Farm forestry in Australia: review of a national program

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Abstract. Australia, like many other countries, is increasingly turning to farm forestry for its potential to address important economic, environmental and social issues at both the regional and national levels. However, despite its apparent multiple benefits, farm forestry adoption remains low, with less than 3% of all trees planted by farmers during recent years being for commercial timber production. The authors have recently completed an evaluation of the Australian government’s Farm Forestry Program (FFP). That evaluation and a review of current literature are used to provide an assessment of the FFP. While the logic underpinning the program is sound, the authors identified a number of key findings from the evaluation and recommended areas for improvement. The FFP combined 26 projects to form an appropriate mix of community development and research activities and has made an important contribution to regional farm forestry. Despite important gains made by the FFP, viable regional farm forestry industries have not emerged. Whilst projects made a strong contribution to raising awareness of farm forestry, projects lacked a systematic approach to developing landholder knowledge and skills. Large numbers of demonstration sites were established with inadequate consideration given to monitoring, evaluation and dissemination of findings.

Introduction

The authors have adopted a broad definition of farm forestry as the management of trees and shrubs integrated with agricultural systems for multiple products and benefits. For the purpose of this paper, the term farm forestry may also be used interchangeably with agroforestry.

Why farm forestry is important

Farm forestry in Australia is increasingly promoted as a national strategy likely to deliver important benefits in terms of assisting the move to more sustainable agriculture, enhancing regional development and cutting the current account deficit.

Farm forestry has the potential to provide substantial benefits to regions (McDonald, 1993), principally in the form of reduced environmental costs by arresting land degradation, but also in terms of diversifying farm incomes, and contributing to industry development (particularly if added-processing is completed) and employment. The Murray-Darling Basin Commission believes farm forestry, integrated with traditional agricultural practices, will fill a substantial role in addressing a variety of land and water degradation issues.
(Powell, 1995). Current research suggests that in high rainfall (> 750 mm) agricultural areas, perennial pastures alone will be insufficient water users to prevent groundwater recharge, whereas strategically located high density tree plantings (> 300 trees/ha) may be more effective (Clifton et al., 1993). Integrating trees with agriculture can also increase production due to the positive effects of sheltering livestock, pastures (Bird, 1993) and crops (Haines and Burke, 1993). Farm forestry also has the potential to be an important timber source contributing to import replacement – Australia currently has a balance of trade deficit of AUD2 billion of timber products (Commonwealth of Australia, 1995). Farm forestry could also make an important contribution to expanding timber supplies and thereby reduce pressure on native forests in Australia and south-east Asia. Furthermore, farm forestry using native species could also make an important contribution to the protection of biodiversity by improving the quality of buffer zones on private land and supporting high-value conservation areas.

The potential of farm forestry

In Australia about 1 million ha of marginal agricultural land is highly suitable for timber production (NPAC, 1991, p. 9). Further investigation found 286,700 ha of this land is available for hardwood plantations within a 100 km radius of existing processing facilities (RAC, 1992, pp 263–264), suggesting the development of farm forestry is a realistic option for regional Australia (IC, 1993). The potential for regional farm forestry is highlighted by information that farmers in low rainfall cereal cropping areas of Western Australia have established 3,800 ha of trees in an effort to develop a eucalypt oil industry (Inions, 1995, p. 420). Plantations on cleared agricultural land offer substantial commercial advantages over native forest for timber production by having a higher level of productivity, more centralised resource with lower transport costs to processors, better control over timber quality, and better resource security (RAC, 1992).

Approximately 75% of the world’s industrial timber volume is harvested from only ten countries, five of which are within the Pacific Rim (Ryan, 1994). Additionally, many Asian countries with rapidly developing economies have almost exhausted domestic timber supplies: Japan already is a major world importer of timber products. Ryan (1994, p. 23) recently estimated that by the year 2000, the Pacific Rim consumers will be facing an annual timber shortfall of 325 million m³, equal to about 20% of the current world trade in industrial wood. From Australia’s perspective, the Pacific Rim region will provide considerable export opportunities (Ryan, 1994).

