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Environmental and commercial outcomes through agroforestry

Policy and investment options

**A report for the RIRDC/Land & Water
Australia/FWPRDC/MDBC
Joint Venture Agroforestry Program**

by Barry Buffier and
The Allen Consulting Group

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Foreword

Significant areas of land in the low-to-medium rainfall catchments require strategic revegetation with woody perennial plants in order to reduce the rate of water and land salinisation. Agroforestry has the potential to be a major part of this if the present low returns can be improved.

These low returns are primarily caused by a lack of identified tree-based industries that either are as profitable as current grazing or cropping systems or are able to capture returns for the off-farm environmental benefits they provide. However, if the community is to pay for these public benefits, the trees must be located on farms and in catchments where the benefits are clearly available.

This report discusses some measures for increasing the level of agroforestry while at the same time providing environmental benefits. It evaluates a range of instruments and initiatives and recommends a course of action as a pilot program. The project was funded by the Joint Venture Agroforestry Program, which is supported by the Rural Industries Research and Development Corporation, Land & Water Australia, Forest and Wood Products Research and Development Corporation and the Murray Darling Basin Commission. These corporations are funded principally by the Commonwealth Government.

An addition to RIRDC's diverse range of over 800 research publications, this report forms part of our Agroforestry and Farm Forestry R&D Program, which aims to integrate sustainable and productive agroforestry within Australian farming systems. Most of RIRDC's publications are available for viewing, downloading or purchasing online through our website:

- downloads—www.rirdc.gov.au/reports/Index.htm
- purchases—www.rirdc.gov.au/eshop.

Peter Core

Managing Director

Rural Industries Research and Development Corporation

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The consultants are also very grateful for the contributions of members of an expert panel representing farming and environmental stakeholders, forestry and financial interests, research institutions, and state and federal governments. These individuals are detailed in the report, but it should not be construed that they were in agreement with all aspects of the report. In addition, many other people freely gave of their time and knowledge to comment on various aspects of the draft report.

Dr Roslyn Prinsley, from RIRDC, was an enthusiastic supporter of the project and provided strong input and critical comment as well as numerous references and contacts. These were all very valuable.

Finally, thanks are due to John Burch, from The Allen Consulting Group in Canberra, who played a major role in drafting this document.

Contents

Foreword	iii
Acknowledgments	iv
Key Findings	vii
Executive Summary	viii
1 Introduction	1
1.1 Challenge and opportunity	1
1.2 Terms of reference	4
1.3 Report outline	5
2 Context	6
2.1 Forestry fundamentals	6
2.2 Impediments to agroforestry	12
2.3 Impediments and the investment chain	15
3 Encouraging sustainable agricultural investment	17
3.1 A framework	17
3.2 Evaluation criteria	18
3.3 Measures and aims	19
3.4 Key Findings	28
4 Packaged approaches	29
4.1 Environmental management systems	29
4.2 Joint ventures	30
4.3 A vegetation bank	31
4.4 Regional investment vehicles	33
4.5 Leveraging sustainable natural resource management	35
4.6 Multiple environmental services markets	39
4.7 An agroforestry environmental services brokerage	40
4.8 Evaluation	43
5 Next steps	45
5.1 The Three Is Framework	45
5.2 Links	48
5.3 Examples	49
5.4 A pathway for change	52
5.5 Evaluation	54
5.6 A pilot approach	54

Appendix A Terms of reference	56
Appendix B The expert panel	58
B.1 The panel's role	58
B.2 Panel members	58
Appendix C Existing measures	59
C.1 Encouragement of altruism	59
C.2 Closing information gaps	61
C.3 Regulation	64
C.4 Funding	65
C.5 Providing incentives	69
Appendix D Environmental management systems	71
D.1 The role and use of environmental management systems	71
D.2 Relationship to agroforestry	71
D.3 Recent developments	72
D.4 Key findings	73
References	75

Key Findings

- Low returns form a significant barrier to agroforestry investment in areas where it is likely to deliver environmental benefits, especially in low to medium rainfall areas.
- The two prime reasons for these low returns are: lack of identified new tree-based agroforestry industries which will give a comparable rate of return to annual crops or grazing regimes; and absence of rewards for the delivery of the off farm environmental services that agroforestry provides.
- New industries are likely to be ones which provide a higher value product per hectare than timber in the low to medium rainfall areas. This is an area where there is little research funding at present.
- It is unlikely that there will be significant levels of additional investment in agroforestry with environmental advantages unless governments are prepared to purchase, or facilitate a market for, the environmental benefits delivered by private sector agroforestry investors whether they are existing landholders or joint venture investors.
- Existing funding arrangements are too focussed on direct government funding of on ground activities, community action and altruistic behaviour. Much of the allocation of existing funds has not been strategic or driven by likely returns. Private investment has been sorely neglected.
- Governments need to be sure that any encouragement or incentive measures are in fact used to purchase desired outcomes. Any special arrangements need to be limited to farmers or landowners undertaking appropriate landuse changes that impact positively in those regions and where there is reliable information about those benefits.
- There are a multitude of measures available which will, if used in appropriate combinations, achieve the desired policy outcomes. The combinations need to address issues in terms of **information** shortfalls, fulfilment of new **institutional** roles and provision of new **incentives**.
- Lack of **information** is hampering both investors and government. Investors need information about where agroforestry is desired. Governments should specify priority areas where it views that agroforestry activity will be environmentally beneficial.
- Specific **incentives** warranting further development include: government purchasing of environmental services; extension of existing kinds of tax concessions for investors in innovative agroforestry ventures (similar to Pooled Development Funds); and Environmental Management Systems linked to catchment plans.
- In terms of new **institutional** arrangements, the Liverpool Plains Land Management Committee approach and a form of Vegetation Bank have much to offer. The Commonwealth and the States should also explore further the feasibility of establishing an agroforestry brokerage capability.
- The NAP and associated Catchment level plans and business plans provide a pathway for the implementation of measures that will leverage private investment and direct investment in a strategic manner.
- The NAP process can be made more efficient by being more explicit about where public benefits exist and having a menu of pre-approved measures available to regional catchment bodies to help them develop their catchment plans.
- Both the NHT and MDBC now have formal links with the NAP process and there is an opportunity to achieve greater role clarity for these three stakeholders by implementing our proposal to leverage private sector investment as a pilot program in one or more catchments.

Executive Summary

This paper addresses a very complex issue: how to encourage investment in agroforestry whilst also delivering environmental benefits at a farm and regional level which will offset some of the effects of dryland salinity which threatens some 5.7 million hectares of land in Australia.

The issue is that trees need to be planted in specific areas to obtain the required environmental benefits. Understanding of this complexity has brought us to the point where, from an environmental perspective, it is now recognised that not all trees are “good” trees.

In addition it is difficult for the private investor to capture these environmental, and other public benefits such as biodiversity. This often means that the commercial returns achieved are insufficient to justify the investment, and hence the trees are not planted.

The objective of this study is to find ways of encouraging more trees on farms in places where they are useful for the environment. The task involves assessment of existing and potential vehicles and policy measures to encourage the development of agroforestry at a farm and regional level in a way that delivers benefits to producers and the environment.

Based on this review the paper proposes an approach that appears likely to be feasible and which can be implemented as a pilot program.

Agroforestry Challenges

Australian agroforestry is most developed in regions of relatively high rainfall that are close to timber markets or wood processing facilities. Established tree crops have traditionally used long rotations and produced timber-based products in areas with high rainfall. Agroforestry is less well advanced and less easily driven by wood fibre production in the sheep-wheat belts and pastoral zones, which generally are further from markets and processing facilities and have lower rainfall and hence lower timber productivity.

The Joint Venture Agroforestry Program (JVAP) has recognised that the agroforestry systems of the future will need to be in lower rainfall areas in order to address land degradation and enterprise diversification issues in these areas. The focus of JVAP research is therefore on redefining the range of possible farming and agroforestry systems in these lower rainfall areas.

There are many factors that act as substantial barriers to agroforestry. Well documented barriers include: the opportunity cost inherent in locking land away under trees that could be used to generate a more regular income; lack of knowledge about forestry; and timber marketing challenges stemming from the dominance of existing major players. Lack of funds is another major issue.

The pursuit of agroforestry for environmental benefits additional to economic factors raises even more substantial barriers for farmers with the most important being low returns. This raises two issues. The first is that we need new agroforestry industries that are profitable in low rainfall areas. The second is that we need payments for off farm environmental services as most of the environmental benefits flow off farm. This is an area subject to ‘market failure’. Many of the environmental gains are unpriced public goods or externalities.

Existing Measures

There is a large and confusing array of policies, tools and vehicles that have been deployed to encourage more sustainable agriculture and land use. These have been sorted into five broad categories of measures that:

- encourage altruistic investment — providing structures for activities that have regard to benefits for others and which may or may not involve commercial gain;
- close information gaps — creating information or circulating it through education and training to change behaviour or alter perceptions of risk;
- regulate to achieve outcomes — generally involving prohibition of unsustainable activities;
- fund desirable activities — governments have traditionally purchased desired outcomes on behalf of the community; and
- provide incentives — rewarding or penalising activities can involve restoring, implementing or complementing the operation of market forces.

The various measures in use at present suffer deficiencies including that they:

- are rarely actually focused on encouraging private sector investment on private land — funding activities in particular concentrate on public sector or community group projects;
- do not in general address or overcome the fuller range of impediments faced;
- do not fully address all of the layers in the investment chain, or work to take fullest advantage of the considerable pool of capital that is actually available;
- provide a significant injection of funding to combat environmental issues and threats, including dryland salinity — but they are fairly ‘blunt’ in that they tend to support the activity largely independently of specific environmental gains; and
- provide very little information about expected performance, or what is being or will be achieved (ie, what environmental, social or economic outcomes will be advanced).

The categories of measures were evaluated against five criteria in terms of:

- effectiveness
- economic efficiency
- equity
- stakeholder support
- low administrative burden

None of the categories of existing measures are viewed as meeting all of the key evaluation criteria. This is not to suggest that they do not have a role to play but it does explain why successful public policy measures generally involve packages of two or more of the basic category types.

Package Approaches

A further range of measures is under trial or has been recently proposed. Most of these explicitly seek to bundle investments in order to address a broader range of impediments but none of the following proposals are ready to be applied ‘off the shelf, nor do they provide a complete solution.

A significant challenge with *environmental management systems* (EMS) is that it is not clear-cut that consumers or regulators in overseas markets (which have arguably driven Australian producer interest in EMS) are as concerned about salinity and land degradation in Australia as they are about, say, chemical-free food. Until the business case for an EMS linked to specific environmental outcomes is firmly established, its widespread uptake by conventional (particularly smaller) producers will be delayed.

The *joint venture approach* is viewed as being limited in its capacity to leverage investment in low to medium rainfall areas without an additional source of assistance. It also does little for longer run efficiency as it does not provide support for producers to raise prices or target more profitable segments to cover their investment in more sustainable production.

The *vegetation bank* does not currently have a stream of identified public sector funds. Therefore its scale is uncertain, as is its potential to operate on a basin wide or even larger scale. The approach does not raise efficiency, as it offers no means to influence prices for the supported industry’s products in order to reflect the scarcity value of more sustainable production.

Regional investment vehicles are still searching for means of leveraging sufficient funds. This is related to the fact that they are unable to influence prices so that more sustainable producers are rewarded for being so, or can at least cover their higher costs.

At this stage only cautious, or in-principle, support has been identified for the approach offered in the recent *Leveraging Private Investment* report, in part reflecting its complexity and the large scale adoption required to be fully effective.

The effectiveness of the *multiple services market* approach is open to question because of insufficient knowledge at this point in time on which to build the tradeable permits. It is not certain that stakeholders will be supportive of mechanisms that will constrain their access to resources that were previously used for free.

Engaging the Commonwealth as an *agroforestry broker* has many strengths. It could stimulate further investment in agroforestry in places that generate environmental gains. The approach proposed may, however, burden the Commonwealth with mixed purchaser and regulatory roles, and overlook much that the forestry sector could contribute.

Next Steps In A New Direction

The analysis undertaken in this study points to the observation that the search for a single, optimal measure is likely to be fruitless. There is no silver bullet.

The complication may be that we have mis-specified the problem. Rather than looking for an optimal measure, we should be looking for a framework from which choices can be made. That is, a framework that provides the scope for selection to achieve an optimal mix.

A framework has been developed that delivers outcomes in three overlapping areas. The three *Is* framework proposed includes a menu of measures that could be pre-approved under the NAP process to provide:

- Information;
- Institutions;
- Incentives.

A list of potential measures is detailed in the body of the paper in table 5.1 and examples of how these could be applied is demonstrated in boxes 5.1, 5.2 and 5.3.

Information flows are fundamental to a task which aims to divert capital flows in the public interest and influence outcomes on individual farms, as well as on a regional, catchment, and ultimately national scale. Obtaining public trust and confidence in the arrangements hinges on having a robust understanding about what is to be achieved in terms of say, salt readings as well as changes in other environmental attributes, and being clearly able to account for actual outcomes as well as public resource inputs.

Key new *institutional roles* that need to be defined can be divided into three categories:

- regulatory roles;
- intermediaries to bring together access to finance, forestry skills and land; and
- investor roles.

The use of *incentives* is widely recognised as crucial to changing environment patterns. What is also clear is that incentives are unlikely to be successful without substantial progress in the earlier areas (ie, the other *Is*). The tax measures, in particular will require information and institutional support to encourage investment in situations where specific activities need to be matched with (or adapted to) specific regional circumstances and priorities.

It is very unlikely that any incentive measures for (profitable) private sector investment on private land will receive the support of environmental groups and the community at large without clear evidence that they are achieving a public or environmental purpose, or involve design and governance structures that give confidence.

A Pathway

Even with an optimal mix of measures assembled under the three *Is* framework, change is unlikely unless the structure can be accommodated within frameworks and strategies that are already understood and resourced.

A good pathway would involve programs and activities already concerned with improving natural resource management outcomes, yet where the framework is still open to new ideas. We believe that The National Action Plan for Salinity and Water Quality (NAP) fits this requirement admirably and that it is an excellent start. We have aligned our proposals, in the first instance, with the NAP since it also has a strong funding interrelationship with the Natural Heritage Trust (NHT). In addition, consistency with the Murray Darling Basin Commission (MDBC) policies and strategies is required for the accreditation of catchment plans.

We recommend the following changes to the NAP:

- giving regional catchment bodies preparing catchment plans a list of measures drawing on the three *Is* framework that have been pre-approved. In this context, pre-approved would mean that accreditation should be a degree easier because well understood mechanisms have been employed. Innovative arrangements would not be precluded, but the architects of catchment plans that use them should understand that they would need to explain more fully why additional approaches are desirable.
- developing catchment plans that are more transparent about the relative priority placed on salt, water, biodiversity and other outcomes and the public good aspect of these outcomes.

- specifying the likely magnitude of public benefit associated with various priorities and actions so that it is possible to assign priorities across catchments and so that national measures can be implemented.
- holding some of the funding under NAP centrally rather than allocating it all to the catchments so that national measures, such as market based mechanisms, a vegetation bank or tax arrangements can be applied across catchments.
- using the investment plans for each of the catchment plans to leverage private investment rather than focussing on government money, community activity and altruistic behaviour.
- leveraging private sector investment through the investment strategy and business plan requirements of the catchment plans by allowing the private sector to capture some of the public benefits they are contributing towards. This can be achieved by competitive tendering for a grant to plant trees in areas where there are significant public benefits, the use of Sustainable Landuse Investment Companies for trees planted on areas designated in an accredited plan, or other tax incentives for private landholders implementing an EMS which is strongly linked to the catchment plan objectives.

Whilst the focus of these proposals has been in the context of achieving a greater uptake of agroforestry in areas which will deliver a better environmental outcome, the principles we are proposing can apply to the majority of actions that are being included in the draft catchment plans currently available under the National Action Plan process.

1 Introduction

1.1 Challenge and opportunity

There is compelling evidence that much land in medium-to-low rainfall agricultural areas of Australia requires revegetation with perennial plants. Reforestation would have a significant impact on rates of water and land salinisation, which at present are posing serious environmental, economic and social threats. Current land and water degradation is estimated to impose costs of approximately \$3.5 billion per year in Australia, equivalent to about an eighth of the value of the nation's agricultural activity.

It helps to understand the problem if we recognise that historically it was market prices and signals, or tax incentives and government regulations, that led to much of the land in low-to-medium rainfall areas being cleared of trees. Quite simply, converting the land use to either grazing or cropping with annual crops gave a higher return on capital invested by the landholder compared with leaving the land in its natural state.

The scale of reforestation required is significant, possibly involving new plantings to multiply the current forestry estate many times over. Increasing perennial vegetation cover on this scale—whether for timber, biomass or other products—would make a contribution to reducing greenhouse gas emissions, stimulate regional development, and provide employment in local processing and manufacturing industries. Biodiversity threats can be tackled using suitable species and designs.

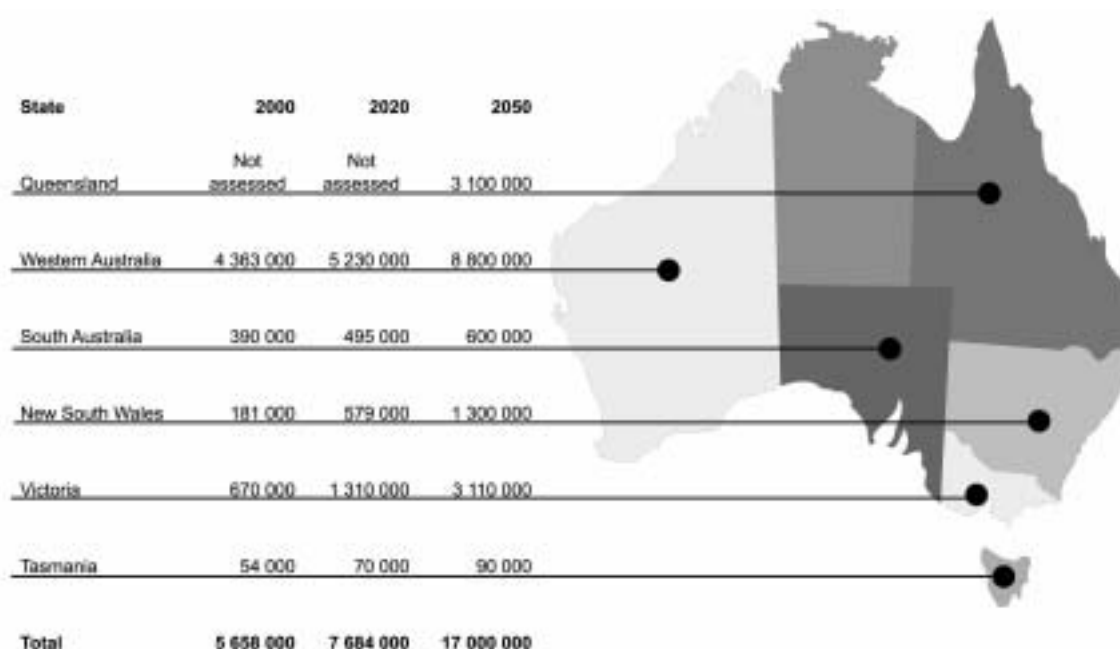
The scale of action required to redress the salinity threat, or to make a meaningful difference in fighting it, is daunting. The National Land and Water Resources Audit found that approximately 5.7 million hectares of Australia's agricultural or pastoral zone is at risk; this figure could treble, to 17 million hectares, in 50 years' time (see Figure 1.1).

Revegetation over such a large area poses a significant funding challenge: an investment involving billions of dollars would be required. Given fiscal constraints, this is likely to be beyond the capacity of governments.

Private investment may offer a solution. Private investment to pay for tree establishment and management could be encouraged through development of new agroforestry industries operating on a large scale in the lower rainfall agricultural areas. The primary challenge is to make these industries profitable.

A further challenge is to link profitability with environmental goals. Offering an incentive to plant in areas for a specific environmental purpose—for example, to affect local water flows or to provide a wildlife corridor—is central to achieving sustainability. Commercialisation of agroforestry environmental services represents both a major challenge and a major opportunity.

Figure 1.1 Areas at high risk or hazard of dryland salinity, Australia, 2000–2050



Note: The Northern Territory and the Australian Capital Territory were not included because their salinity problem was considered to be very minor.

Source: National Land and Water Resources Audit (2001).

Information shortages may be as big a hurdle as the scarcity of capital. Many environmental benefits from actions such as tree planting are strongly ecosystem-specific, being influenced by the nature of the water flow, landscape features, and the area and density of plantings—that is, they vary depending on the nature of threats to a particular piece of land or catchment (O’Loughlin & Nambiar 2001). Many analysts have highlighted the complexities associated with the interactions between factors such as precipitation, vegetation cover, surface water flows and groundwater processes (ABARE 2001b). There are also important time and spatial elements associated with the benefits that can be delivered through planting trees, and the full suite of potential benefits will not be realised in all areas.

Assistance that leads to indiscriminate tree planting, for example, could potentially exacerbate rather than alleviate water quality and salinity problems in some circumstances. Concern has been expressed that, if forests are planted on a large scale in certain areas, hydrological flows could be diminished and water availability or quality threatened for other users; that is, a trade-off in available water resources may be necessary if the effects of the plantings are not properly considered. Outcomes also change over time, and obtaining environmental outcomes is invariably long term in nature (O’Loughlin & Nambiar 2001). Additionally, many environmental problems, such as dryland salinity, involve privately owned land, and detailed information held by landholders is not always readily available for consideration in the public domain.

Box 1.1 The role of afforestation in controlling dryland salinity

Controlling salinity is a complex task because of the many causes and solutions. Afforestation is one approach that is widely recognised as being able to play a positive role in many circumstances.

The intricate interplay between trees and salinity has become most apparent where clearance of native vegetation has produced major changes in the water cycle. These changes have altered groundwater levels and led to increasingly widespread dryland salinity scalds. Replanting trees is seen as a way of better using water to reduce 'leakage' into the groundwater system.

Where the causes of dryland salinity are linked to specific groundwater behaviour, strategic replacement of deep-rooted perennials may check or slow the spread of salinity and in some cases even mitigate damage. Although the hydrological response of catchments to tree planting varies enormously between areas, reforestation can play an important part in lowering the water table again and redressing land productivity failures over time. In general, tree plantings can help with salinity and lost productivity in two areas—the recharge zone and the discharge zone.

Most groundwater recharge is supplied by rainfall (except in the case of irrigated land), and more of it reaches the groundwater when trees are cleared. This is because trees develop extensive root systems to trap the water, which is then used for tree growth or returned to the atmosphere through evaporation and transpiration. Scientists estimate that the amount of water that percolates below the root zone of crops and pastures can be 10 to 100 times that percolating below trees.

Although tree plantings in discharge areas are of questionable value for lowering water tables, trees can still play an important role in these areas. For example, trees and other deep-rooted salt-tolerant plants can help stabilise the site and prevent soil erosion, provide fodder shrubs for drought-proofing, increase biodiversity and productivity, and improve aesthetics.

Planting trees at the required scale is not simple and relies on a good understanding of the interactions between trees, water and salt. Nevertheless, modelling exercises have shown that it can produce significant benefits. The benefits achieved will vary depending on groundwater flow systems and the scale being addressed. The greatest difference can be made at the local scale, where groundwater flows are most responsive to tree plantings. In comparison, groundwater flows at the intermediate scale are less responsive to plantings; the regional scale is even more challenging, requiring larger amounts of vegetation and longer periods before benefits are realised.

