

# 1. Reforestation with rainforest timber trees in the tropics and subtropics of Australia: A brief overview

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## Introduction

In the last 100 years the world's tropical forests have dramatically decreased in area. A recent survey by the Food and Agriculture Organisation of the United Nations, for example, found 14.2 million ha had been lost from the world's tropical forests between 1990 and 2000 (FAO 2002). Some of this formerly forested land has been used for permanent agriculture but large areas have been cleared, used briefly for agriculture, and then abandoned. Reforestation has occurred on some of this abandoned land but much remains degraded or in an under-utilized state. Estimates of just how much cleared and then abandoned lands that now exist are difficult to find but ITTO (2002) estimate there are around 350 million ha of deforested and degraded land scattered across the world's tropics. They also estimate there could be a further 500 million ha of partially deforested land.

This loss has had several consequences. One consequence has been that, globally, food production has kept pace with rising human populations. But another has been that the various goods and services once supplied by tropical forests are no longer available. This loss particularly affects rural people who have traditionally depended on forests for a variety of forest-derived resources. Many of these people have not benefited at all from the loss of forests in their regions and they continue to live in rural poverty.

Reforestation has occurred in many tropical areas. FAO (2002) has reported an increase in tropical plantation cover of 1.9 million ha between 1990 and 2000. Most of these plantations have used a small number of species, often exotic to the regions they are planted, and an even smaller number of genera (primarily *Eucalyptus*, *Acacia* and *Pinus*). Most plantations have fast growing species and a large proportion are being grown as monocultures on short rotations (ca. 10 years) to supply pulpwood. The legacy of this history of deforestation and reforestation is that the most species-rich forests on earth have been replaced by comparatively simple agricultural or plantation systems, or by degraded landscapes.

## Deforestation and reforestation in the wet tropics of Australia

Similar events have occurred in Australia. Clearing of tropical forests started over 100 years ago and continued until recently. Much of this land has been used for agriculture but there are now significant areas of formerly forested land in Queensland and northern New South Wales that were once used for agriculture but which are now under-utilised or have been abandoned. Again, estimates of just how much of this land might be available for reforestation are scarce. Shea (1992) suggested 47,150 ha of land in the wet tropics of northern Australia is 'unsuitable for sustainable agriculture... that would be suitable for tree establishment.' He goes on to suggest it would be composed of both private and public land, and that while not all landholders would want to plant trees, 'a net figure of 30,000 ha would be available for planting.' Subsequently a field-based survey of privately owned rural land within 200kms of Cairns in north Queensland (see Figure 1) by Annandale *et al.* (2003) identified approximately 86,000 ha of land with rainfall and slope conditions suitable for timber plantations.

The first attempts to grow rainforest trees in plantations began in the early 1900's but only *Araucaria cunninghamii* (hoop pine) was ever planted over significant areas (Lamb *et al.* 2001). Reforestation

was never an attractive option while the demand for agricultural land was high and high-value timbers could be obtained by logging natural forests. The large areas of natural forest suggested the supply of high-value rainforest timbers was assured. This situation changed in 1988 when logging of tropical forests in north Queensland ceased (logging had ceased earlier in New South Wales and most of these rainforests had been placed on the World Heritage register in 1986). In this new situation it seemed there might be scope for growing rainforest trees in plantations to supply a high-value niche market and, at the same time, to restore some diversity to the cleared and simplified landscapes.

However, there were two problems. One was the political imperative to do something quickly. In particular, there was a need to begin the compensation program for former timber workers who had lost their jobs when logging ceased (see Vize *et al.* Chapter 2). The other problem was that the technical knowledge necessary to undertake a large reforestation program was lacking. The previous 100 years of logging had bequeathed some of the required knowledge. This included the identity of the most commercially attractive tree species, knowledge of the natural distribution of these and some limited information of their ecology and silviculture. The former Queensland Forest Service had also carried out trials with some of these species (summarized in Cameron and Jermyn 1991) but detailed knowledge of the seed sources, nursery systems and plantation silvicultural requirements for most species was extremely limited.

