

Whole farm considerations in the design of management agreements

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Abstract

Management agreements for the delivery of environmental services by farmers typically relate to that part of the farm that is of immediate public interest. However, the decision-making unit with which the farmer is primarily concerned is the farm business as a whole. This provides the context within which any particular area of the farm is managed. In this paper, the importance that a focus on the wider farm context might hold for achievement of conservation outcomes is shown by drawing on economic theory as well as recent case studies of farm businesses.

Factors likely to influence conservation outcomes are: motives and other behavioural influences, character of production processes and farmer routines, potential to define alternative farm futures, uncertainty, capabilities of the farm manager and resources available to them. These factors have implications for how economists approach key issues in design of management agreements - information asymmetry, cost (including transaction cost) and encouraging proactive rather than reactive behaviour by the economic agent.

Whole farm considerations will be taken into account by farmers in their decisions about whether to participate in management agreements, and in the terms of that participation. In this paper, explicit attention is given to opportunities that the principal has to address whole farm considerations. These opportunities can be addressed in the assessment process, in preconditions, as part of the management agreement, or as complementary mechanisms. The purpose of the paper is to highlight these opportunities, and to discuss their pros and cons. Tentative conclusions are drawn, and further research into this previously unexplored topic is proposed.

1 Introduction

Management agreements typically relate to that part of the farm that is of immediate public interest. However, the farmer is primarily concerned with the whole farm operation. This is recognised explicitly in some areas of government policy where concern is with getting better outcomes from the parts by focusing on the whole.

Nationally, the whole farm emphasis has been in place in some areas of policy for over 10 years. The Property Management Planning (PMP) program commenced in 1992. It was directly concerned with improving the capacity of the farmer to manage their business. Its stated goal was to:

... assist property managers to take control of their future, to plan for change and to better manage the economic, social and environmental risks associated with running a farm business in today's changing environment (AFFA

¹ The views expressed in this paper are those of the author, and do not represent those of the Department or of Michael Crowe and Loris Strappazon who provided valuable comments on an early draft. Bill Malcolm has inspired much of the thinking about farm businesses.

1999).

This is not a new development; whole farm plans have been promoted in the Riverine Plain for at least twenty years (Semple 1990, more generally see also Garrett 1989). A National Property Management Planning Campaign was established in 1992. This Campaign arose from a review of farm planning projects funded under the National Soil Conservation Program. It was concluded that workshops run by a trained facilitator were most effective. An earlier review of drought policy called for measures to encourage farmers to be more self-reliant. Training farmers to identify all the resources at their disposal and how to best manage them within the context of the whole property was seen as the best means of enabling them to manage through the fluctuations in weather and prices that are characteristic of Australian agriculture (AFFA 1999).

Workshops under the PMP program, and its successor the Farm Business Improvement program (Farmbis), included courses on various aspects of agricultural production, nature conservation and land management, as well as aspects of the farm business such as financial management and estate planning. The future of the farm business was emphasised as the framework for considering specific issues:

The value of the PMP Campaign is that it puts technical advice into a holistic strategic framework so the participant can see its relevance in the context of their overall business direction (Read and Heinjus 1999).

PMP was absorbed into FarmBis in 2000, with its functions to continue. This is consistent with the general directions of agricultural and land management policy in Australia; the Federal Government's current initiative Agriculture - Advancing Australia also places emphasis on self-reliance, innovation, adjustment and profiting from change (AFFA 2000).

The influence of whole farm considerations on conservation outcomes does not extend to discussion of specific policy mechanisms such as incentives, management agreements, and regulation. The aim in this paper is to draw out the implications for policy of whole farm considerations for management agreements using Victoria's Bush Tender scheme as a case study.

Currently, there are many different schemes involving management agreements in Australia. The focus is on site management, and not on how management elsewhere on the farm might influence outcomes at the site level.

There are many properties and a large area of land voluntarily enrolled in the Land for Wildlife program, which covers most states. Landholders seek registration with the scheme though it does not involve legally binding contracts and does not involve payments. Properties can be deregistered for failing to abide by the conditions of the scheme. In late 2002, there were 7,750 properties registered with another 1,349 working towards registration. The registered properties totalled over 2.5 million hectares in area, with the area of habitat protected being 538,711 hectares and 8,875 hectares under restoration.

Covenants that provide for conservation outcomes, for instance through Trust for Nature in Victoria, involve legally binding conditions in perpetuity, but do not involve payments. Relatively few landholders have taken such covenants out. There are 493 covenants set up through Trust for Nature in Victoria with another 250 properties in the process of registering areas of land. Covenanting is increasing in other states. Western Australia has three schemes with the largest involving about 100 covenants, and a scheme has recently started in New South Wales.

Heritage Agreements in South Australia were the first agreements to involve payments from governments in Australia; there were elements of compulsion as these agreements were designed to provide compensation for halting vegetation clearance in South Australia. They cover over 500,000 hectares that is managed by over 1,000 landholders. Agreements involving payments associated with ending the clearance of native vegetation have since followed in New South Wales and Queensland.

There are several management agreement schemes that more truly involve payments for conservation services over and above what is regarded as the landholder's obligation. These include Voluntary Conservation Agreements in New South Wales and Nature Refuge Agreements in Queensland.

Most recently, there are management agreements in which payments are based on the level of conservation benefit delivered per dollar outlay by the conservation agency. Auctions have been proposed in Australia to improve the system of government agencies reaching agreement with landholders (Stoneham et al. 2000). The Murray-Darling Basin Ministerial Council (2000) has recently accepted the approach in funding landholders to undertake revegetation for salinity control purposes. Bidding systems are also being implemented in Europe where competition in schemes such as the Countryside Stewardship Scheme is not on price but on the basis of environmental quality of the plan being submitted (Fraser 1996, see also Latacz-Lohmann and Van der Hamsvoort 1998).

In Australia, two such trials are underway. One trial, being conducted by World Wide Fund for Nature and the Liverpool Plains Land Management Committee, involves strategic revegetation works on the Liverpool Plains in New South Wales.