Although reafforestation has been widely discussed as a tool for combating salinity, a diverse range of factors have operated to limit reafforestation for this purpose to date. Factors that affect the success of afforestation include:

- the location and arrangement of trees within the catchment
- the catchment–climate combination
- geographic restrictions such as the degree of salinisation present
- the ability to make tree planting commercially attractive by building profitable industries based on trees
- the ability to value, and capture value from, environmental services arising from tree plantings
- the ability to adopt farm forestry systems that complement, rather than replace, traditional farming systems
- cultural attitudes.

The Bureau of Rural Sciences (2000) estimates that approximately 5.5 million hectares of land subject to salinity hazard in Australia also has the potential for commercial tree plantations.

Sources: Stirzaker et al. (2002); O'Loughlin & Nambiar (2001).

While acknowledging that these information gaps are significant, we already face an urgent need to make decisions, such as decisions about land use options. This means that, despite the gaps, there is no excuse for inaction. Immediate application of our existing understanding to the problem is unavoidable, even if we need to revisit our ways and means some time down the track when better information becomes available (O'Loughlin & Nambiar 2001).

Reflecting these challenges, it is unlikely that significant levels of new investment could be mobilised without effort by communities and governments. New frameworks and policies for developing new

industries in key regions are required. Innovation to construct suitable investment vehicles is also needed.

If governments wish to achieve particular environmental outcomes, policy measures designed to encourage agroforestry that produces both commercial and environmental outcomes might have to be restricted so that they apply only to areas designated under an accredited catchment plan. That is, because encouraging the development of agroforestry is likely to deliver only specific environmental outcomes in certain regions, any encouragement or incentive measures may need to be limited to farmers or landowners engaging in land use changes that will benefit those regions.

1.2 Terms of reference

The Allen Consulting Group joined with Barry Buffier to examine policy and investment options for achieving environmental and commercial outcomes through agroforestry. The study was commissioned by the Rural Industries Research and Development Corporation on behalf of the Joint Venture Agroforestry Program. Its main aims were as follows:

- describe and review existing vehicles to encourage sustainable farm forestry investment
- review measures that have been proposed or are under trial to establish markets for environmental services in Australia
- review the potential contribution of environmental management systems to the development of agroforestry with environmental benefits
- consider policy and other investment options that would contribute towards the development of farm forestry at the farm and regional levels and that also meet environmental objectives.

The detailed terms of reference for the study are provided in Appendix A.

As part of the study, the consultants presented their proposals for consideration by and input from an independent panel of experts; the members of this panel are listed in Appendix B. In addition, a draft report was discussed at a meeting in Canberra with members of JAENIT (the Joint AFFA, EA, National Action Plan Implementation Team). Feedback from these experts and others was drawn on in preparing this report for presentation to a wide range of stakeholders in Canberra on 1 July 2002. This was a mutually agreed variation to the terms of reference.

Having set out the aims of the report, it is important to clarify how the consultants have defined *agroforestry* and how it differs from other forms of forestry—see Box 1.2.

Box 1.2 Terminology

- *Agroforestry*. All trees on farms, including woody shrubs such as saltbrush and tagasaste, grown in association with crops, pasture and livestock. Wood is typically the main product, but there is also potential for non-wood products such as nuts, seeds, oils and foliage. The term also includes 'landcare'-type plantings aimed at creating more sustainable farming systems.
- *Farm forestry*. The incorporation of commercial tree growing in farming systems. This can take many forms—plantations on farms, woodlots, timber belts, alleys and wide-spaced plantings, as well as on-farm native forests (although privately owned native forests are not specifically dealt with in this study). It assumes an intention to produce a commercial product, usually wood, as one of the outcomes of the farm forestry activity. Farm forestry can be regarded as a subset of agroforestry.
- *Industrial plantations*. Tree plantings for wood or wood-product production. The key characteristic is that the planting is intended for commercial gain and is unrelated to agricultural activities.
- *Private forestry*. The entirety of private sector forestry in Australia—undertaken by large companies, small investors and individual landholders. Farm forestry and agroforestry are subsets of private forestry. Private forestry is quite distinct from public sector forestry by virtue of ownership, but in other respects, such as silviculture, may be similar.

Sources: Alexandra & Hall (1998); Robins et al. (1996); and variations by the authors.

1.3 Report outline

Chapter 2 of this report reviews key points about the nature of the forestry estate in Australia at present and the main determinants of change. It looks at the potential for growth in the plantation estate and the role expected to be played by farm forestry and agroforestry in general. It also reviews the factors that are seen as impediments to expansion of agroforestry.

Chapter 3 outlines the nature of the actions taken by industry and communities, as well as the policy response by Australian governments, to encourage sustainable agricultural practices. A plethora of investment vehicles and measures have been designed and applied that could also apply to agroforestry. Analysis is simplified by concentrating on major categories of measures. The focus of attention is the relevance of existing measures to the development of agroforestry that produces both environmental and commercial outcomes.

Chapter 4 reviews newly proposed measures against the criteria used to evaluate the existing measures. Seven major approaches are tabled, one of which emerged as a response to ideas put forward in earlier phases of this study.

Chapter 5 discusses the steps required to achieve a satisfactory mix of measures that will encourage investment in agroforestry and also result in environmental benefits. It sets out the need for a more strategic approach that deals with layers of issues, rather than specifying a single measure. It also discusses how these ideas can be advanced with the use of existing policy directions or pathways.

2 Context

This chapter reviews key points about the nature of the forestry estate in Australia at present and the main determinants of change. It looks at the potential for growth in the plantation estate and the role expected to be played by farm forestry and agroforestry in general. It also reviews the factors that are seen as impediments to expansion of agroforestry.

2.1 Forestry fundamentals

Traditionally, discussions about tree planting have drawn a distinction between three broad types of activity: commercial or industrial plantation forestry; agroforestry and farm forestry; and plantings for environmental purposes. It is useful to review these activities and identify how the industry is changing—in particular, the search for new agroforestry industries.

2.1.1 Industrial plantations

Plantation forestry involves intensive planting of one or more tree species for the purpose of felling. The plantation sector in Australia plays an important role in the domestic wood-processing industry. In 1996–97:

- around 58 per cent of saw, ply and veneer logs processed came from plantations
- the wood panels industry sourced around 96 per cent of its roundwood from plantation softwood
- the paper and paperboard industry sourced around 62 per cent of its roundwood from plantations (Burns et al. 1999).

In 2000 there were over 1.4 million hectares under plantation in Australia, with softwoods accounting for around 67 per cent of the plantation estate (Wood et al. 2001). The three states with the largest areas of industrial plantations are New South Wales, Western Australia and Victoria. In terms of regions, the Green Triangle (Victoria – South Australia) and the Murray Valley (Victoria) are the most significant.

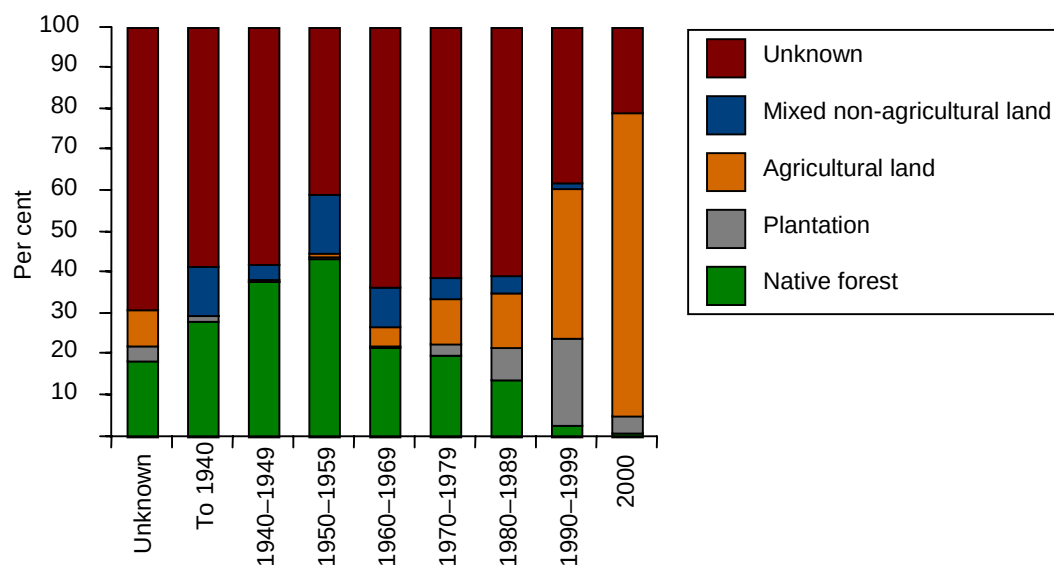
In recent years the industrial plantation sector has changed in terms of ownership of resources and the kind of land used for plantings. In the past most of the plantation estate was under public ownership, but now the private sector owns most of the national plantation estate. The proportion of the estate under public ownership fell from more than 68 per cent in 1995 to less than 50 per cent in 2000, following the sale of harvesting rights for the Victorian Plantation Corporation's softwood plantation resource (Burns et al. 1999; Wood et al. 2001). The majority of plantation growers are either industrial companies or forest-management agencies (Wood et al. 2001).

In terms of the kind of land used for plantings—that is, the *previous* land use—the trend has been to move away from native forest land to cleared agricultural land (see Figure 2.1):

- Of the known previous land uses for trees planted in the 1940s, 90 per cent was native forest land, whereas only 1 per cent was agricultural land.
- Of the known previous land uses for trees planted in the 1970s, 51 per cent was native forest land, whereas only 29 per cent was agricultural land.
- Of the known previous land uses of trees planted in 2000, only 1 per cent was native forest land, whereas 94 per cent was agricultural land (Wood et al. 2001).

This demonstrates the critical importance of agricultural land to the current plantation industry.

Figure 2.1 Previous land use of plantations: Australia, to 2000



Source: Wood et al. (2001).

Plantations have been the major driver of growth in the forestry sector in recent years. Since 1994 the total area of plantations has been expanding by an average of about 70 000 hectares a year, ranging from 30 000 hectares of new plantings in 1995 to at least 125 000 hectares in 2000.¹ This expansion is mainly of new plantings of eucalypt hardwoods grown mainly for the pulpwood market. Investment in prospectus-driven tax-effective plantation forestry schemes has underpinned this strong growth.²

The Commonwealth Government has flagged industry concerns that the decline in the rate of new softwood plantations may inhibit investment in major processing facilities if long-term supply is not assured (AFFA 2002a).

Governments in Australia have developed a long-term vision for growth in the plantation sector; the key elements are summarised in Box 2.1.

With the benefit of further analysis, it is not clear that trebling the size of the plantation estate is feasible. Even under the most optimistic scenario in recent modelling by the Australian Bureau of Agricultural and Resource Economics, the plantations were forecast to increase by about 1 million hectares. This would represent only a doubling of the estate. Key constraints to be considered are the returns that landholders can obtain from alternative uses (that is, farming) and factors such as access to infrastructure, including milling facilities.

Whether the plantation estate doubles or trebles, industrial plantations will probably account for the larger part of plantation activity for some time to come. This dominance is likely to influence many of the key parameters in forestry. In particular, it is possible that the price of forest products will be largely determined by prices achieved in the plantation sector. Agroforesters will have to evaluate their investments in terms of the probable competitive response of plantation forestry.

2.1.2 Agroforestry and farm forestry

Distinguishing farm forestry from plantations has traditionally been a matter of differences in scale, planting patterns, and species used.

¹. In 2000 there was an unusually high level of plantings, largely because of the Commonwealth Government's removal of the '13 month rule', which caused a bring-forward of plantings originally scheduled for 2001. As a result, the consultants were advised by forest industry representatives that plantings in 2001 were only around 30 000–40 000 hectares.

². The growth of tax-driven investment in plantation forestry is covered in Chapter 3.

Another aspect of the difference between agroforestry and traditional views about plantation forestry relates to the motivation. Agroforestry differs from plantation forestry because it can deliver a broader range of benefits. This can include returns from harvested forest products, improved farm productivity in other areas (for example, as a shelter for livestock or a windbreak), and knowledge that the land is being used in a more sustainable way. In contrast, consideration of the returns to plantation forestry has traditionally focused on the forest products, usually timber (NSW Agriculture 2002).

The diversity of farm forestry is great. The key distinction that analysts point to is ownership. Farm forestry is about farmers committing land and other resources to the development and management of forests for, among other things, a commercial return. If a farmer decides to participate in forestry, then that is farm forestry.

Box 2.1 *Plantations for Australia: the 2020 vision*

The 2020 Vision is a partnership between industry and Commonwealth and state governments, implemented in 1997. The purpose of the vision is to make plantation forestry in Australia a sustainable and profitable long-rotation crop with significant private sector investment. The target is to treble the plantation estate, to 3 million hectares, between 1996 and 2020. The vision focuses on removing impediments to the expansion of plantations as a legitimate agricultural land use and making industry more internationally competitive and market-focused. The vision aims to:

- encourage investment of around \$3 billion—mainly private investment
- increase farm incomes by 20 per cent
- convert the current \$2 billion trade deficit in wood and wood products into a surplus
- create up to 40 000 jobs in rural areas.

The specific outcomes outlined in the vision include ensuring that plantation forestry in Australia:

- responds to diverse market needs and niches with high-quality products
- exports more wood and wood products than are imported, by being active in the international wood and wood products markets
- promotes diversity in operations by encouraging large-scale industrial plantations as well as smaller scale on-farm plantings with a variety of management, ownership and investment options and opportunities
- supports a mix of new and existing players—large and small—who invest in the growth and development of their plantation businesses on an ongoing basis
- attracts investment by large institutional investors—domestic and multinational—and superannuation funds, as well as individual investors and potential growers
- offers enough opportunities and certainty to allow strong secondary and tertiary markets for plantations to develop
- leads the way in providing sustainable employment in agricultural regions and regenerating their economies
- revitalises rural communities
- earns community respect as a significant primary industry that is viable, sustainable, credible, desirable and reliable
- adapts to changing needs and circumstances by being flexible and innovative
- employs a highly skilled, professional workforce—people recognised as world leaders in plantation management, processing and marketing—who are supported by education and training
- encourages and is underpinned by leading-edge research and development that targets market research, product development and productivity enhancement in different growing environments
- presents internationally as a model of environmental, social and economic sustainability
- helps the nation reduce net greenhouse gas emissions and provides other environmental benefits without compromising commercial attractiveness.

The vision is currently being reviewed by the partners to take into account developments since 1997. Emerging questions concern the environmental benefits of plantations, markets for plantation products, and providing information to the community about plantation management.

Source: Plantations 2020 (2002).

Farm forestry has the potential to deliver many benefits, among them:

- supplementing plantation resources
- addressing environmental problems through providing environmental or ecosystems services
- supplementing and diversifying farm incomes
- supporting and facilitating regional development, including employment.

The extent to which these benefits are realised will depend largely on whether opportunities can be developed enough to pass the test of commerciality and on the level of support provided by governments.

- We will need to pioneer the development of a landscape mosaic of commercial tree crops driven by large scale industrial markets, high value annual crops, mixed perennial and annual cropping systems, and areas devoted to maintaining ecosystem services that depend on native vegetation. (CSIRO Land and Water 2001)

Farm forestry currently makes up a small portion of the national plantation estate: the area owned by farmers is estimated to be about 5 per cent of the total. The majority of farm plantations (including the land) are fully owned and managed by private individuals such as farmers and other property owners. There is also a small area devoted to demonstration and trial sites, which is jointly owned and managed by government agencies and private landholders (Wood et al. 2001).

In 2000 there were around 67 000 hectares under plantation on farms in Australia, with hardwoods accounting for around 64 per cent of the plantings. This preference for hardwood species on farms reflects the wider trend towards hardwoods in industrial plantations. The first widespread hardwood plantations on farms were established in Tasmania and Western Australia in the late 1980s, but there has been strong growth in recent years in other areas such as the Green Triangle, north-east Victoria and northern Queensland. Most of the plantings since 1995 have been prompted by government initiatives to develop private forestry—for example, the Farm Forestry Program. The three states with the largest areas of farm forestry plantations are Victoria, Tasmania and Western Australia (Wood et al. 2001).

2.1.3 Environmental plantings

Trees can generate substantial environmental gains, and increasingly the community is calling on those who plant trees to consider the environmental benefits in addition to any commercial returns.

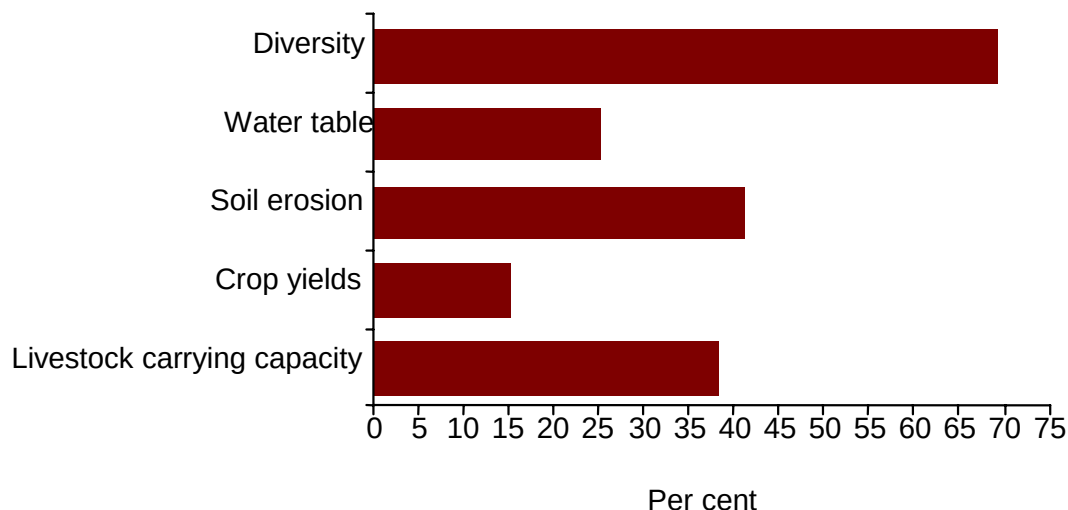
- Trees on farms provide both an alternative enterprise and land and water protection, whilst trees from farms supply a wood and non-wood product resource from outside public native forests as well as supplementing plantation resources. However, both farming and forestry sectors need to address more than their respective production concerns. They must also contend with greater community interests and responsibilities.
- Commercial farm forestry may provide a profitable footing from which large scale revegetation can take place, making a substantial contribution to environmental repair and conservation. (Robins et al. 1996)

Tree planting on farms in Australia has reflected a mixture of farming and land-protection goals for some time. Farmers in many areas and communities, either singly or in cooperation with others in their region, have invested money and personal effort in planting trees to mitigate land degradation or to provide environmental benefits such as:

- reduced wind erosion
- improved water quality
- wildlife corridors
- habitat protection
- salinity control
- improved aesthetics.

Surveys consistently show that farmers are aware of the considerable environmental benefits that can accrue from trees, as well as the benefits the trees can bring to farming activity. Figure 2.2 shows some of the commercial and environmental benefits that farmers perceive as coming from planting trees on farms.

Figure 2.2 On-farm impact of trees planted on farms: proportion of farmers surveyed seeing a strong impact



Source: Wilson et al. (1995).

More recently there has been a renewed focus on the environmental benefits arising from tree planting and, in particular, the recognition of these benefits as ‘environmental services’. This brings a new focus to tree planting for environmental reasons and could spark further interest in environmental planting as a means of greater value realisation. It also brings new commercial potential for planting for environmental purposes, with investors seeking returns from a range of environmental services, including:

- sequestration of carbon
- water management
- soil stabilisation
- habitat provision and conservation of biodiversity (Binning et al. 2002).

2.1.4 New agroforestry industries

Both industry and government believe that farm forestry represents the main area for growth in the plantation estate. Clearing land for plantation development is largely prohibited, and (as discussed) the vast majority of new plantation plantings are on cleared agricultural land. The bulk of the land that is already cleared is privately owned, mostly by farmers.

The Joint Venture Agroforestry Program recognises that agroforestry systems of the future will need to be in lower rainfall areas in order to redress problems of land degradation and enterprise diversification in these areas. The focus of the program's research is therefore on redefining the range of possible farming and agroforestry systems in these lower rainfall areas (400–650 millimetres a year). This requires a completely new and innovative approach to the design of the agroforestry systems. Starting new industries requires vertical integration across the span of activities and products in the system—from biophysical to manufacture of novel products and definition of new markets.

New systems will need to integrate with established farming system structures. Two systems of tree cropping show some potential:

- short-rotation tree crops that can be grown in rows or blocks within existing farming systems. The trees can be harvested in short cycles (five to 10 years) and regrow from coppice—for example, mallee systems
- 'phase farming' with deep-rooted perennials. The trees are planted in blocks and harvested after five to 10 years. They will 'dewater' the soil profile or lower the water table while they grow. The tree crop phase is followed by a conventional crop phase for five to 10 years; during this phase the water table may rise again, ready for the next phase of trees to dewater.

It is equally important to find potential products from the new range of woody species. Australia has a wealth of native plant species that have never been systematically investigated for their potential products or suitability for cultivation. The Joint Venture Agroforestry Program is supporting research into systematic screening of woody perennials native to low-rainfall farming areas that have potential for novel products (including bio-products) and are suitable for integration into agriculture at a broad scale. Research into 'best bet' products from non-traditional species includes:

- composite wood products such as medium-density fibreboard, oriented strandboard and wood fibre–plastic composites
- high-value specialty timbers
- electricity production
- ethanol production and potential markets
- thermochemical pulping and kraft pulping technologies
- bio-based products.

Another factor that usually differentiates new industries from established ones is that, in order to be commercially viable, the harvested trees often yield more than one product. For instance, the Joint Venture Agroforestry Project has recently commissioned a study of the feasibility of building a commercial-scale mallee-processing plant in Western Australia. The plant would turn coppiced, chipped mallee biomass into feed and produce activated carbon, renewable energy and eucalyptus oil.

