” any person who planted trees on 40 acres in ten years and kept the trees healthy was entitled to 64 hectares of federal land at the end of the eight years. As the objective of this Act was to patent federal lands, its impact on tree planting was questionable primarily because many settlers could not afford to plant and cultivate trees (Hodges 1879, p. 159). This Act was repealed by the 1891 General Revision Act, which also established national forest reserves (later to be reclassified as National Forests) (Libecap 1989).

The first modern government incentive for promoting private plantations was spelled out in the 1924 Clarke-McNary Reforestation Act. This Act authorized the Secretary of Agriculture to cooperate with land grant colleges and universities, and state agencies to assist farmers and small-scale forest land owners in the production and distribution of seeds and seedlings for the creation, maintenance and utilization of woodlots, shelterbelts, windbreaks and other forest growth.

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2 The Morrill Act of 1862 provided federal funding in the form of land granted to one public college or university in each state. These land grant colleges and universities were to train students in applied sciences such as agriculture and engineering.
The very first government incentive for promoting tree planting was the Timber-Culture Acts of 1873 and 1874 (amended in 1876 and 1877). Under this “Act to encourage the growth of timber on Western Prairies,” any person who planted trees on 40 acres in ten years and kept the trees healthy was entitled to 64 hectares of federal land at the end of the eight years. As the objective of this Act was to patent federal lands, its impact on tree planting was questionable primarily because many settlers could not afford to plant and cultivate trees (Hodges 1879, p. 159). This Act was repealed by the 1891 General Revision Act, which also established national forest reserves (later to be reclassified as National Forests) (Libecap 1989).

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More significantly, the 1928 McSweeney-McNary Act authorized the Secretary of Agriculture to establish forest experiment stations for cooperative research on reforestation and forest product development. This legislation paved the way for federal forest research agencies and programmes that still exist today.

Finally, two federal programmes encouraged tree planting on private and public lands. Under President Franklin D. Roosevelt’s New Deal, implemented between 1933 and 1945, the Civilian Conservation Corps (CCC) assigned millions of young people to build and protect facilities in America’s parks and forests, including tree planting. In total, 2.3 million acres (930 000 ha) of lands were planted from the mid-1930s to the mid-1940s, some of which still exist today (Moulton and Hernandez 2000). Most of these tree-planting activities were on public lands. Although the main objective of the CCC as a Great Depression programme was to provide employment to thousands of young people, it set a precedent for government intervention in tree planting and increased timber supply in the coming decades.

Sources: USDA Forest Service (1964); Ulrich (1990); Howard (2001)

Figure 5: Real price indices, in terms of 1992 prices (1992 = 100)
Another federal programme was the Agricultural Conservation Program (ACP) that encouraged farmers to address soil erosion problems. Authorized in 1936, this programme provided assistance to agricultural producers for up to 75 percent of their costs of long-lasting conservation practices (mostly tree and grass planting) that would not have been carried out without assistance. This programme was phased out in 1995.

**Impact of incentives**

The first official estimation of tree-planting activities in 1928 showed that trees were planted on 125,000 acres (43,000 ha) of private lands, accounting for 63 percent of the 200,000 acres (81,000 ha) of land planted in the country. The total area increased to nearly 270,000 acres (110,000 ha) in 1931 and 427,000 acres (173,000 ha) in 1935 (Figure 6).

The area planted increased to 519,000 acres (204,000 ha) in 1940. Between 1941 and 1944, only 75,000 acres (30,000 ha) were planted, although it is not clear how these areas were divided between public and private lands (Zillgitt 1958). Between 1928 and 1945, the total area planted was 5.4 million acres (2.24 million ha), half of which could be attributed to the CCC. However, private forest land owners started to plant trees in response to market demand, even before the CCC and ACP were implemented.

![Figure 6: Tree planting in the U.S.A., 1928-1999](chart)

**Summary and lessons learned**

Forest resources were abundant and tree plantations were not economical in most parts of the U.S.A. until about 1900. After timber prices had risen substantially tree planting became a voluntary activity under the free-market system with relatively secure private property rights arrangements. The conservation movement and the establishment of the USDA Forest Service raised the public awareness of forest issues (for example, potential timber famine). Several legislative acts that promoted forest regeneration research and fire prevention, and provided subsidies to landowners, encouraged tree planting on public and private lands between the 1920s and 1930s.
Plantation development between 1946 to 1976: acceleration phase

Overview
The U.S. economy declined for two years after the Second World War and then expanded for the most part until 1976. The real GDP grew at about 3.1 percent annually on average in this period. The total GDP in 1976 was 2.5 times greater than that of 1945. The population rose from 142 million in 1945 to 215 million in 1975, increasing at an annual average rate of 1.4 percent. The per capita GDP nearly doubled in 31 years, increasing from US$11 000 in 1945 to US$19 000 in 1976 (both in 1996 dollars).

Increasing population and rising incomes translated into high demand for industrial forest products such as paper and wood products, and forest services (for example, recreation). Demand for paper products outpaced demand for other forest products, and prices for paper and lumber escalated (Clawson 1979). Increases in lumber prices forced some users to switch to steel and plastic, plywood and other engineered wood products. Industrial forest product imports, which came primarily from Canada, had also multiplied, peaking at 14 percent in 1950, and helped to alleviate the shortage of domestic supply (see Box 2). Finally, electricity, oil and other energy sources had largely replaced fuelwood until the 1973 energy crisis, and the annual per capita consumption of industrial forest products averaged at 1.72 m³ in this period.

Box 2: U.S.A.-Canada forest product trade disputes
Currently, more than half of all U.S.A. forest product imports come from Canada. More importantly, Canada’s share of total U.S.A. imports in some products, such as newsprint and softwood lumber, is more than 90 percent. Not surprisingly, these two countries have experienced a number of conflicts in forest product trade in the last 150 years – log and newsprint from 1880 to 1913, shake and shingle in the early 1980s and softwood lumber since 1982.

A group of U.S.A. lumber producers charged that most Canadian softwood lumber producers are subsidized by their government, which holds most forest lands in Canada. They appealed to the U.S. Department of Commerce to impose a stiff tariff on Canadian softwood lumber imports in 1982, leading to five rounds of accusation, investigation, litigation, negotiation and settlement since then. The battles have been fought through various channels – executive, judiciary, legislative – in the U.S.A., multinational organizations such as the North America Free Trade Agreement (NAFTA) and international organizations such as the World Trade Organization (WTO). In May 2002, the U.S.A. imposed a 27 percent tariff on Canadian softwood lumber imports. The Canadian Government has firmly denied the charge of subsidizing lumber production and is challenging the imposed tariff at NAFTA and WTO.

The tariff will raise softwood lumber price in the U.S.A., which in turn could increase stumpage price and promote forest plantation development in the country. However, it has hurt U.S.A. softwood lumber consumers and its economy (Zhang 2001a).

The investment climate for plantations became promising. Scarcity of forest products led private landowners – large- and small-scale – to increase tree planting drastically. The total area planted amounted to 37 million acres (15 million ha) in this period, 20 percent of which was on public lands, and the rest evenly divided between industrial and non-industrial private lands.

At the same time, additional forestry education programmes were set up in land grant universities. All forestry programmes started to embark on research, in addition to the traditional teaching responsibilities. Most schools also had steadily increasing budgets and numbers of scientists devoted to research (Cubbage et al. 1993). The 1962 federal McIntire-Stennis Act authorized the Secretary of Agriculture to provide technical assistance and financial support to state colleges and universities. In 1987, McIntire-Stennis funds amounted to US$17 million. Other sources of funding, such as state appropriations and external grants, doubled the total research budget to at least twice that amount.
Forest research conducted by universities, the USDA Forest Service, private firms and collaboration among these institutions covered a wide range of topics and led to breakthroughs in genetics, tree breeding, nursery management, planting techniques, herbaceous weed control, pest and disease control, fertilization and plantation management. Applying these results to forest plantations increased productivity and economic returns to landowners. For example, Pritchett and Comerford (1982) report that gains in pine volume due to fertilization averaging 50 cubic feet/acre/year (3.5 m³/ha/year) for 15-20 years are common in southern coastal plains. Similarly, Allen (1987) finds that gains in pine volume could be as high as 80 cubic feet/acre/year (5.6 m³/ha/year) for newly planted stands or 100 cubic feet/acre/year (7 m³/ha/year) for established stands. Martin and Shiver (2002) document that improved genetics significantly reduced the percentage of fusiform infection and increased pine volume by 11 to 19 percent, and that herbaceous weed control contributed another 39 to 45 percent in volume growth in a 12-year old pine plantation. Borders and Bailey (2001) showed the real rate of return for loblolly pine plantations using intensive site preparation, complete control of vegetation and annual fertilizer application was eight to 12 percent.

Federal and state governments have provided technical assistance to forest landowners since the 1937 Cooperative Farm Forestry Act. A federal funding programme was established for providing technical assistance to farm woodland owners employed by the state governments. This Act was superseded by the 1950 Cooperative Forest Management Act, which broadened the clientele and served to include non-farm private forest landowners, harvesters and primary processors (Skok and Gregersen 1975). In 1978, the Cooperative Forestry Assistance Act consolidated all previous cooperative legislation. Many forest industry companies and consultants also independently provided forestry assistance to non-industrial private forest landowners. A few firms required assisted landowners to give them the first right of refusal to the landowners’ timber, but the majority of the companies merely asked to be notified about the sale of timber so that they could make an offer, before or along with other buyers.

Parallel to the public technical assistance programme was the forestry extension programme that provided forestry information and education services to landowners. In 1914, the USDA and the state land grant universities set up agricultural and forestry cooperative extension services in all 50 states. A separate congressional authority for forestry extension services was granted in 1978. Funding for extension was provided by federal, state and local communities. Extension foresters took a leading role in disseminating research findings to public and private foresters, and information on timber prices and costs to landowners.