The Bush Tender program operated by the Victorian Government is now in its second phase. The first phase involved selected areas in North-East and North-Central Victoria, and the second trial is taking place in Gippsland. Bush Tender has several components. It is based on a system of scoring conservation services being offered by measuring vegetation quality as it currently is, and estimating the gains from the proposed management. A site assessment by field ecologists engaged by the Department is needed to measure vegetation quality and determine the 'habitat hectares' present and to determine management options. A management plan is then agreed. Landholders submit a bid specifying the payment that they require. The conservation services and the cost are combined into a Biodiversity Benefits Index. The bids that offer most value for money are taken first, with the last bid accepted exhausting the available budget. In the first trial bids were accepted from 73 landholders and 3,160 hectares of land under placed under agreements. The basis for Bush Tender is that the landholder knows best how to deliver environmental services, and knows the opportunity cost of doing so.

In the next section, management agreements for the delivery of environmental services by farmers are further discussed. Three design issues for management agreements - information asymmetry, cost (including transaction cost) and encouraging proactive rather than reactive behaviour by the economic agent - are discussed.

In section three a theoretical perspective on farm management and firm behaviour is presented, which is followed by discussion of selected results from a series of farm case studies. These two sections show that the decision-making unit with which the farmer is primarily concerned is the farm business as a whole, and that it is this that provides the context within which any particular area of the farm is managed. This provides a basis for showing that a focus on the wider farm context might hold previously unperceived opportunities for achievement of conservation outcomes.

In later sections, a set of nine issues that are *prima facie* important from a whole farm perspective are identified. These issues are then considered against design issues for management agreements - information asymmetry, cost (including transaction cost) and encouraging proactive rather than reactive behaviour by the economic agent. Then opportunities for incorporating whole farm considerations within an auction-based management agreement system, such as Bush Tender, are identified. These opportunities can be addressed in the assessment process, in preconditions, as part of the management agreement, or as complementary mechanisms. Some advantages and disadvantages of these opportunities are considered. Finally, a research agenda is identified.

2 Management agreements

In this section, management agreements are discussed in terms of principal-agent theory and the three issues of information asymmetry, proactive management, and costs. A whole farm perspective is justified by reference to debates about the object of economic analysis.

In the environmental arena, management agreements formalise the management undertakings of the farmer and the expectations and commitments of government (or its agencies). The management agreement is a form of contract, in which the government is principal and the farmer is agent. There are three factors relevant to the design of management agreements that are highlighted here. These are information asymmetry, whether the agreement primarily seeks to prevent damage or to encourage proactive management, and costs of the agreement to government (including direct costs and transaction costs). Later in the paper, all three of these issues will be considered from a whole farm perspective.

2.1 Information asymmetry

Economists see information asymmetry as a key issue in design of the management agreement. Farmers can potentially use to advantage their greater knowledge of both the farm environment and the costs of provision of services agreed in the agreement.

Principal-agent problems refer to the difficulties that those purchasing a service over time have in ensuring that the agent provides the service in the required way and to the required specifications (Stiglitz 1987). Contracts or agreements are frequently used between landowners and governments and other parties involved in remedying conservation or land management problems. Australian examples include covenants, management agreements and even grants given with the expectation that the land will be managed into the foreseeable future in a particular way.

There are several problems a principal may have in enforcing delivery of the agreed service. There may be information asymmetry, whereby the agent is privy to information not known to the principal but which is critical to the performance of the contract. An example is failing to pass on information about the spread of an environmental weed in native grassland when early action to control the weed is critical to both success and cost. This is an example of a moral hazard problem. First-mover problems occur when the agent uses information to which they are privy to act in their own interests and contrary to the principal's interest, before the principal can act or is aware of the need to act. In the above case, the agent may decide to spray out the grassland and resow a mix of exotic species.

There are several ways in which principal-agent problems can be addressed. These include: rewards for information disclosure (Bowers 1999); provision for agreements to be revised to account for new information and circumstances (Young et al. 1996); encouragement of group norms which discourage 'deviant' behaviour (Mohr 1994); and subsidiarity so that responsibility for defining and achieving public policy goals is shifted close to the agent (Binning and Young 1997).² Knowing more about the (farm business) context within which the agent is operating enhances the capacity of the principal to achieve the original objectives of the agreement.

2.2 Reactive or proactive intent

Early management agreements in Europe were reactive in intent, seeking a restriction of the presumptive rights of farmers so as to prevent environmental damage. This applied to the agreements used to protect Sites of Special Scientific Interest in the United Kingdom (Colman *et al.* 1992). Such agreements are tailored to individual circumstances and specify conditions of management, require notification of intention to change management, and specify payments. Adherence to the spirit of the practices specified in the agreement can be a problem.

² Given moral hazard and first mover problems, Bowers suggests that ultimately management agreements, rather than regulation, are the most effective mechanism of last resort (Bowers 1999). He distinguishes four types of agreement – critical habitat, standard, enhancement and rehabilitation – and argues that the type of agreement will vary with the number of sites of each conservation type remaining and their quality.

In the United Kingdom, at least 10 years ago emphasis began shifting from compensation for not undertaking potentially damaging operations to rewards to the landholder for active management (Colman *et al.* 1992, Lomas 1994, Webster and Fulton 1993). Proactive agreements allow for the expertise of the landholder and allow discretion (e.g. by specifying that management action will occur after rain or another natural event, rather than on a particular date). The outcomes are seen to be better conservation results, more interest from landholders and reduced potential of farmers holding out the potential loss of biodiversity as a ransom. Now, meeting minimum standards of management has become a condition of entering an agreement, rather than being the substance of the agreement (Fraser & Hone 2002). The agreement itself deals only with the positive actions that the landholder will undertake to enhance the environment. This is consistent with the approach taken in Victoria's Bush Tender scheme.

2.3 Cost

The total cost of management agreements influences the amount of conservation services that the government can purchase for a given budget. The costs include the direct payments to farmers, the costs associated with reaching agreement (transaction costs), as well as the fixed costs of administering the scheme. These costs will vary between agreements according to whether they involve standard payments for predefined services, discretionary payments based on the bids submitted by farmers, or individually negotiated payments (Fraser & Hone 2002).