## Problems in creating a new forest and timber resource

Establishing a new industry based on rainforest tree species is difficult. The problems include that:

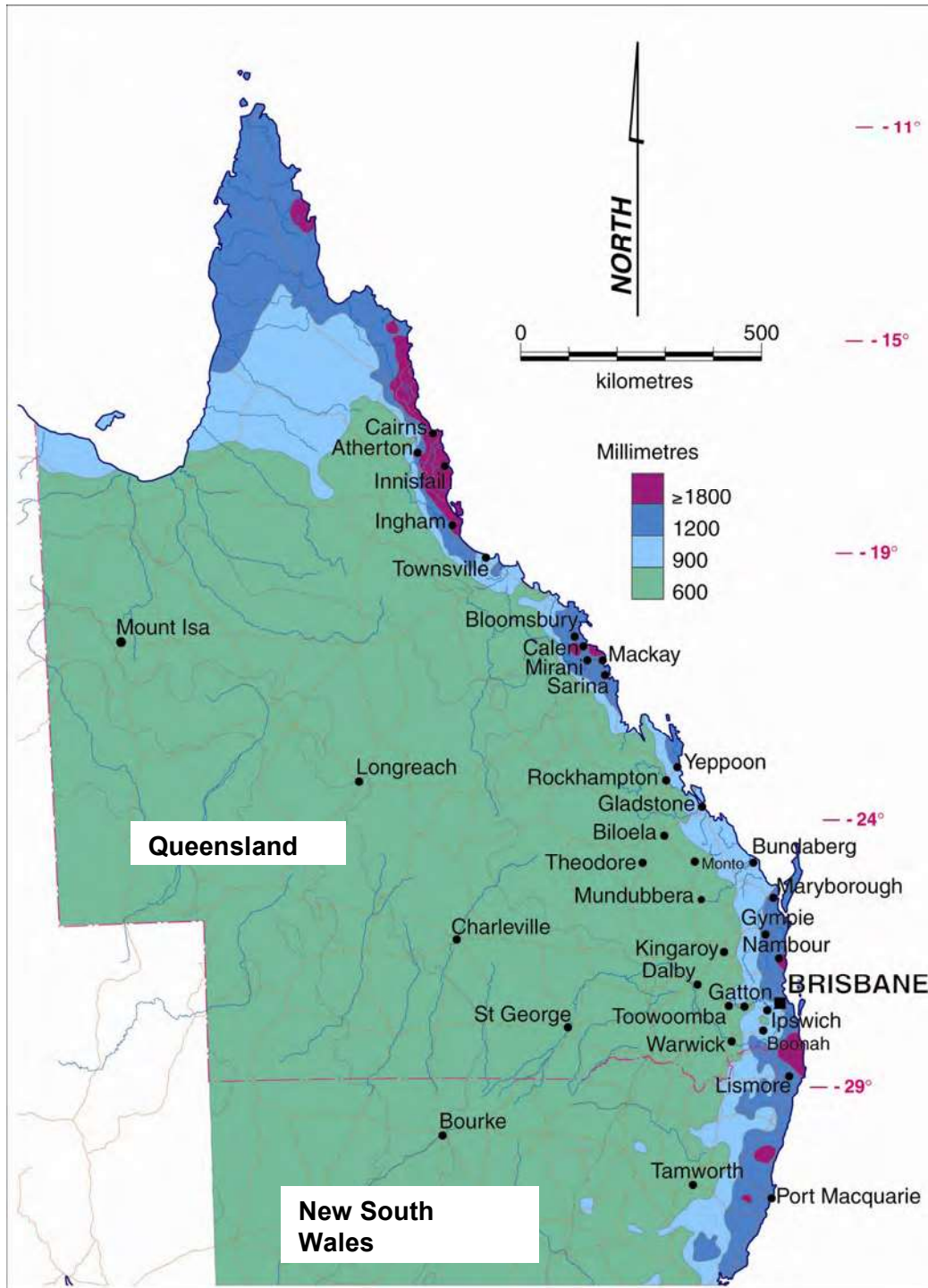
- suitable land for growing rainforest timbers is restricted to the higher rainfall areas (see Figure 1) which generally have higher land values;
- there are many potential timber species and provenances to choose from;
- the ecology and silviculture of most of these species is unknown;
- most of these species are slow growing (meaning the rotation length of any commercial plantation will be long – possibly 30 to 60 years - and therefore financially problematic);
- the future timber markets over time scales such as these are uncertain; and
- many landowners have multiple objectives; many are interested in growing trees for timber production but are also interested in creating “conservation” benefits as well (such as providing wildlife habits and improving biodiversity on their properties).