**Incentives**

The primary incentive for private landowners to plant trees in this period was the increase or expected increase in the prices of forest products. Forest industry companies, in response to demand for paper products, planted trees for pulpwood production. As stumpage prices rose (Figure 7), non-industrial private forest land owners planted trees with the expectation of generating high economic returns (relative to the risk of owning timberlands). Falling agricultural commodity prices also persuaded some landowners to convert their agricultural lands to forest plantations (Alig et al. 1980).

Relatively secure property rights, stable macro-economic policies and relatively low income taxes provided stable investment conditions throughout the period.

The Soil Bank Program (SBP) was a significant government incentive during the period. The Soil Bank Act of 1956 was designated to withdraw land from agricultural production and convert it to conservation use. From 1957 to 1960, the USDA paid landowners part of the establishment costs and annual cash payments (typically US$10-12/acre/year) for up to ten years to maintain cropland in permanent cover (mostly trees or grass). Through the SBP, trees were planted on 2.2 million acres (880 000 hectares) of private croplands (Figure 6, Moulton and Hernandez...
2000), 95 percent of which was in the southern U.S.A. Trees are still found on most of these plantations long after the cash payments were discontinued (Alig et al. 1980), indicating that landowners valued their tree-planting investments.

The SBP was primarily prompted by an agricultural economic crisis and the need to reduce surplus crop production to enhance farmers’ incomes and reduce federal government agricultural subsidies. In 1974, the federal government implemented the Forest Incentives Program (FIP), which provided cost-share funding and was especially targeted at the development, management and protection of timber and forest resources on private forest lands. Cost-share agreements may be annual or multi-year (3-10 years) (see Box 3), but the SBP had a greater impact in increasing the size of forest plantations in a short time.

Southern United States refers to the following 12 states: Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia.

Sources: Data for delivered pulpwood price (US$/cord) and planting cost (US$/acre) (both are averages for 12 southern states) are from Kline et al. (2002); and data for sawntimber stumpage (US$/mbf) (Louisiana only) are from Howard (2001).

Figure 7: Private stumpage price and plantation cost indices in the southern U.S.A. in terms of 1992 prices (1992 = 100)
The Agricultural Conservation Program (ACP) funds for tree planting and timber stand improvement dwindled in the 1960s because of increasing competition for available funds and the reluctance of county-level ACP administrators, who favoured farm management, to approve forestry practices. Perceiving needs for a better funding base, forestry interest groups successfully lobbied Congress for a separate cost-share programme for forestry practices (Cubbage et al. 1993). In 1973, Congress enacted the Forestry Incentives Program (FIP) as a rider to another bill. Congress authorized US$25 million/year for FIP, starting in 1974. Actual appropriations have ranged from US$10-15 million/year. An average of 160 000 acres (64 000 hectares) was planted and another 80 000 acres (32 000 hectares) of timber stands were treated under FIP each year. The average cost-share rate under the FIP for tree planting was about US$56/acre (US$22.4/hectare) between 1974 and 1992 (Table 3).

The federal cost-share rate is commonly 50 percent and has ranged up to 65 percent. Non-industrial private forest landowners who own less than 1 000 acres are eligible for FIP cost-share funds. The tract size must be at least 10 acres in size to qualify, and land must be capable of growing 50 cubic feet of wood per acre per year (3.5 m³/ha/year).

Mills and Cain (1978) and Risbrudt and Ellefson (1983) estimate that social (that is, both private and public costs) internal rates of return range from 8.3 to 9.4 percent in real terms and that the total benefit-cost ratio is 1.0 or greater for the FIP.

Table 3: Funding and tree planting area under various cost-share programmes

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<th>% of total programme funding</th>
<th>Total area planted with trees ('000 acres)</th>
<th>Cost/acre (US$)</th>
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<td>56.49</td>
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<td>373</td>
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<td>n/a</td>
<td>1 345</td>
<td>n/a</td>
<td>McClure (2002)</td>
</tr>
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Sources: Cubbage et al. (1993); Gaddis et al. (1995); Stein (2002, personal communication); McClure (2002, personal communication)

The second, perhaps more significant, government programme was the capital gains tax treatment for timber income. In 1944, new legislation allowing timber to be treated as long-term capital gains for tax purposes went into effect. Prior to that, only individuals who were not involved in commercial timber production and who sold timber occasionally could claim capital gains taxes. The legislation extended this benefit to individuals and corporations engaged in the timber production business (Siegel 1978).

Under the capital gains treatment intended to benefit investors in long-term endeavours such as timber growing, only 40 percent of capital gains income was taxed, compared to ordinary income. For example, individuals who were taxed at the maximum marginal rate of 50 percent on ordinary income would pay only (40 percent)×(50 percent), or 20 percent, on timber sale income and
other capital gains. This assistance did not apply to corporations, who received a tax rate differential between ordinary income (46 percent marginal tax rate) and capital gains (28 percent marginal tax rate) (Cubbage et al. 1993).

Government policies can indirectly provide incentives to forest plantations as well. At the height of the environmental movement in the 1960s and 1970s, various environmental laws were enacted. Most notable are the National Environmental Policy Act of 1969, the Endangered Species Act of 1973 and the Federal Water Pollution Control Act (Clean Water Act) Amendment of 1972. The significance of these laws gradually appeared over time as they collectively reduced timber harvesting on public lands (see Box 4). The Endangered Species Act has been successfully used by environmental groups to stop or delay timber-harvesting activities on public and private lands.

Box 4: U.S. court rulings on Endangered Species Act

"It may seem curious to some that the survival of a relatively small number of three-inch fish among the countless millions of species extant would require the permanent halting of a virtually completed dam for which Congress has expended more than US$100 million….We conclude, however, that the explicit provision of the Endangered Species Act requires precisely that result."

"Congress intended endangered species to be afforded the highest priorities….The plain intent of Congress in enacting this statute was to halt and reverse the trend towards species extinction, whatever the cost." (Tennessee Valley Authority vs. Hill 437 U.S. 153, 174, 184 [1978])

These are direct quotes from U.S. Supreme Court ruling on Endangered Species Act in 1978. Since then various court rulings have greatly impacted timber supply from public and private lands in the country. Perhaps the most famous case was the 1988 Jude Zilly’s ruling that the government acted illegally by not listing the Northern Spotted Owl as an endangered species (Northern Spotted Owl vs. Hodel 716 F. Supp. 479 W.D. Wash [1988]). This resulted in the official listing of the Northern Spotted Owl as a threatened species in 1990 under the Endangered Species Act.

The Northern Spotted Owl lives in the Pacific Northwest, primarily in Washington and Oregon, but also in Northern California. Two characteristics of the owl are important. First, they live only in “old-growth” timberlands, roughly defined as being 100 or more years old. Secondly, each pair of owls requires a very large area to breed successfully. Consequently, preservation of this species necessitates the cessation of logging over vast areas of old-growth forests.

The listing of the Northern Spotted Owl in 1990 resulted in 80 percent reduction (four billion board feet or 18 million m³) of annual timber harvests from federal forests in the Pacific Northwest. The timber harvest from federal forests in the 1990s was therefore only 20 percent of the average timber harvests for the 1980s in the region (Brooks 1995).

On the forestry side, the environmental battle focused on clear-cut practices. The result was the National Forest Management Act of 1976. The major provisions of the Act require:

- Public participation in the planning process of national forests;
- Regulations for the preparation and revisions of the management plans;
- Resource management guidelines for controversial management activities such as clear-cutting; and
- Economic analysis of alternatives.

This Act, developed along the lines of the National Environmental Policy Act, gave citizens and interest groups the power to use administrative appeal processes to stop or delay USDA Forest Service actions on national forests. It is this law and other environmental legislation that created a near gridlock on, and high costs of, timber harvesting in national forests. Reduced production from the national forests in turn exerted pressure on private forests.
Rising planting costs acted as a deterrent to investments in plantations. From 1951 to 1971, plantation costs in the southern U.S.A. nearly quadrupled, and then declined somewhat in the next three decades (Figure 7). The increase in plantation costs before 1971 was due to increases in labour and equipment costs in mechanical site preparation and machine planting. Since 1971, these cost components have been steady or have declined. For example, substitution of less expensive one-pass mechanical site preparation for the more expensive two- and three-pass mechanical site preparation systems contributed to a moderation of overall mechanical site preparation costs. In addition, moderation of fuel and energy costs and substitution of chemical for mechanical treatments have reduced planting costs in the last 30 years.

**Impact of incentives**

Private forest land owners planted 29 million acres (11.6 million ha) or 78 percent of the total planted area in the country between 1946 and 1976. While government subsidies such as the SBP had little impact on industrial landowners’ tree-planting decisions, they significantly influenced small-scale landowners’ decisions to switch from agriculture to forestry. The SBP alone contributed 15 percent to the total plantations on non-industrial private lands in 31 years.

The impacts of all three federal incentives or cost-share programmes (SBP, ACP and FIP) can be better illustrated at the regional level in the south. From 1951 to 1999, 12 southern states (Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and Virginia) accounted for 68 percent of the total area planted with trees in the country. Private landowners in these states accounted for 78 percent of all private planting in the country in the same period. The cost-share tree planting area accounted for 5.3 million acres (2.12 million ha) or 47 percent of all areas planted by non-industrial private landowners and 23 percent of all areas planted by private landowners in these 12 states from 1951 to 1976 (Figures 8 and 9). Obviously, federal cost-share programmes had a major impact on plantation development in the southern U.S.A. in this period.