2.4 What is economics about?

A final question is how management agreements seek to influence behaviour of agents in terms of economic theory. Clarifying this will allow the effect of taking a whole farm perspective to be highlighted.

Management agreements typically cover only those dimensions of the farm operation that are directly relevant to the site of public interest. In this approach to management agreements, critical assumptions are being made about how the farmer will respond. These are the same assumptions that make it possible for the methods of neo-classical economics to be used to predict the aggregate response of all producers to a given change in market conditions.

There are differences amongst economists about whether economic theory can be about explaining the behaviour of the single economic agent, or only about aggregate behaviour (Langlois 1986). Most argue that the latter is the predominant if not sole role because economics is a social science. However, Langlois suggests that where:

... social outcomes depend crucially on the behavior of one or a few pivotal individuals ... then we need to know a lot more about the agent's situation and how he (sic) perceives it (Langlois 1986 p.241).

Langlois goes on to say that in large-numbers situations, a 'more simplified ideal type' can be used in which less needs to be known about the economic agent (Langlois 1986 p.241).

In their use to deal with conservation and land management problems on farms, management agreements are based on expectations about the market behaviour of the business units responsible for land management. Any given system of agreements with farmers seeks to alter market signals and so bring aggregate behaviour more into line with what would happen in a world where there is a perfect market.

An alternative approach takes the internal operations of the business units as the object of the analysis. This approach examines the capacity of the individual farm business to operate successfully and to respond to stimuli introduced by policy makers; internal changes that might allow it to respond differently into the future are also important. This approach is explored in the remainder of the paper.

2.5 Questions

Some key questions about the the farm business in relation to management agreements are:

- Are there matters associated with other aspects of the farm operation that are likely to influence the agent's performance against what is required in the management agreement?

- Can a better fit between management of the site of public interest and management of the rest of the farm be achieved, thus leading to more proactive management?
- Might the cost of the management agreement be reduced if a whole farm perspective is taken?

These questions are testable, and can be incorporated into monitoring of performance of management agreements. This paper does not report empirical results about any management agreements that are now in place. Rather the relevant issues are explored, and a priori judgements made about options for improving management agreements or complementary mechanisms to them.

3 Theoretical perspectives on firm behaviour and farm management

... today the imperative exists to understand farm behaviour and well-being in a more complicated policy context [than in the past]. Farm families have been adopting new ways of doing business and of integrating farming into their livelihoods, so that today's sector is truly diverse, with respect to size, choice of farming enterprise, business organisation, environmental performance ... the list goes on. (Offutt 2002)

In this section, relevant economic theory is drawn upon to discuss how the farm context might influence the management of any particular area of the farm. It is followed in the next section by reports of case study findings. Together this will provide the basis for examining how management agreements, and policy more broadly, can be used to more successfully influence conservation outcomes.

3.1 Understanding farmer motives and other influences on behaviour

Profit maximisation can be a reasonable assumption to make when predicting market behaviour (Boland 1997), for instance predicting at an aggregate level which crops will be sown on the basis of expected prices, yields and costs. However, it is more problematic when dealing with the expected responses of individuals and firms.

Recent market research shows that in relation to conservation inclination, Victorian farmers can be grouped into: stewards (who are conservation-minded), embattleds (who would be stewards if better off), opportunists (profit-orientated), traditionalists (not likely to be responsive to conservation issues), and unawares (people who haven't been caught up in the issues) (Down to Earth 2002). Although the research did not quantify the numbers in each category, this variety has important implications for policy.

Although it deals with the behaviour of large firms, the economics literature confirms this variation. Scitovsky, Baumol, Marris, and Williamson have argued that firms might seek to maximise any or all of 'profits, sales, the growth rate, and managerial perquisites' (Leibenstein 1979). Family farms clearly have other objectives, often influenced by family needs. Goals can be many and varied, and for family farms rarely include short-term maximisation of profit (Malcolm, Sale and Egan 1996).

Some writers have questioned maximisation itself as a reasonable basis for analysing firm behaviour. Demetz (1995) cites Leibenstein on x-efficiency and ignorance, Alchian on natural selection and Simon on bounded rationality. Lane (1991) and others have used psychological concepts to develop alternative explanations. Drawing on the psychological writings of Kelly, Loasby (1986) suggests that the actions of people need to be explained in terms other than their motives. He goes on to say that:

... instead of regarding people as responding to stimuli, or drives, or whatever, we should regard them as people trying to make sense of the world and to do so by imposing some kind of interpretive framework upon it (Loasby 1986 p.45). Perceptions, learning from events - sometimes different things from the same events - and adaptability become the determinants of actions. Heiner points out that as well as conscious mechanisms,

'... the language of habits, rules of thumb, drives, passions, and the like, is also connected with human decision making' and further that '... only a relatively small fraction of people's conduct is informed by explicit self-awareness of its intended purpose' (Heiner 1986 p.95).

In the transaction cost approach to economics, there is a major emphasis on human factors, although '... these rarely occupy an active role in the analysis' but underpin the concepts of bounded rationality and opportunism (Williamson 1975 p.2). Williamson uses the concept of *atmosphere* to account for interactions over and above the direct costs and benefits of a transaction, and gives the example of giving blood to show how payments for blood changes the individual's perceptions and willingness to donate (p.37). By contrast, as Williamson points out, a standard economic model assumes individuals 'regard transactions in a strictly neutral, instrumental manner' (p.37).

The implications of these perspectives about motives and behaviour for designing management agreements and policy more generally are:

- a) that factors other than monetary reward may be important in winning and retaining commitment to providing conservation services;
- b) that decisions on investments, whether having positive or negative environmental consequences, are driven by a range of factors, not all 'rational'; and
- c) that responsiveness of farmers to signals via management agreements or other policy may be less than expected.