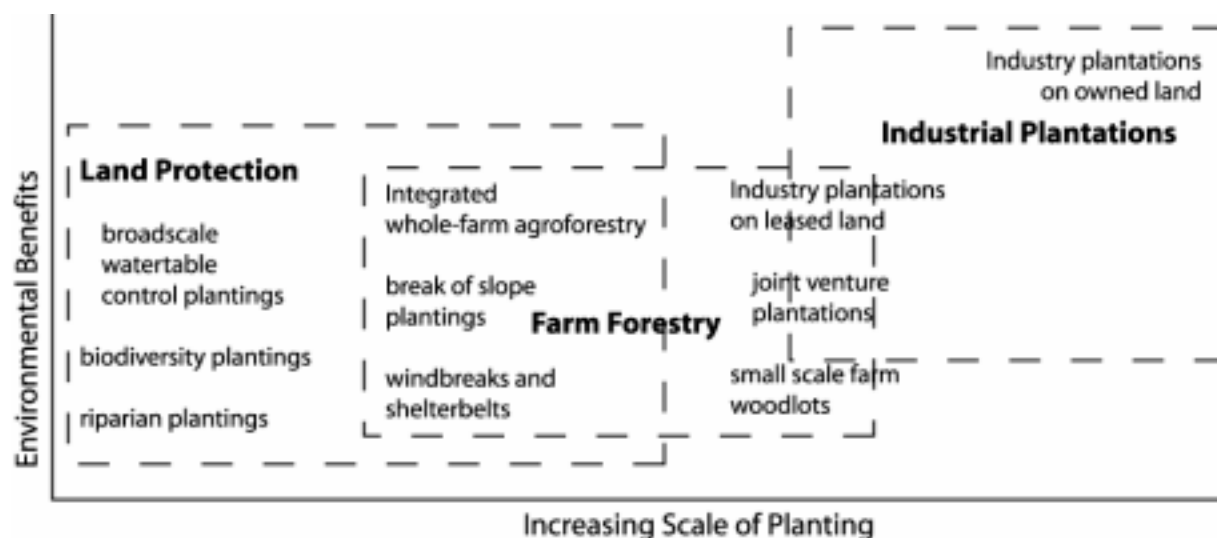
Among the kinds of tree-based industries that are relevant in the context of new industries—and for which there is ongoing R&D—are other eucalypt species, wattle, melaleuca, acacia, conifers,

banksias, and any other tree-based industries that are potentially viable in low-to-medium rainfall areas.

2.1.5 Convergence

Distinctions between environmental and farm forestry and between farm and industrial plantings have been blurred for some time; Figure 2.3 shows the areas of overlap.

Figure 2.3 The plantation continuum



Source: Based on Donaldson & Pritchard (2001), cited in Wood et al. (2001).

The transition in the industry and the motivation behind forestry are leading to broader areas of convergence in the reasons for planting. For example, some 'post-Kyoto' industrial plantations now look a little like environmental or land-protection plantings, only on a larger scale.

A longer term outcome of policies designed to encourage agroforestry that delivers environmental benefits on a large scale is likely to be further convergence of the types of planting activity, particularly as new agroforestry industries emerge where timber is not the principal product.

2.2 Impediments to agroforestry

Any consideration of what measures to take to encourage agroforestry should be guided by a clear understanding of the impediments that currently lie in the way. There is an extensive literature outlining impediments to investment in agroforestry—see, for example, Binning et al. (2002); Alexandra and Hall (1998); RIRDC, in Allen Consulting Group (2001); Burns et al. (1999); Industry Commission (1999); Robins et al. (1996). The impediments can be sorted into clusters, as discussed in the following paragraphs.

2.2.1 Cultural factors

Many commentators note that Australia does not have an agroforestry culture: trees have been seen as competing with agriculture rather than complementing it.

2.2.2 Technical knowledge

There is a great deal of uncertainty surrounding many of the technical aspects of undertaking agroforestry with environmental and commercial outcomes, including: the interaction between catchments and water balances; the trade-offs involved in implementing different agroforestry systems; design systems that maximise the benefits of trees and minimise their negative impacts; how to optimise commercial benefits for growers in lower rainfall areas; and the environmental services that agroforestry provides. Given this uncertainty and a lack of supporting knowledge systems, it is no surprise that agroforestry is yet to be widely embraced by land managers (Binning et al. 2002; Alexandra & Hall 1998).

Further, there is inadequate dissemination of R&D effort, and farm foresters have few opportunities to access results in a structured way.

2.2.3 Market power and barriers to entry

The dominant position of state governments in wood supply has inhibited farm forestry, and the problem has been aggravated by conflicts in government roles as resource owner–operator and as regulator (Robins et al. 1996). This has led to significant distortions and low prices for forest products that do not reflect the true economic cost, as well as other competitive neutrality issues—that is, presenting government forests with an unfair advantage because of government ownership.

A lack of transparency in log pricing and contractual sales arrangements also acts as a barrier to entry into timber markets (Binning et al. 2002; Alexandra & Hall 1998; Burns et al. 1999).

For new entrants there is often poor access to sawmills and other processing facilities, and log markets are dominated by a small number of large companies. If farmers do not have access to this infrastructure, the commercial value to them of forestry activities dwindles.

2.2.4 Risks

Historically, investment in tree products has taken a long time to yield a return—often more than 20 years—and anticipating the nature of future markets has generally been highly speculative. Accordingly, risk premiums are much higher than for agricultural activities that have greater liquidity and shorter production cycles; for example, livestock can be sold early to capitalise on temporarily buoyant markets. Long lead-times attract high inflation-related discount rates and are not necessarily appealing to an ageing farm demographic: many current farmers will probably have retired before agroforestry ventures reach maturity, and commercial agroforestry investments are not always reflected in the sale value of properties.

Burns et al. (1999) note that governments have been significantly involved in plantation development in Australia because of the high levels of risk and uncertainty. This makes forestry less attractive to the private sector, especially small investors. Key factors that promote this perception are:

- high risk of loss from fire and disease
- high initial cost of establishment whilst revenue is received only after harvest
- high risk associated with marketing products, especially small timber from thinning
- difficulty in locating secondary markets for plantations to allow the sale of stands prior to clearfall.

2.2.5 Poor access to capital

Previous forestry schemes have developed a poor reputation for ‘scams’, inhibiting investment by institutional investors such as superannuation funds and other fund managers. This poor access to capital has also been partly a result of the cyclical nature of investment in the forestry industry (due to agronomics and the end-of-financial-year rush) and the occasional tendency towards over-investment, which affects the financial viability of smaller operations first.

2.2.6 Market failure

At present there is no framework for capturing non-wood, non-farm production benefits such as environmental services from agroforestry.

There are also few or no cost-sharing arrangements for environmental benefits.

2.2.7 Public policy

Previous government policy settings have not been conducive to agroforestry. Failure to allow tree tenure dogged the growth of agroforestry for many years. Permitting ownership of trees, as distinct from the land they occupy, is central. Role conflict has already been noted (see Section 2.2.3).

There is also confusion about the way agroforestry is to be taxed, including complexities in areas such as double taxation of royalty payments, income averaging, and superannuation and investment schemes.

2.2.8 Development of supporting infrastructure: critical mass

Another important impediment to the development and viability of new industries has been a lack of supporting infrastructure to allow the scale of production to increase (and production costs decrease) to reach a profitable critical mass. For example, there is potential for mass production of some currently boutique or niche products, such as wattle seed or mallee oil. However, establishing a mass market would require:

- intensive R&D in relation to
 - the identification of appropriate plant species—in terms of profitability and potential to achieve environmental outcomes
 - the development of efficient, mechanised, large-scale harvesting techniques and equipment, along with supporting transport and storage infrastructure
- a substantial production support network providing inputs, equipment and technical support to farmers
- financial systems supporting the higher capital costs of planting new products and possibly rewarding farmers for their contribution to salinity mitigation, carbon sequestration and other environmental goods
- well-developed Australian and overseas markets for substantial quantities of these new industry products (Australian Native Produce Industries 2001).

An example of the kind of R&D required is the recently commissioned study into the feasibility of building a commercial-scale mallee-processing plant in Western Australia (see Section 2.1.4). On the basis of investigations to date, construction of the plant is expected to achieve returns to growers and factory investors (RIRDC 2001).

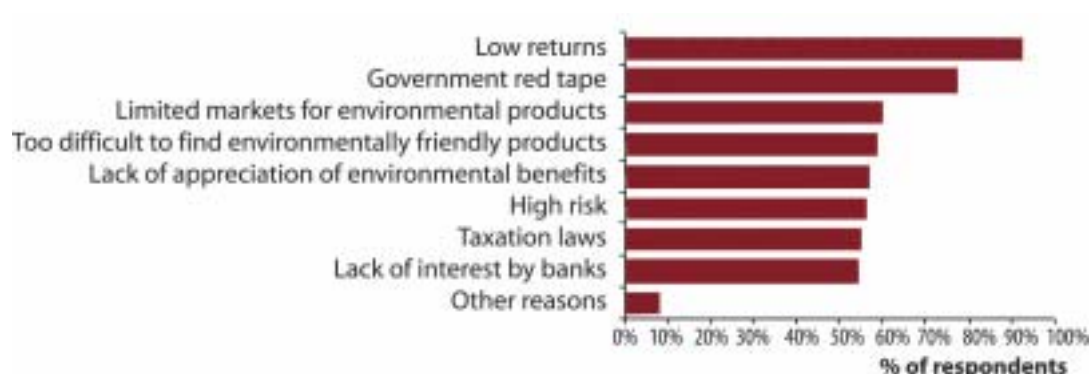
2.2.9 Relative importance of different impediments

Which impediments are most important? Alexandra and Hall's 1998 study provides some additional light. After their nationwide consultative process—involving key stakeholders in forestry and farming, environmental interests, scientists and government, among many others—they ranked each identified impediment according to whether, in their view, stakeholders saw it as a high, medium or low barrier in each jurisdiction they visited. Looking at the impediments with the most consistent high or medium score suggested the following order:

- lack of transparent pricing
- lack of markets for environmental services
- difficulties with facilitating external investment
- scams and a poor investment record
- lack of a farm forestry culture.

An overarching view that results from the long list of impediments to investment is an entrenched perception that investment in the environment is unprofitable. Certainly this was supported in the findings of a recent nationwide survey of land managers (see Figure 2.4).

Figure 2.4 Barriers to investing in the environment



Source: Allen Consulting Group (2001).

2.3 Impediments and the investment chain

An additional dimension to understanding the nature of the impediments facing investors in more sustainable agriculture was provided in a recent study and report commissioned by the Business Leaders Roundtable (Allen Consulting Group 2001). The report observed that investment involves a series of decision-makers through an investment chain linking agencies that filled roles such as:

- owners of capital
- intermediaries providing broking, financial and information services
- providers of land and technical expertise.

The report found that different layers in the investment chain faced different impediments when looking for opportunities to invest in more sustainable natural resource management, or the emphasis of impediments was felt differently at different levels.

The providers of capital in the Business Leaders Roundtable emphasised that, while others complain about the lack of capital, their challenge was to find good investments for large pools of capital. They were investing in activities with associated environmental gains and would invest more in the following circumstances:

- *There were commercial advantages.* This could take many forms beyond immediate profitability, including raising performance across the ‘triple bottom line’, raising the corporate identity, taking a first-mover advantage, covering other risks (such as eventual restrictions on carbon emissions), or simply minimising costs (more relevant for businesses already reliant on natural resources).
- *Environmental values could be clearly identified.* A specific dollar value for environmental results from an investment is most desirable, but measures that promote the good image of a company are also of value. Association of environmental gains with a corporate brand is a regular strategy. Independent certification and the use of logos are other means of allowing companies to obtain a premium in their market as a result of their environmental investment.
- *They could find reliable partners.* It is especially important when corporate identity is at stake to find reliable partners. Corporates, especially those in the business of managing other peoples’ money, are more demanding in this respect than philanthropic investors and even governments. Companies that are prepared to put up funds for an entrepreneurial investor with an untried product and no established market are very rare. Companies are more likely to invest in other companies that have a track record in finding successful entrepreneurs.
- *Transaction costs could be kept to a minimum.* In contrast with many other aspects of socially responsible investment, the search costs for investment in more sustainable natural resource management are high. The pathways are not yet as well established when compared with social goods such as education, youth and health care.

A further theme of the report was that the intended users of capital (that is, owners of land and expertise) appear to face barriers to access and use of capital markets. Farming is traditionally self-financed or financed through heavily intermediated, and therefore expensive, bank loans. This places the sector at a disadvantage because it limits the use of the much less expensive capital available in large capital markets and, more importantly, limits the avenues available to pool commercial risks.

This impediment is probably as substantial as the claims, made by farmers themselves, about the lack of a farm forestry culture and unfair competition in forestry. It has a cultural base (with independence being highly valued by many farmers) as well as a financial base (reflecting much bitter experience with the financial community). The prospect of large-scale transformation to new land uses on cleared farmland, which would involve large-scale investment, is extremely remote if farmers are willing to rely only on traditional sources of finance.

Plantation forestry has been more successful in using equity markets—many forestry companies are listed on the stock exchange—as well as in creating innovative channels to access large pools of investors at the retail level. Smaller scale agroforestry ventures may find that the investment required to build their own investor base is prohibitively expensive.

3 Encouraging sustainable agricultural investment

This chapter outlines the nature of the actions taken by industry and communities, as well as the policy response by Australian governments, to encourage sustainable agricultural practices. A plethora of investment vehicles and measures have been designed and applied that could also apply to agroforestry. Analysis is simplified by concentrating on major categories of measures. The focus of attention is the relevance of existing measures to the development of agroforestry that produces both environmental and commercial outcomes.

3.1 A framework

A large number of measures have been deployed to encourage sustainable agriculture and land use. For convenience, these are arranged into five categories of measures:

- encouraging altruistic investment—providing structures for activities that have regard to benefits for others and that may or may not involve commercial gain
- closing information gaps—creating and circulating information through education and training to change behaviour or perceptions of risk
- regulating to achieve outcomes—generally involving prohibition of unsustainable activities
- funding desirable activities—governments have traditionally purchased desired outcomes on behalf of the community, including through direct provision
- providing incentives—rewarding or penalising can involve restoring, implementing or complementing the operation of market forces.

A number of the measures, approaches and investment vehicles that have been tried, or thought about for some time, within each category are listed in Table 3.1.

Table 3.1 Approaches to encourage sustainable investment

Altruism	Information	Regulation	Funding	Providing incentives
Philanthropy	Extension	Prohibition	Grants	Emission taxes and charges
Community participation	Education and training	Standards and penalties	Competitive grants/BushTender approaches	Full-cost pricing of public, community and environmental resources
Socially responsible investment funds	Public R&D	Land use controls and zoning	Subsidies/bounties	Removal of distortions
Covenants and management agreements	Catchment management plans	Self-regulation	Stewardship payments	Clean-up levies
Revolving funds	Accreditation and labelling schemes	Conditional licensing		Tax concessions
Environmental management systems	Rating systems	Offsets		Tradeable permits (for environmental services)
	Demonstration projects			

Note: Further details about existing measures are provided in Appendix C.

3.2 Evaluation criteria

Five fundamental evaluation criteria can be used:

- leverage
- economic impact
- fairness
- stakeholder support
- low administrative burden.

These criteria align broadly with the traditional criteria of effectiveness, efficiency and equity, with the addition of stakeholder support and administrative efficiency.

3.2.1 Leverage and effectiveness

Effectiveness is about achieving the desired outcome. In this case, that means mobilising or leveraging a significant increase in private sector investment in agroforestry that produces environmental gains. When making assessments using these criteria, a key question is, Does the approach combat the identified impediments to investment? Judgments about value for money or up-front cost to government in terms of outcomes in this case are indicators of different dimensions of leverage.

3.2.2 Economic impact and efficiency

Governments are loath to support investment vehicles if they see them promoting an activity that will not be self-supporting in time or will raise for other industries flow-on problems that distort the economy. They are generally supportive of measures that will encourage everybody in the economy to factor the full economic, social and environmental implications into investment or purchase decisions. In practical terms, this often boils down to analysis of the way that prices are formed: Does the measure make prices reflect true costs or not? Does it facilitate competition or block it?

3.2.3 Fairness and equity

The public finance literature usually draws a distinction between horizontal equity and vertical equity—that is, treating everyone in the same way or treating like with like. Getting the technical analysis right is no guarantee that the community will see a measure as fair. Practical considerations include leaving no one worse off and/or managing the ‘politics of envy’ by making sure that beneficiaries are not made too well off.

3.2.4 Stakeholder support

Assessing stakeholder support typically involves looking at stakeholders’ reaction to the three preceding criteria. It is a cliché, and not very helpful, to observe that policy involves winners and losers. Having either does not automatically preclude widespread support for a measure. Often the question of support can be more about reasonableness, the outcome of a fair process, or trust in a fair decision-maker.

3.2.5 Low administrative burden

All government measures require some degree of administration, which entails use of government resources. This cost is normally included in the cost of a measure, but often it is not. Some measures involve an administrative burden up-front; others require constant government monitoring for the duration of the measure. Some other measures, such as ‘permanent’ tax concessions, usually involve ongoing administration costs.

3.3 Measures and aims

Table 3.2 summaries the consultants' evaluation of the existing measures.

Table 3.2 Evaluation of existing measures

Measure	Altruism	Information enhancement	Regulation	Direct funding	Providing incentives
Leverage (effectiveness)	✗	✗	✗	✓/✗	✓
Economics (efficiency)	✓/✗	✓	✗	✗	✓
Fairness (equity)	✓/✗	✓	✓/✗	✓/✗	✓/✗
Stakeholder support	✓	✓	✓/✗	✓	✓/✗
Low administrative burden	✓	✓	✗	✗	✓/✗

Note: ✓ = meets criteria; ✗ = does not meet criteria; ✓/✗ = mixed impact.

The main message is that in the consultants view no single existing approach is adequate. None of the approaches unambiguously meets all of the criteria. Only two approaches are viewed as having scope to meet the leverage (or effectiveness) criterion: direct funding and providing incentives. But these approaches have deficiencies in other areas. Other approaches offer strengths in many areas, except that, by themselves, they are unlikely to actually leverage substantial private sector investment. Each of the approaches is discussed in more detail in the following sections.

3.3.1 Encouraging altruistic investment

It is very difficult to find or construct a simple or single definition for *altruistic investment* because the definition constantly changes to meet changing needs and demands. Broadly, altruism involves selfless behaviour, but in practice there are many degrees of selflessness. A common characteristic of altruistic investment vehicles is that they encourage investors to take a wider view when it comes to value. Philanthropic investment often places little emphasis on commercial outcomes: it focuses more on the outcomes desired. Other forms involve a mixture of commercial and non-commercial gains. It is, however, not necessarily the case that investment in this category will accept lower commercial returns: many managers of socially responsible investment funds, for example, seek and obtain a commercial return plus additional value in terms of beneficial social or environmental outcomes.

In terms of the evaluation criteria, altruistic approaches are not viewed as likely to be effective in raising billions of additional private sector funds for investment in agroforestry with environmental gains in the next few years. It is acknowledged that altruistic investment vehicles are currently enjoying a resurgence, but it should also be noted that sustainable natural resource management stands in a long queue of issues crying out for funds, including other environmental problems such as greenhouse. Experience with altruistic purchases in areas such as 'green power' schemes in New South Wales and elsewhere indicates that these are attractive for only a small part of the market. The cost to government in terms of administrative burden is typically quite low (often linked to various tax concessions for charitable activities). If the need is to raise billions quickly, altruistic drivers will not be sufficient in themselves.

In relation to economic outcomes, altruistic approaches are unlikely to distort resource flows or encourage progress towards decisions being made on a more sustainable basis. Basically, the approach allows 'free riders'—people and businesses that benefit from unsustainable activity—to continue to free ride.

Because altruistic activities are voluntary, they are often viewed as not raising questions of equity. It is not clear, however, that they do in fact contribute to fairer outcomes if they offer no remedy to free-rider problems. In terms of stakeholder support, altruistic approaches are rarely opposed.

3.3.2 Closing information gaps

There are two broad thrusts to closing information gaps. The first is to create and circulate information throughout the community, through education and training, in order to change awareness, attitudes and behaviour—which could include altering perceptions of risk—and so encourage more sustainable investment. Activities designed to improve information about sustainable agricultural investment include extension programs, the Landcare initiative, the CSIRO's Ecosystem Services Project, the Bush for Greenhouse program, the Farm Forestry Program (all of these are discussed in Appendix C) and environmental management systems (see Chapter 4). The second thrust concerns disclosure or labelling, allowing the consumer to make a more informed decision about the environmental implications of making or using a particular good or service.

In terms of administrative burden, the costs to government of activities in this area are generally low, and they can encourage changes in investment patterns. Basically, the approach is good value for money for governments. Measures can enhance efficiency where prices more clearly reflect inputs and preferences. The measures overcome some impediments and market failures and also promote efficiency and equity by increasing transparency; that is, there is an improved outcome when producers make more sustainable products that buyers are prepared to pay a premium for. Where labelling and quality assurance activities have worked in the past they have generally promoted specialised niche markets. It is unclear that these sorts of measures would, by themselves, encourage large-scale investment in more sustainable agroforestry or farm forestry. Stakeholders will generally support information-enhancement measures but acknowledge their limited power to encourage further investment on a large scale.

Governments tend to place heavy reliance on this category of measures because the measures are cheap. There is already evidence that programs such as environmental management systems and labelling schemes are leading to more investment in sustainable agriculture. However, although these measures can be a very important element of any strategic response, in isolation they are not likely to be effective in stimulating additional investment in agroforestry on a large scale.

3.3.3 Regulating to achieve outcomes

A range of regulatory instruments are used to tackle environmental problems. Regulation has been applied in many areas to reduce polluting emissions; in natural resource management, it has been focused on controlling land and water use. Zoning resulting from planning decisions is a regulatory approach; legislating to prohibit the clearing of native vegetation is another. Rules about access to waterways and protection of the riparian zone are increasingly common.

Regulatory approaches are viewed as providing a high level of control and certainty and in that context are often considered effective (ABARE 1993). It is not clear that they are effective, though, in terms of leveraging investment. In practice, 'command and control' regulation is often better at preventing activity than encouraging it. Application of heavy regulation is normally a signal for firms to exit an industry, rather than a stimulus for rapid growth. The up-front cost to government of regulation is usually low, but policing and enforcement can be costly, so the administrative burden associated with regulation can be high. The approach is not likely to be effective in encouraging large-scale agroforestry investment.

In relation to economic outcomes, regulation is rarely effective in removing price distortions and generally reduces or constrains competition. In the long term, prescriptive regulation blocks innovation. While the costs to government are small, compliance costs are not and pose a substantial deadweight loss.

Regulation is rarely equitable in the technical sense: somebody generally ends up paying because of the normally adverse implications for efficiency, and often these consequences are felt most keenly by the most vulnerable producers. In addition, regulation often has the effect of blocking new entrants to an industry, which has efficiency and equity impacts. Regulated industries generally feel singled-out

for attention, so they complain loudly and lobby determinedly for change. These factors are offset somewhat by a sense the community often holds—that it is fair that the polluting industry or company should pay.

There is often strong support for regulatory measures from those who suffer because of the externalities created by the actions of others. Thus, in a catchment, residents whose homes are affected by a rising water table and salt will lobby to have land practices that are adversely affecting them regulated to prevent the externalities. In other areas, governments have traditionally favoured regulatory approaches when responding to a perceived need to do something. Application of the full force of regulatory approaches to completely stop activities that result in land degradation, or penalising those who do not cease such activities (in line with the polluter-pays principle), is almost certain to alienate a key stakeholder group in the context of this study—farmers.

3.3.4 Funding desirable activities

To encourage sustainable agricultural practices, governments can use a direct funding approach, which basically means they are purchasing outcomes. Examples of direct funding approaches in sustainable agriculture that are used at present are the programs funded under the Natural Heritage Trust, the National Action Plan for Salinity and Water Quality, and Landcare.

While the number of programs and their funding magnitude have increased in recent years, the new activities have been the subject of criticism:

- Few of the existing measures are designed to leverage private sector investment, and much of the funding has not had a strategic basis.
- The measures that do target farm forestry are modest and fairly ‘blunt’; that is, they tend to support the activity in general, independently of specific environmental gains.
- Many of the programs operate independently of the very important work that is under way to develop catchment management plans.
- Key programs have been subject to compelling criticism that the programs’ goals are unclear and there is very little accountability in terms of available information to assess them—that is, to determine what environmental, social or economic outcomes are advanced (Industry Commission 1998).