Recent technological developments enabling sawn timber production from 20-year-old plantations rather than 60-year-old native forest timber (e.g. Eucalyptus nitens, Shining Gum; E. maculata, Spotted Gum) have improved the potential returns from farm forestry (Kirby and Waugh, 1994) and contributed to increased optimism about the viability of farm forestry in Australia.
However Ferguson (1995) is more cautious as to whether fast-grown eucalypt plantations can produce timber of sufficient quality to compete with hardwood timber from native forests. The potential value of plantations is highlighted by information that just 0.7% of Australia’s forest area grows plantations yet it produces 54% of the industrial wood supply (Turner and Gessel, 1990, cited in Mather, 1993, p. 4). Recent calculations by CIE et al. (1996, p. 1) indicate ‘The value of farm forestry to Australia could be AUD3.1 billion a year once a sustainable harvest is reached...’ AACM et al. (1996, p. 39) also concluded ‘Commercial timber production has the potential to be a major new farm industry and thus provide diversification of farm income, particularly in areas with rainfall higher than 600 mm, where there is a processing facility close by.’ However, despite its apparent potential, farm forestry represents less than 5% of Australia’s plantation area (ABARE, 1991, cited in Ferguson, 1995, p. 2) of 1 million ha (Newman, 1994, p. 21). A national survey indicated that 35% of Australia’s commercial farmers had recently planted trees (mainly for livestock shade and shelter, land rehabilitation), with less than 3% of the trees for commercial timber production (ABARE, 1995, p. 19). Additionally, a review of the Department of Primary Industries and Energy’s (DPIE) Farm Forestry Program (FFP) indicated that the program had funded the establishment of 1,300 ha (mainly as demonstration sites) and had stimulated a further 500 ha of plantings during 1993–1995 (Curtis and Race, 1995, p. 22). Increased landholder interest in farm forestry was highlighted by survey results showing that 25% of 180 Victorian Landcare groups (Curtis, 1996, p. 20) had in-depth discussion of farm forestry in 1995. These figures suggest it is reasonable to believe that the adoption of farm forestry can be increased. As simply put by Raintree (1983, p. 173) ‘...no agroforestry technology... will have a significant impact on the landuse scene unless it is adopted by a significant percentage of the intended users’.

The Australian approach

Commercial reafforestation began in Australia during the middle of the nineteenth century with South Australia and Victoria commencing trial plantings in the 1860s and 1870s respectively. Yet it was not until after the 1950s that the main expansion in plantation area occurred (Ryan, 1994). The declining value of traditional agricultural commodities is suggested by Inions (1995) as prompting the rural community to examine alternative enterprises to maintain farm viability, one of which is farm forestry. As in many other countries, establishing windbreaks to prevent excessive winds tended to be the most common form of integrating trees with agriculture (Prinsley, 1991; Matthews et al., 1993; Nair, 1993; Rule et al., 1994; ABARE, 1995).

The Joint Venture Agroforestry Program initiated by the Australian government and industry in the early 1990s included a major farm forestry project with several research projects contributing to the development of a national farm forestry strategy. The Joint Venture Agroforestry Program
(involving Rural Industries, Land and Water Resources, Forest and Wood Products Research and Development Corporations) and the Murray-Darling Basin Commission (MDBC), support investigation and development of a range of farm forestry research topics. These include: socio-economic factors affecting adoption; tree selection and management; harvesting, processing and marketing of forest products; interactions between trees and agriculture; environmental rehabilitation and sustainability; insect control; growth modelling; regional and national strategies; and policy analysis. Research projects investigating many of these topics are also being conducted by the CSIRO, state agencies, universities, industry, consultants and research cooperatives (e.g. Cooperative Research Centre for Temperate Hardwood Forestry, Trees for Profit, Southern Tree Breeders Association).

The Farm Forestry Program (FFP) is a major farm forestry initiative and is managed by the federal Department of Primary Industries and Energy (DPIE). The objective of the FFP is to:

- promote commercial wood production on cleared agricultural land, so as to provide a wood resource for industry, to improve the skills base of landholders in plantation management, and to stimulate regional economic development (DPIE, 1995a, p. 15).