3.2 Farm management routines and production processes

Nelson and Winter (1982) argue that production and the choice about what to produce cannot be easily distinguished. Skill or capability in production depends on suppressing choice - this is directly contrary to the fundamental distinction made in orthodox economics between the choice set facing a firm and the act of making a choice (Nelson and Winter 1982). These writers argue that calculated choice may occur only with major decisions, and that routines are important in enabling firms to survive,

Georgescu-Roegen argues for the importance of *process* in production (Georgescu-Roegen 1972). Leijonhufvud notes that Georgescu-Roegen 'especially stresses the failure of neoclassical production theory to illuminate the fundamental difference between manufacturing processes and agricultural production processes where nature dictates the time phasing of operations' (Leijonhufvud 1986, p.209). What happens at any particular part of the farm will be influenced by how production processes are organised temporally as well as spatially across the farm. The nature of the transformation of resources into products *as it occurs* over time is vital for management of natural resources. Erosion, weed invasion, and fragmentation of habitat for native species are processes occurring in time. These processes operate on a different time scale to agricultural production processes, but are influenced by and to some extent caused by the latter.

The implications for designing management agreements and policy more generally are:

- a) that calculated choice may only occur with major decisions, which is likely with a decision to enter a management agreement but it may be harder to achieve the changes in management practices that are necessary to deliver the desired outcomes; and
- b) how production processes are organised on, and across, the farm will have significant implications for achievement of outcomes specified in a management agreement or otherwise sought through policy.

3.3 Defining their own future

In neoclassical theory, all-knowing firms compete in the sense of reacting to market signals, and if the perfect knowledge assumption is relaxed, by paying search costs to reveal the market signals. This is very different to the perspective of the classical economists for whom competition involved actively seeking advantage in a situation where opportunities have to be discovered or created. For Adam Smith, the firm contributed to economic growth because it occupied a niche in the division of labour and its activities had the effect of expanding the division of labour (Smith 1976). In this perspective, the division of tasks within

and between firms leads to the discovery of currently unknowable opportunities for mechanisation or the further division of labour (Leijonhufvud 1986). Blaug states how the firm can create its own opportunities in these terms:

... a firm is never actually subject to the constraints of exogenously specified demand and production functions. It is the task of the entrepreneur to manipulate these constraints to create new markets, to stretch old ones, and to discover new processes by R&D expenditures (Blaug 1997 p.81).

The sub-discipline of managerial economics is now largely about firm strategy, and this emphasis is also strong in farm management economics (Kaine, Wright and Lees 1993). This approach parallels that of Robinson (1971) who emphasises the need for economics to focus on questions of growth rather than just resource allocation.

Pressures to grow are not felt uniformly by the firm over time, and do not affect all competing firms in the same way. Once having captured the benefits of a particular technological advance, which gives a firm a significant lead over competitors, the pressure on each firm to act in a certain way may ease. Its owners and managers may then be content to earn normal profits for some time before that firm or competitors make the next decisive change. Nelson and Winter emphasise how a search for new routines is triggered if profits fall below a threshold, and how the selection of new routines equips the firms for survival (or otherwise) (Nelson and Winter 1982, Hodgson 1999). The family farm is in a different position. On the one hand, most family farms produce bulk commodities and relatively few individual markets emerge, or are developed by such farmers, in which there is an opportunity to steal a lead over competitors. On the other hand, family lifecycle and questions of inter-generational transfer interact with the external pressures to grow. There are some stages in family life when income needs are very high, and others where they are low. If children are not intending to farm, the period in which income needs are low can extend 20 or 30 years until the farm is finally sold.

In pursuing growth, or survival, one of the tasks of management is to devise, choose between, and implement strategies (in a farm management context, see the literature cited by Kaine, Wright and Lees 1993). These management roles are of particular interest in this research because choice of strategy and method of implementation has the potential to significantly affect environmental outcomes. The way in which the farm business expands is likely to be associated with particular ways of managing the land, and this growth will have a critical bearing on environmental outcomes. Changes in land condition generally occur slowly over time, except in cases of extreme disturbance such as ploughing. The growth path of the farm business will in part be determined by goals. Profit maximisation or business survival as goals will frequently clash with other goals that farmers might have, or might adopt. Secondly, there might be scope to reconcile these goals and hence the dichotomy is not necessarily perpetual. Private interest is not necessarily opposed to the public interest in all cases now, and certainly not in the future.

If the firm can make its own future far more than is allowed for in the traditional theory, this has important implications for policy. In some cases, directing assistance at helping the firm define, if not create, a future might be more valuable than direct assistance for environmental management. An evaluation of how well Farmbis and other programs achieve the integration of conservation and land management into farm business plans may be in order.

The implications for policy are:

- a) that farm strategy, and stage in family lifecycle, will influence willingness to enter management agreements
- b) there may be potential to reconcile current farm activities and conservation goals, or at least reduce the degree of conflict, through a new business strategy

3.4 The influence of uncertainty

Uncertainty is a fundamental question if farm businesses are able to determine in some senses their own future. Langlois (1986) criticises the position of Arrow (1974) in which the economic agent knows the possible states that might be reached in the future, but not necessarily which one is the right one. Langlois (1986) states that 'one can be uncertain not merely about which pre-given state will obtain, but also about which states are possible' (p.228). For Littlechild (1986), the future is uncertain in the sense of being

indeterminate, and imagination is required to address this uncertainty. Action goes beyond search, which cannot directly reveal the future, and beyond discovery, because opportunities may not yet exist. The future has to be created by the agent rather than simply being estimated or discovered. Imagination is required and futures are not independent of preferences - 'their predictions of consequences will be influenced by what they wish to happen - and also by what they fear' (Littlechild 1986 p.29).

Some decisions of the firm involve probabilistic assessments of the future; for instance expected prices can be used as a basis for determining which crop to plant. Decisions about the direction of the business involve multiple considerations - prices, costs, drought, condition of the land, technology, labour, family situation, and so on. Expected values can be used for the first of these, while others are more likely to be ventures into the unknowable. In neoclassical theory, as Rumelt sees it, entrants select production functions from 'known bundle of technological possibilities', and asks but what if there is 'an irreducible uncertainty connected with the creation (or production) of a new production function' (Rumelt 1997). Businesses, whether large or small, do not operate by determining expected outcomes of different options based on the expected values of all the variables entering into complex strategic decisions. It is the entrepreneurial function to take the known, the knowable and the unknowable into account when making such decisions.