More importantly, plantations on private lands were expanding in this period, as the economics of plantations worked in private landowners’ favour. The combination of tax incentives, cost-share arrangements, increased demand for timber, higher biological growth due to technological advances and macro-economic policy had a positive impact on plantation development in the first three decades after the Second World War.

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4 In addition, the SBP helped establish 18.4 million acres (7.36 million ha) of vegetative (grass) cover, 14 000 acres (5 600 ha) of dams and ponds and 310 000 acres (124 000 ha) of managed marshlands. The programme paid a total of US$162 million in cost-share funds for these initiatives. Furthermore, Soil Bank rental payments amounted to US$2.4 billion. An economic analysis of tree planting under the SBP in South Carolina shows that the real social internal rate of return for the project was 6.3 percent, which is satisfactory compared with other investments made during the 1950s (Marsinko and Nodine 1981).

5 The remaining 53 percent planted by non-industrial private landowners did not cost-share. It is hypothesized that these areas are either not qualified for cost-share programmes (e.g. reforestation is not qualified under the SBP) or the funds are not enough to cover all of these areas. For example, annual funds for reforestation under the ACP were only US$1.5-3.9 million or 1-4 percent of the total ACP funds in the 1960s and early 1970s.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

Summary and lessons learned

As forest resources became scarcer after the Second World War, tree planting appeared to be more economical than exploiting natural forests in the long term. The following factors pointed to a reasonable economic return for landowners who planted trees:

- Timber prices had risen substantially;
- Tree growth could be increased based on improved technology;
- Favourable capital gains tax treatment reduced income tax on timber; and
- Through cost-share programmes, the government subsidized tree planting.
These positive factors had a greater impact than the single negative factor – increasing costs of tree planting early in the period. Consequently, tree planting became a private and voluntary economic activity especially in the South and Pacific Northwest where climate and soil conditions favour rapid tree growth.

**Plantation development between 1977 and 1999: steady growth phase**

**Overview**

Despite experiencing a period of high inflation in the late 1970s and early 1980s, the country’s economy continued to grow in the next two and a half decades at an annual rate of 3.2 percent on average. By 2000, its total GDP was more than double that of 1976. In the same period, the population increased from 215 million in 1975 to 281 million in 2000, at an annual rate of 1.1 percent. The per capita GDP increased nearly 75 percent in 25 years, from US$19 000 in 1975 to US$32 776 in 2000 (all in 1996 US dollars).

Demand for forest products continued to rise (Figure 3). At the same time, more public forest lands were set aside as protected areas, or had logging bans imposed and had roads closed after 1964 when the Wilderness Act was enacted (Smith *et al*. 2001). Consequently, the share of timber production from public forest lands started to decline in the late 1970s (Table 2; Figure 4), and the volume of timber harvests from public lands started to decline in absolute terms in the late 1980s when the Northern Spotted Owl was listed as an endangered species. The states of Washington, Oregon and California are affected most by this listing.

Industrial timber production and net forest product imports increased during this period (Table 2). Both were subjected to fluctuations, but net import was more sensitive to changing economic conditions. For example, the share of net imports of industrial forest products in total consumption declined dramatically in 1975, 1980 and 1990 to 1992, when the country was in recession or economic growth slowed down. Imports served as a reservoir to bolster the shortfall of domestic production. Annual per capita consumption of industrial forest products increased modestly from 1.72 m³ (1946-1976) to 1.78 m³ (1977-1999).

The trend of real lumber price remained unchanged during this period. This was largely due to increased production efficiency, imports and the use of substitutes such as engineered wood and non-wood products. Similarly, the price of paper products was stable, largely due to paper recycling, paper imports and the increasing use of computers. Consequently, the real price of stumpage was also constant, except in the late 1970s when timber was sought as an asset to hedge against double-digit inflation, and in the early 1990s when the listing of the Northern Spotted Owl created a temporary timber shortage in the country.

Research and development activities by the USDA Forest Service, after several decades of increase, started to decline in the 1980s. The total number of research scientists dropped from 985 in 1985 to 537 in 1999 (National Research Council 2002). Forest product technologists constituted the largest proportion of experts lost, while the number of ecologists and social scientists experienced the largest increase. Forest research in colleges and universities remained steady or grew only slowly during the same period. Research conducted by the industries was curbed as a result of mergers, acquisitions and other cost-cutting measures.

The investment climate for tree plantations was not as favourable as during the 1946 to 1976 period due to a lack of price appreciation of forest products and government policies. The total area planted with trees was 58 million acres (23.2 million ha) during this period. However, annual private tree plantations only increased at a modest rate of 2.4 percent – far below the 16 percent annual rate of increase during the acceleration phase. Some nine million acres (3.6 million ha) (17 percent) were on public lands, 28 million acres (11.2 million ha) on forest industry lands and 21 million acres (8.4 million ha) on non-industrial private lands. Until 1987, the forest industry continued to plant more areas than non-industrial private forest land owners. Since 1988, the industry and non-industrial private landowners have roughly planted equal areas.
Incentives

Demand for forest products continued to expand. Although this did not translate into higher stumpage prices, forest land owners could still rely on technological improvements to increase the productivity of timber stands. At the same time, the declining cost of establishing plantations (Figure 7) helped to generate an adequate return on investment.6

Indeed a few publications (Washburn and Binkley 1990; Zinhkan et al. 1992; Sun and Zhang 2001) document that timberland investment was a low-risk investment that generated a comparable or even higher returns (about 12-16 percent in nominal terms) than assets at the same risk level from the late 1970s to the mid-1990s. These were due to price change, productivity increases and land appreciation during this period.

Meanwhile, a 1980 reforestation tax incentive provision was enacted to allow landowners to receive a tax credit against their income tax for timberland investment. Subsequently, private landowners could receive both federal tax credits and deductions on their income tax for planting trees. For up to US$10 000/year of reforestation (or afforestation) expenses, the legislation allows a ten percent investment credit plus deduction of the expenses over an eight-year schedule, instead of waiting to deduct expenses at the time of harvest. The investment tax credit cannot exceed US$1 000 annually. The amortized deduction requires that one-fourteenth of the investment be deducted in the first and eighth years respectively, and one-seventh in the second through the seventh years. If investors take the full ten percent investment credit, they can deduct up to 95 percent (instead of 100 percent) of the reforestation expenses. This tax incentive remains in effect today.

In addition, aimed at fighting government budget deficits, the Tax Reform Act of 1986 eliminated the preferential taxation rate for capital gains income, including timber, by reducing the amount of income excluded from taxation to zero. It also reduced the individual maximum marginal tax rate from 50 percent to 28 percent. The brackets for marginal tax rates were changed several times since 1986. In 1996, capital gains treatment was partially re-enacted, which means gains from long-term investment such as timber will be taxed at a lower rate than ordinary income.

Various federal programmes also provided incentives to landowners. The ACP existed until 1995.7 The FIP was the only federal cost-share programme specifically targeted at enhancing productivity and increasing timber supply. In 1996, the FIP was enlarged and broadened into the Stewardship Incentive Program that promotes stewardship of multiple forest resources. The Environmental Quality Program and Wetland Reserve Program also had minor impacts on tree planting even though this is not their primary focus.

In total, forestry cost-share programmes are found in 18 states (Mehood and Zhang 2002). Under these programmes, federal or state governments provide 50 to 75 percent of the site preparation and tree-planting costs for qualified landowners. The Conservation Reserve Program (CRP), on the other hand, provided qualified landowners a 50 percent cost share and an annual rental for lands retired from agriculture. Started in 1986, the CRP was similar to the SBP and was intended to conserve soil, water, grazing land, wetland and wildlife by taking surplus cropland out of production. Some 2.3 million acres (920 000 ha) were planted with trees under the CRP – larger than any other cost-share programmes in this period (Figure 4).

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6 Based on Kline et al. (2002), the elasticity of non-industrial private tree planting to planting costs was calculated to be -1.00 to -1.26. Since tree planting costs declined 20 percent from US$136 in 1976 to an average of US$108 between 1977 and 1997, it could be inferred that everything else being equal, about 4.2 to 5.3 million acres (or 20 to 25 percent) of total non-industrial private plantations were added due to the decline in planting costs alone during this period. In the same study, Kline et al. (2002) found that planting cost has a negative but insignificant impact on industrial tree planting.

7 The Republican Party controlled Congress and the Clinton Administration repealed the ACP in 1995 to reduce government spending and subsidies to farmers.
Finally, the federal government established a technical assistance programme – Forest Stewardship Program (FSP) – in 1990 to encourage better non-industrial private forest management. Public foresters, employed by state and federal governments, were asked to provide technical assistance, including preparing management plans, educating landowners about multiple use and best management practices. The programme has enrolled some 25 million acres (ten million ha) of non-industrial private forest lands.

One disincentive during this period was the partial government regulatory expropriation of private property. Under the Constitution, private property owners receive compensation when their properties are expropriated for public use. In 1922, the U.S. Supreme Court (Pennsylvania Coal Co. v. Mahon (260 U.S. 393 [1922]) recognized that legitimate government regulations could expropriate private property by reducing its value to zero. In this case, property owners are also entitled to full compensation. However, when property values are reduced but not to zero, the property owners will receive no compensation at all. This traditional all-or-nothing compensation and increasing environmental regulations on private forestry practices have had a negative impact on private investments in silviculture because the property valuations and management activities are frequently restricted or regulated with no guarantee of full compensation (Zhang 2001b; Zhang and Flick 2001). With restriction, landowners are likely to reduce their expectation of future returns and thus decrease investments in silviculture. On the other hand, full compensation could lead landowners to invest excessively in tree planting.

The second disincentive stemmed from environmental campaigns against forest plantations (Williams 2000). Some radical groups, such as the Earth Liberation Front, have even physically violated genetic research facilities (Forestry Source 2001). Landowners have yet to be influenced by such sentiments against plantations, but in the long term, plantation development could be negatively affected by these actions.