Notwithstanding the criticisms of recent programs, it should be clear that funding measures have the potential to leverage private investment. Earlier programs have been successful in this regard. There is anecdotal evidence that Landcare achieved relatively high private sector investment leverage ratios for every public dollar contributed, although the funding base was small compared with other programs. In comparison, governments leverage considerable private investment off a substantial base in areas such as transport, education and health care, where there is a longer history of public and private role-sharing (Industry Commission 1997).

The technique can offer good value for money when expenditure is well targeted. The increasing use of tender systems is improving value for money and can be effective in getting beneficiaries to make a contribution. Governments face considerable accountability requirements and the administrative burden for large-scale grant schemes is substantial.

The fact that access to public sector funds is limited by sustained pressure for fiscal consolidation imposes a fundamental constraint on this approach.

Direct funding measures can enhance economic efficiency when targeting public goods (of which there would be under-provision without public support). However, without good information about the

community's willingness to pay for intervention, there is potential for a misallocation of resources, a reduction in economic efficiency, and a reduction in overall wellbeing.

Funding options can become entangled in questions of equity and fairness. Investors in more sustainable land management typically obtain a private benefit, even if it is rarely the full benefit. Giving funding to investors can therefore clash with the beneficiary-pays principle. Funding natural resource management to reduce, say, salt emissions or land clearing can also clash with the strongly held polluter-pays principle. Leveraging private investment through budget funding in the longer term involves paying what could be substantial sums to profitable farms and other businesses. This stands at odds with the purpose of most programs, which is to compensate the less fortunate or those that are struggling.

One of the strongest messages that emerges from the literature, and from conversations with farmers and other natural resource managers, is that if these people are asked to protect the environment for the benefit of the rest of the community (as well as themselves) then the community should pay its fair share. The concept of stewardship payments resonates deeply in the bush. In addition, environmental groups see an almost endless and urgent need for greater public sector support for environmental activities. These groups are very vocal—unlike everyday taxpayers, who would ultimately pay.

3.3.5 Providing incentives

All the approaches discussed thus far aim to provide an incentive to some degree to encourage investment to take more sustainable directions. What is different about this general approach to incentive provision is that it runs with the tide of market forces rather than against it. A wide range of instruments is included in this approach—such as generalised tax concessions as well as tradeable permit systems.

To date, very few genuine incentive measures have in fact been applied to encourage sustainable agriculture, although they have been used in efforts to alleviate other environmental problems.

Properly designed incentives have the potential to mobilise large investment flows. There is more experience with tax measures than with many of the other types of measures in this category. Looking at experience with the R&D tax concession, for example, it is estimated that a leverage ratio of 2:1 has been achieved over the last decade—that is, two private sector dollars of investment for every dollar in tax forgone. Tax concessions for pooled development funds are estimated by the Treasury to have cost less than \$1 million in revenue forgone, while some \$476 million in funds under management has been raised (The Allen Consulting Group 2001). The structure of pooled development funds and their applicability to natural resource management and agroforestry are discussed in Box 3.1.

Tradeable permit systems do not need to involve a direct cost to government³ and may even generate revenue in circumstances where property rights are auctioned by government. Taxing and charging for the use of community resources—such as salt or the environment's capacity to absorb carbon dioxide—would divert investment from less sustainable activity and raise revenue. The administrative burden associated with providing incentives can be minimised through careful design of the measures.

³. That is, apart from market establishment and regulation costs that governments may elect to cover, although it is notable that these costs are often covered by participants in traditional markets.

Box 3.1 Pooled development funds and agroforestry

The concept of applying pooled development funds to natural resource management was first raised by The Allen Consulting Group in its *Leveraging Private Investment* report. PDFs have been in use for some time, but they are not well known by people involved in natural resource management. This box provides an overview of how PDFs work.

The Pooled Development Funds Program was introduced in 1992 to develop the market for equity capital for small to medium-sized enterprises. Under the *Pooled Development Funds Act 1992* a private company, known as a PDF, is established to raise capital from investors for investment in SMEs. To date, the program has been administered by both Coalition and Labor governments and appears to have bipartisan support.

Establishing a pooled development fund

To become a PDF, companies are required to register with the PDF Board and provide the board with annual returns on the status of their investments.

Concessional tax treatment

To provide an incentive for investors, PDFs and their shareholders qualify for tax concessions on income generated from qualifying investments in SMEs that are available under the program. There are three types of tax concessions:

- PDFs are taxed at 15 per cent on the SME component of their investment income.
- Unfranked PDFs are tax-exempt in the hands of investors—unless the investor elects to be taxed, when they can use the imputation credits attached to the franked dividend to offset other tax obligations.
- The capital gains on realisation of shares held in a PDF are tax-exempt.

Investment parameters

Investments made by PDFs must:

- be in SMEs with total assets of less than \$50 million and whose primary activities are not retail operations or property development
- not be in another PDF
- be for the purpose of establishing an eligible business, either alone or with other parties, or to increase substantially the production or supply capacity of an established eligible business and to substantially expand existing markets or develop new markets for goods and services of established eligible businesses
- normally, be at least 10 per cent of the total capital of the investee's business, although the PDF Board is able to approve investments of lower proportions. The investment must be in newly issued ordinary shares or other newly issued or pre-owned shares, as approved by the board. A PDF is not permitted to invest more than 30 per cent of its capital in any one-investee company without prior approval of the board.

The board

The board is made up of six members, five of whom are drawn from the private sector; the Act provides for one board member to be an ex-officio member from the Department of Industry, Science and Resources (now the Department of Industry, Tourism and Resources). The board's function and powers, as set out in the PDF Act, include:

- consideration of applications for registration as a PDF
- registration of PDFs
- examination of requests from PDFs to vary investment plans
- exercising discretion for PDFs under various sections of the Act
- monitoring compliance of PDFs with the legislation
- collection and examination of annual returns from PDFs
- revocation of PDF registration
- provision of advice to the Minister on the operation of the PDF Program.

The state of play

At 30 June 2000 there were 96 registered PDFs, of which 34 were registered in 1999–2000. This reflects the growing use of PDFs: in 1998–99 only five new PDFs were registered. Thirty-six of these PDFs raised \$148 million in new capital, the largest amount for any one year and 200 per cent more than raised in 1998–99. From the start of the program in 1992 to 30 June 2000, 57 PDFs had raised capital totalling \$476 million. During the same period total investment raised through PDFs was \$309 million invested, in 286 companies, reflecting the lag between raising capital and investing in suitable companies. At the time of writing, the capital base raised through PDFs had risen to about \$700 million.

Applicability to natural resource management and agroforestry

PDFs could provide a funding vehicle for more sustainable natural resource management and agroforestry. They already can invest in innovative NRM and agroforestry. To make it more attractive, it would be useful to construct a different class of PDFs, without the focus on SMEs. Ideally, this would be accompanied by a regulatory regime that clarified a class of assets that environmental PDFs were restricted to investing in, thus ensuring that the tax concessions were exclusive to activities of environmental benefit. This could stimulate hundreds of millions of dollars of new investment in more sustainable NRM, at minimal cost to the taxpayer. Costs to the taxpayer would by definition apply only to successful companies.

Source: Pooled Development Funds Registration Board (2000).

The key point about incentive measures is that they work by placing scarcity and a market price on previously unpriced impacts. They should therefore improve the efficiency of resource allocation.

Incentive measures can also improve equity, particularly where they reward 'desired behaviour' and ensure that people bear the full costs of their use of the environment's natural resources. There will generally be winners and losers, though, if the measures are applied on a large scale.

The continuing debate about the use of economic instruments in the context of the Kyoto Protocol and domestic policy responses to the threat of global warming is indicative of the difficulty of obtaining consensus about the use of economic instruments, particularly tradeable permits. Some influential groups consider that the whole idea is a ploy to privatise the environment, which is inimical to conservation. Individual farmers and industry representatives generally support the idea until it becomes clear that creation of the tradeable permits relies already on progressively restricting access to resources they take for granted; water reform is bringing this lesson home to many farmers. Farmers and many industry and environmental groups tend to be more comfortable with tax cuts in exchange for environmental services. Tax collection agencies have a long list of reasons why it is unsustainable, in their view, to use the tax system in this way. The trial of many incentive measures that are under way in other natural resource management areas may boost stakeholder acceptability in time, but for now it is realistic to say that these measures involve substantial policy risks.

Box 3.2 Existing tax concessions for sustainable agriculture

Tax expenditures, or financial support delivered through tax concessions, do not currently play a significant role in encouraging sustainable agricultural practices.

The main concessions for sustainable land use identified in the Treasury's *Tax Expenditures Statement 2000* are:

- accelerated depreciation for water management costs
- the Landcare deduction
- the Landcare offset for conservation-related capital works, which is estimated to cost the Government around \$20 million a year.*

In terms of addressing the problem of salinity in the landscape—which is the focus of this study—these existing tax concessions are not very helpful for the following reasons:

- First, the concessions affect only the timing of tax deductions. The objective is to encourage Landcare expenditures by bringing forward deductions that would have occurred anyway. As a result, the value of the concessions is small and any *additional* Landcare operations would probably have only a marginal impact on a very big problem.
- Second, the type of expenditure that qualifies for a deduction is often only vaguely defined and not necessarily targeted at salinity mitigation. For instance, under the Landcare provisions of the *Income Tax Assessment Act 1997*, a deduction is available for, among other things, 'the destruction of weed or plant growth detrimental to the land'. But *detrimental* is not defined in the Act, so related on-farm actions may or may not result in positive salinity outcomes.
- Third, given the vague definition of *qualifying expenditure*, there is no ability to monitor natural resource management outcomes associated with qualifying expenditure.
- Finally, the Landcare provisions do not provide a good model for targeted action. For example, they take no account of regional considerations and they are not designed to assist in cases where one farmer's actions affect other farmers elsewhere in the catchment; that is, diffuse externalities are involved. The provisions seem to be based on the idea that a farmer will act in his or her own interest to engage in Landcare expenditure—but what if the cause and effect are not on the same farm (which science tells us is often the case)? In these cases, the Landcare provisions do not provide incentives for a farmer to internalise the results of his or her negative practices.

*. *Some progress has also been made in removing other perverse tax incentives, such as capital gains tax provisions discouraging conservation covenants, and older income tax concessions that encouraged land clearing (Treasurer 2001; Treasury 2001, p. 94).*

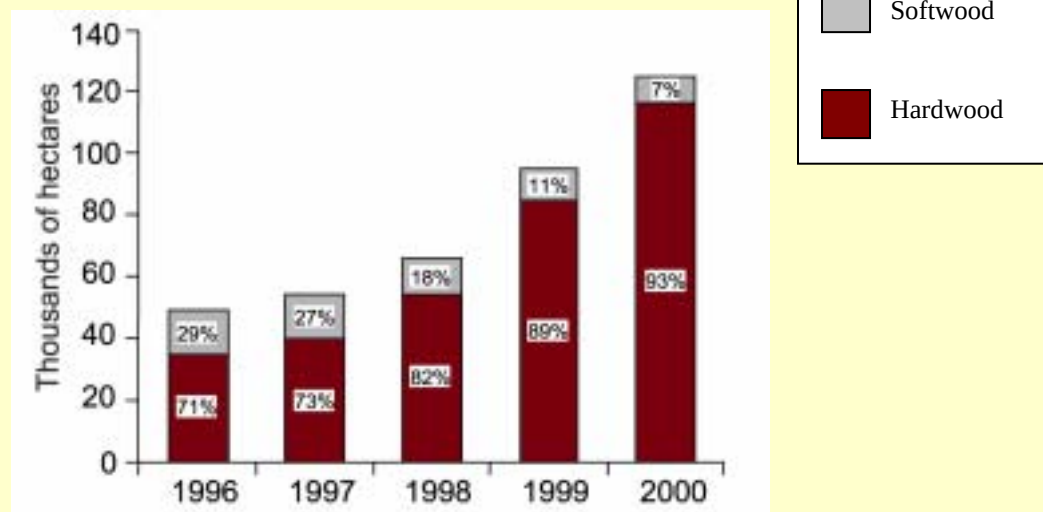
The limitations under existing tax concessions, as discussed in Box 3.2, highlight the central role information flows play in shaping outcomes. The effectiveness of concessions (as they operate now) is doubtful because of poor information about the environmental benefits. These examples also highlight the need for institutional roles. More effective outcomes could be achieved with better information and a body responsible for assessing environmental gains. Naturally, it is expensive and difficult for tax officials to obtain and manage that kind of information. It would be relatively straightforward, though, if another institution accredited the environmental benefit of activities and access to tax concessions were made conditional on this accreditation.

It is apparent, nevertheless, that tax concessions have played a role in boosting investment in plantation forestry in Australia. It is also apparent that these concessions do not discriminate between plantation forestry activities that deliver environmental services and those that do not—see Box 3.3.

Box 3.3 Tax-related investment in plantation forestry

Investment in plantation forestry grew rapidly in Australia in the late 1990s, with hardwoods accounting for the majority of new plantings (see Figure 3.1).

Figure 3.1 Rapid Growth in plantation forestry investment



Source: Based on Wood et al. (2001).

This rapid growth was driven mostly by the emergence of plantation forestry schemes, although momentum in plantation forestry investment had been building from the mid-1990s due to a number of government initiatives, including 2020 Vision (1994), the Farm Forestry Program (1995), which pumped \$63 million into farm forestry, and the Wood and Paper Industry Strategy (late 1990s). Figure 3.2 reproduces a diagram demonstrating the recent rapid growth of the blue gum plantations under management by the Timbercorp Group.

Figure 3.2 Recent rapid growth in blue gum plantations



Source: Based on Timbercorp (2001).

But what caused this growth?

The growth occurred because these schemes were tax-effective, which meant that investors on the top marginal personal tax rate were able to reduce their tax liability by offsetting high incomes with large, fully deductible investments in plantation forestry.

What set this kind of investment apart from others, such as stock market investments, was that the forestry schemes had been designed in such a way that the Commissioner of Taxation had to rule that the afforestation activities of an investor (or 'grower') constituted the carrying on of a primary production business. Hence, outright deductions were allowed for related expenses such as management fees, plantation preparation and establishment works.

Once the income tax treatment was established, the plantation industry expanded the schemes to take full advantage of an income tax provision that was not originally designed to encourage forestry investment. The lesson to be learnt from the plantation forestry experience is that tax considerations can be a very powerful tool for mobilising and leveraging investment funds.

Unfortunately, as with the existing tax concessions for sustainable agriculture, the success of plantation forestry does not provide a good model for targeted action—primarily because environmental outcomes are not built into the schemes.

If tax were used as part of the solution to the concerns raised in this study, it would be important to ensure that any related investment vehicle had the capacity to deliver investment with commercial and environmental outcomes, including the following key elements:

- It would be desirable to create a legislative provision that delivered a tax concession designed to improve the rate of return on forestry investment in, for instance, specific recharge areas or areas designated under an accredited catchment plan as offering a significant public benefit from a change in land use. The effect of the provision would be to 'top up' the current 'uncommercial' nature of such investment. Essentially, the cost of the tax concession to government would represent government's contribution to paying for the public outcomes being sought. By linking these environmental outcomes with commercial gain on the part of growers and investors, the cost to government of addressing salinity is reduced.
- Scope for delivering environmental outcomes would need to be built into the tax concession, a feature that is missing from the tax provisions that underpin current forestry schemes. To qualify for the concession, forestry investment in appropriate areas would need to be accredited by, say, the federal Environment Minister, who could delegate these powers to those responsible for the accreditation of plans under the National Action Plan for Salinity and Water Quality. This would be governed by an agreed national strategy that clearly defined problem areas and the kinds of remedial action required. To account for continual improvement in technology and our understanding of hydrological processes, the national strategy would need to be dynamic and subject to regular review. It is our understanding that the Murray–Darling Basin Commission has the technical capability to enable definition of eligible areas. Building environmental criteria into a 'tax expenditure' has been done before, so it should not be difficult to build such a feature into a new scheme.
- While the existing product rulings system could be used to support a new legislative provision and provide an avenue for financiers to raise funds, it would be better—simpler administratively and less costly for taxpayers—if a provision were developed around the principle of self-assessment, rather than relying on the tax office to 'rubber stamp' a particular project.
- It would be important to ensure that the resulting investment fitted comfortably into the existing tree products industry in terms of localised processing infrastructure and the market's ability to absorb increased volumes of product. In this regard, participation of the plantation sector in the development of such a vehicle would be appropriate.

There would be some important advantages in creating a specific tax-driven vehicle. Whilst the role of tax in supporting the current forestry schemes is understood, it is difficult to precisely calculate the effectiveness of the tax provisions in terms of the cost to government per dollar of investment. This is because a 'structural' feature of the tax system promotes the current schemes and not a specific concession, so is not considered a 'tax expenditure'. If a specific concession were created, the cost of the measure to government in terms of revenue foregone could be monitored.

A mechanism that includes such transparency is also likely to be more acceptable to people who are concerned about incorporating new tax expenditures in the tax system.

*. *Under the 2001 amendments to the capital gains tax rules, landholders who set aside part or all of their land for conservation in perpetuity will not be disadvantaged (that is, they will pay less or zero capital gains tax), provided they enter into a conservation covenant accredited by the federal Minister for the Environment (Treasurer 2001).*

3.4 Key findings

In practice, major policy initiatives generally involve a mixture of two or more of the five basic categories of measures. It is nearly always the case, for example, that government invests in gathering information about desired outcomes and sharing it with people in the community before taking any other approach. Most incentive approaches are also backed by regulation preventing or limiting specific activity. The foregoing analysis suggests there are good reasons for this. And this suggests that the most likely area to look for a successful measure is in those proposals that take a packaged approach.

4 Packaged approaches

This chapter reviews newly proposed measures against the criteria used to evaluate the existing measures. Seven major approaches are tabled, one of which emerged as a response to ideas put forward in earlier phases of this study.

Many of the recent reports and schemes that are under discussion basically bundle measures. Seven new types of initiatives are canvassed here:

- environmental management systems
- encouraging joint ventures
- establishing a vegetation bank
- establishing regional investment vehicles
- taking a package of measures to leverage private sector funds
- development of multiple services markets
- establishment of an agroforestry environmental brokerage.

4.1 Environmental management systems

Environmental management systems can be described as a tool forming part of an overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, and processes and resources for developing, implementing, achieving, reviewing and maintaining an environmental policy—ISO 14001-1996, cited in Crook (1999).

Producers may adopt EMSs in order to improve the environmental management of their properties, to make an altruistic contribution to reducing costly externalities in their catchment, to differentiate their products or improve their image in the marketplace, or to reduce financial risks or seek better access to overseas markets. One of the main drivers of EMSs in Australian agriculture has been to achieve external accreditation in order to secure product access to increasingly demanding export markets.

When used in conjunction with other policy instruments, EMSs also have potential to provide a basis for payments for environmental services where environmental outcomes are difficult to measure with precision. These payments could be based on compliance with an EMS in terms of on-farm activities rather than, for example, improvements in salinity levels or downstream water quality.

4.1.1 Commentary

A significant challenge with environmental management systems is that it is not clear-cut that consumers or regulators in overseas markets are as concerned about salinity and land degradation in Australia as they are about food safety and chemical-free food. Domestic markets may prove to be important when looking to create a premium stemming from EMSs applied to farm forestry designed to produce regional environmental gains. Discussions with some land managers indicate that producers see challenges in relation to small operators who farm generic rather than niche products. Developing market awareness for an EMS scheme in agroforestry may require investment by governments in building public and consumer interest, at least in the initial phases.

A big challenge is to sell the idea to producers, which involves demonstrating the business case for implementing EMSs and communicating the work of adopting these systems. Until this is done, the widespread uptake of these systems by conventional (particularly smaller) producers will be delayed, so they would be unlikely to be a leading instrument in the development of new industries promoting environmental and commercial outcomes.

4.2 Joint ventures

Forestry businesses are looking to work jointly with other interests. One approach is the *joint venture*, which has been defined as ‘an arrangement between two or more parties to combine land, capital, management and market opportunities to produce timber’ (Burns et al. 1999). The schemes normally involve the participation of a landholder, who provides the land, and industry or governments, who provide the plantation management, capital and marketing expertise.

Joint ventures split risk and return. Key forestry and market risks are unbundled and handled by those best able to manage them. Often this results in a lower return to landholders investing in forestry with less risk. It also meets plantation companies’ need to secure land (Wood et al. 2001). Through the range of schemes available and through negotiation, prospective investors in plantations and farm forestry have the opportunity to arrive at their preferred trade-off between risk and return.

While farm forestry currently accounts for about 5 per cent of the plantation forestry estate, joint ventures and plantations established on leased land have continued to expand, now accounting for at least 20 per cent. These ventures therefore represent an increasingly important means of facilitating the development of forestry plantations on cleared private land.

The main aspects of change are the increase in foreign participation in joint ventures and the ventures’ connection in some cases with delivery of environmental services.

Australia’s adoption of the Kyoto Protocol in December 1997 has opened the way for trade and investment in measures that reduce greenhouse gas emissions. While international regulations and guidelines for the protocol and the potential under it for trading in emission credits are in their formative stages, a limited number of transactions based on the capacity of ‘post-Kyoto’ forest plantations to sequester carbon have occurred in Australia.

In a very recent initiative, New South Wales Premier Bob Carr announced on 25 May 2002 that \$100 million of NSW and Federal Government money from the National Action Plan for Salinity and Water Quality would be devoted to establishing 33 800 hectares of trees in the state in the next seven years. The trees will be planted on private land and managed by State Forests of NSW, with raw product delivered to paper manufacturers such as Visy and Norske. Joint venture arrangements will be set up between private landholders and catchment management boards.

There has already been some experimentation with joint ventures that address salinity. One example is an arrangement between Macquarie River Food and Fibre and, once again, State Forests of NSW. This arrangement is outlined in Box 4.1.

Box 4.1 The Macquarie River Food and Fibre – State Forests of NSW agroforestry joint venture

A pilot program is currently in progress under an agreement between Macquarie River Food and Fibre (MRFF) and State Forests of NSW. MRFF represents more than 600 Macquarie River valley irrigation farmers in the Central West of New South Wales. Their main farm enterprises are cotton, dairy and horticulture. MRFF realises that if farmers upstream in the Macquarie catchment planted trees in recharge areas of their farms they would reduce dryland and stream salinity. This would benefit downstream farmers because the irrigation water they used would be less saline. But upstream farmers would have to take some land out of more profitable uses to plant trees.

To explore making salinity reforestation a profitable proposition for upstream farmers, MRFF offered a financial incentive to State Forests to develop a pilot reforestation program on private land. So in 2001 State Forests planted 100 hectares of new forests on salinity 'hot spots' on two farms in the Little River and Cudgegong River sub-catchments. The new forests are expected to transpire 5350 million litres of water over 10 years. The unit of exchange between MRFF and State Forests is a salinity control credit: 1 unit of salinity control credit is equal to transpiration of 1 million litres of water. MRFF pays State Forests for the transpiration service only. State Forests pays the farmers an annuity for the use of the land; it also pays for the establishment and maintenance of the trees and retains the forestry and timber rights on them.

The trial project reflects the catchment community's desire to work together in finding a cost-effective solution to salinity.