The implications for policy are:

- a) that the precise value of the management agreement to the farmer may be less important than the overall fit within an overall farm strategy, which may or may not be explicitly formulated;
- b) that assistance in the discovery and creation of new opportunities on the farm may be worthwhile.

3.5 Capabilities and resources

The issue of capabilities is important for the small farm business. Over the last 20 years, the agricultural economics and farm management literature has emphasised managerial capacity as a key limiting factor (Kaine, Wright and Lees 1993, Malcolm 1990, see also Alexander 2000). Farm management economics explicitly recognises several dimensions of the farm business - technical production, economic, financial, human, risk, and social (Makeham & Malcolm 1993).

The likelihood that farms will vary greatly in how they change their management of natural resources in response to external stimuli is supported by an emerging area of the economics literature - what is now commonly known as the resource-based, capabilities or competence-based approach to the firm (Foss 1997). This approach emphasises the resources, particularly human resources, which the firm has at its disposal. Hodgson sees Adam Smith, Frank Knight and Edith Penrose amongst others as precursors to the resource-based approach, which he contrasts to a contractual approach of which Coase, Williamson and Demetz are exemplars (Hodgson 1999). Hodgson finds the contractual approach lacks explanatory power because of assumptions of 'given, atomistic individuals', the neglect of production, and the use of comparative statics rather than dynamic evolution.

Capabilities vary. Foss argues that:

... essential firm heterogeneity is surely the most basic assumption that is needed for building strategically relevant models of the firm' (Foss 1997 p.6).

Heterogeneity is not simply in terms of the physical resources that the firms command, but it is 'an endogenous creation of economic actors' (Rumelt 1997, p.134). Foss also argues that mainstream economics made a clean break with Marshall's work on the firm, which had embraced diversity amongst firms - 'Marshall's analysis of organisation, his 'trees in the forest' metaphor, etc., all of which were designed to emphasise the essential heterogeneity of firms, were discarded in favour of the uniform equilibrium firm, which logically made evolutionary reasoning impossible and suppressed any co-ordination between firms' (Foss 1998 p.141).

The implications for policy are:

- a) policy attention to the resources available to the farmer, especially those influencing human capacity, as well as opportunities to influence these, is justified,

- b) uniform responses of farmers to management agreements and other policy initiatives should not be expected,
- c) variants to policy are likely to be required for different segments of the farming population.

4 Results from the case studies

In this section relevant issues from a series of case studies about conservation management within whole farm businesses are outlined.

A series of case studies were conducted with farmers managing native grasslands in south-eastern Australia in the late 1990s (summarised in Crosthwaite & Malcolm 2000). In these case studies, a whole farm perspective to conservation and natural resource management issues was taken. These case studies were later used as the basis for further research into farm businesses and natural resource management, conclusions to this study are presented elsewhere (Crosthwaite 2001). Suffice it to say that the study revealed much that is relevant to the consideration of whole farm influences on the design of management agreements.

The case study investigations explored several different aspects of the farm environment to which policies might be directed. These, and other mechanisms that are only indirectly related to the farm, can be targeted at:

- The problem that is of public interest
- Farming system
- Farm business level
- Ownership and management structure
- The off-farm context

Each of these categories gives a different perspective on environmental management on farms. The problem that is of public interest can be conservation across the farm, or it might relate to a particular part of the farm that has high conservation value. The farming level allows us to see how grazing and other management practices on the grassland are part of a property-wide management system. The farm business level allows the way in which the native grassland and how it is managed to be seen in the context of farm business goals and how all resources available to the farm business, including labour and capital, are utilised. There are then two broader levels influencing all the above with ramifications for the native grassland. Who makes the decisions is identified in the ownership and management structure of the farm business. Finally, on-farm activities are influenced by the local community, farm advisors, policy makers and players in the marketing chain (from inputs to end products).

The site-specific category is usually seen as the most important - because 'all may be lost' if the area of conservation interest is not managed according to conservation criteria. However, the other levels provide the context within which the area of conservation interest is managed.

The lessons that can be learned from four of the eight case farms about the value of mechanisms under the first four categories for achieving policy goals will now be outlined. The order is reversed in order to emphasise the broader context within which management of a particular part of the farm occurs. Influencing the off-farm context is not considered further. These four case studies are all located on the Riverine Plain in northern Victoria and southern New South Wales (Crosthwaite & Malcolm 1999). Similar conclusions were drawn for the other four case studies that were in hill country in both states (Crosthwaite & Malcolm 1998).

4.1 Owners and managers of the farm business

Improving the capabilities and skills of farm operators is now a focus of government policy, and many programs are provided in which farmers can enrol. The managers of the case farms have already participated in a range of public programs. Improving the capabilities and skills of those farmers who manage natural resources of public significance will contribute to the achievement of public policy goals. There is a case for targeting such farmers, rather than leaving the initiative to the individual farmer.

How future owners and managers incorporate the management of conservation areas into the farm system is likely to differ from current arrangements. The owners of Plain Farm One and Two are relatively young, and provided that the farms are commercially viable, they are likely to be the managers for at least twenty years. On Plain Farm Three, the father mostly runs the sheep enterprise, with some help from the two sons who run the cropping enterprise. Once there is one less family member involved in the day-to-day work, major management changes are likely. These could affect areas of conservation interest either positively or negatively. The most significant areas for conservation on Plain Farm Four were purchased by Trust for Nature in late 1999.

One option open to conservation agencies is to initiate discussions about how the area can be managed in the context of plans for the future of the farm. However, farm transfer from one generation to another can be fraught with difficulties (Alston 1997). Advice from specialist counsellors can now be sought to assist in the farm hand-over, so it may be possible for conservation agencies to inform family members of such advice, and to help them obtain it. The advice is tax deductible, and is also available through social welfare programs set up to assist farmers in difficulty (AFFA 2000). Exploring options for a covenant on the title that restricts management options is likely to be easier if there is open discussion about the future of the property. Any management agreement might also include conditions relating to the transfer of the property to other family members.