**Impact of incentives**

On average, trees were planted on 2.2 million acres (880 000 ha) of private lands annually during this period. In comparison, only 2.3 million acres (920 000 ha) were planted under the CRP. This indicates that market forces, driven by demand and supply, rather than cost-share programmes, have guided private tree planting.

The area planted under cost-share arrangements accounted for 6.8 million acres (2.72 million ha) or 43 percent of the total area planted by non-industrial private landowners and 17 percent of the total area planted by private landowners in the 12 southern states from 1977 to 1997. This compares with 47 and 23 percent, respectively, from 1951 to 1976 (Figures 8 and 9). The federal and state governments could still subsidize more private landowners as 64 percent of the land harvested in the south in the early 1980s was left to reforest itself (Kaiser and Royer 1983). A large proportion (79 percent) of the land was left to natural regeneration because of the owners’ misperception that their sites would reforest to pine naturally; 51 percent was due to high reforestation costs involved; 41 percent can be attributed to the long gestation period; and 40 percent was the result of using the revenues from the harvests for other purposes.8

On the other hand, tax incentives could have played a more substantial role in enhancing returns to landowners who then invest more in tree planting. Guertin and Rideout (1987) indicate that the 1986 elimination of capital gains tax treatment of timber income reduced financial returns on all sites. This meant that some marginal sites became economically unproductive. Royer and Moulton (1987) report that 59 percent of landowners who planted trees claimed the reforestation tax incentive and only 48 percent used some type of federal or state cost-share programmes, indicating

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8 Owners may have multiple reasons for not replanting their trees, thus the percentages do not add up to 100 percent.
that there were insufficient cost-share funds to subsidize all landowners. Dennis (1983) also concluded that the reforestation tax incentives had favourable impacts on timber investment returns of non-industrial private forest land owners. For landowners in the 40 percent tax bracket, average loblolly pine investment rates of return increased from 6.9 to 8.4 percent; returns on Douglas fir investments increased from 7.3 to 8.2 percent.

While the area of trees planted by non-industrial private forest land owners increased, the area planted by the forest industry declined in the 1990s. Overall, private tree planting activities increased only slightly if CRP planting is not considered. The decline of industrial timberland ownership by 3.4 million acres (1.36 million ha), or five percent, from 1977 to 1997 (Table 2) explains to some extent why forest industry firms planted fewer trees. Most of such lands was sold to other corporations, especially timberland management organizations that administer timberlands for pension funds and insurance firms. A small portion of these lands was sold to developers.

**Summary and lessons learned**

The annual rate of tree planting grew more slowly between 1977 and 1999, compared to the 1946-1976 period. The area planted reached a record level of 3.3 million acres (1.32 million ha) in 1988 when tree-planting under the CRP was at its peak. The rate of tree planting by non-industrial private landowners remained unchanged in the 1990s, while that of the forest industry declined. The sluggish prices of forest products, restructuring of the forest industry, disinvestment in timberland (sale of timberlands to other corporations) and the forest industry firms’ new emphasis on productivity rather than size of timberland ownership all contributed to the decline in the forest industry’s planting activities.

Several factors worked in favour for tree plantation development including:

- Continued growth in population and economy, which translated into high demand for forest and non-timber products;
- Lower plantation establishment costs;
- Advancement in technology;
- The federal reforestation tax incentive; and
- Various government cost-share programmes.

Factors that impeded rapid forest plantation development were:

- The elimination of capital gains tax treatment for timber income in 1986;
- Depressed timber prices due to increased imports of forest products;
- Increased partial government regulatory expropriation of private property rights; and
- Environmental campaigns against tree plantations.

**CONCLUSIONS AND FUTURE DIRECTIONS**

The United States Constitution protects private property rights, and thus encourages landowners and other investors to engage in long-term projects such as tree planting. However, prior to 1900, forest resources were abundant and timber derived from natural forests could easily meet the demand for forest products. After the First World War, tree planting became financially attractive because of three main factors: timber became scarce and timber prices rose substantially; wild forest fires were under control; and extensive fencing had minimized open grazing.
While the early sparks of tree planting were private endeavours for profits, government policies and programmes (for example, the CCC and ACP) provided incentives and funding to many other landowners for tree planting. Since the Second World War, federal and state governments have used various cost-share programmes to encourage planting successfully. Plantation establishment costs were also reduced, which enhanced financial returns for landowners. However, these programmes were criticized for being inefficient and inequitable (see Box 5). While they undoubtedly raised profitability and increased wood production domestically, their primary purpose was basically environmental in nature (for example, reducing severe erosion by taking cropland out of production). The single exception was the FIP, which specifically focused on enhancing timber supply from non-industrial private forest lands.

Forestry-related tax incentives were directly aimed at enhancing the profitability of the forest industry. Applicable to all landowners, they were more equitable and widely accepted. Therefore, federal capital gains tax treatment for timber income and the reforestation tax incentive perhaps had a bigger impact in attracting landowners to plant trees than cost-share programmes. The elimination of capital gains tax treatment, along with the stagnation of forest product prices, contributed to the decline of the forest industry’s tree-planting activities in the 1990s.

In addition, research conducted in public institutions (public universities, the USDA Forest Service and state forestry agencies) and private industrial firms increased the productivity and certain traits of trees. The dissemination of technological advances through publicly-funded technical assistance, extension, private consultants and forest industry firms’ landowner-assistance programmes aided their rapid adoption in the field.

When considering investment in tree planting or any other long-term endeavours, landowners or other investors look for political stability, secure property rights, sound economic and trade policies, favourable tax policies, a competent labour force and suitable infrastructure. In these respects, broadly referred to as the “investment climate,” the U.S.A. is generally considered an attractive environment. However, when regulations negatively affect private land values and forest management activities significantly, and landowners are not compensated for losses, these landowners will logically try to sidestep these regulations. In addition, some landowners may also be influenced by environmental protests against forest plantations.

All these factors point to the risks and returns of private plantation development. It could be expected that the area under tree plantation will continue to expand if: (1) the combination of timber price appreciation and productivity increase outstrips increases in plantation establishment and management costs; and (2) public policies enhance the financial returns of forest plantations. In fact, due to diminishing timber supplies from natural forests and increased demands for forest products, forest plantations are perhaps the only way to strike a balance between forest conservation and satisfying growing demands for timber products.
**Box 5: The economics of public subsidies**

Public subsidies are payments from governments designed to form a wedge between consumer price and producer cost so that the price is less than the marginal cost. Often, subsidies are backed by reasons of market failure – the market either cannot produce at the desired level or is not equipped to internalize the externalities of production. Thus, the objectives of offering subsidies (Pearce 1992) are to:

- Transfer wealth from taxpayers to the producers or consumers of certain goods;
- Influence producer or consumer behaviour; and
- Keep prices of certain goods low or stable.

These three objectives have been used to justify cost-share programmes for forest landowners in the U.S.A.. It has been argued that productivity of non-industrial private forest lands is low. These lands, however, are becoming increasingly important in meeting the nation’s demand for wood products given the rising demand and diminishing supply from public lands (de Steiguer 1984). Hence, a transfer of wealth to the landowners may help in maintaining the supply of wood fibres at a healthy level. Changing behavioural patterns has been advocated as an option to encourage non-industrial private forest landowners to invest in long-term timber production. In addition, is has been argued that the cost-share programmes can help minimize the externalities of timber production and maintain a socially desirable environmental quality (de Steiguer 1984). Finally, it has been contended that rising demand may exceed supply in the future, causing real prices of wood products to increase. A subsidy, therefore, may help keep the prices reasonably low and stable.

Cost-share programmes, however, have their share of controversies and criticisms. Forestry research has concentrated on changing landowners’ behaviour through sharing costs. Except for Boyd and Hyde (1989), the price effects of cost-share programmes have largely been ignored in the literature. Among the landowner behaviour studies, Boyd (1984) and Boyd and Hyde (1989) found that landowners who would have invested on their land anyway would use public funding instead. Bliss and Martin (1990) reported that cost-sharing does not change the level of management practised by active forest managers, and Cohen (1983) concluded that the substitution effect of public for private funding in tree planting on non-industrial private forest lands is between 30 to 50 percent, while Zhang and Flick (2001) find a smaller (17 percent) impact. On the other hand, both de Steiguer (1984) and Lee et al. (1992) found no evidence of such substitution effect on plantation investment on non-industrial private lands. It is also possible that landowners may delay reforestation in the absence of cost-sharing arrangements (Bullard and Straka 1988), but no empirical evidence supports this hypothesis.

Although views and justifications for such programmes differ, these programmes did transfer wealth from the taxpayers to a certain targeted group of landowners. Two additional obvious results from this transfer are deadweight loss and administrative costs (Cook 1994). (Deadweight loss refers to economic losses due to either market imperfections or market intervention. For market interventions, deadweight loss is the social loss due to subsidy or taxation.) Economists have tried to measure the extent of the deadweight loss and quantify the efficiency of the redistribution of wealth in public subsidy programmes. However, studies on the size of the deadweight loss created by forestry cost-share programmes do not exist, with the only notable exception of Boyd and Hyde (1989).
LITERATURE CITED


The role of incentives in forest plantation development in Asia and the Pacific


WHAT DOES IT TAKE?
INCENTIVES AND THEIR IMPACT ON PLANTATION DEVELOPMENT

Thomas Enters, Chris L. Brown and Patrick B. Durst

The purpose of this concluding chapter is to provide a synthesis of the nine country case studies, identify common threads and differences and present guiding principles for encouraging private sector investments in forest plantation development.