The FFP aims to do this by supporting the development of a network of integrated regional farm forestry demonstrations, extension and training activities, and through improved linkages between industry and the farming community. Federal government funding of about AUD8 million was provided for the establishment of the FFP and the North Queensland Community Rainforest Reforestation Program. The FFP initially involves government expenditure of AUD3.7 million on 26 projects over the period 1993-1996. Additional government funding of AUD2 million has been secured for the FFP in 1995/96 (DPIE, 1995b). Further funding for 1995/96 and for future years is being sought by DPIE through the Wood and Paper Industry Strategy released late-1995 (C'wealth, 1995). The FFP has informal links with the National Landcare Program (NLP), with the NLP's aim '...to promote farmers' awareness of environmental and sustainable agriculture issues'. (ABARE, 1995, p. 13). The FFP is distinct from the NLP primarily due to the former's focus on tree planting for commercial wood production. However, both programs seek to inform each other of effective approaches to expanding tree planting on cleared agricultural land.

Given the current significance of the FFP in the development of farm forestry in Australia, it was considered timely by DPIE and other program participants for an evaluation to be conducted in 1995. The authors were commissioned to undertake an evaluation of the FFP during 1995 (Curtis and Race, 1995).
Evaluation methodology

Evaluation has an action focus which distinguishes it from basic research which attempts to contribute to theory development and the discovery of knowledge for its own sake (Prosavac and Carey, 1992). Whilst applied research attempts to identify solutions to social problems, Patton (1990) suggested evaluation tests the effectiveness of specific interventions with the focus upon obtaining information of use to stakeholders involved in ameliorating social problems. Increased understanding of organisations and political decision making, including greater awareness of the difficulties of influencing decision making has forced evaluators to adopt more limited expectations and to renew their efforts to make evaluation relevant (Cook and Shadish, 1986; Shadish et al., 1991). From the outset the authors adopted a utiliser focus (Patton, 1987), with the emphasis upon formative evaluation that would assist the refinement and improvement of the program (Chen and Rossi, 1983; Patton, 1990; Shadish et al., 1991). The authors worked closely with the DPIE program staff, as DPIE would be largely responsible for implementing evaluation findings.

The evaluation involved three phases:

- a detailed desk top review of the 26 FFP projects;
- in-depth review of selected regional projects; and
- interviewing a large number (85) of program participants (farmers, industry and government staff) to obtain feedback of client perceptions and needs.

The evaluation brief sought assessment of the appropriateness (compared to alternative approaches), efficiency (benefit-cost analysis) and effectiveness (achievement of objectives) of the FFP in contributing to farm forestry. After a review of relevant DPIE FFP documents to identify key farm forestry issues and after discussion with DPIE staff and the Evaluation Steering Committee, the authors identified a preliminary list of key evaluation topics. This list of key evaluation topics was refined over time to provide the evaluation criteria listed below.

Given that forestry in Australia is a long-term industry and the complex and somewhat risky nature of commercial farm forestry, it seemed reasonable to assume that limited government intervention was not expected to produce sufficient trees to establish a viable farm forestry industry in strategic regions in the 3-year time frame of the FFP. Indeed, there was no indication in program documentation of tree planting targets to be achieved. Given the limitations of single measures such as “trees in the ground” to assess the impact of the FFP, the authors examined a range of evaluation criteria. These criteria were:

- impact on management policy/practices of landholder, industry and government stakeholders,
- extent of project findings,
• contribution to raising awareness,
• contribution to knowledge/training (particularly of landholders),
• contribution to enhanced linkages between stakeholders,
• overall project performance against project objectives, and
• project administrative performance.

As part of the desk top review, a qualitative assessment was made of each project's performance (using a 1–5 rating, with 1 as poor and 5 as excellent) on each criterion (see Table 1).

Discussion

Government intervention and the expenditure of public funds to develop private farm forestry appears to have been justified in terms of the perceived long-term viability of the industry and a range of community benefits expected to flow from farm forestry.