Source: Australian National University (2001).

4.2.1 Commentary

It is not clear that joint venture approaches are likely to be relevant for forestry on land in areas with low-to-medium rainfall without a means of obtaining a cash flow from the environmental impacts. This could include a funding 'top-up' for environmental services such as beneficial impacts on salinity or, in time, the trading of salt reductions under a cap and trade scheme.

An investment vehicle for encouraging forestry in areas that generated benefits for water management and for combating salinity in drier areas and other environmental areas would have a greater chance of success if it were open to joint venture developers.

The proposal just announced by the New South Wales Government appears to envisage such a top-up but no details have been provided yet. It will be important to ensure that there is a clear linkage between the level of the top-up and the value of public goods provided by the reafforestation. Unless this process is transparent, there is a risk that funds will not be allocated first to areas where the environmental benefit–cost ratio is highest.

Forestry transactions involving trade in carbon credits have to be viewed as speculative. Both parties—the investor and the seller of the investment—are taking risks because the regulatory arrangements for carbon credit trading remain uncertain. Because of this, risk investment would be lower than otherwise.

Carbon credits by themselves are unlikely to influence outcomes in relation to tree planting in low-to-medium rainfall areas. Investors can be expected to show most interest in plantations in high-rainfall areas unless there is an additional funding top-up for other environmental services.

4.3 A vegetation bank

A proposal for a vegetation bank is being developed by the Murray–Darling Basin Commission for the purpose of leveraging private investment into a salinity target zone. The commission has not yet completed its proposal, but the broad concept has been made available to the consultants.

4.3.1 Key elements

Through a tendering process, the vegetation bank would channel government funds into commercial ventures for the purchase of salinity credits and other public good outcomes from revegetation within a target zone. The bank would essentially provide a top-up to encourage investment in land viewed as sub-commercial but that is a prime zone for dryland salinity.

It is understood that the vegetation bank would provide finance for:

- forestry where it would not otherwise be commercial. Attention would be directed to salinised catchments in areas receiving 500–800 millimetres of annual rainfall
- native vegetation management, rehabilitation and land stewardship. Where previously cleared but unproductive land is not reforested, it could be rehabilitated and stewarded for a range of ecological services, including catchment management
- innovation for short-rotation tree crops. These crops have considerable potential to overcome the economic impediments encountered in extending forestry outside its traditional zone and into the wheat belt.

The vegetation bank would be a purpose-built entity. Basin governments, through the Murray–Darling Basin Commission Ministerial Council, would set the balance of effort within each jurisdiction. Catchment management organisations would determine needs at a catchment level, assess where the revegetation should occur within the catchment, advise on any special conditions applying to their catchment, and facilitate on-the-ground activities in harmony with other natural resource management investments.

All major revegetation initiatives would be eligible for salinity credits under the Basin Salinity Management Strategy and, through their entry on salinity registers, would help states meet their agreed accountability arrangements (MDBC & AGO 2001).

4.3.2 Commentary

As noted, final details of the vegetation bank concept have not been released, so it is difficult to form a definitive view about it. Uncertainties about the broad concept include:

- How would the measure assist in relation to needs outside the Murray–Darling Basin?
- How much funding would be at the vegetation bank's disposal? What levels of leverage would be expected and achieved?
- Would the bank's governance arrangements help or hinder? With the intergovernmental arrangements operating under the National Action Plan for Salinity and Water Quality, reluctance to provide pooled funds allocated by priorities is likely to be a significant barrier. This could sit at odds with obtaining the maximum environmental gains.

It is too early to be definite about how the vegetation bank concept would rate under the various criteria. Broadly, though, it would appear to share many of the characteristics of budget funding. The concept would probably fill a void left by current government funding initiatives—purchase of environmental improvements from commercial land users on a large scale. Like other funding mechanisms, its effectiveness is likely to be limited because of the constraints on budget expenditure.⁴

⁴. The leverage potential from budget funding is constrained by the exhaustive and constant review applied to budget outlays. This contrasts with tax expenditures within structures such as pooled development funds, where the leverage potential faces no arbitrary limits. In the case of PDFs, the leverage potential reflects the underlying opportunities and the capacity for investors to discover new

One aspect that appears to set the measure apart from traditional funding is the apparent involvement of salinity credits. Thus the measure could facilitate the operation of a tradeable permit system, which is a generally positive step.

4.4 Regional investment vehicles

Given the growing emphasis on natural resource management within catchments and the need to involve farmers, who increasingly understand the threats and the actions necessary, one way to proceed might be to construct a catchment investment approach. Innovative investment models along such lines are beginning to emerge; one example is the Liverpool Plains Catchment Investment Strategy.

4.4.1 Key elements

The Liverpool Plains Catchment Investment Strategy brings together community action and vision. It identifies concrete actions for different land management units within the catchment with the intention of redressing environmental problems. The actions, which include agroforestry, and problems they are intended to redress are summarised in the Table 4.1.

Table 4.1 Major problems and actions to manage them

Action	Problem					
	Dryland salinity and groundwater	Flooding	Soil erosion	Water quality and quantity	Nature conservation and biodiversity	Riparian zone health
Cropping systems for recharge control	✓	✓	✓	✓	✓	
Tree cover and farm forestry	✓	✓	✓	✓	✓	✓
Ground cover management	✓	✓	✓	✓	✓	✓
Restore natural floodways		✓	✓	✓	✓	✓
Crop rotations and tillage	✓	✓	✓	✓		

Note: ✓ equals action to address problem.

Source: URS, Dames & Moore Woodward-Clyde (2001).

The strategy links farm plans to the overall catchment management plan. Land managers have a clear picture of what is needed if continued use of the region is to become more sustainable. An important strength of this planning approach is that it enables the integration and coordination of many actions, including across neighbourhood properties, to maximise benefits and minimise costs.

A further innovation is the proposed operating environment and institutional setting. At its core, this entails a substantial role for the Liverpool Plains Land Management Committee, involving:

- facilitating community support for objectives and priority actions
- providing resources and distributing funds according to accepted objectives and priorities
- governance arrangements

business opportunities. There are no limits on the amount of funds invested or available for investment, although it is likely that if there were a surge in investment interest the government would consider it had achieved its objectives and contract the scope of the scheme.

- coordination of roles with other government agencies
- facilitation of cost-sharing approaches with stakeholders
- monitoring and accountability.

The consultants have been given some preliminary data about the economics of the strategy as it stood in draft form. Broadly, the net present value of the investment cost was estimated at about \$169.5 million. This consisted of \$155 million for on-ground works and maintenance costs over 25 years, plus some \$15 million for lost production. Calculation of the benefits was limited to those that can be priced in existing markets; they were forecast to have a net present value of \$171 million. It is thus estimated that the strategy would produce a small net financial gain—some \$1.5 million.

The preliminary strategy still faces major economic challenges, among them the following:

- The costs and benefits are unevenly distributed between land management units and farms.
- While the catchment at large benefits, some land management units and farms are net winners and others are disadvantaged, unless a cost-sharing approach is adopted.
- A cost-sharing outcome based on the beneficiary-pays principle, which could be achieved through negotiations between land management units, would still leave many costs uncovered, especially where benefits are expected to be obtained by interests outside the catchment. It is estimated that some \$65 million of the costs are uncovered in this way.

It is understood that the preliminary strategy foreshadows that the \$65 million gap could be closed through one or more methods, including:

- additional cost-sharing arrangements within the catchment
- obtaining contributions from external interests that benefit directly from the strategy—for example, downstream natural resource users
- investment from outsiders through credit trading
- grant procurement.

Given that the remainder of funds required equates to a top-up of only \$10 per hectare of vulnerable land that could be placed onto a more sustainable footing because the community in the catchment is meeting a fair share of strategy costs, this should represent a more affordable opportunity for parties with an interest in leveraging the highest value from money they plan to invest in more sustainable natural resource use.

4.4.2 Commentary

The Liverpool Plains Catchment Investment Strategy highlights the considerable potential that lies in engaging farmers and the community ‘from the bottom up’ in contributing to an overall catchment plan. It goes some way to overcoming many information-related problems about what to do and where. It also overcomes inertia by encouraging group action. This is a much more tangible approach than many others that have been put forward, and it is likely to be powerful in mobilising effort.

It also shows that coordinated activity supplementing private action can lower the cost and raise the benefits to be obtained.

At a conceptual level, the approach being developed in the strategy is likely to work best in combating local externalities—that is, where clusters of producers can agree to act together because they see their actions generate sufficient return to make it worthwhile; or, more technically, they can cooperate to internalise an externality even if there is some value that leaks out to downstream interests. The strategy could form a template to assist in identifying the nature and magnitude of landholder and local community contributions to solving problems where solutions offer private and community-wide gains.

One weakness is that in the case of the Liverpool Plains, and possibly many similar regions, funding gaps are likely to remain; that is, because of the difficulty of charging for environmental services, a portion of the costs remains uncovered by future revenue and the strategy as a whole risks financial loss or being unable to make investments that are needed to genuinely improve sustainability. Despite the possibility of community coverage of many costs within a catchment, an external investment vehicle is the missing link.

At present, it is understood that the strategy is receiving funding for some preliminary activities from state and Commonwealth government programs (the Natural Heritage Trust). The lack of a clear-cut funding path is a weakness. It is notable, too, that this weakness applies to many other initiatives that could or should be funded under recent Commonwealth–state programs (for example, the National Action Plan for Salinity and Water Quality).

The institutional dimensions of the strategy are very important. They play a central role in linking the overall strategy to improve the environmental impact of natural resource use to priority actions, incentives and funding plans within the catchment. They also appear likely to ensure that there is stakeholder support for decisions that are taken: the stakeholders see that the decision-making body understands the problems and is fair and representative.

4.5 Leveraging sustainable natural resource management

The Allen Consulting Group’s *Leveraging Private Investment* report contributed new ideas on how to attract significant capital for natural resource management, including research and development. The measures proposed in the report were designed to address key strategic parameters, including the need to:

- take account of the three broad layers in the investment chain—capital, land, and technical expertise—by providing a mix of measures concentrating on closing information gaps, funding high-priority activities, and providing incentives for genuine private investment that delivered environmental gains
- build the capacity of land managers and investors to explore and identify new commercial opportunities that are also more sustainable
- provide incentives for private land managers to disclose detailed information about environmental conditions on their property and their plans for managing emerging threats
- channel whatever public and private funding is available to investments that are aligned with local catchment management plans based on independent accreditation processes
- use policy instruments and investment vehicles that governments and investors are familiar with and have been tried and tested in other policy areas.

4.5.1 Key elements

The package of measures proposed involved establishment of the following:

- sustainable land use investment companies, which would be private companies that were limited to making investments solely in new projects or existing businesses that were operating with an accredited plan. The incentive to invest in activities that would otherwise produce a lower commercial return would be provided by granting the investment companies tax concessions along the lines of existing pooled development funds
- a land repair fund, which would administer a range of programs and a tax concession aimed at building the capacity of land managers to learn about new industries and develop business plans suitable for accreditation, as well as encourage R&D commercialisation
- sustainable accreditation agencies, which would be independent agents, generally working with expert knowledge of specific catchments, that review sustainable land use plans proposed by investors
- a natural resource protection agency, which would act as a repository for sustainable land use plans by building a detailed database of environmental conditions on land throughout Australia to guide further policy measures. It would also supervise the accreditation agencies, to ensure that they had the necessary skills to accredit
- other measures, including the provision of green bonds (similar to the existing Infrastructure Borrowings Tax Offset Scheme) and extended R&D concessions to accelerate investment in supporting activities such as construction of infrastructure and building knowledge about opportunities.

The Allen Consulting Group estimated that this approach could raise about \$5.0 to \$12.7 billion in private investment in conjunction with a public investment of between \$2.4 billion and \$3.6 billion. This represents a leverage ratio of between 1:2.1 and 1:3.5; that is, an additional \$2.10 to \$3.50 of private sector investment could be stimulated for every public sector dollar invested.

How could it work in practice? The main leverage is achieved by raising the profitability of investments in accredited activities or in accredited businesses that concentrate on providing services in activities that are accredited. Box 4.2 explains how the package would work for different stakeholders.

Box 4.2 Opportunities for stakeholders

Farmers

Sustainable land use investment companies, or SLICs, will provide a source of low-cost, long-term finance to introduce new or improved land use activities and projects. Capacity-building support and expanded tax concessions will assist farmers with identifying environmental risks, research into environmental risks and solutions, developing sustainable land use plans and business plans, achieving accreditation, and obtaining SLIC funding. Tax concessions would be available for accredited activities even if SLIC funding is not achieved.

Large agricultural businesses

Larger businesses will have access to low-cost, long-term capital and are likely to be involved in the full range of activities encouraged by the proposed arrangements. These include research and development; commercialisation of new technologies, products and services; changes to existing land use activities; the introduction of new land use activities; and the development of off-farm infrastructure to support more sustainable land use activities and practices.

New businesses

Opportunities will arise for new businesses in all the areas encouraged by the proposed institutional framework, such as changed land use practices, new land use activities, and on- and off-farm infrastructure development. New businesses will bring new ideas and skills that can be exploited to improve environmental outcomes and sustainable land use.

Communities

Communities will be empowered to play a role under the proposed arrangements. For example, a community could identify an environmental problem in its local area caused by an unsustainable land use practice or activity, develop a sustainable land use plan to reduce or eliminate the activity, and seek accreditation and funding from SLICs and other investors.

Brokers

Opportunities will arise for brokers to bring together land users, new businesses, SLICs and other investors to develop bankable proposals capable of obtaining accreditation. With all the necessary institutions, stakeholders and programs in place, opportunities arise for intermediaries to bring all the parties together to produce a mutually beneficial outcome.

4.5.2 Commentary

The Allen Consulting Group's *Leveraging Private Investment* report is a recent contribution to the debate and analysts are still evaluating it.

While some responses to the report have taken issue with aspects of the package (such as the use of taxation concessions and the estimates of the size of the investment required to repair environmental damage), the integrated-solution approach at its heart remains unchallenged. Because it spans the full range of measures—encouraging altruistic activity, closing information gaps, building a regulatory structure, involving funding, and incentives—it incorporates the strengths of all the measures in terms of the criteria of effectiveness, efficiency, equity, stakeholder support and administrative efficiency. However, because it has many parts, it is unlikely to have an overall low administrative burden, although this is to be expected because it is designed to counteract specific market failures and requires a suite of measures, some of which call for continuing government involvement. Of course, with careful design, the administrative burden of particular measures can be minimised.

The taxation question deserves a specific response. The main point is that tax concessions are relied on as part of a range of measures, including mechanisms intended to raise awareness of opportunities and build the capacity of land managers and others to invest in new industries. The proposed tax incentives are part of the way that government, on behalf of the community, purchases outcomes that would otherwise not be commercially viable. The fundamental purpose of the proposed information-sharing and accreditation processes is to create a system that will ensure environmental and community value in exchange for tax revenue forgone. Agencies with revenue-raising responsibilities are naturally cautious about proposals that could reduce revenue; their concerns are summarised in Table 4.2.

Table 4.2 Leveraging Private Investment: taxation concerns and responses

Concern	Response
It is difficult to ensure that a natural resource management investment claiming a tax concession will in fact lead to a positive environmental outcome.	This is why an independent accreditation approach for specific actions is essential. Experts familiar with catchment requirements and local needs should determine whether a specific investment will deliver environmental benefits. The rate of assistance provided should be a matter of public policy.
There are high administrative costs associated with assessing whether natural resource management activities generate environmental outcomes.	This point emphasises the advantages of having an accreditation approach for specific actions, thus minimising the administrative burden on tax officials. The overhead involved in accreditation is an unavoidable cost, but it could be minimised through regional planning.
More rigorous targeting of tax assistance raises administrative costs. Once administrative costs become high, it would be better to use an expenditure program.	Because of the accreditation process, targeting is essentially a by-product of catchment management planning, which should be done in any case. Because of the multitude of investments that need to be made, it would be more efficient to use an umbrella approval system than to have to make an expenditure decision on each one.
Tax incentives attract investors who care more about the concession than about the outcome they are supposed to generate through the investment activity.	Careful design features resolve this problem. First, they avoid up-front tax benefits for long-term investments. Limiting tax benefits to activities that actually generate a profit introduces strong incentives to make the activity genuinely commercial—at the cost of limiting the range of circumstances where the tax measures will provide an incentive to those activities that are close to fully commercial.
Tax concessions rarely stimulate additional investment but instead provide tax cuts for activity that would have happened anyway, posing a threat to the revenue base.	This is a problem with many tax concessions. There is little evidence in this case that a surge in investment in agroforestry would occur without assistance. Even if the ‘additionality’ of an investment is subject to doubt by revenue agencies, additional value is obtained from beneficiaries of assistance because accreditation depends on placing detailed information about environmental conditions in the hands of planning authorities.
Tax concessions distort investment flows, encouraging investment in less productive activities.	The proposed measures correct or counteract well-known market failures and so are welfare enhancing. Accreditation is the central means of ensuring that there are valued non-commercial gains from a tax-assisted investment.

An important weakness of the approach is that it does not provide a tangible pathway to change: it does not show how the proposed structures and measures could be accommodated within existing or emerging institutions and policies.

4.6 Multiple environmental services markets

The idea of tradeable permits for environmental services is not new. A recent report by Binning et al. takes a new perspective. The core of their position is that it is unlikely that the returns from any single commodity or environmental service will be sufficient to secure large-scale investment in agroforestry in low-rainfall areas. According to this view, while carbon credits may ultimately come to have a value of around \$40 per tonne in the future and this would provide an important supplementary source of income, it would not be sufficient to sustain a viable farm business. What is needed is a mix of ecosystem service markets including carbon, water, salt and biodiversity to supplement the existing mix of timber markets and other sources of farm income.

Table 4.3 sets out one vision for the composition of value generation in the future for Australian farming. It highlights multiple commodities, including those flowing from environmental services. *Mixed farming* would acquire new meaning. Many of the environmental services would arise as joint products from agroforestry.

Table 4.3 One vision of the future of Australian farming

Commodity	Share of farm business (%)	Potential client
Wheat	35.0	World market
Wool	15.0	World market
Timber	25.0	Specialty and world market
Carbon credits	10.0	Steel company
Salinity credits	5.0	Catchment management authority
Water filtration credit	7.5	Urban water authority
Biodiversity credits	2.5	Philanthropic trust

Source: Binning et al. (2002).

Binning et al. propose seven practical steps for moving towards implementation of a multiple market system:

1. *Accounting.* This involves establishing methods to account for and calculate ecosystem service credits that are based on the costs and benefits of land users' and management actions on the ground.
2. *Investment vehicles.* This involves establishment of a catchment ecosystem services investment centre to be responsible for accounting for the credit creation through on-the-ground projects and for attracting buyers as well as brokers to on-sell the credits.
3. *Marketing and finding clients for the credits.* Intermediaries will emerge to promote interest in credits and credit trading.
4. *Allocation of credits.* This would be managed by the investment centre.
5. *Facilitating trading of ecosystem services credits.* Trading could begin prior to the introduction of regulatory caps.
6. *Setting a regulatory cap.* The investment centre, in conjunction with other authorities, would establish caps on resource use, which is how the system reduces activities that are degrading the environment.
7. *Monitoring and adapting the system.*

As with the *Leveraging Private Investment* approach, it is not envisaged that a trading system would replace other mechanisms such as education, environmental management systems, and assistance for R&D.

4.6.1 Commentary

Taking the seven steps identified in the Binning et al. approach is not easy. The main challenge starts right at the beginning, in step 1. Our knowledge is not yet sufficiently advanced to be able to form common metrics about the range of ecosystem impacts that are of interest: basically, we cannot yet define the product to be bought and sold; in practice, we are still at the information-gathering stage.

It is notable that an important part of the earlier *Leveraging Private Investment* approach is to create a system that encourages natural resource managers to provide information about the condition of their land. The detailed national map that would be built, pixel-by-pixel as properties entered the system, would form an important part of moving to the next, more complicated stage of forming tradeable rights.

The longer term potential of the multiple environmental services market to stimulate large-scale investment in agroforestry that brings environmental gains is substantial. This hinges, however, on restricting access to environmental resources that are currently being overused—that is, by limiting use of the environment’s capacity to absorb carbon or a catchment’s ability to absorb water. Step 6 of the seven steps involves constraining the activities of farmers and others: there are substantial regulatory, equity and, ultimately, political hurdles to be overcome before that step could be taken.

4.7 An agroforestry environmental services brokerage

Following discussions on an earlier draft of this report, Environment Australia, Agriculture, Fisheries and Forestry—Australia, and the Australian Bureau of Agricultural and Resource Economics suggested another option for achieving agroforestry that produces beneficial commercial and environmental outcomes. This was put forward as an idea to be discussed, rather than as a formal indication of potential policy development.

It is understood that the purpose of this proposal is to develop an investment mechanism that brings together private sector timber investors, the Commonwealth, and landholders who have an interest in adopting an integrated agroforestry project on their land to grow and manage plantations for the purpose of maximising the returns that can be derived from:

- timber product
- salinity remediation (or other environmental services)
- production of auxiliary benefits to the landholder, complementing traditional farming practices already undertaken by the landholder.

The focus of the proposal is to stimulate investment in areas of low-to-medium rainfall—areas traditionally with an under-investment in agroforestry and where salinity and biodiversity problems necessitate large-scale planting.

4.7.1 Key elements

The proposed brokerage facility would involve the stakeholders undertaking new roles, as summarised in Table 4.4.

Table 4.4 Proposed brokerage facility: stakeholder roles and benefits

Stakeholder	Resources contributed to agroforestry project	Expected returns from plantation
Commonwealth	Brokerage services—bringing all the stakeholders together Scientific and technical expertise to determine the best mix of species and the location and pattern of plantings to maximise benefits Funding to compensate landholders for establishment of agroforestry plantations	Provision of environmental services—salinity remediation, biodiversity, wildlife corridors, and so on
Landholder	Land for the project Some resources (either in-kind or financial) for establishment of the project	Auxiliary benefits—for example, stock protection and additional products such as seeds and nuts and firewood
Timber business investor	No up-front resources required Provision of options or futures contract for purchase of the timber	Funds for the purchase of timber upon maturation of project

Source: Personal correspondence with officials from Environment Australia, AFFA and ABARE.

- The Commonwealth allocates funds for the provision of environmental services on an ‘opportunity cost’ basis; that is, it buys up the ‘supply curve’ of environmental services offered by the participating landholders. This supply curve is constructed through a BushTender-style process, whereby interested landholders put in bids for the agroforestry project, taking into account that they will also receive timber revenues and other auxiliary benefits from the trees. Landholders can elect to contribute to some of the start-up costs themselves.
- Emphasis will be given to agroforestry proposals that complement, rather than compete with, traditional agricultural enterprises. This is important in overcoming some of the cultural barriers to agroforestry.
- The landholder and the private sector investor enter into a contract for the production of timber on a commercial basis.

Possible criteria for selection of landholders would be:

- the suitability of the site to produce commercial timber
- the suitability of the site to produce desirable environmental services
- the extent to which the project produces auxiliary benefits for the landholder and complements, and is integrated into, traditional farming practices
- the price at which the landholder provides the environmental service.

4.7.2 Rationale

Conditions in low-to-medium rainfall areas are not conducive to the commercial production of timber; at the same time, however, these areas have the greatest need for reforestation in an effort to deal with serious land degradation.