In general, the long-term nature of tree growing makes investments in tree plantations distinct from many alternative investment options. The synthesis therefore starts with a brief illustration of the characteristics in forest plantation investments.

Of all the incentives that have been provided not one emerged as “perverse”. Incentives are neither good nor bad. Viewed as policy instruments it depends very much on when they are used during the development of a country’s plantation estate. We will therefore look closely at the stages that the countries have reached, the continuum from initiation to maturation.

Direct and indirect incentives can be presented in a hierarchical order of sophistication. The order starts with the relatively simple provision of free seedlings, which is still a common incentive. It continues through such incentives as tax relief for individual entrepreneurs or adjustments of interest rates, which favours all investors. It reaches its highest level when policy instruments are applied, which create a favourable and attractive investment climate through the reduction of risks and the removal of structural impediments. We will move up the hierarchy and discuss aspects surrounding the provision of incentives and their impacts to complete the synthesis.

A significant, but not surprising, conclusion is that there is no single path to success. If this were the case, a blueprint for providing incentives could be prepared. Instead we outline some guiding principles that, if followed, will contribute to achieving a viable plantation sector. The principles are presented at the end of the chapter in the form of “do’s and don’ts” for plantation policies.

CHARACTERISTICS OF FOREST PLANTATION INVESTMENTS

There are several characteristics of plantation investments that strongly influence investors’ decision-making relative to alternative investment options. The most obvious is the long-term nature of growing trees, with a very high proportion of expenditures early on, and most of the revenues coming only at the end of a rotation. In short-rotation plantation forestry, rotations can be as short as five years. Typically, however, maturity is not reached before years ten to 20, depending on the production objectives. In temperate regions rotations are even much longer. This long gestation period adds greatly to the uncertainty and risk of plantation investments. The lack of regular cash flow often leads to liquidity problems and there are usually considerable difficulties in withdrawing from the investment before the trees have reached maturity. In addition, there are inevitable uncertainties about future prices of products and inputs – especially regarding the prices and marketability of the final plantation harvest.

Because of progressive income tax systems (under which tax rates escalate with increased income) and the large but periodic returns from a single plantation, individual investors can be hit with the highest marginal taxation rate in the year of harvest unless tax relief is provided. However, if continuous replanting takes place after clear-felling, then a less fluctuating revenue stream can

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be expected in the long run. The minimum commercially viable investment in a plantation is also likely to be large, relative to an investment in agriculture on the same land.

These uncertainties and characteristics give ample cause for investors to shy away from the plantation sector despite apparent advantages of investing in plantations (for example, expected increases in demand for wood products, diversification of investment portfolios, assuring long-term supplies for downstream industries, potential profits in the long run). Thus, there remain regular calls for assistance in the form of incentives.

**A BRIEF HISTORY OF PLANTATIONS IN THE STUDIED COUNTRIES**

The impact of incentives on plantation development differs from country to country, even where situations seem similar. The studied countries in which plantation development is often considered to be successful (for example, Australia, New Zealand, the United States of America) are all economically developed countries where the overall importance of agricultural production in the economy has declined relative to the other sectors, agricultural intensities and productivity are high, population pressures are low and most people reside in urban areas (Tables 1 and 2).

The decline in the importance of agricultural production in Australia, New Zealand and the United States has made (especially marginal) agricultural areas more readily available for growing trees, although in recent years tree growers have lamented the shortage of suitable land at affordable prices. In the other six countries, with perhaps the exception of Malaysia, land availability – especially access to suitable land with a clear title – remains a severe constraint. Even in Peninsular Malaysia, potential investors perceive land shortages as a constraint to tree growing (Krishnapillay and Ong 2003).

<table>
<thead>
<tr>
<th>Countries</th>
<th>Land area (1000 ha)</th>
<th>Total (millions)</th>
<th>Density (pop./km²)</th>
<th>Annual rate of change 1996-2002 (%)</th>
<th>Rural (%)</th>
<th>Per capita, annual growth rate of GDP (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>768 230</td>
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<td>2.5</td>
<td>1.1</td>
<td>9</td>
<td>19 740</td>
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<tr>
<td>China</td>
<td>932 742</td>
<td>1 281.0</td>
<td>137.3</td>
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<td>950</td>
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<tr>
<td>India</td>
<td>297 319</td>
<td>1 048.3</td>
<td>352.6</td>
<td>1.7</td>
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<td>470</td>
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<td>1.3</td>
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<td>710</td>
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<td>2.3</td>
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<td>3 540</td>
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<td>35 060</td>
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Note: Data derived from http://www.worldbank.org/data/countrydata/countrydata.html

Common to all countries, natural forests have been, and in some countries (for example, Indonesia and Malaysia) still are, viewed as a considerable land reserve for agriculture and industrial development. In most countries, forest conversion rates were high as populations expanded and as long as agriculture was a considerable contributor to national development. At the same time, natural forests were viewed, overtly or intuitively, as standing capital to be liquidated to fuel economic development. As long as natural forests were extensive, there was no apparent reason to plant trees. In fact, forests were – and in some countries still are – viewed as barriers to development without due recognition of their environmental and other values.
Table 2: Forest resources

<table>
<thead>
<tr>
<th>Countries</th>
<th>Land area (1000 ha)</th>
<th>Forest area, 2000 (or more recent figures)</th>
<th>Plantation area per capita (m²)</th>
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<td></td>
<td>Total forest (&lt;000 ha)</td>
<td>Percentage of land area</td>
<td>Area per capita (ha)</td>
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<tr>
<td>Australia</td>
<td>768 230</td>
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<tr>
<td>U.S.A.</td>
<td>915 895</td>
<td>225 993</td>
<td>24.7</td>
</tr>
</tbody>
</table>

Source: FAO (2001)
¹ as of 2003 (NFI 2004)
² as of 2001 SFI (undated)
³ as of 1 April 2003 (MAF 2004).

Over recent decades, this view has slowly changed and the widening gap between demand and domestic supply (the fear of a timber famine) stimulated significant activities in the plantation sector in Australia, New Zealand and the United States of America as early as the 1920s. Notwithstanding the land shortage, in many countries, the plantation area has grown considerably. Does this mean that the conditions for plantation development have become more encouraging and/or that governments have selected the right incentives to turn an inherently risky investment into a lucrative venture? Before attempting to answer this question we turn briefly to forestry development and the historical planting trends in the case study countries.

**Australia**

Forests in Australia cover 155 million ha, with most classified as open savannah woodlands. Plantations make up slightly more than one percent of the forest area but contribute 60 percent of annual timber production. State forestry agencies initiated efforts to establish plantations in the late 1800s. Until the 1950s, the private sector played only a minor role in the plantation sector. By the early 1970s, around 500 000 ha of plantations (predominantly softwoods) had been established. Steady progress until 1990 saw the Australian plantation estate increase to more than one million ha. Since 1995, a rapid acceleration in private planting (predominantly hardwoods) has seen the Australian plantation estate increase to about 1.67 million ha (NFI 2004). Large areas of plantations were transferred from the public to the private sector in the late 1990s, through privatization/corporatization of state (public) plantations. Today, about 57 percent of the plantations are in private hands. In 1997, the industry and government developed a partnership, called *Plantations for Australia: The 2020 Vision*, to develop plantations and processing industries. The partnership aims to extend the plantation estate to three million ha by 2020. However, since 2000 annual planting rates have decreased from about 137 500 to 42 300 ha in 2003, mainly due to a shortage of suitable land at affordable prices and uncertainty over tax provisions, which was only resolved in April 2002 (NFI 2004). Hence it is questionable whether the target set by *The 2020 Vision* can be reached.

**China**

Forests in China cover 163.5 million ha, with plantation forests totaling 46.7 million ha, or 29 percent of the total forest area. For much of the twentieth century, the forest area of China was in decline, reaching a low point measured by the second forest inventory (1977-1981) of 115.3 million ha (12 percent national forest cover). Much deforestation was a direct result of
overharvesting and insufficient investment in forest regeneration. This negative trend was reversed with the initiation of the Three-Norths Shelterbelt Development Programme in 1978. By 1999, more than 25 million ha had been planted under the programme. In the late 1980s, China started a number of large-scale afforestation and reforestation projects, which accelerated planting rates even further. Extensive tree planting has been coupled with logging bans in natural forests, which highlights the urgency of a shift to plantations. Moreover, the government is seeking to raise the forest cover to 19.4 percent (by 2010) and 26 percent (by 2050). Recent statistics suggest that plantation establishment has picked up the pace. The establishment rate for 2002 is reported to have exceeded seven million ha. Forest lands in China are owned by either the state (42 percent) or by forest collectives (58 percent), with most collective forests managed by rural households under contractual arrangements. Collectives, including the private sector, dominate ownership of forest plantations, while state forests primarily comprise natural forests.

India

In India, forests cover 67.5 million ha or 22 percent of the total land area. Forest plantations total 32.6 million ha, constituting more than 50 percent of the total forest area. India’s forests are under tremendous pressure due to the country’s large population. Approximately 3.4 million ha of forest were cleared between 1951 and 1972, mainly for agricultural purposes. The planting rates between 1956 and 1979 ranged from 62,000 to 244,000 ha (Pandey 2000). Until the mid-1970s, forest plantations played only a minor role, extending over approximately three million ha. This changed in 1976, when a National Commission on Agriculture report identified the potential of plantations to meet the shortfalls in industrial wood and fuelwood production. The following 15 years were marked by numerous social forestry projects, which led to an annual expansion of the plantation estate by about 1.7 million ha. Donor support for most forestry projects ended in the early 1990s. This triggered a shift from social forestry to Joint Forest Management (JFM) – by 2003 more than 84,000 JFM groups were managing over 17 million ha of forest land (Bahuguna 2004) – and enabled the private sector to claim a greater stake in forest plantation development. Annual planting rates have slightly dropped to about 1.5 million ha. Of the total forest plantation area of 32.6 million ha more than ten million were planted by farmers and public and private institutions with seedlings distributed by forestry agencies (Pandey 2000).