The authors determined that the key assumptions underlying the FFP were that a program involving limited government funding would contribute to the development of a viable and self-sufficient farm forestry industry by:

• increasing awareness of farm forestry;
• changing landholder attitudes about farm forestry;
• raising skills and knowledge of farm forestry; and
• linking key farm forestry stakeholders (landholders, industry and government) in the various regions, frequently through the emerging community groups such as landcare.

A key evaluation finding was that the FFP sought to address a comprehensive range of farm forestry topics through an appropriate mix of community development and research projects. For example, community development projects typically sought to involve regional farming communities with information days and visits to on-farm demonstration sites. Interested landholders were kept informed of project developments through regular (1/month) project newsletters. Research projects included hardwood tree breeding (eucalypt spp.) and commercial investigations. The FFP had also made a distinctive and important contribution to the emergence of farm forestry as an identifiable and legitimate farm enterprise in many agricultural-forestry regions. However, despite some obvious successes with regional projects, at this stage, viable farm forestry industries have not emerged in any region. Indeed, FFP activities had stimulated the establishment of 500 ha of tree plantings, much less than the critical mass required to support commercial timber production. On a positive note, all 26 FFP projects had established cooperative links with key farm forestry stakeholders to share information likely to contribute to the development of farm forestry (see Table 1). Most FFP projects had undertaken activities (e.g. established demonstration sites, held information days) that
Table 1. Summary of FFP project performances: Percentage of projects receiving a satisfactory rating (scored 3 and above) \( (N = 26) \).

<table>
<thead>
<tr>
<th>Findings</th>
<th>Awareness</th>
<th>Training</th>
<th>Linkages</th>
<th>Impact</th>
<th>Reporting</th>
<th>Against objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>58%</td>
<td>86%</td>
<td>44%</td>
<td>100%</td>
<td>73%</td>
<td>96%</td>
<td>77%</td>
</tr>
</tbody>
</table>

*See explanation of criteria in Discussion*

could be expected to have made a strong contribution to raising the awareness of farm forestry (see Table 1). However, a large proportion of projects focussed upon raising awareness of farm forestry without any systematic approach to developing landholder knowledge and skills (see Table 1). Education/training appears essential to increasing farm forestry adoption and so this deficiency reduced the impact of the FFP. Whilst, large numbers of demonstration sites had been established (covering about 1,300 ha), inadequate consideration had been given to monitoring, evaluation and dissemination of findings.

The authors also suggest that a number of farm forestry topics require further exploration, development and coordination. These topics include:

- developing effective links between labour market initiatives and farm forestry projects, thereby allowing unemployed people to be purposefully involved in community development work;
- ensuring private landholders have sufficient incentive (e.g. harvesting rights) to retain and manage remnant native vegetation for conservation, land protection and commercial benefits;
- developing guidelines for ‘best practice’ farm forestry;
- working through international forums to promote the adoption of ‘best practice’ native forest management and ensure unsustainable harvesting of timber resources is phased out (selling of unsustainably harvested timber in world markets can undermine the market price of timber produced from ‘best practice’ farm forestry);
- providing harvesting rights for trees established for farm forestry at the time of planting; and
- forestry rights legislation to enable separation of ownership of trees and land, thereby allowing greater investment flexibility considered important for long term farm forestry projects which may having a growing period of 30 years or more.