4.2 Adjustment at the farm business level

The vision for each farm, and options available to the owners, are outlined elsewhere (Crosthwaite & Malcolm 1999). Here we discuss what would it require to ensure that the farm in 20 years time is managed in a way that is consistent with management of the native grasslands for conservation and long-term productivity.

If Plain Farm One changed hands, there is a strong likelihood that a new owner would increase stocking pressure to the point where long-term productivity declined. Implementing and enforcing a duty of care is a first step to preventing this decline. A complementary approach is to increase the current owners' chances of remaining viable. It is argued that the owner's chance of success are likely to be higher with the development of a farm business plan, off-farm investment advice, establishing saltbush plantations, and seeding funds for ecotourism activities.

On Plain Farm Two, if further surveys confirm that Dillon Bush is demonstrably adversely affecting the production and conservation values of the native grassland across much of the property, the owners are likely to commit to reducing the stocking rate. However, they would require assistance before this became feasible. Rather than a direct payment to encourage the stocking reduction, public assistance might be best targeted to development of a farm business plan, securing a water entitlement to allow them to regularly grow rice, and later off-farm investment advice as well as changes in the farm system.

The owner's chance of success on Plain Farm Three is likely to be greater with the development of a farm business plan, advice on managing the transition to a two person operation, identification of training needs and their provision, and later off-farm investment advice. As the farm is already intensely managed, and the owners do have plans to fully crop the whole property, protection of the native grassland might be best achieved via a management agreement. However, there may be considerable potential to increase whole farm viability; this will not be known at least until the scope to provide assistance and training directed at managing the farm business is fully evaluated.

Plain Farm Four will be sold within 10 years. The future of the areas of conservation interest will be in the hands of other owners. The only way to be sure that these areas have a future as native grasslands of significance is for conservation agencies to act soon.

4.3 Changing the farming system

Changes made to the organisation of production systems may lead to better conservation outcomes. Possible changes on the case study farms include improving stocking practices, planting saltbush to take pressure off pastures, and changing crop-pasture rotations

More rotation of stock within the existing paddock set-up would occur on the first three case farms if pasture condition were treated as an equally important as stock requirements. This is likely to increase conservation values. It could be largely achieved within the existing paddock set-up. The extra time required is a constraint. As the sheep manager on Plain Farm Three is aged over 60, there may also be a reluctance to change. Incentives could include reimbursing any direct costs associated with making the shift, support in learning new management and pasture recognition techniques, and motivational rewards, and possibly tax deductions or rebates for fencing and water supply costs. Though incentives may be unwarranted except as a transitional arrangement where changing grazing practices is expected of landholders, for instance under a duty of care.

These measures are unlikely to be adequate on Plain Farm Two, even with the whole farm initiatives outlined in the previous section. Based on the economic evaluation of lighter stocking, it is likely that the owners would have a significant incentive to breach a strongly formulated duty of care. Direct payments to compensate for a loss of grazing income are one option, but would be very costly to government. Subsidising the establishment of saltbush will be cheaper and may ultimately have the same outcome.

Another approach is to support measures that increase management flexibility at times when stock feed is scarce. At a general level, this involves promoting self-reliance as in drought policy. More specifically, it might involve supporting particular investments like saltbush plantations that will provide an extra feed source during autumn. The owners of Plain Farm One are already investing in saltbush. Their model is likely to deliver public benefits if adopted on other farms, and an incentives program may be justified. This approach is also likely to benefit future owners, on Plain Farm One and elsewhere, who might otherwise be inclined to over-stock, leading to the loss of palatable perennial shrubs and grasses and inter-tussock species. Subsidising the establishment of saltbush will be cheaper and may ultimately have the same outcome as incentives to reduce stocking rates. Assistance could include adequate technical support to assist farmers develop their saltbush plantations and assistance to ensure that the plantations are then effectively integrated into the tactical management of the pasture-livestock system.

Two of the case farms engage in cropping as well as run livestock. The crop and pasture systems are inter-related in several respects. This is important when considering the management of areas of conservation interest.

When cropping area expands, pressure on native grasslands from greater numbers of livestock can increase. Such pressure can be significant if farmers do not reduce stock numbers more or less in proportion to the extra area cropped, after allowing for some grazing of stubble in summer. Such issues could be covered in a management agreement. Farmers can now enrol in programs such as PROGRAZE that provide farmers with the necessary skills to be alert to the effects of increased grazing pressure on pastures.

Cropping systems can have other effects on areas of conservation interest. Herbicide sprayed onto crop may drift. Weeds encouraged by the soil disturbance will spread, particularly if a pasture is not sown when the cropping phase of a rotation ends. Buffer strips between areas chosen for cropping and areas of conservation interest may be effective. Several options for promoting the use of buffers are available to policy makers. One option is an environmental management standard or a code of practice similar to a forestry code of practice, which require buffers between forestry operations and streams. Incentives may be required to establish a buffer. Whole farm plans can also reflect how cropping and grassland management are to be integrated.

5 Relevance to the issues associated with management agreements

In this section, how a whole farm business perspective is relevant to the three aspects of the management agreement - information asymmetry, cost and being proactive – is identified. Consideration is given to the extent to which current approaches to management agreements address them, and whether significant problems still remain. The section ends with a summary of important whole farm issues to account for in a management agreement system.

BushTender essentially leaves whole farm considerations to the farmer who is involved in developing the management plan, and in setting their price for delivery of conservation services. There is limited scope in the scheme as currently designed to incorporate such considerations; they may be explicit in discussions when the landholder and the extension officer are developing the management plan. Characteristics of the participants (and non-participants) are also considered in the landholder surveys that are conducted as part of Bush Tender evaluations. There may be scope to go further.

5.1 Information asymmetry

Where the potential problems associated with information asymmetry are expected to be significant, more effort to probe the 'black box' of the farm business makes sense.