Indonesia

Indonesia has undergone significant deforestation, with around 60 million ha of forests cleared since 1950. Officially, the country’s forest area stands at around 105 million ha (FAO 2001), although numerous sources put it at around or below 100 million ha in 1997 (FWI/GFM 2002). As the current rate of deforestation is officially acknowledged to be around two million ha per annum, actual forest cover has probably fallen below 90 million ha. Indonesia has almost ten million ha of forest plantations, including approximately 3.5 million ha planted with rubber (*Hevea brasiliensis*). Until about 1990, the involvement of the corporate sector in plantation development was negligible. Smallholders on the other hand had always played an important part in the plantation sector and had established 4.6 million ha as early as 1969 (Booth 1988; cited in FWI/GFM 2002). Officially, between 1990 and 1997, when Indonesia was affected by the Asian financial crisis, about 1.6 million ha were planted, although doubts about the accuracy of this figure remain. The crisis, subsequent political changes, poor law enforcement and land-use conflicts continue to keep investors away from Indonesia's forestry sector. From 230,000 ha in 1997, the planting rate dropped to 78,000 ha in 2000.

New Zealand

New Zealand's forests cover more than 7.9 million ha, of which about 1.8 million ha are plantations. Large-scale plantation establishment began in the early twentieth century, with a significant
acceleration during the Great Depression of the 1930s. By 1936, almost 300 000 ha of plantations had been established. The government initiated a second wave of tree planting in the early 1960s, driven by Forest Service planting and incentives to the private sector. By the mid-1980s, the national plantation estate covered more than one million ha. Large-scale deregulation of the New Zealand economy included the privatization of many state-owned assets including the vast majority of the plantation forests. Since the mid-1990s, a third wave of private sector planting has markedly expanded the plantation forest area in New Zealand. New plantings peaked in 1995, when close to 100 000 ha were established. At 14 900 ha in 2003, new planting is well below the average afforestation rate of the last 30 years (MAF 2004).

The Philippines

In the Philippines, forests cover 5.8 million ha or 19 percent of the total land area. Forest cover has declined substantially since the mid-1930s, when the natural forest area was estimated at 17 million ha, and deforestation remains a problem. Through the 1950s until the late 1970s, forestry was a mainstay of the Philippine economy. Forest plantation establishment in the Philippines largely dates from the Presidential Letter of Instruction No. 145 in 1973, which issued a directive to promote the establishment of plantations and tree farms. Between 1980 and 1985, plantation development was accelerated through the Industrial Tree Plantation (ITP) Programme that attempted to directly involve timber license agreement holders in tree growing. However, the bulk of the plantations was established by the government. Of the 750 000 ha, most were planted in the late 1980s and early 1990s, with very little expansion since the Asian financial crisis started in 1997.

Sabah (Malaysia)

Forests in Sabah (Malaysia) cover 4.56 million ha, or almost 61.8 percent of the total land area of the state. Almost two-thirds of the plantations in Sabah have been planted since 1990. In 2001, plantations extended across 146 311 ha. *Acacia mangium* is the most common plantation species, comprising more than half of all forest plantations. Forest plantation development started in 1973. In contrast to Peninsular Malaysia, tree planting was initiated through state corporations and later was followed by private and public companies. During the 1990s, annual planting rates averaged about 10 000 ha. Despite the government’s efforts to encourage forest plantation development, tax incentives alone did not sufficiently stimulate investments in tree growing. This is clearly reflected by the fact that the current establishment ratio of oil-palm to forest plantations is about 6:1. Between 1995 and 2000, the area under oil-palm has increased twice as fast as forest plantations. Between 2000 and 2001, forest plantations even declined by approximately 8 000 ha. There are several reasons for the lack of interest in forest plantations including limited land availability, high land rents and premiums (a one-time payment) for forest plantations compared to other land uses, competition with agricultural plantations (mainly oil-palm), and the much higher financial returns that can be gained by investing in oil-palm plantations.

Thailand

Forest cover in Thailand totals 14.8 million ha, with a plantation estate comprising 4.9 million ha, or 33 percent of the total forest area. Thailand’s plantation estate is dominated by rubber plantations, which constitute 43 percent of the total plantation area. In 1961, the country was estimated to have forest cover amounting to 27.4 million ha. During the next 30 years, forest cover declined by approximately 45 percent, prompting the government to impose a total ban on harvesting in natural forests in 1989, in the aftermath of a major flashflood in Thailand’s south. Plantation development over the same period was modest. Between 1961 and 1991, the Royal Forest Department, the main engine of plantation development (with the exception of rubber plantations), established 540 000 ha of forest plantations. The turning point in Thailand’s forestry sector was the imposition of the logging ban. In late 1992, the Royal Forest Department
was formally directed to shift its focus from forest exploitation to forest conservation. The Re-afforestation Act of 1992 was specifically designed to encourage the private sector to develop forest plantations. For the next five years, the government initiated numerous projects (for example, the Private Reforestation Extension Project, Fast-growing Trees Reforestation Project, the Reforestation and Extension Project in the Northeast of Thailand) that triggered a surge in plantation development. There is a severe lack of accurate data on area covered by plantations. It appears that between 1986 and 1997 the area planted with eucalyptus increased from 53,500 to 438,500 ha. However, as in Indonesia, the expansion in Thailand was short-lived owing to the Asian financial crisis. Only rubber plantations continued to attract interest.

The United States

The United States of America has approximately 226 million ha of forests extending over almost 25 percent of the country. Two-fifths of the country’s forests and other wooded lands are owned by the State (much of this in the west and mountainous regions, and Alaska) and other public institutions; most of the remainder is owned by private individuals and forest companies. Forest plantations cover 16.2 million ha, and constitute approximately seven percent of all forests. Tree planting was of little significance before the Second World War. Between 1945 and 1976, it was fuelled by high timber prices, technological advances and favourable tax policies. Private owners planted 11.7 million ha during the period. Private tree-planting areas increased ninetyfold from an annual area of 6,408 ha in 1946 to 579,000 ha in 1976, representing an annual increase of 16 percent. From 1977 to 1999, there was a phase of steady growth. The area planted reached a record level of 1.3 million ha in 1988, when tree-planting under the Conservation Reserve Program was at its peak. Private tree planting still expanded but at a much lower annual rate of 2.4 percent. In 1999, the private tree planting area was about one million ha. The rate of tree planting by the forest industry declined during the second half of the 1990s owing to the sluggish prices of forest products, restructuring of the forest industry, the sale of timberlands to other corporations and the forest industry firms’ new emphasis on productivity rather than size of timberland ownership.

SIMILARITIES AND DIFFERENCES IN PLANTATION HISTORIES

While there are some clear differences with regard to forest plantation development in the nine countries, there are also some similarities.

Although in some countries data are of variable quality, which complicates an assessment of developments in the forest plantation sector, two general conclusions can be drawn. First, there has been a pronounced shift from public to private sector involvement, which includes large-scale corporate investors, forest industries, farmers and local communities. In Sabah and the United States, the bulk of the plantations was always in private or semi-private hands. In several countries, the government had initiated tree growing on its own or with the assistance of donor-funded projects. Although in most countries there had always been attempts to bring in the private sector, greater involvement of private growers started only during the 1980s and in some countries (for example, Thailand, Indonesia) only in the 1990s.\(^2\) Shifts were most dramatic in New Zealand where the government sold off most of its plantations during the 1990s. Of the 1.827 million ha estate, today the State holds only a meager 87,000 ha (MAF 2004).

Second, most of the plantings started during the 1980s, peaked during the mid- to late 1990s and have since then slowed down, with the exception of China. There are numerous reasons for this quite uniform development. Australia, New Zealand and the United States of America have reached the maturation or consolidation stage, although each country intends to continue expanding its plantations. However, land-use competition and lower than expected forest product

\(^2\) This assessment excludes the fact that smallholders in a number of countries contributed quite substantially to plantation development for decades.
prices since the price spike of the early 1990s, have dampened investor interest to some extent. Also, the number of plantations that are reaching the end of their first rotation is increasing steadily. For example, in parts of Australia, plantations are into their third rotation (Roberts 2002) and the area harvested is increasing rapidly, so that some new investment funds are being directed to re-establishing sites after harvesting, rather than planting of new sites (NPI 2004). In other words, reforestation is replacing afforestation, a clear indication of having reached maturity.

China and India find themselves in the early acceleration stage. The economies in both countries have been growing steadily during the past ten years. This development freed financial resources for the expansion of plantations. The transfer of responsibilities to communities (India) and households (China) also assisted state efforts in tree growing. Due to land shortages in India (mainly artificially generated due to land ceiling laws) progress in plantation development has somewhat slowed but maturation is not yet in sight. The private sector shows great interest in covering larger areas with trees and many companies collaborate closely with farmers in wood production (Lal 2004).

Indonesia, the Philippines and Thailand are still at the initial stage of plantation development. This is not to say that tree growing in these three countries does not have a history. It is rather that the involvement of the private sector is in its infancy. There are two main reasons. First, for decades the three countries viewed their natural forests as an inexhaustible resource. To some extent, this continues to remain the case in Indonesia. With regard to the forests being considered an inexhaustible resource, the imposition of logging bans in Thailand and the Philippines indicates that forest departments have had a change of mind. Both countries were unprepared for the impacts of the bans on wood supplies. Although substantial efforts were undertaken to involve the private sector in tree planting and, sometimes, generous direct incentives were offered, progress almost came to a complete halt when the Asian financial crisis hit in 1997. Although developments in Indonesia are not a mirror image of what happened in Thailand and the Philippines, private sector development never really got off the ground. Annual planting rates between 1993 and 1998 averaged 250 000 ha in Indonesia, but they were reduced to negligible levels in the late 1990s. The former approach to large-scale plantations led to land-use conflicts and a new beginning will have to be made. Also, as Potter and Lee (1998, cited in Williams 2001) observed, even the subsidized returns from the fast-growing plantations, the industrial timber plantations, or hutan tanaman industri (HTI), were rather unattractive. Oil-palm on the other hand was, and still is, a more lucrative crop.

