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Financial and economic performance of long-rotation hardwood plantation investments in Queensland, Australia

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Abstract

In Queensland, Australia, there is presently a high level of interest in long-rotation hardwood plantation investments for sawlog production, despite the consensus in Australian literature that such investments are not financially viable. Continuing genetics, silviculture and processing research, and increasing awareness about the ecosystem services generated by plantations, are anticipated to make future plantings profitable and socio-economically desirable in many parts of Queensland. Financial and economic models of hardwood plantations in Queensland are developed to test this hypothesis. The economic model accounts for carbon sequestration, salinity amelioration and other ecosystem service values of hardwood plantations. A carbon model estimates the value of carbon sequestered, while salinity and other ecosystem service values are estimated by the benefit transfer method. Where high growth rates (20–25 m^3 ha^{-1} $year^{-1}$) are achievable, long-rotation hardwood plantations are profitable in Queensland Hardwood Regions 1, 3 and 7 when rural land values are less than $2300/ha. Under optimistic assumptions, hardwood plantations growing at a rate of 15 m^3 ha^{-1} $year^{-1}$ are financially viable in Hardwood Regions 2, 4 and 8, provided land values are less than $1600/ha. The major implication of the economic analysis is that long-rotation hardwood plantation forestry is socio-economically justified in most Hardwood Regions, even though financial returns from timber production may be negative.

Keywords: Timber plantations; Ecosystem services; Financial analysis; Economic analysis; Environmental valuation; Carbon sequestration; Salinity

1. Introduction

In Queensland, Australia, only small areas of long-rotation hardwood plantations have been established. This is possibly due in part to the abundant, low-cost supply of large hardwood logs from mature natural forests (Keenan, 1998). However, over the last two decades, large areas of State-owned natural forests have been transferred from the production to conservation estates, resulting in large reductions in supply of hardwood logs. The 1999 South East Queensland Regional Forest Agreement included a commitment for all natural forest logging on State-owned land in the south–east to cease by 2024. These processes appear to have contributed to an increase in enthusi-

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asm and optimism about the potential for long-rotation plantations of native hardwood species in Queensland to supply sawlogs to industry. The total area of hardwood plantings in the State grew from 1300 ha in 1994 (National Forest Inventory, 1997) to 20 000 ha (87% privately owned) by June 2001 (Shaw, 2003, personal communication).[1] Forestry prospectus companies and the Queensland Department of Primary Industries (DPI), are promoting long-rotation hardwood (primarily eucalypt) plantation investments in the State on the basis of sound financial returns (DPI, 2000; Forest Enterprises Group, 2002).

The optimism surrounding long-rotation hardwood plantations defies the consensus of published literature in Australia, which has, generally reported poor financial prospects for such plantings (FAFPIC, 1989; O'Hara, 1989; Shepherd et al., 1990). It has been argued that hardwood plantations in Australia generally require higher rainfall and soil fertility, and that they are more site-specific than the exotic conifers that dominate the national plantation estate (Shepherd et al., 1990). There are also widely espoused concerns that fundamental wood properties—such as density, strength, shrinkage and growth stresses—may be inferior to those of the natural forest hardwood resource, which may affect market acceptance of plantation hardwoods (Shepherd et al., 1990; Yang and Waugh, 1996). Recent research on eucalypt plantations that had been established in Queensland during the 1960s and 1970s confirmed the long-held negative views about growth rates, timber quality and potential profitability (Leggate et al., 2000). However, these early eucalypt plantings suffered from inadequate site preparation, weed control, fertilisation, thinning, pruning and pest control, and there was a high degree of genetic variability in the unimproved planting stock. Consequently, Lewty et al. (2001) have asserted that the growth, wood quality and financial performance of early eucalypt plantings in Queensland are unlikely to be indicative of the potential for future hardwood plantings in the State.

The Queensland Forestry Research Institute (QFRI) has founded the Hardwoods Queensland research program to support the establishment of high-yielding hardwood plantations, and the transition of the Queensland timber industry from natural forest to plantation hardwood logs. Researchers within Hardwoods Queensland have highlighted two important factors that make a contemporary analysis of the performance of hardwood plantation investments in Queensland warranted. First, while few published data are available, current research and expert opinion suggests that the more intensively managed hardwood plantations established in Queensland since the mid-1990s, some with genetically superior stock, are far more productive than early hardwood plantings. Second, there is a growing awareness in Queensland about the range of ecosystem services that plantation forests can generate when established on cleared agricultural land, although few studies in Queensland have attempted to quantify these non-timber benefits. Non-timber benefits are becoming increasingly important in the decision-making of the Queensland Government (e.g. Environmental Protection Agency, 2001), which is currently the largest plantation grower in the State, and of some potential private investors (perhaps hoping markets will emerge in the future).

Hardwoods Queensland has funded the study reported here with the joint objective of estimating the potential, financial and economic performance of long-rotation (sawlog) hardwood plantation investments in Queensland.[2] The paper assesses financial performance from the grower's perspective when logs are sold at the stump. Carbon sequestration, salinity amelioration and other ecosystem service values of hardwood plantations are evaluated in predicting the socio-economic performance of hardwood plantations. Three types of investors are likely to play an important role in the establishment of a hardwood plantation resource in Queensland. First, private landholders who own idle or low opportunity cost land. Second, private investors, including plantation prospectus companies, who do not own land. Third, the State Government, which owns land, and

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[2] The terms 'hardwood plantation' and 'eucalypt plantation' are synonymous in Queensland forestry and they will be used interchangeably throughout the paper.