The discussion of economic theory above suggests that the principal can be more confident of anticipating the most likely responses from the farmer if they take into account their goals, values, thought processes, available resources and responsiveness to changes in the external environment. It also highlights the scope to possibly support farmers in identifying and acting on opportunities that better meet private and public goals.

The discussion of the case studies reinforces many of the above points, but also highlights the value of understanding how the particular parcel of land is now integrated into other farm operations, and how it might be affected if other key aspects of the farm operation change in the future.

Measures that address farm business issues and management that affect the whole farm, and not just the site of public interest may reduce, the potential for first mover and moral hazard problems. For example, if the farmer is under severe financial pressure, assisting them with new investments elsewhere on the farm might mean they actually provide the services as agreed, and it might even forestall actions such as over-grazing that damage the conservation site

5.2 Encouraging proactive management

Where the potential gain from encouraging proactive management of a particular parcel of land is significant, more effort to understand how that parcel fits within the overall farm business makes sense.

The discussion of economic theory above suggests that the principal will be more successful in 'switching on' the farmer if they account for what now motivates them and their management style. There may be routines in how the farm is run that are potential obstacles to adopting the desired management of the particular parcel of land.

The discussion of the case studies emphasises that management practices, such as grazing and fencing, across the farm will influence capacity to change.

Bush Tender encourages farmers to be proactive, by linking payment to service. More can be potentially achieved. The more that the provision of conservation services fits in with how the farmer goes about achieving their goals, the more likely it is that a positive attitude to conservation management will continue.

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5.3 Cost

Where the payments to farmer under management agreements are likely to be relatively high, it makes sense to investigate whether taking a farm business perspective might reduce those costs. The discussion of economic theory above suggests three points of relevance to the principal. Firstly, farmers may not be profit-driven. Secondly, uncertainty about the future may seriously affect the willingness of agents to enter a management agreement. Thirdly, the effect of a management agreement on routines may have a big impact on willingness to enter, or price of entering, a management agreement. There may be opportunities for the principal to take account of farmer goals and opportunities for changing how the farm runs so that both farmer goals and public goals can be met.

Considering the concept of opportunity cost further supports these points. The minimum price that the farmer sets upon their conservation services will reflect the opportunity costs of participating. A Bush Tender type system is designed to reveal the 'true' opportunity cost for the participating landholder. This information otherwise remains concealed from the principal. Where payments are fixed for a given level of conservation service (as in most European systems), there is no scope for the farmer to convey what they see as their opportunity costs. In an individually negotiated agreement, and the absence of competition in the bidding process, means that farmers can potentially inflate their costs without the principal being aware of it or being powerless to do anything about it.

Opportunity cost is the expected contribution to farmer goals from using in some other way the resources required to provide the conservation services. Opportunity cost is thus not just financial costs, but reflects a balance between financial and non-financial considerations in terms of relative contribution to farm family or corporate goals. This is a wider treatment of opportunity cost than usual. Typically opportunity cost is based on the assumption that the resources to be used in a new activity are currently optimally employed. However, opportunity cost is not simply a question of forgone financial rewards. Such an assumption is a reasonable one in analysing the aggregate behaviour of firms, but not necessarily for examining individual responses.

Bush Tender does not rest on any assumptions about the nature of opportunity cost. Goals of the farmer are implicitly taken into account. Estimation of costs is in the hands of the farmer, and will be reflected in the price that they bid. It doesn't matter how they reach their estimate. However, the more that providing the conservation service is seen to be consistent with achieving their overall goals, the lower the opportunity cost is likely to be. Assistance to farmers in meeting their overall goals in ways that were not available or not known to them might thus lower the price at which they bid to provide conservation services.

The central issue is whether new information that can be provided through the management agreement system could further reduce opportunity cost of participating. Participation in group learning initiatives like Victoria's BeefCheque, Paired Paddock Program, ProGraze has lead many producers to greatly increase productivity and to better meet their goals. Crosthwaite & Malcolm (2000) present the case that improving productivity of selected parts of the farm and thereby farm profitability can greatly reduce the opportunity cost of conservation on many farms.

5.4 Summary of relevant issues

In summary, the issues that are *prima facie* important from a whole farm perspective are:

1. how consistent farmer goals are with conservation management of parts of the farm; might their goals lead them to investment or management decisions that impact on the public site, **and** whether a long-term vision consistent with their goals can be developed that is also compatible with conservation goals
2. what is the current and expected profitability and cash flow situation; is it possible that this will lead them to investment or management decisions that impact directly or indirectly on the public site,
3. What is the likelihood that management of the property, or key part of it, will change hands through sale or succession
4. what investment opportunities are available on-farm that will help in achieving overall goals, and what

obstacles (including risk) are there to pursuing these opportunities

5. what are the management capabilities, are they likely to be able to manage the site in new ways and integrate this effectively into the farm system
6. what labour resources are available now and will be in the future, and could this influence site management directly or indirectly
7. what are the livestock types and what is the grazing system, and what constraints/flexibility does this mean for how the site is managed, and are any changes being considered to the livestock types and grazing system,
8. what other enterprises are there on the property, and are any new ones being considered, and could the demands of these enterprises influence the site management
9. is the farm being managed in a way that would be regarded as meeting a duty of care – loosely defined as being what is generally expected by and of farmers in that area

6 How to account for whole farm issues in a management agreement system

The aim in this section is to identify options for dealing with whole farm issues in a management agreement system, and also where in the system they might be best covered. An evaluation of the options is provided in the next section.

There are five broad options for anticipating and dealing with possible clashes for each of the nine whole farm issues. These are:

- a) actions to reveal information so that some assessment can then be made of a potential clash prior to reaching any agreement. Options include discussions with the farmers, and external assessment.
- b) actions aimed at ensuring that the issue has been explicitly addressed in relevant plans such as a business plan, whole farm plan, succession plan, EMS or grazing plan, prior to or during the process of developing a management agreement,
- c) provision of training and advice to better equip the farmer to reconcile differing goals. This advice in some cases might be best delivered one-to-one.
- d) a requirement to notify a change in circumstance, or to provide a statement of intent
- e) provision for investment elsewhere on the farm to improve profitability and to thus indirectly help pay for delivering conservation services, by allowing the farmer's bid price to reflect such activities or by otherwise incorporating relevant incentives into the management agreement

There are several ways in which whole farm considerations might be included in the management agreement system. They can be:

- a) included in the bid assessment process,
- b) required as preconditions for making a bid or entering an agreement,
- c) specified as terms within the management agreement, or
- d) dealt with via other complementary policy mechanisms.