Sabah is a special case. State corporations and companies played a major role in tree growing right from the start in 1973. Planting rates were steady, although the recognition that considerably higher returns could be achieved on alternative investments (such as oil-palm), led to a decline in interest. Plantation development never accelerated sufficiently to reach the maturation stage and currently the area covered is barely stable or perhaps even in decline.

USE OF INCENTIVES IN ASIA AND THE PACIFIC

A variety of incentives have been used throughout the Asia-Pacific region. Comparisons among the studied countries are necessarily broad, since even schemes that are generically similar differ in detail. As a very simple example, there is little potential for analysing the “price sensitivity” of plantation growers to various cash grant schemes, since circumstances in different countries (and over time in the same country) vary markedly. Similarly evident is the incompatibility of various tax concessions offered in countries. However, a broad evolutionary hierarchy can be perceived in the types of incentives offered at different stages of plantation development (Figure 1).
In most countries covered by the study, forest plantation development on a significant scale was initiated by the State, which supports the argument that an initial critical mass is necessary to ensure private-sector involvement in plantation development. Once the involvement of the private sector is sought more directly, the use of incentives appears to progress gradually from provision of free inputs, to grants and loans, to tax concessions, to joint venture arrangements and finally to a focus on creating an enabling environment and removing structural impediments (Table 3).

Table 3: Plantation development and incentives (reported examples)

<table>
<thead>
<tr>
<th>Country</th>
<th>State planting</th>
<th>Low-cost seedlings</th>
<th>Land grants</th>
<th>Nursery subsidies</th>
<th>Survival incentives</th>
<th>Grants to growers</th>
<th>Concessionary loans</th>
<th>Tax concessions</th>
<th>Joint venture arrangements</th>
<th>Research and extension</th>
<th>Resource security</th>
<th>Focus on enabling incentives and removal of structural constraints</th>
</tr>
</thead>
<tbody>
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<td>High</td>
</tr>
<tr>
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<td>X</td>
<td>X</td>
<td>X X</td>
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<td>Low</td>
<td>Low</td>
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<tr>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X X</td>
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<td>X</td>
<td>X</td>
<td>Low</td>
<td>High</td>
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<tr>
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<tr>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Low</td>
<td>Medium</td>
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<tr>
<td>Sabah</td>
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<td>X X X X X</td>
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<td>Low</td>
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<tr>
<td>Thailand</td>
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<td>X</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>U.S.A.</td>
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<td>Low</td>
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</tbody>
</table>

Early government efforts to engage the private sector in tree planting have tended to focus on the provision of physical incentives. In the United States of America and New Zealand, one of the earliest incentives was land grants, which encouraged settlement and, under certain conditions, tree planting. As long as governments maintained extensive land banks in sparsely settled regions this was a relatively low-cost incentive, which promoted both tree planting (not necessarily very effectively) and settlement. More recently, China has provided significant land allocations to farmers for tree growing.

The provision of free-of-charge seedlings and fertilizer has also been a common physical incentive. Such free inputs are appealing because they are straightforward and less intimidating – especially to small-scale investors – than more bureaucratic incentives such as grants and loans.
subsidized loans, which may require complicated forms and paperwork. However, free physical inputs often do not stimulate planting as effectively as cash grants, because most grants are financially more attractive and provide more flexibility than often bulky physical inputs. Yet, many forest agencies still favour the provision of free or low-cost seedlings because within their own administrative systems funds for nursery activities can be easily budgeted.

Cash grants and concessionary loans have proven popular at various times in most of the studied countries. These instruments have engendered significant planting in China, while in Thailand the effectiveness of grants was mixed, mainly because they were not sufficiently attractive. In a number of the studied countries, these more direct financial incentives have been followed by a more complex approach – namely, the offering of tax concessions for plantations. Tax breaks – which have been notably successful in Australia, New Zealand and the United States of America – can be especially effective in helping bridge the long gap between the initial plantation investment and later harvest revenues.

More recently, several countries, which earlier focused mainly on physical incentives and later indirect incentives, have shifted to the emphasis on enabling incentives, removing structural constraints and creating an attractive environment for plantation investment.

**DIRECT INCENTIVES – WHAT CAN THEY ACHIEVE?**

Assessing the impact of direct incentives in isolation from indirect and enabling incentives is very difficult, and the results can be misleading. In an environment characterized by strong disincentives (for example, complex requirements for obtaining permits for cutting, transporting and processing wood, low timber prices, inconsistent policies, high fire risks, high land prices, high interest rates, uncertain marketing opportunities) and an opaque bureaucracy, direct incentives may have only marginal effects. In the worst cases, they may lead to misallocation of funds, trigger investments in plantations that are ultimately not viable, or have long-term negative impacts on interest in growing trees.

Owing to a lack of monitoring, it is difficult to determine the extent to which direct incentives have accelerated planting relative to other factors. In some locations, extensive areas have been planted without direct support, which suggests that funds have sometimes been spent inefficiently or unnecessarily.

On the other hand, when the general investment climate is favourable and demand for wood increases, direct incentives can definitely increase the speed with which the private sector is drawn to forest plantations. The most effective direct incentives include tax concessions and favourable capital gains treatment. Loan and grant schemes have achieved mixed results – some being more generous than others – and have favoured predominantly large-scale investors.

There are five caveats to this general assessment:

- Direct incentives are difficult and costly to administer, and it is questionable whether the high transaction costs they incur make them an efficient tool, particularly for attracting small-scale investors;
- Tax concessions can only work if investors actually pay taxes. This is especially significant in countries where paying taxes is sometimes seen more as an option than a requirement;
- Direct incentives are easily abused. Free seedlings may be resold, loans used for unintended purposes and corruption is virtually impossible to control;
- Direct incentives are frequently flawed if they are designed according to the interests of the provider (usually the government), rather than with the needs of the recipients in mind;
- In some instances, World Trade Organization rules or national policies may preclude the use of certain types of overtly protectionist incentives such as import restrictions.
THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

INDIRECT INCENTIVES – A SOLID FOUNDATION FOR INVESTMENTS

The study results indicate that variable and enabling incentives generally play a much larger role in encouraging investments than direct incentives. Direct incentives can influence the speed to some extent, but not the direction of investments, or more general change.

As commercial investments in forest plantation development aim to maximize financial returns, high timber prices – and the perceptions that prices would continue to climb in the future – have sometimes triggered investments in tree growing. Perhaps the most attractive and tempting recent stimulus for many investors in Asia and the Pacific was the global spike in wood prices in 1993 and 1994, which triggered a planting boom in many countries. Conversely, when wood prices have been low generally, or especially where prices have been kept artificially low, plantation investments have been sluggish. Under such circumstances, investor interest is seriously dampened irrespective of the provision of other incentives. Examples include:

- Price controls, as they existed in New Zealand until 1965;
- Depressed timber prices due to cheaper imports (for example, Canadian exports to the United States);
- A policy of cheap raw material for the wood-processing industry (for example in Indonesia); and
- Illegal logging (for example in Indonesia and India).

Prices also need to be reasonably predictable and provide returns to investments comparable to, or better than, those from similar land uses (for example, oil-palm, rubber or pastoral farming). In Malaysia, current returns to investment in oil-palm are considerably higher than for fast-growing trees, thus discouraging potential investments in forest plantations. Alternative investment opportunities will always compete with forestry and even where the plantation sector is well established some investors may switch to other land-based investments such as dairy farming, as indicated by Terry McFadgen, the former chief executive of Fletcher Forests Ltd. in New Zealand. In early 2003, he warned that “if the forestry industry continues to perform at its current level and if dairy continues to perform better, then yes there will be some conversions” (Graham 2003). There never appears to be much room for complacency, even in a “success-story” country such as New Zealand.

A key factor in obtaining significant levels of investment in plantations has been political, institutional and macro-economic stability. Although it is difficult to disentangle specific factors from the overall investment environment, it is clear that investments are forthcoming when risks are perceived to be low and governments signal unambiguous support for private-sector involvement in plantation development (Clapp 1995). This has not been the case for the Philippines and Indonesia, which explains to a considerable extent the relatively poor performance of tree-planting by the private sector in these countries.

A crucial factor is resource security. The decollectivization of land and forest tenure in China, beginning in 1978, provides an excellent example of the importance of respected and protected property rights. A principal goal of the reform was to encourage farmers to manage forest resources sustainably and to plant trees. The reform has been neither smooth nor uniform, and forest tenure arrangements often vary even among townships. Consequently, not all collectives
have been equally enthusiastic. However, a clear pattern is discernible: where decollectivization has gone furthest there have been significant increases in investments in tree growing (Lu et al. 2002).

**Unbundling ownership rights to increase resource security and comfort**

Markets can potentially play a much wider role in forest management than they have in the past if a more detailed approach is taken to the definition of rights. If need be, ownership of rights can be unbundled to retain public ownership of land while privatizing the timber resource or other commercial goods and services.


Just as clear tenure arrangements have underpinned the success of forest plantation development in Australia, New Zealand, the United States of America and parts of China, uncertain tenure has constrained investment in Indonesia, Thailand and the Philippines. In extreme cases, tenure and land-use conflicts have resulted in the destruction of plantations and equipment (Kartodihardjo and Supriono 2000), which is certain to deter investors.