Development of environmental services markets requires that government (most probably the Commonwealth or state governments) be involved to create scarcity and raise the economic value for more sustainable natural resource management activities. Although the Commonwealth remains

reluctant to be involved in this way, for the purposes of illustration it is nominated as the hypothetical buyer of environmental services and credits.

By combining income streams from two different sources, and obtaining auxiliary benefits from the trees, this proposal aims to raise the returns that landholders could receive from agroforestry in these areas and hence stimulate further development of these types of projects. In this way, this project attempts to overcome a number of the identified impediments to agroforestry:

- *Cultural factors.* By emphasising the need for agroforestry to complement, rather than compete with, traditional agricultural practices, this proposal could help break down the cultural barriers to this type of farming.
- *Technical knowledge.* The Commonwealth would provide the necessary scientific and technical knowledge. This project helps to disseminate knowledge across target communities.
- *Poor access to capital.* By acting as a broker and providing funds for the provision of environmental services, the Commonwealth is leveraging private and public financial resources into low-to-medium rainfall agroforestry. By recognising and paying for environmental services, this proposal raises the returns and hence improves the incentives for landholders.
- *Market failure.* This proposal creates a market for environmental services and hence overcomes an important market failure.

The approach can be expected to have a number of spin-off benefits:

- demonstration and extension and/or information dissemination within the target community
- provides mechanisms with which to explore, analyse and possibly quantify the split between the public and private benefits that may be derived from these types of projects
- provides an opportunity to apply within a commercial context the R&D currently being carried out by the Joint Venture Agroforestry Program
- provides an opportunity to further scientific understanding of the link between tree planting and salinity amelioration
- possibly, industry-development benefits.

4.7.3 Commentary

Overall, the approach offers the potential to make substantial progress. It brings together many elements that are essential. Most importantly, it creates a purchaser and, in time, a price for environmental services, which would be a strong catalyst for change and improved economic efficiency. The existence of a purchaser would signal a much higher degree of commitment on the part of the public sector, which in turn would stimulate more interest and investment by farmers and foresters—and, most importantly, financiers.

Many of the spin-off benefits identified would constitute valuable progress.

It is not clear, however, that the approach makes full use of the capabilities of all potential stakeholders. The role for timber business investors appears to be focused on harvesting and marketing: this is narrower than it could be and, perhaps, should be.

A further concern is that it seems that the approach would involve placing too many roles in the hands of the proposed government purchaser—purchaser, broker, planner (or at least information gatherer and analyst), and regulator.

Mention of a regulatory role may surprise some. Generally speaking, public sector purchasing of public interest outcomes involves setting up markets in new areas. Regulatory questions inevitably arise. Quality of service and the suitability of providers are key considerations. Practical experience points to conflicts of interest in the roles of both purchaser and regulator: these conflicts are most easily avoided by separating roles.⁵

At a practical level, the approach seems to involve arrangements (or contracts) between government, farmers and forestry interests. This would appear to involve transactions for every farm involved, which would inevitably become very demanding administratively for the government if the approach were to become national.

4.8 Evaluation

How do the newly proposed measures stand up against the criteria used to evaluate the existing measures? Table 4.5 summarises the consultants' views. Once again, the consultants do not consider that there is a measure that could be applied 'off the shelf' and offers a complete solution at present.

Table 4.5 Evaluation of packaged approaches: an evaluation

Measure	EMS	Joint ventures	Vegetation bank	Regional investment vehicles	Leveraging private sector funds	Multiple services markets	Government agroforestry broker
Leverage (effectiveness)	✗	✓/✗	✓/✗	✓/✗	✓	✓/✗	✓/✗
Economics (efficiency)	✓	✗	✗	✗	✓	✓	✓
Fairness (equity)	✓	✓	✓	✓	✓	✓/✗	✓
Stakeholder support	✓/✗	✓	✓/✗	✓/✗	✓/✗	✓/✗	✓
Low administrative burden	✓/✗	✗	✗	✗	✗	✗	✗

Note: ✓ = meets criteria; ✗ = does not meet criteria; ✓/✗ = mixed impact.

A significant challenge with *environmental management systems* (EMS) is that it is not clear-cut that consumers or regulators in overseas markets (which have arguably driven Australian producer interest in EMS) are as concerned about salinity and land degradation in Australia as they are about, say, chemical-free food. Until the business case for an EMS linked to specific environmental outcomes is firmly established, its widespread uptake by conventional (particularly smaller) producers will be delayed.

The joint venture approach is viewed as being limited in its ability to leverage investment in low-to-medium rainfall areas without an additional source of assistance. It also does little for longer term efficiency because it does not provide support for producers to raise prices to cover their investment in more sustainable production.

The vegetation bank, as the consultants understand it, will be limited by constraints on access to public sector funds. Further, it is not clear that the approach raises efficiency since prices are not influenced

⁵. In the example of the purchaser-provider arrangements in aged care, the conflict of interest arises where government is reluctant—because of, among other things, the shortage of alternative accommodation—to close down nursing homes that are not suitable until gross abuse or negligence is shown, by which time of course the event becomes newsworthy. It would be more straightforward if government allowed an independent party to exclude poor performers well before the matter became politicised.

in order to reflect the scarcity value of more sustainable production—that is, how can sustainable producers capture higher prices to cover their higher costs?

Regional investment vehicles are still searching for means of leveraging sufficient funds. This is related to the fact that they are unable to influence prices so that more sustainable producers are rewarded for being so or can at least cover their costs.

There is still not a great deal of support for or understanding of the complexities of the approach offered in the *Leveraging Private Investment* report (Allen Consulting Group 2001).

The effectiveness of the multiple services market approach is open to question because of insufficient knowledge at this stage on which to build the tradeable permits. It is not clear that stakeholders will be supportive of mechanisms that would constrain their access to resources (as with the continuing difficulties in water reform) without the support of other measures.

The government agroforestry approach is rated highly. It is viewed as having the potential to stimulate significant investment, although, like the vegetation bank concept, much depends on the level of funding support. The idea works towards development of a price for environmental services set in a competitive context, so it would improve the efficiency of resource allocation. It is also likely to be viewed as fair when it is clear that payment is for the purchase of a better environment at a lower cost than obtainable elsewhere. Explicit involvement of key stakeholders (including farmers and forestry interests) is likely to enhance support, although factoring in a more active role for environmental interests (perhaps through a separate regulatory arrangement) would increase its chances substantially.

Because all the new proposals move us closer to redressing specific market failures and achieving specific environmental outcomes, which require regulation and monitoring, they can all be expected to impose a high administrative burden on governments. A high administrative burden seems to be the price we have to pay if we are to achieve environmental outcomes that are currently not being delivered by the market.

5 Next steps

This chapter discusses the steps required to achieve a satisfactory mix of measures that will encourage investment in agroforestry and also result in environmental benefits. It sets out the need for a more strategic approach that deals with layers of issues, rather than specifying a single measure. It also discusses how these ideas can be advanced with the use of existing policy directions or pathways.

Farmers, foresters and financiers will be unlikely to invest in agroforestry on a large scale without an investment vehicle. Governments probably cannot mobilise these groups' support for the development of agroforestry and achievement of related environmental gains unless there is a clear vehicle on the negotiating table. This is a catch-22 situation.

The foregoing chapters point to the observation that the search for a single, optimal investment vehicle will probably be fruitless. This does not mean it is necessary to do more research and development in relation to investment vehicles. We have at hand a wide range of investment vehicles that have been designed over time and refined by experience in other policy areas. Many can contribute some value and meet their assigned role.

The complication could be that we have mis-specified the problem. Rather than looking for the optimal investment vehicle, we should be looking for a framework whereby we can make choices that meet most requirements, despite the many uncertainties. A satisfactory mix.

A further theme from the earlier chapters is the lack of a pathway joining institutions and incentives to arrangements that are in operation now or are under construction.

5.1 The Three /s Framework

Drawing on the analysis in the earlier chapters, the primary needs of a policy-mix approach can be distilled into three overlapping areas:

- Information
- Institutions
- Incentives.

5.1.1 Information

Ironically, money is not the heart of a successful investment framework. Information flows are the heart. They are fundamental to a task that aims to divert capital flows in the public interest and influence outcomes on individual farms, as well as at the regional, catchment and, ultimately, national scales. Obtaining public trust and confidence in the arrangements hinges on having a thorough understanding of what is to be achieved—in terms of, say, salt levels as well as other environmental attributes—and being clearly able to account for actual outcomes and public resource inputs.

Information is needed about:

- the extent of environmental services that are expected to be obtained from trees grown for commercial harvesting
- specific areas where agroforestry is viewed as delivering an environmental service

- the extent to which there is a purchaser for environmental services delivered by trees on farms and the value or price of those services
- how to be involved in forestry on farms in places where such trees deliver environmental services—that is, technical information about how to create farm forestry assets that also have environmental benefits
- where investors can invest in order to obtain environmental outcomes—that is, what to invest in.

Improving the quantity and quality of the information available does not mean that governments need to absorb the commercial risks associated with agroforestry investment. It does mean, however, that through the provision of better information the private sector is better able to manage that risk; that is, government does not need to be an underwriter of private investment.

A key way of better managing risk is to engage the forestry and wood products industry in the design of information measures. For instance, if through the planning process we are able to identify geographic locations where significant forestry plantings are required for environmental service gains, industry bodies could play an important part in facilitating the building of associated infrastructure and providing technical advice on appropriate species, volumes required, and state-of-the-art harvesting and processing methods to give these products the best chance of commercial success.

Saying that we need information does not mean that government should do nothing until these information needs are met. Additionally, it is not always necessary or appropriate for the required information to be produced by the public sector. Some funding vehicles that could be used offer the ancillary benefit of creating useful information through their operation. An important benefit of the BushTender approach, for example, has been the information it generates about particular attributes, such as information about the cost of procuring environmental services. There are a range of measures to choose from in order to close information gaps. Examples of measures already analysed elsewhere in this report are listed in Table 5.1.

It is notable that a two-way flow of information is generally required for the construction of effective investment vehicles that are designed to advance public interests. That is, information about what actions are desired generally needs to flow down to people considering actions in catchments. It is also important to obtain information from the catchment activity providers to verify that investment activities are in fact delivering the desired environmental service. Use of a single element or approach is unlikely to result in the dual flows required.

5.1.2 Institutions

Institutional roles span three overlapping types:

- *Regulatory.* This involves institutions that influence investment behaviour to deliver more public benefits—in this case, through agroforestry. Traditional roles include setting standards. Additional roles might include bodies determining what kinds of activities are desired in specific areas, as well as evaluating an agroforestry investment or action to determine whether it is consistent with desired behaviour. Where public resources are required, it is essential to factor in accountability arrangements, especially accountability for outcomes.
- *Financial intermediaries.* These institutions facilitate increased investment flows, which will be required to encourage more investment in agroforestry in areas that deliver environmental services. Financial intermediaries exist in even the most efficient financial markets because of imperfect information. The value they add lies in bringing buyers and sellers together. They are probably more necessary in new areas, where the opportunities and risks are less well understood.

- *Investors.* These are the providers of the funds. It is important to look beyond farmers thinking about agroforestry as potential investors. Investors could be public institutions (investing entirely in the public interest), private bodies or individuals focused on commercial gain, or a mix somewhere in between.

It would be desirable to use measures that fill each of these roles—see Table 5.1.

5.1.3 Incentives

Use of incentives will not be successful without substantial progress in the earlier areas. The tax measures, in particular, are unlikely to be useful in encouraging investment in preferred activities in the geographic areas where they are needed if there is inadequate information and institutional support.

The influence of the political economy is probably the binding constraint. It is very unlikely that any incentive measures for (profitable) private sector investment on private land will receive the support of environmental groups and the community at large if there is not clear evidence that the investment is achieving a public or environmental purpose.

Table 5.1 A menu of measures to provide a funding vehicle package

Information	Institutions	Incentives
Create knowledge to be shared	Support for community and catchment committees to evaluate catchments and plan actions	Provide public funding for environmental services—grants, bounties, and so on
Conduct research into catchment and local conditions	Establish independent accreditation agencies that can evaluate environmental benefits from agroforestry investments (and others)	Purchase environmental services through competitive tenders
Share knowledge about best practice	A planning and coordination agency with a national focus and regional connections	Provide tax concessions for more sustainable agroforestry
Provide education and training	Support to boost sustainable land use and zoning decisions	Funding for capability development for potential agroforestry investors
Develop catchment blueprints and plans	Standard setting and establishment of penalties	Provide tax concessions for agroforestry R&D
Evaluate environmental factors on a property-by-property scale	A licensing agency to control land use activities that are restricted	Provide commercialisation grants for innovative agroforestry and emerging-industry business proposals
Plan to redress environmental problems on a property-by-property basis	An agency to gather information and make it available—for example, a sustained land and water audit	Develop and facilitate community cost and benefit-sharing models
Collect catchment management information	Creation and expansion of public joint venture schemes	Provide tax concessions for new agroforestry infrastructure such as mills
Encourage use of environmental management systems	A specialised public funding agency—for example, a vegetation bank	Introduce new taxes and charges for unsustainable activities
Engage in capacity development for potential agroforestry investors	Create private sector investment funds with tax concessions—for example, sustainable land use investment companies	
Conduct research to identify and develop new agroforestry industries	Support altruistic investment activities	
	Community and regional cooperative arrangements to coordinate sustainable private investment	

5.2 Links

Fundamental to the Three Is Framework is ensuring that the elements are linked:

- Incentives should be tied to specific activities approved by regulatory institutions.
- Regulatory institutions should act on the basis of bottom-up information flows about the expected and achieved environmental outcomes of investment activity.
- Investor and financial intermediaries should be able to rely on information about high-priority investment activities—that is, top-down information flows.

These links have to be built into the mix of measures actually adopted.

5.3 Examples

The proposed approach is offered as a flexible way that involves choice. A consequence is that it is not easy to say precisely what should be done next.

To show how the range of available measures link together under the Three Is Framework, three examples are briefly outlined in Boxes 5.1, 5.2 and 5.3.

Box 5.1 Example 1: Boosting environmental management systems

The thrust of this approach is to raise awareness about the potential usefulness of EMSs and encourage more widespread application of the concept. It involves making progress towards more spatially specific elements of EMS approaches over time, recognising that this will indeed take time. Elements of the approach under the Three Is Framework are as follows:

Information

- Give stronger official recognition to EMS arrangements that are linked to catchment plans, their environmental outcomes and agroforestry.
- Boost awareness of the role that EMSs can play in more sustainable natural resource use.
- Encourage participation in training and demonstration activities.

Institutions

- Raise awareness of EMSs and sustainability among farmers, direct investors and customers.
- Require catchment planning bodies to encourage agroforestry that is certified as meeting recognised EMS requirements.

Incentives

- Provide fiscal incentives (grants, tax concessions or sustainable land use investment companies) to make greater use of EMSs and to facilitate the on-farm investment that is required to change farming practices.
- Support development of EMSs to better match the needs of agroforestry.
- Encourage the development of a spatial dimension in EMS approaches—that is, encourage the incorporation of, or reference to, specific catchment or regional requirements.

This approach may encourage some additional development of agroforestry, although the link to agroforestry in places that deliver environmental gains would not be assured at first. It may also increase efficiency where markets are better informed about differing quality attributes of products and services, and it is likely to be supported by industry participants already involved in EMSs. Environmental groups may note that the environmental gains are unlikely to be site-specific until spatial needs are factored in.

The next approach is a variation on the government agroforestry broker possibility introduced in Chapter 4. The variation revolves around building in more distinct roles for government—that is, separating the brokerage, purchaser and regulatory roles. It also augments the role played by forestry businesses and other stakeholders.

Under this approach, rather than involve the government in every land or forestry transaction, it would be useful to allow farmers, foresters and others (such as financiers) to form combined property offers. There would thus be potential to aggregate agroforestry activities in designated ‘hot spots’, and this would reduce the transaction costs for government, which would otherwise be very heavy. This approach offers the added benefit of encouraging a combination of skills and abilities in terms of managing a forest and the economic risks so that it makes most commercial sense. Of course, it should still be open for individual farmers to make bids.

Box 5.2 Example 2: Agroforestry purchaser–provider model

Under this approach the government acts as a purchaser of environmental services that stem from agroforestry activities. Elements of the approach under the Three /s Framework are as follows:

Information

- The public sector purchaser provides information about the broad environmental outcomes that it wishes to advance and the structural aspects of the proposed purchase—for example, the duration of purchase or funding.
- Information concentrates on specific areas where it has been assessed that agroforestry will deliver environmental benefits—basically, tree ‘hot spots’ are put on a map.
- In order to stimulate interest in initial offerings where much is uncertain, the purchaser also provides information about the public sector value of agroforestry activities in specific areas.
- There may be a need to educate and inform farmers and foresters about how the scheme works and develop their capacity to participate in it. The greater the pool of potential participants, the higher the level of competition.

Institutions

- A public sector entity is required to act as purchaser of environmental services.
- A separate regulator is introduced to verify that environmental services are delivered.
- A brokerage role for innovative farmers, environmental interests and community and forestry business interests is left open.

Incentives

- The winners of the competitive process are paid by government for the environmental services they provide.
- All stakeholders have better information about tree ‘hot spots’. Altruistic investors may invest in agroforestry options in these areas—even if they miss out on competitive support—if they can clearly point to the fact that they are doing ‘the right thing’.

This approach could stimulate investment in agroforestry in areas where it would be expected to deliver environmental gains. The extent of the impact made through this approach will largely be determined by the magnitude of funds committed to purchase environmental outcomes (with allowance for the leveraging effect).

Using this variation, the government would be able to influence a larger area, with fewer expensive contracts to negotiate, and encourage innovation. It would also result in prices for environmental services that are set in a competitive market. Possibly, and most importantly, there would be independent assessment of the delivery of environmental gains. The approach would assist in redefinition of what is viewed as fair—away from arbitrary distribution of funds—to achieve an acceptable spread towards allocation for activities that deliver the greatest environmental gains.

It is apparent that it is feasible for a government agency to fill the proposed purchasing role. Discussions with the Murray–Darling Basin Commission suggest it will have the capability to produce maps that specify the likely level of public benefit attached to changes in vegetation cover in particular areas. For consistency across catchments, it would be preferable to have one entity do this assessment work.

Responses to similar schemes in relation to preservation of biodiversity values—for example, the BushTender approach—indicate that environmental stakeholders would be broadly supportive of this approach.

Box 5.3 Example 3: Strong leverage

This approach aims to deliver larger scale agroforestry investment in activities that deliver environmental gains, recognising that the problem is of national scale. It involves a more comprehensive range of measures designed to address more fully the complex range of barriers to investment in agroforestry that is expected to deliver environmental gains. A key strategic thrust lies in linking information about needs at the catchment, and even property, level to independent assessment of actions, as well as a mix of incentives to encourage appropriate action.

Information

- Develop specific catchment plans for action, highlighting roles for activities including agroforestry.
- Encourage the conduct of voluntary property-level assessments and the development of plans (some of which involve agroforestry).
- Boost capabilities for all to be involved in assessment, planning and development of commercial approaches.

Institutions

- Develop catchment planning capability—this is already largely in place in National Action Plan priority areas.
- There is a need for accreditation agencies that are able to assess proposed actions on a property scale against expected performance under catchment plans. This may also require audit capability.
- Establish bodies that specialise in funds mobilisation and in finding innovative approaches—to meet the needs of larger scale investment in sustainable agroforestry. This could include specialised private sector companies that can invest only in accredited activities or the establishment of a public sector intermediary such as the proposed vegetation bank. This should be linked to incentives or assistance if investment in activities that deliver genuine environmental returns is desired.
- Build the capabilities of farmers, investors, government agencies, community groups and Indigenous interests, to facilitate their widespread involvement.

Incentives

- Investors would receive public assistance related to the achievement of accredited environmental activities that are defined as being needed under the planning process at the catchment level.
- Provision of an additional generalised tax concession for the specialised investment bodies that are able to invest only in accredited activities would significantly lower barriers to investment and reduce the transaction costs inherent in other means of applying public sector assistance to advance the public interest.

This approach could deliver significant levels of investment in agroforestry whilst also delivering desired environmental outcomes. It provides incentives for the development of innovative agroforestry approaches within a framework where actions are assessed against a plan made at the catchment level. Such a plan is central because it essentially defines the public interest. The approach is inclusive: it builds in roles for farmers, investors, entrepreneurs, innovators, environmental interests, community groups, local government, scientific and ecological experts, and many others.

The approach focuses on satisfying public and private sector needs against a background of imperfect information. The arrangements can be refined in time, using the improved information that would result from the property action plan and accreditation processes. Then it would become feasible to develop tradeable permit arrangements that would encourage greater market determination of the value of environmental services. More detailed information about environmental benchmarks, and ways of measuring change in them, is essential to resolving the ‘missing link’ problems associated with defining the commodity, which is what currently impedes widespread use of tradeable permit arrangements.

In the spirit of flexibility that underpins the Three Is Framework, it is noteworthy that the approaches discussed are not mutually exclusive. Combinations of them—and possibly others—can be devised.

While the consultants have focused on the use of these tools for agroforestry, the tools can also be applied in other areas where changes in land management practices are required.

5.4 A pathway for change

Even with an optimal mix of measures assembled under the Three *Is* Framework, change is unlikely unless the structure can be accommodated within policies and strategies that are already understood and resourced. We need a way forward.

A good pathway would involve a program or activity already concerned with improving natural resource management outcomes, yet where the structure is still open to new ideas. There appears to be potential to draw on the National Action Plan for Salinity and Water Quality, the Natural Heritage Trust and the Murray–Darling Basin Commission in this regard.

It is understood that the administrators of the National Action Plan have finalised the details and criteria for accreditation of catchment plans that will be developed through an interactive process between catchments and regions, relevant state and territory governments, and the Commonwealth. The Commonwealth and the relevant state and territory governments will be responsible for accrediting the plans. The Murray–Darling Basin Commission assesses and advises on the plans' consistency with agreed policies and strategies. It is expected that plans will be accredited on the basis of their goals and objectives, analytical base, strategic planning, priority actions, proposed targets and outcomes, and accountability and performance-monitoring and reporting arrangements. (The National Action Plan is discussed in Appendix C.)

As part of the development of accredited catchment plans, governments, regional communities and other investors will need to agree on an investment strategy or business plan, which will provide a commitment to funding for plan implementation. This is a work in progress, and there are currently no authoritative documents available in the public domain that explain what the expected investment strategies will look like. Discussions between the consultants and senior officials involved in the preparation of processes for developing the investment strategies indicate that the investment strategies or business plans would, among other things:

- provide details about specific actions and what they are expected to achieve
- identify benefits as public or private and the cost-sharing arrangements to reflect this
- explain how the actions will be carried out through commissioned works, small grants to local groups and auctioning for outcomes, among many other approaches.

In considering and negotiating funding support to implement the investment strategy, governments would consider the potential to attract private investment—both from industry and through leveraging additional input from landholders.

A clearer pathway for change, involving the suggestions explored in this study, could be achieved if regional catchment bodies preparing catchment plans or investment strategies were given a list of measures that have been pre-approved, drawing on the Three *Is* Framework. Pre-approved in this context would mean that accreditation should be a degree easier because well-understood mechanisms have been employed. Innovative arrangements would not be precluded, but the architects of catchment plans or investment strategies that use such arrangements should understand that they would need to explain more fully why additional approaches are desirable.