While there is growing recognition that the decision by Australian farmers to adopt farm forestry involves the complex interaction of social, economic and environmental factors, it is argued by Treecorp (1993, p. iii) that ‘... the strongest stimulus (e.g. profitability, regional development) and the greatest obstacle (i.e. risk of poor returns) is the economic argument’. This situation appears to be shared with Canadian farmers who also ‘... face the very real
conflict of surviving in an increasingly competitive agricultural market place, while shouldering the burden of maintaining the integrity of the land'. (Matthews et al., 1993, p. 167). Growing trees for timber involves a relatively long term commitment, either from the landholder, government or industry and there are many economic constraints upon the development of profitable farm forestry. These constraints include lack of unbiased locally-relevant information, lack of technical and educational assistance, high establishment costs, difficulty in managing livestock amongst trees, and belief that the farm already has enough trees (Prinsley, 1991; Lawrence and Hardesty, 1992; Lawrence et al., 1992; ABARE, 1995). Other reasons include long investment periods, lack of liquidity, markets heavily influenced by low prices for native forest timber in Australia and overseas, uncertain market demands, uncertain economic predictions of a new long term enterprise, and the profitability of alternative enterprises in high rainfall areas which alter opportunity costs. These impediments were confirmed by the interviews with 85 farm forestry stakeholders. The economic limitations of investing in long term projects (i.e. commonly >10 years) with poor ‘cash flow’ and a small, discontinuous supply of timber has been noted as a particular disincentive to farmers (ACIL, 1984; Bartle, 1995) who tend to be dependent on maintaining adequate levels of cash flow in their businesses. The problem of landholders having insufficient funds to cover the initial capital costs of AUD1,200–1,500/ha (Eckersley et al., 1993; Lyons 1993) and long period before there are significant financial returns on the investment is of concern not only in Australia, but throughout many European countries and the USA (Pearse, 1994; AACM et al., 1996). Indeed, for many marginally viable farmers, farm forestry does not represent a sufficiently reliable or quick return. The following comment from an interviewee illustrates this view:

... I doubt we'll be farming here in 20 years, as we won't have the money to buy the other kids out. So there doesn't seem to be much point going to the trouble of managing a lot of trees for timber for someone else's benefit. We'll probably sell up here and go buy a smaller place near town.

Those promoting farm forestry as a strategy to solve a variety of economic and environmental problems need to be careful to give adequate consideration of the relationship between landholders and industry. Burch et al. (1992) argued agribusiness corporations, which largely control the supply of farm inputs and the processing and marketing of farm outputs, have dramatically altered the social organisation of agriculture. Furthermore, the family farm has been progressively integrated into the corporate structure of agribusiness, with farmers assuming a subordinate and dependent role as a production unit in industrialised agriculture (Burch et al., 1992). In the case of farm forestry, such a relationship may force small-scale tree growers to become 'price takers' with their profit margins squeezed. If this occurs, many of the suggested benefits of farm forestry will not flow to farmers or their regional
communities. These problems may be accentuated in Australia by the nature of the timber industry where processors often enjoy a regional monopoly (AACM et al., 1996), with competition limited by product specialisation and long distances, and therefore high transport costs. Small-forest grower cooperatives have been forming in some regions (e.g. north-east Victoria, Tasmania) since the late-1980s to better coordinate disparate small timber supplies and add to regional competition (Henderson and Leech, 1994). However, Dunse and Sinclair (1995, p. 35) found only 8% of 96 landholders randomly surveyed preferred a grower cooperative as a marketing partner in farm forestry, compared to 83% who preferred the forest industry.

Prinsley (1991, p. 2) points out that “although it was emphasised as a key research area, social research has received very little attention” from those researching farm forestry in Australia. This situation is typical of the limited attention to social research on key natural resource management issues (Rickson et al., 1987). However, there is some evidence that this is changing (MDBC, 1994; ANCA-LWRRDC, 1995).

Interviews with farm forestry stakeholders identified some important social factors affecting farm forestry adoption in Australia, including:

- the trend for increased numbers of landholders with greater off-farm income and less reliance upon on-farm income; and
- farm family dynamics.

A survey of rural landholders participating in the NLP revealed a mean of 29% of members had full-time off-farm employment (Curtis, 1995). Compared to full-time farmers, part-time farmers may have higher levels of off-farm income yet less time for on-farm management than full-time farmers. Interviews revealed part-time farmers are more inclined to ignore the often higher financial risks associated with growing non-commodity tree products and less likely to be deterred by the lack of cash-flow of long term farm forestry ventures than full-time farmers.