In New Zealand, the development of infrastructure (for example, roads, railways, modern port facilities, hydro-electric power stations) by the government paved the way for large-scale processing initiatives and assured potential planters that the government was serious about developing a viable plantation sector. Similar developments occurred in Australia and the United States of America. These measures were complemented by increased research and extension, which reduced risks, raised yields and effectively lowered the costs of plantation establishment.

In several countries, policies are in place to encourage plantation development, but little is done to translate them into action on the ground. It is critical to follow up supportive policies with strategies and actions that provide a tangible framework to encourage and enable investment. This may include examining incentive structures across all sectors of the economy to ensure a level playing field for investments in forest plantations. The role of the public sector as a forest owner and manager should regularly be reviewed to ensure that public-sector plantations do not compete unfairly with private-sector investments. Public-sector plantations are affected differently by taxes and land prices and often determine log prices and log allocation, as has been the case in Australia. In addition, the rates of return from public-sector plantations may not reflect the market cost of capital.

Removing impediments to plantation development often means reducing or eliminating subsidies in other directly competing sectors of the economy, especially in agriculture. In Thailand, for example, financial support through the Rubber Plantation Aid Fund for the replanting of rubber amounts to approximately US$1 000/ha, whereas the Private Reforestation Extension Project offered less than half that amount for timber plantations. If governments are truly committed to augmenting wood supplies, then such substantial differences provide the wrong signal to investors. Other factors may also sour the investment climate for plantations relative to other sectors, such as when markets for plantation products are restricted in discriminatory fashion, or when foreign investments in plantations are constrained relative to other sectors.

**Same approach but different results**

One of the crucial differences between the Chilean and Indonesian experiences is that plantations are presently the highest yielding land use in many regions of Chile, whereas oil palm is much more lucrative in Indonesia. Subsidies provided to oil palm growers further discouraged timber plantation development.

Source: Williams (2001)
A key point is that policies need to be consistent over time. Frequent policy changes result in increased risks and provide a climate of insecurity for investors, especially given the inherently long-term nature of plantation investment. In some countries, frequent changes of government have resulted in repeated changes in policies and the erosion of support mechanisms. For example, between 1982 and 2002 Thailand had ten governments, and the new governments rarely followed the paths of their predecessors. Political stability has also led to conflicting policies and constrained investments in the Philippines and Indonesia.

In most countries, the expansion of plantations has been to some extent paralleled by increasing objections over the use of natural forests for timber production. As concern over the fate of natural forests increased, decision-makers passed a variety of harvesting restrictions in many countries (Durst et al. 2001). While this provided a window of opportunity for investments in plantations, environmental concerns over monoculture forest plantations also translated into a worry for investors. In Thailand, environmentalists warned that, “commercial eucalyptus plantations are incompatible both with forest conservation and with village livelihood(s)” (Lohmann, 1990, p. 9; see also Lang 2002). Although the discussion on the environmental impacts of plantations, especially related to catchment hydrology, is plagued by myths and misperceptions (Cossalter and Pye-Smith 2003), environmental campaigns against tree plantations have clearly affected investor behaviour in some countries, including the United States. In addition, it led to the condemnation of some “exotic species” such as *Eucalyptus camaldulensis* as an inherent evil, in many countries in Asia.

The notoriety of eucalyptus

For example, under certain soil and climatic conditions, it might be ecologically feasible and economically profitable to clear-cut a forest and replant it in a monoculture (such as eucalyptus). While this might be profit-maximizing, it is unlikely to be social welfare maximizing because forest plantation monocultures are associated with notoriously low ecological services.

Source: Kahn (2002)

Finally, it must be asked whether incentives in any form are justified on social grounds. Forest plantations generate employment, but this benefit may be outweighed by job losses in agriculture at the local level and by the costs of significant restructuring in local economies (Tonts et al. 2001). In Australia, for example, there is widespread unease about the impact of plantations on demographic, economic and social structures. Key responses that have been used by both plantation companies and governments to resolve concerns include information dissemination, improved communication and consultation strategies, adjustments to statutory and strategic planning systems, and collaborative approaches that bring different stakeholders closer together (Schirmer and Tonts 2002).

Addressing community concerns in Australia

The Plantations 2020 Vision recognises the role that plantations play in the community, and encourages Vision partners to address the social and environmental changes being experienced by communities in areas where plantations have developed rapidly. This includes providing a role for community participation in the on-going development of the plantation resource.

Examples of this approach include the development of a “Good Neighbour Charter” by the plantation timber industry in Tasmania. The Good Neighbour Charter contains a set of best practice guidelines as a minimum standard for community engagement by the Tasmanian Plantation Timber Industry.

Where social benefits are insignificant, the private sector, and particularly the processing industry, has an important role in motivating landowners to plant trees. In India, a legal ceiling on landholdings prohibits private companies from establishing large-scale plantations. To overcome this constraint, private companies have offered a number of incentives to smallholders, including technical assistance and buy-back guarantees (Saigal et al. 2002). Similar arrangements have been put in place in other countries (for example, Australia, Indonesia, New Zealand, the Philippines and Thailand), which indicates that private companies may be in a better position than governments to reach small-scale growers through outgrower schemes (Desmond and Race 2003).

There is broad agreement that high social benefits, coupled with insufficient or even negative private returns, are a rational justification for offering incentives to investors. However, in many cases the social benefits are not obvious, nor is tree-growing inherently unprofitable. Applied economic analysis is rarely used to assess whether a particular level of support is justified. This is not surprising, since broad agreement on how social benefits should be valued is even more elusive. Thus, incentives tend to be offered based on less tangible criteria, including in some cases political manoeuvring and favouritism.

CONCLUSIONS

The roles played by the private and public sectors in forest plantation development have undergone major changes in Asia and the Pacific, although the level of success in attracting private investors to plantations varies considerably. Plantation development can be divided into three stages: initiation, acceleration and maturation. Australia, New Zealand and the United States had reached the maturation stage by the 1990s, but most Asian countries are still in the initiation or early acceleration stage.

Direct incentives are most likely to be important in the initiation stage, to raise awareness and to increase the pace and scale of plantation establishment, especially to build up raw material supplies for a nascent processing sector. However, they can only be effective if an enabling environment already exists or if investors feel that first steps towards creating an enabling environment have been initiated. Direct incentives should be complemented and ultimately replaced by variable incentives and accompanied by research and extension. If a direct incentive becomes obsolete in the acceleration stage, this is a good sign of its success (Williams 2001).

Over the long term, a favourable investment climate, research, technical assistance and well-established markets usually have greater influence than direct incentives such as free seedlings, subsidized credit or cost-sharing of planting expenses. In countries with a long history of providing incentives, it has become evident that incentive systems must be timely, well-targeted and flexible if they are to engage the private sector in forest plantation development successfully.

In countries that have reached the maturation stage, it has been recognized that key measures to maintain private-sector interest in plantation development are related to the reduction of barriers and the removal of structural impediments and operational constraints. Some measures such as providing adequate tenure arrangements and resource security are difficult to undertake, but crucial to success. Others such as tax reforms, removing unnecessary regulations and eliminating bureaucratic procedures (licensing and permits) are just as important and in many cases easier to realize. While there is no single effective strategy, it is possible to outline some guiding principles that will contribute to achieving a viable forest plantation sector.
Most people agree that forest plantations can help meet the increasing demands for wood and provide public goods and services, although in some cases they can also have negative social and environmental impacts. Most people also agree that appropriate incentives – particularly enabling incentives – play a key role in stimulating plantation development. However, there are two caveats that need to be considered. The first is to recognize that the forestry sector is not alone in asking “What does it take?” The agricultural sector has its own advocates, often backed by generous incentives of their own. Proponents of forestry need to recognize that alternative land uses may offer similar, or even greater, benefits to society. Under such circumstances it may be pointless to offer incentives for plantation development, since it may be more economically efficient to invest in alternative land uses.

The second caveat concerns the conventional belief that timber shortages will assure lucrative markets for wood indefinitely into the future. Recently, however, warnings of the exact opposite scenario have emerged, suggesting a possible timber glut in the future (Adams 2002). If this proves true, promoting too many plantations now may result in a rude awakening down the road for investors and those who encouraged them.

A final observation from the studies is that, in a historical context, incentives have largely been applied in an ad hoc manner. As improved understanding of the mechanisms and conditions related to economic growth and development has evolved, it has become apparent that, in many instances, plantation incentives have been less successful than they might otherwise have been, had various disincentives to plantation establishment also been addressed and had governments...
directed their attention also to creating enabling environments. Just as good physical site preparation is important for enhancing tree growth, so too, preparing a favourable policy and administrative foundation is crucial for supporting successful plantation development.

LITERATURE CITED


As the role of the public sector in forest plantation development is diminishing, governments and their respective forestry agencies are increasingly asking what it takes to encourage non-government entities to grow trees. There is much interest in offering incentives to prospective small- and large-scale investors. Yet, little is known about the role that direct and indirect incentives have in influencing plantation development.

What does it take? The role of incentives in forest plantation development in Asia and the Pacific helps fill this knowledge gap by examining how incentives influence plantation development, through a series of country case studies in the Asia-Pacific region.

Although direct comparisons between countries are problematic, a common theme emerges: clear, consistent and stable policies and a favourable investment climate are essential ingredients to promote the development of forest plantations by both small- and large-scale producers. These factors show to be more important than the provision of direct incentives such as free seedlings or tax deductions. The overall picture that emerges is sufficiently coherent to outline a set of guiding principles that should help policy makers and forest managers to better understand the key issues, challenges and opportunities concerning private investment in forest plantation development.