On past occasions when a new industry has been developed the government has usually reduced the risk to landowners by undertaking the necessary research (usually at specialised research stations) or by creating farms or plantations of its own at which problems can be identified and solved over time. New industries often take a number of years to become self-sustaining so this support is usually long-lasting. The north Queensland sugar industry and the softwood plantations of south east Queensland are examples where support was provided over many years and allowed significant industries to develop. But an industry based on high-value rainforest trees was always destined to be a small one because the land available for such plantations is limited and mostly privately owned. This has meant that government support was always going to be modest.

In north Queensland, the main support provided to create a new timber resource came through the Community Rainforest Reforestation Program (CRRP) and the background to this is described in Vize *et al.* Chapter 2. There was also some interest in reforesting abandoned land for, largely, biodiversity and other “conservation” reasons. In central and southeast Queensland and in northern New South Wales, a variety of individual landholders, government and non-government groups have undertaken reforestation work (see Vize *et al.* Chapter 2 and Lott *et al.* Chapter 3). The outcome of these activities has been a flourishing of mostly rainforest tree plantings across the wet tropics of north Queensland as well as in southern Queensland and northern NSW.

Research to support this reforestation has been relatively recent, and modest in terms of silviculture. The Cooperative Research Centre for Tropical Rainforest Ecology and Management (the “Rainforest CRC”) has had a program working on rainforest reforestation research since 1993. Other

reforestation research by universities and government agencies, with a range of funding including by the Joint Venture Agroforestry Program, has also been undertaken.



**Figure 1** Rainfall zones in the tropics and subtropics of eastern Australia. Areas with average annual rainfall of greater than 1200 mm are generally capable of supporting rainforest timber species.

## The objectives of this book

More than ten years have elapsed since many of these programs and plantings commenced. Some of the plantings are now well established and are growing well. Others have failed. It seemed timely to review what has been learned over this period.

A workshop was held at the University of Queensland in June 2003, attended by many of those who have been involved in this reforestation effort in both Queensland and New South Wales. The intention was to capture their experience and document the lessons learned. The organisers sought to include practitioners as well as researchers, foresters and ecologists. The focus of the meeting was primarily on the ecological and silvicultural issues rather than on the social, economic or policy issues. The latter are equally important of course, if reforestation is to actually take place, and two chapters in this book review some of the social and economic research that both complements and interacts with this biophysical research. It is expected that a more detailed treatment of these issues will be presented elsewhere.

As the rainforests of eastern Australia are natural biodiversity hotspots the reforestation efforts discussed in this book are obviously concerned with retaining species and landscapes in cleared rainforest regions, and several methods of reforestation are compared in later chapters. One of the strengths of this book is the contrasting opinions on reforestation methods presented, or implied, by various authors. The editors believe that the competition for commercial returns from productive, agricultural land in these ex-rainforest landscapes, coupled with the current modest levels of investment in rainforest restoration, necessitate pragmatic approaches to reforestation. For private landholders to adopt and fund conservation efforts outside the existing reserves, on the scale that is needed to prevent further degradation of rainforest landscapes, will require planting systems that are 'profitable' to the landholder. It is unlikely that these efforts will be able to conserve everything and it may be necessary to consider trade-offs. Trade-offs between biodiversity and production in reforestation plantings have recently been discussed by Erskine and Catterall (2004) and are further discussed in this book. From a biodiversity perspective, the need to maintain or enhance structural complexity and floristic composition in disturbed ex-rainforest landscapes in order to increase the usefulness of these forests to a diverse range of wildlife was examined. From a primary industries or land productivity perspective (e.g. agricultural, horticultural, industrial timber plantation or farm forestry production), the need for better understanding of the functional consequences of biodiversity in order to satisfactorily resolve the contention that "increased biodiversity is good" was highlighted. Both standpoints agreed on the need to know more about what scale of reforestation is required in these ex-rainforest landscapes. Practical outcomes for forest growers will come from answers about how many fleshy-fruited rainforest trees should be added to production-focused monocultures to increase biodiversity, or how can timber plantations be made more useful to rainforest wildlife, or how does increased biodiversity affect the silviculture or ability to harvest plantations?

The workshop and this book that has emerged out of it have had a largely Australian focus. But the problems of how to reforest cleared or degraded land in Australia's tropics are problems being faced by foresters and ecologists in many other tropical regions. It is our hope that at least some of the lessons we have learned and the solutions we have found will have use in these other tropical situations as well.

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