Farm family dynamics may constrain or encourage adoption of new practices (Munton et al., 1992). Farm family dynamics which may affect the capacity of a farming business to change or diversify farm production, include: family size; the age and number of dependents in a family; amount of off-farm employment; and inheritance arrangements. A possible situation may be, if a farmer can attain full financial control of a prosperous farm before the age of 30, say through inheritance, then long-term options (e.g. farm forestry) are more likely to be considered. Conversely, farmers who are struggling financially and have several dependant family members may be far less likely to adopt a long term and still largely uncertain enterprise such as farm forestry. Even when landholders agree with the technical information given to them about the benefits of farm forestry, they may not be in a position to adopt. Additionally, in times of uncertainty (economically or socially), farmers may wish to maintain flexibility, and so are less inclined to make long term investments with enterprises such as farm forestry. Also, for younger landholders
or where the next generation has an interest in carrying on the farm, there appears to be greater interest in farm forestry. The following comment from an interviewee illustrates this point:

... we have an 18-year-old son who is interested in the farm, so hopefully we're adding something to his future.

ABARE (1995) also found broadacre farmers who were planting trees were younger, operated smaller areas and had higher farm income compared to those who were not planting. This Australian research is similar to that in Canada, with Matthews et al. (1993) reporting that younger farmers were more likely to consider new technologies, such as agroforestry.

Conclusions

Since the 1980s there has been a rapidly growing community awareness of the need to integrate trees with agriculture to address natural resources degradation in Australia (Inions, 1995). However, with uncertain economic returns for a long-term and often complex undertaking, it is understandable that farm forestry adoption has been slow and viable regional farm forestry industries have not emerged despite considerable government support. Nevertheless, the FFP has made an important contribution to achieving the potential of farm forestry and continued government support is warranted. In many instances, returns from growing forest products may not be sufficient motivation for adoption of farm forestry and where there are important community benefits, the authors suggest there is a legitimate role for governments in supporting farm forestry. The difficulty here, is in apportioning the costs of these benefits between individuals and the community (Pearse, 1994). Advances in this direction were made when the MDBC Ministerial Council recently commissioned a consultancy to prepare a discussion paper on cost sharing for on-ground works to reverse land degradation (AACM, 1995).

Australian government funding in support of farm forestry needs to be better coordinated, with formal links between the multiple federal government agencies (e.g. DPIE, MDBC, Joint Venture Agroforestry Program). A coordinated approach at this level would encourage a more efficient allocation of research and development funds and better dissemination of research findings.

Farm forestry in Australia tends to produce small volumes of timber causing economic returns to the grower to be less than optimum (JAMC, 1991; Henderson and Leech, 1994; Pearse, 1994), with the absence of regional markets a major disincentive to farm forestry (Prinsley and Moore, 1992). However, grower cooperatives have formed in some regions and offer some protection of growers’ interests, so are likely to offer part of the solution to the marketing problems of small and discontinuous timber volumes. Government and/or industry offering more flexible credit, joint-venture
arrangements and sharing establishment costs would reduce a major impediment to farm forestry adoption.

Until now, a large proportion of Australian government FFP funds have focussed upon raising awareness of farm forestry without a systematic approach to increasing landholder knowledge and skills. Program activities need to reflect the reality that farm forestry is a long term, somewhat risky and complex undertaking and that extension/communications theory suggests awareness raising will be insufficient to create the conditions in which widespread adoption of farm forestry occurs. Such training projects must involve skilled and experienced people/organisations to develop and trial courses covering the range of farm forestry management topics. This situation appears to be similar at the international level, as Nair (1993, p. 111) points out the recent ‘... recognition of serious deficiencies in agroforestry education and training’. Sands (1990) provides a useful list of agroforestry topics taught at university level in Australia.

In summary, the development of farm forestry has considerable potential to yield important economic, environmental and social benefits for regional communities. These benefits may include better catchment management, the multiplier effects of incomes spent in regional communities derived from processing activities, improved farm income, and the social impacts of increased rural employment and associated opportunities for the youth of regional Australia. It appears reasonable to expect continued debate over issues surrounding harvesting of native forests. It is here that farm forestry, as an adjunct to plantation development, can play an important role in forging a new alliance between commercial realities and conservation imperatives.

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