Pre-approved approaches would also streamline the process of advising investors and farmers interested in exploring agroforestry options about what was needed. An objective of the National Action Plan is that there be partnering with farmers, investors and others. While it is understood that some stakeholders have been involved to date in formulating plans and investment strategies and catchment blueprints, they have probably done so in the context of representing broader interests. At some stage, these stakeholders also need to put on their farmer's or forester's hat and think through the

issues from a commercial perspective. At the moment it is not clear that they would have very much that is concrete to think about.

Where possible, agencies and potential investors in turn should be given guidance about the investment strategy parameters that would be viewed as normal. In line with earlier findings, this should span three key aspects—the Three Is. These aspects could be viewed as immediate needs.

5.4.1 Information aids

Investors need to know where planners want agroforestry. The key to many environmental benefits, especially in relation to dryland salinity, lies in ensuring that trees are in the right place, at both catchment and farm levels. This place is surely where investors are invited to investigate the commercial viability of agroforestry activities. Planners need to be quite specific about the role they see for agroforestry and where it should be located, and this should be clearly reflected in the plans. Ideally, the priority given to tree plantings relative to other activities, in that catchment and in other catchments, should be conveyed through a broad indication of the dollar value of the public benefit involved.

This information could form the basis of more regionally specific EMS arrangements. As noted, EMS compliance could incorporate a broader range of environmental factors if compliance with specific spatial needs were factored in. The planing process under the National Action Plan seems to offer that possibility. This would enhance the capability of investors, farmers and producers to support claims that they were engaged in more environmentally sustainable activities.

5.4.2 Institutional arrangements

Investment strategies could facilitate greater use of agroforestry, among other approaches that they wish to encourage, by specifying:

- if agroforestry investments in a specific catchment were to be made eligible as accredited investments for funding vehicles similar to pooled development funds (or sustainable land use investment companies) or the vegetation bank concept
- if government-owned forestry businesses were looking for landholders to participate in agroforestry joint ventures in the catchment area of concern
- arrangements to facilitate cost and benefit sharing negotiations for agroforestry activities that were more extensive than single properties in specific regions
- measures that would be used to assess performance against expected environmental outcomes in relation to specific investments.

5.4.3 Incentives

Because there are many barriers to investment in agroforestry, a clear-cut framework involving public sector purchasing of environmental outcomes is unavoidable for anything but small-scale agroforestry action. Approaches include the following:

- paying a bounty per hectare in specific catchment areas or regions where substantial public goods are provided by agroforestry. How much should be involved? By way of example, the government could offer a bounty that would be less than the net present value of the projected public benefits to be provided. It would be appropriate to have higher or lower bounty rates for different catchments (reflecting the lower or higher timber return and risks and higher or lower public benefits for environmental or other public benefit outcomes)
- implementing competitive purchasing arrangements to apply in specific locations where the public benefit is significant. In this situation, government would provide to the investors details of the

size of the benefit and then select by tender the bid that provided the desired outcome at the lowest cost

- provision of tax concessions applying to agroforestry activities that are accredited as providing public benefits.

The knowledge that these incentives were available would greatly streamline the plan-accreditation process and ensure that activities such as assistance for agroforestry were considered in the context of ongoing National Action Plan, catchment plan and business plan preparation.

A question often raised with the consultants in connection with the use of incentives is whether there is sufficient knowledge with which to start investing in agroforestry with the intent of improving environmental outcomes. The response is that the purpose of the National Action Plan accreditation process is to make a judgment about whether a regional action plan is sufficiently comprehensive at a particular time to provide a sound basis on which investments can be made. If the plans are accredited they essentially provide a working definition of the public interest.

Linking support measures for agroforestry to the National Action Plan as a pathway for change involves some limitations. Longevity is a concern. The plan, as currently configured, is to terminate in six years' time. To the extent that there is much in agroforestry that will probably not have been achieved by that time, there will still be a need for a pathway. For agroforestry, this could be provided through the Murray–Darling Basin Commission, which is already involved in the National Action Plan process and has the potential to be a major player in this arena with the implementation of its vegetation bank proposal.

Longevity also provides an environment of greater certainty, which is critical to attracting investors and is essential when performing an auditing role where investors are paid for activities that have long-term consequences. It is also important to have consistency across the various jurisdictions, so that priorities are assessed relatively across catchments as well as within catchments.

This approach forms a pathway to action in the near future. Longer term agroforestry strategies involving a fuller range of interconnected measures should be reviewed and applied as appropriate with the benefit of experience with these shorter term actions.

5.5 Evaluation

Having subjected all the previous measures to evaluation against the criteria of effectiveness, efficiency, equity stakeholder support and low administrative burden, as set out in Table 3.2, the consultants are obliged to do the same for the framework they propose. In a nutshell, the consultants consider that there is at least the potential to obtain a tick against every criterion for the Three *Is* Framework, as long as substantial measures are taken in each *I* category in a packaged approach with effective linkages.

5.6 A pilot approach

Discussions with key stakeholders—particularly those with responsibility for developing the National Action Plan arrangements—indicated that they were interested in the consultants' proposal, particularly in how it might be used to implement the business plan component. Many suggested that perhaps a pilot approach would be a good means of gaining a better understanding of how the framework would work in practice.

Piloting the Three *Is* Framework in a way that would help us to gain practical insights on a timely basis could involve:

- accelerating the meeting of information needs by operating the pilot in a catchment or region with specific spatial areas where significant environmental benefits from agroforestry are reasonably certain and could be conveyed to investors fairly precisely
- streamlining the undertaking of institutional roles by using a broadly representative decision-making body that already exists
- setting aside funds to draw on as incentives for agroforestry in the selected area and deciding on a process for dispersing them. To replicate the conditions that would be generally applicable in other catchments if the pilot were successful, the purchasing agency should be the local decision-making body.

In conducting their study the consultants encountered many regional activities and processes that are currently under way to deal with salinity and other threats. The approach that—in the consultants’ opinion—seems advanced to the point of being able to meet the above requirements is the Liverpool Plains Land Management Committee’s process. Of course, there may well be others that are similarly advanced and it would be beneficial to test the ideas out in a range of areas.

Appendix A Terms of reference

A.1 Preamble

The National Land and Water Resources Audit concludes that about 40 percent of the land in mid to low rainfall (<700 mm) agricultural catchments requires strategic revegetation with woody perennial plants to have a significant impact on the rate of water and land salinisation. Increasing perennial vegetation cover on this scale would also make a contribution to reducing greenhouse gas emissions, stimulate regional development and provide employment in local processing and manufacturing industries. Biodiversity goals can also be addressed using appropriate species and designs.

However, the cost of revegetation over such large areas runs into the tens of billions of dollars, and is beyond the likely rate of public investment. One way to attract private investment to pay for the tree establishment and management is to develop new agroforestry industries with large markets in these lower rainfall agricultural areas. Unless trees are profitable for farmers in these areas they will never be planted on a sufficient scale to achieve desired environmental benefits. Another option being investigated by the Joint Venture Agroforestry Program (JVAP) is the commercialisation of environmental services and the development of markets for them. The JVAP has a strategic research and development program specifically investigating a range of new tree products for lower rainfall areas.

The process of developing new industries for these low rainfall areas will be expensive and take some time. There will be a strong need to find new investment vehicles to attract investment in the development and possibly even the research associated with these new industries.

However, even once some of these new industries have been developed, history tells us that investment in farm forestry will be commercially driven. The opportunity to achieve important environmental goals by planting trees in the right places and designs will be lost under existing frameworks and policies for investment. New frameworks and policies are required both to achieve new industry development in these regions and also to drive environmental benefits from these new industries.

A.1 Terms of reference⁶

1. Describe and review existing investment vehicles and associated tax policies that encourage sustainable agricultural development, focussing in particular on the positive and negative impacts of those policies designed to encourage farm forestry investment.
2. Review existing reports and schemes that describe efforts to establish markets for environmental services in Australia and overseas. Discuss how the commercialisation of environmental services could achieve new industries that have environmental and new product outcomes.

⁶. *New industries* refers to tree-based or agroforestry industries.

3. Review the latest developments in Environmental Management Systems and discuss how the implementation of these could contribute to new industries with environmental and commercial outcomes.
4. Consider other policy and investment options that would contribute to the development and implementation of new industries with environmental and commercial outcomes.
5. Considering all of the above, discuss the 3-5 most likely policy and investment options for attracting investment to farm forestry development at a farm and regional level which also meets environmental objectives.
6. Organise an expert panel to provide feedback on a draft of the report/options from (5).
7. Organise a forum to consider outcomes from TOR 1-5, inviting about 50 or more representatives and speakers from the investment, public sector, environmental, research and forestry and related industries sectors.

Appendix B The expert panel

B.1 The panel's role

The role of the expert panel was to engage with the consultants at critical times to review and discuss ideas and findings. The panel was broadly representative of many key stakeholder groups, including environmental interests, farmers, government advisers and researchers experienced in agriculture and forestry at Commonwealth and state levels, and investors and financiers.

The consultants do, of course, take ultimate responsibility for the contents of the report (including any errors or omissions), but the role of the expert panel is gratefully acknowledged.

B.2 Panel members

Panel Member	Organisation
Mr Corey Watts Coordinator Salinity and Sustainable Agricultural Practices	Australian Conservation Foundation
Ms Lalage Cherry Assistant Manager Greenhouse and Land Management	Australian Greenhouse Office
Dr Trevor Booth Team Leader Farm and Environmental Forestry	CSIRO
Ms Rhonda Dickson Assistant Secretary Natural Resource Management Branch	Environment Australia
Mr Ian Donges President	National Farmers Federation
Mr Colin Mues Senior Program Leader	Australian Bureau of Agricultural and Resource Economics
Mr Robert Delforce Senior Economist Natural Resource Management Strategies Unit	Agriculture, Fisheries and Forestry—Australia
Dr Chris Guest Deputy Director General	NSW Department of Land and Water Conservation
Mr Phil Townsend Deputy Executive Director	National Association of Forest Industries
Mr Craig Parker Director and Head of Consumer Industry Group	Westpac Institutional Bank
Dr Roslyn Prinsley General Manager, Research	Rural Industries Research and Development Corporation
Mr Michael Whitehead Project Manager Vegetation Bank	Murray–Darling Basin Commission

Appendix C Existing measures

This appendix details experience with existing measures in five categories:

- altruism
- information
- regulation
- funding
- providing incentives.

C.1 Encouragement of altruism

According to the (then) Industry Commission, the aim of altruistic measures is to change perceptions and priorities (and hopefully behaviour) at the individual or firm level by increasing environmental awareness and a sense of responsibility about what should be done. Altruistic actions include participating in and acting on education and training, as well as steps to encourage development and application of voluntary codes of conduct. When a little pressure is applied, altruism becomes suasion, which includes social pressure, negotiation and the threat of regulatory action (OECD 1994, cited in Industry Commission 1997).

For the purposes of this study, however, altruistic measures include those with a ‘moral dimension’, or those designed to appeal to peoples’ consciences, such as policies that encourage conservation covenants and socially responsible investment. Other, largely information-related measures are grouped separately in this appendix.

C.1.1 Covenants

Conservation covenants—also known as ‘management agreements’—are voluntary agreements that permanently bind a landholder and all successors in respect of the way that land covered by the covenant is used. Usually, they permanently restrict adverse land uses and prescribe the management actions required to sustain conservation values in the long term. Since a conservation covenant restricts use of the land for future owners, the covenant appears directly on the land title (HORSCEH 2000, p. 143).

Placing a covenant on land is often achieved through a contract between a landholder and a third party, usually a conservation organisation or a government, establishing new property rights over the land. Doing this is usually a less costly option for conservation organisations or governments than having to buy the land outright since it allows for conservation-compatible commercial uses of the property.

At present there are few financial incentives for producers to enter into a conservation covenant in Australia. In fact, landholders have to incur significant administrative, legal and personal costs. Some payments (funded by the Natural Heritage Trust) are made to some landholders (generally those who own high-conservation value land) for entering into a covenant under the Tasmanian Regional Forest Agreement. In addition, the Commonwealth Government recently agreed to allow landholders to claim

a tax deduction equal to the value of a covenant donated to organisations eligible to receive tax-deductible donations.⁷

It seems that very few conservation covenants have been established in Australia, and the approach is unlikely to be a major impetus for investment in agroforestry in the immediate future.

C.1.2 Socially responsible investment

Most managers of investment funds focus on matters such as dividends, interest, market value and risk, although some are very discerning, focusing on socially or environmentally responsible activities or similar considerations.

Socially responsible investment can be defined as the integration of an individual's investment objectives with his or her commitment to concerns such as social justice, economic development, peace or the environment. This kind of investment is on the verge of a transition from being a niche activity to having a place in mainstream investment options. While the SRI market in Australia is relatively new, in the United States, where it is relatively mature, it is estimated that in 1999 US\$2.16 trillion, or around 13 per cent of funds under management (one in eight dollars), was under professional management as part of a socially responsible portfolio. SRI, including community and church-based investment funds, is estimated to be worth around \$1 billion in Australia (Allen Consulting Group 2000).

Currently, agroforestry investments are rarely financed via capital market sources, including SRI fund managers. Traditionally, in contrast to plantation forestry, farmers have not been major users of capital market vehicles.

Discussions between the consultants and major SRI funds indicate that SRI fund managers are interested in environmental agroforestry investments if they can meet a number of key needs, including: clarification of the environmental gains (for example, carbon, salinity or biodiversity impacts); preferably independently verified or accredited (linking to EMS approaches); reduced transaction costs (that is, more straightforward market arrangements on a par with listed equity investments); and a more liquid market (that is, sufficient depth to help manage risk).

The key challenge for capital market involvement in environmental agroforestry—even for socially responsible investment—lies in generating a commercial rate of return, or close to it. Unless returns from planting in the low-to-medium rainfall areas can be boosted, it is not feasible to expect SRI to be a major contributor. If these criteria could be met (through other investment vehicles), the approach could be usefully augmented by other sources of capital.

C.1.3 Landcare

The original Landcare philosophy was based on the recognition that no single landholder was responsible for, or had the resources to rectify, land degradation and that collective action and government support were required. The goals of the Decade of Landcare plans were to:

- integrate conservation and development and emphasise their interdependence and common ground
- encourage approaches to land management that retain options for a variety of future uses
- increase the productivity of Australia's land resource through the adoption of sustainable agricultural methods and practices

⁷ The covenant has to be entered into as part of an approved conservation covenant program or be approved directly by the Minister for Environment and Heritage. In addition, where a deduction is claimed, or where a landowner receives something in return for granting a conservation covenant, new capital gains tax provisions apply.

- improve the capability of land managers by helping them better understand the causes and symptoms of land degradation and implement better practices
- identify the main constraints to sustainable land management and take appropriate steps to address those constraints
- educate the community about ecologically sustainable development and land use, so that individual land users and the community can assume their responsibility for controlling land degradation
- lead by example, by managing Commonwealth lands sustainably (Marriott et al. 2000; Toyne & Farley 2000; Landcare Australia 2000).

Common problems tackled by Landcare groups are weed control and revegetation, water quality, soil erosion by water, stream-bank erosion, river corridor degradation, dryland salinity, and remnant vegetation loss or decline.

Increased funding through the Natural Heritage Trust refocused the National Landcare Program to encourage on-ground action that will result in integrated and sustainable natural resource management at the farm, catchment and regional levels. Substantially increased support provides for the development of community-initiated and -managed projects addressing critical issues on public and private land for the public benefit (AFFA 2002c).

C.2 Closing information gaps

Markets work better when everybody has a clear idea of the full ramifications of their actions. Poor outcomes, including environmental degradation, are often the result of information gaps.

C.2.1 Land for Wildlife

Land for Wildlife is a voluntary, non-binding property registration scheme that encourages and helps landholders to provide habitats for wildlife on their property. It offers significant conservation and community benefits, including:

- free advice and assistance with integrating wildlife habitat with land management—erosion control, natural pest control, shade and shelter for livestock, and so on
- recognition and support for landholders
- opportunities to share experiences through publications, events and the Land for Wildlife network (Department of Natural Resources and Energy 2002).

C.2.2 The CSIRO ecosystem services project

CSIRO has taken an important step towards the development of markets for environmental services in Australia (and perhaps the rest of the world) through its *Nature and Value of Ecosystem Services* project. The objective of the project is to provide an assessment of the nature and value of environmental services across a selection of Australian ecosystems. Placing value on (these currently undervalued) environmental services should lead to their inclusion in natural resource management and policy decisions. Examples of potential policy and legislative changes from this project are:

- improved capacity to price and create markets for critical ecosystem services
- development of new techniques for environmental impact assessment under both Commonwealth and state legislation

- improved capacity to develop regionally based natural resource management strategies and codes of practice—the capacity for such strategies to be accredited under quality assurance processes, such as ISO 14000, may lead to significant marketing advantages in the future
- improved capacity to establish priorities for natural resource management within different regions and ecosystem types (CSIRO 2002b).

C.2.3 The Bush for Greenhouse program

The Bush for Greenhouse program seeks to develop tools for best-practice management and establishment of carbon sinks and carbon accounting and verification. Regional organisations, landholders, state and local government, and forestry agencies and companies in particular are interested in greenhouse sinks and are seeking clear, well-targeted information on which to base their decisions.

Bush for Greenhouse also seeks to develop and deliver this information, which includes a range of legal and administrative tools (related to pool management and regional brokering), field management and measurement systems, and appropriate modelling tools linked to the National Carbon Accounting System.⁸

C.2.4 The Farm Forestry Program

Funded under the Natural Heritage Trust, the Australia-wide Farm Forestry Program aims to promote commercial wood production on cleared agricultural land and, where possible, to integrate plantation enterprises with other agricultural land uses. The objectives of the Program are to:

- build up the knowledge and skills of landholders in establishing, managing and harvesting trees for commercial purposes
- improve the availability of information about all facets of commercial tree growing
- develop and enhance regional farm forestry strategies, focusing in particular on industry development but also on integrating commercial tree growing activities with other land, water and vegetation management strategies
- establish strategic demonstration plantings and ensure these are effectively used for extension, research and monitoring purposes and are consistent with other regional strategies and property management plans
- support the development of effective linkages between farm forestry and labour market and training programs
- provide support for specific landholder- and community-led initiatives (including increasing the capacity of smaller growers to form tree grower cooperatives and thus overcome diseconomies of scale in product marketing), undertake wood supply planning, and develop tailored investment and marketing strategies (AFFA 2002b).

It is intended that the program provide support to build on the existing network of regional plantation committees and farm forestry projects. The program will be extended to provide support for activities in lower rainfall regions, including the development and promotion of wood and non-wood products, especially where these activities help to mitigate biodiversity and land degradation problems.

⁸. Based on unpublished information from the National Action Plan on Salinity and Water Quality Working Group on Market-Based Instruments.

The main thrust of the Farm Forestry Program, like its FarmBis counterpart, appears to be about the provision of funding and assistance to close information gaps and encourage best practice. It aims to boost farm forestry as a goal in itself, with less emphasis at present on leveraging region-specific environmental gains. How different would the program appear if it started from region-specific environmental needs and then helped farmers identify the role that farm forestry could play in meeting them?

C.2.5 The Farm Business Improvement Program—FarmBis

FarmBis is funded under the Natural Heritage Trust on a 50:50 basis between the Commonwealth and the states. It aims to increase farmers' participation in learning activities in order to enhance the profitability, sustainability and competitiveness of their business. The program objectives are to:

- increase farmers' participation in learning activities that will enhance the profitability, sustainability and competitiveness of their business
- engender greater acceptance of the benefits of continuous learning and skills development and their relevance to the changing management needs of a competitive farm sector
- enhance farmers' capacity to identify and access appropriate learning activities and, over time, influence more flexible delivery of such activities (AFFA 2002d).

FarmBis is basically a program designed to develop capabilities.

C.2.6 The Joint Venture Agroforestry Program

The Joint Venture Agroforestry Program was established in 1993 and is a collaborative undertaking by three R&D corporations: Rural Industries (RIRDC), Land & Water Australia (L&WA—formerly the Land and Water Resources Research and Development Corporation), and Forest and Wood Products (FWPRDC). Additional funding has been provided for some activities by the Murray–Darling Basin Commission; the Grains R&D Corporation; Agriculture, Fisheries and Forestry—Australia (formerly the Department of Primary Industries and Energy); the Natural Heritage Trust; the Australian Greenhouse Office (AGO); and private investors. JVAP and the AGO also lead Bioenergy Australia, a consortium of 40 private and government investors formed to promote the development of biomass energy in Australia.

The program's guiding objective is 'to integrate sustainable and productive agroforestry within Australian farming systems'. It takes a broad view of farm forestry and agroforestry; it includes farm trees that are planted or managed by farmers for one or more purposes, with products and services that may or may not be commercial. JVAP supports R&D that will support the quantification and commercialisation of these products and services so that they will be more attractive and feasible options for farmers to incorporate in existing farming systems.

JVAP says that future commercial agroforestry investments, particularly in the medium-to-low rainfall regions, are subject to considerably greater risk than other commercial land use enterprises with proven production systems and more transparent commodity markets. It considers that R&D intervention can help reduce this risk by:

- quantifying land, water, biodiversity and social responses to agroforestry systems
- developing and demonstrating design principles for agroforestry systems
- extending commercial forestry research to agroforestry systems
- demonstrating the ability of agroforestry systems to meet forest industry needs.

JVAP sees that it has a key role in initiating and coordinating these four spheres of action. This role will vary between regions. Where commercial agroforestry is already well advanced, JVAP should assist the removal of remaining policy and institutional impediments and help rectify market failures. In the lower rainfall zones, where agroforestry is less dynamic, JVAP is becoming increasingly active.

New systems will need to integrate with established farming system structures. JVAP is supporting several research projects covering various aspects of these farming systems, with a major focus on developing design principles at the farm level. The book *Design Principles for Farm Forestry* uses the best available scientific knowledge to evaluate trade-offs in designing for a range of outcomes. This line of research has been further developed with a series of Agroforestry Design Principles publications—including *Trees, Water and Salt*; *Trees for Shelter*; *Site Selection for Farm Forestry*; and *Trees and Biodiversity*.

A JVAP-funded study attempted to estimate the potential benefits that agroforestry might achieve should it be adopted across the country at optimal rates. Based on a range of arguable assumptions, the study predicted:

- an increase of \$2.7 billion per year in farm income, of which about 40 per cent would accrue from timber production and 60 per cent from yield improvements in other farm enterprises
- an increase in the annual volume of wood available equal to about four times the current annual harvest. This would have a market value of \$20 billion and lead to an increase in employment of over 40 000 people
- the delivery of non-market environmental services worth \$363 million a year, consisting of about \$150 million in reduced land degradation, \$115 million in carbon sequestration, \$32 million in reduced salinity, \$27 million in improved water quality, \$35 million in enhanced biodiversity and aesthetics, and \$5 million in regional spillover effects (AACM International, Centre for International Economics & Forestry Technical Services 1996).

C.3 Regulation

Regulatory approaches aim to influence, and usually stop, a particular behaviour by imposing controls, monitoring compliance and penalising non-compliance. They are often better at preventing activity than encouraging it. Regulation often involves high administration and compliance costs (ABARE 2001a); among the regulatory measures are prohibition, standards and penalties, land use controls, and zoning and conditional licensing.

The main thrust of development in regulatory approaches is to achieve certainty of outcome at lower economic cost. This often involves building in features found in other approaches, particularly incentives. Some of the newer approaches of relevance to agroforestry and salinity applied in Australia and overseas are discussed in the following sections.

C.3.1 Offset schemes

The New South Wales Department of Land and Water Conservation is currently developing a framework for the introduction of an offset scheme. The state's *Native Vegetation Conservation Act 1997* specifies that consent be obtained for clearing vegetation in most circumstances. Introduction of an offset scheme would mean that land managers could clear native vegetation, providing that offsetting measures and actions (such as fencing and reduction of stocking rates in another area) were implemented. Among the advantages of this scheme are increased flexibility for land managers and net environmental improvements through a 'net gain' requirement (DLWC 2001).

The New South Wales Salinity Experts Group recommended the development of a pilot offset salinity trading scheme in the Liverpool Plains catchment encompassing the following elements:

- an initial focus on the requirement to more than offset the adverse salinity impacts of any land clearing under the Native Vegetation Conservation Act
- measurement of offsets calculated using technology developed by CSIRO (Land and Water), the Department of Land and Water Conservation, and NSW Agriculture
- the pilot to be implemented in a manner that supports delivery of the land use management actions contained in the Liverpool Plains Catchment Strategic Plan (Salinity Experts Group 2000).

C.3.2 Wetland banking

Wetland banking has operated in the United States since the mid-1970s. The idea is to allow businesses to offset developments that adversely affect wetlands against developments that rehabilitate wetlands. According to the Environment Law Institute, there are now several hundred wetland banks operating in the United States (Binning et al. 2002). Binning et al. note several important features of wetland banking:

- It has no impact on regulatory approval processes.
- Mitigation works have to be completed before credits can be drawn on.
- Large-scale and strategically targeted conservation works can be undertaken that provide much greater environmental benefits per dollar invested than small-scale on-site remediation activities.

C.4 Funding

A long-established role of government is to spend to change things in the public interest; in contemporary terms, governments purchase outcomes. This is particularly useful where public goods are involved, in which case there would be under-provision without public support. Funding measures include grants, subsidies and stewardship payments.

Governments have traditionally stretched their financial resources by cost-sharing with other layers of government—although this often also reflects constitutional responsibilities and differing resource positions. There is increasing recognition of the potential to stretch public sector resources even further by joining with private interests when encouraging investment in activities offering private and public benefits. In the case of agroforestry, there is potential to use a variety of support mechanisms to provide financial assistance to top-up returns for private sector investment in plantings in low-to-medium rainfall areas that also generate regional environmental gains.

It is unwise to overlook the broader considerations that often accompany financial support from governments: the community usually sees that it is fair and reasonable to make payments for people that are disadvantaged; it is quite rare for governments to sustain payments to people or businesses that are successful or profitable.

Some of the existing and emerging activities that have potential relevance for agroforestry and environmental outcomes on private land are discussed in the following sections.

C.4.1 The Natural Heritage Trust

The main purpose of the Natural Heritage Trust, which was established in 1997 with total funding of \$1.25 billion over five years (later expanded to \$1.5 billion over six years), is ‘to stimulate activities in the national interest to achieve the conservation, sustainable use and repair of Australia’s natural environment’. In addition, the trust is put forward as a ‘partnership’ between all Australians, bringing together the efforts of individuals, communities and governments, targeting Australia’s environmental problems at their source (Natural Heritage Trust 2002).

The trust's objectives are to:

- provide a framework for strategic capital investment and stimulate additional investment in the natural environment
- achieve complementary environment protection, natural resource management and sustainable agriculture outcomes consistent with agreed national strategies
- provide a framework for cooperative partnerships between the community, industry and all levels of governments.

The key areas of Natural Heritage Trust funding are vegetation, inland waters, biodiversity, land resources, coasts and oceans, environment protection, atmosphere and Australian heritage.

The trust funds 23 previously existing and new programs, among them the National Landcare Program, the Murray–Darling Basin initiative, the National Wetlands Program, World Heritage Area management, the National Reserve System, and the Coasts and Clean Seas program. It also finances new areas of emphasis such as native vegetation management and Rivercare and extends support for activities such as farm forestry, endangered species protection, and weed and feral animal control. Significant funding is also provided to specific projects—nearly 10 000 so far—put forward by proponents drawn from state and territory agencies, local government, non-government bodies and individuals (ANAO 2001; Environment Australia & AFFA 2000).

The Natural Heritage Trust is included for consideration here more as a potential than an existing funding mechanism for agroforestry to deliver regional environmental gains. Most of the activities funded to date seem to involve government-to-government payments or funding for community groups to undertake activities that have strong public-good elements. The consultants obtained no evidence of the NHT structure being used to purchase desirable environmental outcomes in partnership with the private sector through agroforestry or other activities.

Other evaluations of the Natural Heritage Trust have flagged issues in relation to the need to clarify and specify the expected landscape outcomes from NHT activities and monitor achievement of those outcomes. At the core of this criticism is a concern that many NHT activities are not well integrated into increasingly sophisticated regional and catchment management planning and coordination processes (Industry Commission 1998).

The main relevance of the Natural Heritage Trust to agroforestry for environmental gains appears to be limited to the FarmBis and Farm Forestry programs discussed earlier in this appendix.

C.4.2 The National Action Plan For Salinity and Water Quality

Funding for the National Action Plan for Salinity and Water Quality totals \$1.4 billion over seven years, made up of \$700 million in new expenditure by the Commonwealth and an equivalent amount in funding from the states and territories. The National Action Plan involves six elements, all of which are necessary to achieve lasting progress in the face of dryland salinity and deteriorating water quality:

- targets and standards for salinity, water quality and associated water flows, and stream and terrestrial biodiversity agreed either bilaterally or multilaterally, as appropriate
- integrated catchment and regional management plans, developed by the community and accredited jointly by governments, in the 21 priority catchments and regions that are highly affected by salinity (particularly dryland salinity) and deteriorating water quality
- capacity building for communities and landholders to help them develop and implement integrated catchment or regional plans, together with the provision of technical and scientific support and engineering innovations

- an improved governance framework to secure Commonwealth–state/territory investment and community action in the long term, including property rights, pricing, and regulatory reforms for water and land use
- clearly defined roles for the Commonwealth, state and territory governments, local government and the community to provide an effective, integrated and coherent framework to deliver and monitor implementation of the plan
- a public communication program to support widespread understanding of all aspects of the plan, so as to promote behavioural change and community support (COAG 2000).

The National Action Plan is a work in progress. Governments have been finalising the signing of intergovernmental and then bilateral agreements. These pave the way for the development of catchment plans (in the form of partnership agreements) in the priority regions, which are then implemented (funded) when accredited. Some funding is being provided to assist in the development of regional plans for accreditation. A feature of the process is that it is intended to be ‘bottom-up’; that is, plans are to be constructed at the grass-roots level, with community involvement and recognition (Truss & Kemp 2002).

To be accredited, catchment plans will involve identification of key natural resource management issues (not limited to salinity and water) strategies for addressing the issues, as well as an investment strategy. It is not precisely clear at this stage what an investment strategy would look like, but it is understood that it would involve a business plan and elaboration about the source of funds. Private sector involvement has not been a major consideration to date.

One concern with the NAP process is that it leaves open the mechanisms for folding agroforestry into the regional action plans. At present, catchment authorities and others involved in the development of plans have little or no guidance about key questions such as how much external assistance they could rely on to encourage agroforestry activities in their plan and therefore how much agroforestry they might realistically expect to factor in. Nor do they have guidance about aspects such as the techniques they could use to leverage agroforestry activities (and others).

Current uncertainties about the benchmarks for or guidance on the use of agroforestry may have a deleterious impact on agroforestry’s use in the National Action Plan and on environmental outcomes. From experience, it is clear that, all else being equal, investors (including public sector investors) will shy away from riskier activities. There is a concern that, in failing to clarify broad directions, there will be under-investment in agroforestry options in preference to other activities that may seem comparatively straightforward. This helpful tool may be under-utilised, thus threatening the plan’s environmental and social aims.

C.4.3 Bushcare—the national vegetation initiative

Funded under the Natural Heritage Trust, Bushcare aims to reverse the long-term decline in the quality and extent of Australia’s native vegetation cover by conserving remnant vegetation and biological diversity and restoring, by means of revegetation, the environmental values and productive capacity of Australia’s degraded land and water.

To date, Bushcare has funded more than 1800 projects, in which it has invested over \$127 million. The program will invest over \$350 million during the life of the Natural Heritage Trust. The projects vary widely in terms of objectives, context, groups involved and funding provided. About 70 per cent of Bushcare funding has been invested directly in on-ground works to improve native vegetation management (Environment Australia 2002).

C.4.4 BushTender

The Victorian Department of Natural Resources and Environment began BushTender, a trial program for public funding of natural resource management, in June 2001. The trial uses an auction mechanism to award land management contracts through a competitive bidding process.

BushTender aims to encourage participating landholders to provide services that enhance biodiversity, through improving the quality and extent of native vegetation on their land in return for payment. It relies on an auctioning process to identify the most effective management services offered by landholders, with the aim of providing the best value for taxpayers' money—that is, by reducing the price of conservation. Successful bids are assessed on the basis of the current conservation value of the site, the service offered, and the cost involved (Minister for Agriculture & Minister for Environment and Conservation 2001). Even though the BushTender trial concentrates on biodiversity outcomes, the auction mechanism it employs could be used for other environmental problems such as dryland salinity and water quality problems.

C.4.5 The sawlog farming project

In January 2002 the Victorian Government announced a sawlog farming project that offers financial incentives—between \$300 and \$700 per hectare—for producers to establish hardwood sawlog plantations on cleared farmland. Successful applicants retain ownership of the trees and associated tree products but are expected to sign an agreement with the Department of Natural Resources and Energy that assigns to the state government a share of the carbon and other environmental services rights for the plantation and allows access for monitoring and demonstration purposes (Minister for Environment and Conservation 2002).

C.4.6 New York water quality

Markets developing overseas can act as models for Australia. For example, rather than spending up to US\$8 billion on building new water-filtration facilities, the City of New York chose to improve the quality of environmental services in the Catskill Mountains to achieve its water quality targets. Among the changes were the purchasing of undeveloped land throughout the water catchment and leaving it undeveloped and paying for land use changes by producers in the region. The changes were achieved at a cost below the estimated US\$1 billion annual maintenance cost of the new facility, representing benefits to both urban and rural residents of the State.

- Many farms located within the New York City watershed have been implementing 'best management practices' designed to preserve the quality of surface drinking water as part of a program created by the Watershed Agricultural Council. Under the 'Whole Farm Planning' program, farm owners receive assistance in creating a plan that outlines measures designed to reduce runoff and pollutants from their farms. In return, farmers may receive financial assistance to implement their plan. (Catskill Center 2002)

C.4.7 The Forest Bank

The Forest Bank, a program of The Nature Conservancy, was established in the United States to encourage sustainable management of private forest land by providing increased liquidity to landowners:

- By depositing their timber rights, private landowners receive regular income, while the timber is managed by the Forest Bank for long-term forest health and biodiversity. The mission of the Forest Bank is to work in a partnership with private landowners to promote the economic productivity of working forests while protecting the ecological health and natural diversity of the landscapes in which they occur. (Centre for Compatible Economic Development 2002)

C.4.8 The Conservation Reserve Program

The Conservation Reserve Program was established in the United States to protect wetlands and promote the conservation of highly erodible lands. Central to the program is the revegetation of sensitive areas to reduce soil erosion, improve water quality, and enhance or establish wildlife habitat.

Under the program, farmers voluntarily retire environmentally sensitive cropland for 10 to 15 years. In return, the US Department of Agriculture makes annual rental repayments to farmers (to offset income losses arising from the land use change) and shares the cost of establishing approved conservation practices. The US Government may pay up to 50 per cent of revegetation costs (which includes grasses, cover crops and tree crops) and may make rental payments of up to \$50 000 per annum per landowner during the rental period.

In September 2000 over 31 million hectares across the United States were enrolled in the program through over 460 000 contracts made on around 300 000 farms. The annual rental payment made by the Government was approximately US\$1.4 billion, an average of US\$4833 per farm and US\$45.17 per acre. To be eligible, land must be highly erodible, contribute to a serious water quality problem, or provide substantial environmental benefits if devoted to specific conservation uses.

The Environmental Benefits Index is used to evaluate and rank land offered for enrolment in the program during a general sign-up. Scores are based on the expected environmental benefits arising from identified environmental factors plus a cost factor. The six environmental factors are wildlife, water quality, erosion, enduring benefits, air quality benefits from reduced wind erosion, and state or national conservation priority areas.

Each offer submitted is assigned a point score based on its relative environmental benefits and is compared nationally with all other offers at the end of the sign-up. Offers to participate in the program are accepted or rejected on the basis of ranking results (USDA 2002).

C.5 Providing incentives

Incentive measures are usually referred to as ‘economic instruments’. They are designed to affect the relative prices of actions, so as to reveal the true (or underlying) costs and benefits of those actions. They aim to influence decision making in a way that leads to better environmental outcomes (Industry Commission 1997). They are also designed to increase wellbeing associated with resource use through encouraging agents to use resources more efficiently (ABARE 2001). Incentive measures include tax concessions, tradeable permits (for environmental services), and emission taxes and charges.

C.5.1 Salinity emission credit trading

Operating in the Hunter catchment in New South Wales since January 1995, the pilot Hunter River Salinity Trading Scheme is a licensing scheme for discharges of saline water from mines and power stations in the Hunter River catchment above Singleton.

The objective of the scheme is to manage saline water discharges so as to minimise impacts on irrigation, on other water uses, and on the aquatic ecosystems of the Hunter River catchment. It aims to achieve this objective at the minimum overall cost to the community, in an equitable and flexible manner, and in a way that provides ongoing financial incentives to further reduce pollution. Underpinning the scheme is a comprehensive system of real-time monitoring of discharges and river conditions. A ‘river register’ is operated by the Department of Land and Water Conservation and funded by scheme participants, based on the monitoring data (Environmental Protection Authority 2002).

C.5.2 Planted forests for Tokyo Electric Power Company

State Forests of NSW is already producing products for the potential ecosystem markets associated with the yet to be fully ratified Kyoto Protocol. State Forests and the Tokyo Electric Power Company,

or TEPCO, have signed a contract to establish a planted forest estate in New South Wales for carbon sequestration and timber products over a 10-year period.

The contract is for the planting of 1000 hectares initially, with a target total planted forest area of between 10 000 and 40 000 hectares. The planted forests estate is expected to comprise 50 per cent hardwood species and 50 per cent softwood species.

TEPCO's interest in this program arose following the release of State Forests' Information Memorandum in March 1999. TEPCO had been seeking an opportunity to invest in carbon sinks for greenhouse gas offsets as part of its overall package of measures to deliver internal greenhouse gas emission-reduction targets. The investment opportunity developed by State Forests 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 realised, there is still an underlying asset that has value (State Forests of NSW 2002).

Appendix D Environmental management systems

D.1 The role and use of environmental management systems

Environmental management systems can be described as a tool that is ‘part of an overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy’ (ISO 14001-1996, cited in Crook 1999). Although, in principle, EMSs can be applied at any scale, in Australia the concept usually refers to farm-level planning and management.

Producers may adopt an EMS in order to improve the environmental management of their properties, to make an altruistic contribution to reducing costly externalities in their catchment, to differentiate their products or improve their image in the marketplace, to reduce financial risks, or to seek better access to overseas markets. The following are examples of some existing systems:

- the Eco-management and Audit System in the European Union, intended to promote competition on environmental grounds
- the Standards for Organic Agricultural Production, established by the National Association for Sustainable Agriculture Australia Ltd and applying to organic farming
- the Best Management Practice Standard (Cotton Industry)
- ISO14001-1996, published in late 1996 by the ISO (International Organization for Standardization) in Geneva. This worldwide standard provides a framework for an EMS that allows an organisation to establish and work towards internally determined policy goals while requiring a commitment to achieving both compliance with environmental laws and continuous improvement in environmental performance (Environmental Law Institute 2000; Crook 1999).

One of the main drivers of EMSs in Australian agriculture has been the wish to achieve external accreditation and thus secure product access to increasingly demanding export markets. There is evidence that markets, in Europe in particular, are serious about ensuring that businesses right along the supply chain are making verifiable steps towards improving their environmental performance (Alexandra 1999).

There are some overseas examples of EMSs leading to price premiums in overseas markets (see Cunningham 1999). The Salinity Experts Group in New South Wales notes that organic produce enjoys a price advantage and that pesticide-free meat products are best able to access European, Japanese and US markets (Salinity Experts Group 2000). It is also notable that regulators in these markets are making the entry of non-complying food and fibre very difficult. The grains industry, the dairy industry and the cattle feedlot industry, among others, are reportedly investigating the use of EMSs.

D.2 Relationship to agroforestry

When used as a tool for managing, monitoring and improving environmental outcomes, EMSs have the potential to provide a basis for paying for environmental services where environmental outcomes are difficult to measure with precision. Such payment could be based on compliance with an EMS in terms of on-farm activities rather than, for instance, a decline in salinity or improvements in

downstream water quality, but would probably need to be used in conjunction with other policy instruments in order to overcome some of the impediments to agroforestry identified in Chapter 2.

On-farm investments that comply with an EMS could also be tax-advantaged and leveraged through qualifying them as an eligible pooled development fund investment. Any of the major financiers in the rural sector could qualify by establishing a PDF for this purpose and supplying debt finance to farmers through their established processes and channels.

One important stumbling block lies in the fact that it is not clear-cut that consumers or regulators in overseas markets are as concerned about salinity and land degradation in Australia as they are about, say, chemical-free food. Domestic markets may prove important when looking to create a premium stemming from EMSs applied to farm forestry producing regional environmental gains. Discussions with some land managers suggest that producers see challenges in relation to small operators who farm generic rather than niche products. Developing market awareness for an EMS scheme in agroforestry may require government investment in building public and consumer awareness, at least in the initial phases.

EMSs could also be used as a basis for allowing non-point source polluters such as farmers to participate in emissions-trading programs. An effluent-trading demonstration project is under consideration in Idaho in the United States for the discharge of phosphorous into the Lower Boise River. Under the project, selected non-point source best management practices can be used to generate transferable credits, subject to requirements outlined in a best management practices list that will be developed for trading in the Lower Boise River watershed. The list will describe which practices can be used for trading, as well as each practice's procedures for determining the amount of credits and their monitoring requirements. In addition, trades involving non-point source credits will be required to set aside credits to benefit water quality (a water quality contribution), to ensure compliance with applicable total maximum daily load phosphorus-reduction targets and schedules when they are developed (Ross and Associates Environmental Consulting Ltd 2000).

D.3 Recent developments

In May 2000 the Commonwealth Government established an Environmental Management Systems Working Group to identify the role of government in facilitating EMSs in agriculture. The working group considers that adoption and integration of EMSs will contribute to improving agricultural sustainability and meet community expectations of environmental, social and economic outcomes. It will develop a framework for EMSs in agriculture in order to provide a national context for harnessing existing programs and to improve both market and environmental outcomes across industries and regions (EMS Working Group 2001).

In November 2001—as one of its election commitments—the Coalition announced a ‘partnership approach’ to land management; it has since made a number of commitments to support producers who choose to adopt EMSs. One of these involves the provision of a maximum \$3000 tax rebate to eligible low-income landholders for developing and applying an EMS to their properties. Work is under way within Agriculture, Fisheries and Forestry—Australia to give effect to these commitments.

Work is also under way to establish a rural industry EMS forum, to ensure that all agricultural sectors are involved in EMS policy development and that producers have access to EMS information through regional training courses, information kits, and the Internet. In addition, the Government has pledged to fund pilot schemes in up to 15 regions, to help landholders across the range of agricultural industries to work together to develop a consistent approach to EMSs (AFFA pers. comm.; Liberal Party 2001).

An Australian forestry standard is currently being developed to allow Australian forest owners access to a credible forest certification scheme that takes account of Australian conditions (see Box D.1).

Box D.1 The draft Australian forestry standard

Australia has developed a draft forestry standard that embraces the economic, social, environmental and cultural criteria considered most important for securing well-managed forests. At the same time, it supports continuous improvement towards sustainable management. The draft standard is based on community values and the science of forest management.

The draft standard has been developed within recognised international frameworks but also takes Australia's unique environment into account. Eight criteria—drawn from the Montreal Process framework—provide the structure for the draft standard. Auditable requirements underpin the structure, allowing independent verification of performance. The criteria provide for:

- protecting and maintaining the biological diversity of forests
- maintaining the productive capacity of forests
- maintaining forest ecosystem health and vitality
- protecting soil and water resources
- maintaining forests' contribution to carbon cycles
- protecting and maintaining natural, cultural, social, religious and spiritual heritage values
- maintaining and enhancing long-term social and economic benefits
- ensuring a systematic approach to forest management.

The draft standard recognises the variety of objectives governing the management of native forests and plantations. For wood production, it sets out predetermined and clearly defined environmental, social and economic performance requirements for management and operations. Use of the proposed standard is not mandatory: forest owners and managers can decide if they wish to apply it. If they do, it will provide consumers and retailers with an unambiguous statement that the product in question was grown and harvested at a location managed in accordance with the standard's requirements.

The proposal is that the standard be used either by itself or in conjunction with an ISO 14001-type environmental management system. It does not include any criteria about the suitability of the wood for any purpose. The basis for certification is an independent third-party audit of forest management practices for compliance with the standard's requirements, using defined audit protocols. These protocols identify appropriate approaches to implementation and differentiate between different scales of ownership (size and management regime) and between native and planted forests. Certification against the standard may form the basis of claims about the quality of management.

A standard is a necessary part of, but not the full requirement for, a labeling system. The standard will not replace or override the regulatory framework within which Australian forest owners and managers operate. It will set a suite of voluntary requirements that support the goal of achieving sustainable forest management. This may involve going beyond legal compliance to gain certification benefits. Full conformity with the standard and, in particular, assessment by an independent third party audit are voluntary.

Source: Australian Forestry Standard Steering Committee and Technical Reference Committee.

D.4 Key findings

From the perspective of achieving commercial and environmental outcomes, the primary challenge facing proponents of the EMS concept is to link farm actions in a meaningful way with catchment- and regional-level environmental development plans—that is, to make sure that land managers are engaging in on-farm activities that are consistent with and contributing to catchment and regional environmental objectives. As noted, this is part of the task set out for the EMS Working Group.

The role of EMSs as a part of a larger strategy designed to redress the current impediments to investment in agroforestry will also need to be defined. Once this is done, the next challenge is to sell the idea to producers, which involves demonstrating the business case for implementing EMSs and communicating the work of adopting these systems. Until this happens, widespread uptake of EMSs by conventional (particularly smaller) producers will be delayed, so it would be unlikely that the EMS

concept will be a leading instrument in the development of new industries offering beneficial environmental and commercial outcomes.

When used in conjunction with other policy instruments, the EMS concept also has potential to provide a basis for payments for environmental services in situations where environmental outcomes are difficult to measure with precision. These payments could be based on compliance with an EMS in terms of on-farm activities rather than, for example, improvements in salinity or downstream water quality.

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