Options under each of these categories are outlined below. The numbers with asterisks in the text show the whole farm considerations that are addressed by each option. A more complete linkage of option to whole farm consideration and place in the management agreement system is shown in Appendix One.

As part of the bid assessment process, options include:

- Discussions with farmers about some or all of: goals (*1), financial position (*2), future of the property (*3), investment opportunities (*4), self-assessment of capabilities (*5), labour (*6), livestock/grazing system (*7), new enterprises (*8), and self-assessment of land management standard.
- External assessment of some or all of: goals (*1), financial position (*2), future of the property (*3), investment opportunities (*4), capabilities (*5), labour (*6), livestock/grazing system (*7), new enterprises (*8), and land management standard

As a precondition to entering a management agreement:

- the farmer could be required to provide some or all of: goal statement (*1), farm business plan (*1, *2, *5, *7, *8), whole farm plan (*1, *7, *8, *9), statement of intent re. future of the property and succession plan (*3), evidence of EMS (*7, *8, *9)

In the management agreement, there is scope for:

- Cross-reference to farm business plan (*1, *2)
- a requirement to undertake relevant course (*1, *2, *7)
- a requirement to notify: any significant changes in position or decisions (*2, *3, *8), or changes in grazing/livestock (*7)
- provision for investment elsewhere on the farm to improve profitability and to thus indirectly help pay for delivering conservation services (*4),
- a requirement to undertake agreed changes in management across the farm (*9)

As complementary mechanisms, there is scope to:

- make available relevant courses (*1, *2, *3, *4, *5, *6, *7, *8, *9)
- target farmers with significant biodiversity assets with one-to-one advice and other assistance (*1, *2, *3, *4, *5, *7, *8, *9)

7 Evaluation of options

The aim in this section is to evaluate the possible ways of dealing with whole farm considerations in a Bush Tender type system.

Some advantages and disadvantages of each option are outlined in Appendix Two. Criteria against which each option is evaluated are:

- direct cost (or payments to farmers)
- transaction costs
- effectiveness
- complications for the management agreement system
- likely acceptability & effect on participation

7.1 Bid assessment process

The advantages of discussions and external assessment with farmers enrolling in a management agreement about their whole farm situation seem clear. However, making it a formal part of the bid assessment is likely to cause serious complications in ranking the value of bids. This problem could be overcome if advice and external assessment of the whole farm situation were offered as part of each agreement. Willingness to accept this could be then a component of scoring bids. The cost would be a fixed component of the direct cost. An alternative would be to provide advice and/or external assessment as a complementary mechanism, though still targeting it at participants in Bush Tender, and others with high-value biodiversity assets.

7.2 Precondition

Requiring farmers to provide information about aspects of their business and farm apart from that directly relevant to the area of conservation interest could be a valuable mechanism for screening bidders on the likely effectiveness of their actions. Asking for all the information identified as relevant is likely to cause significant public reaction. At a minimum, a whole farm plan, prepared to a specified level of detail, could be required.

7.3 Management agreement

Allowing farmers to use payments for investments elsewhere on the farm provided that they deliver the conservation services is intuitively attractive. However, it does involve essentially two mechanisms - payments for conservation services and investments elsewhere on the farm - being used to achieve a mix of private and public objectives. Following Tinbergen's rule for using one mechanism for each objective, effectiveness could be reduced. Another problem is that the logic of broadening the management agreement away from site-specific requirements is not likely to be immediately apparent to the farmer. If ways cannot be found to address this, such measures may have little value. Considerable effort is likely to be required to explain it, resulting in additional transaction costs for the program. A way around both problems might be for the management agreement to use two separate mechanisms; one for the payments for conservation services (the bidding process) and one for investments elsewhere on the farm (standard or individually negotiated payments based on cost).

The value of the option of linking action to the farm business plan and of undertaking courses that relate to whole farm management is likely to depend on the capacity of extension officers to explain their purpose and to re-inforce this over time. Explicit reference in the management agreement to the farm business plan or whole farm plan is one way of achieving integration of outcomes. A course is likely to be of little value if the participant is not convinced of its merits.

The option of requiring notification of intent to make farm business changes recognises that changes in the whole farm environment might impact on the site. It is thus broader than similar requirements elsewhere; farmers who manage land within the UK Sites of Special Scientific Interest are required to notify intent to change management of that site, irrespective of whether they are party to a management agreement. Extending the measure to the whole farm business may have little acceptance.

The purpose of requiring farmers to undertake agreed changes in management across the farm is primarily to ensure that they are not receiving payments for conservation services until they have met their obligations that would be regarded as 'reasonable and fair' under a duty of care. However, it should be sufficient if the payments are strictly for provision of services over and above their duty of care for the particular site.

7.4 Complementary mechanism

There would appear to be little cost and much to gain from making a concerted effort to encourage participants in the Bush Tender program to take up one-to-one advice about their whole farm operation and to take up relevant courses. The disadvantage of relying only on this is that it relies on the interest of the farmer and the capacity of the extension officer to enthruse them - relatively few may become involved. The alternative is to make it a requirement of the management agreement, possibly with payments - but the extent of the benefits is still likely to depend on the quality of extension support.

8 Conclusion

It has been argued that management agreement systems can be improved if they incorporate whole farm considerations. To date, this has been a neglected area of study - in spite of the obvious point that how a farmer manages a unique part of the farm will depend greatly on what is happening in the rest of the business. This area of study could reasonably be neglected when aggregate behaviour of farmers was being

investigated, but it cannot when concern is with unique biodiversity assets.

The actual decision-making processes of farm managers are important, as is the implementation of decisions. The ways in which farmers co-ordinate activities are also relevant to farm business outcomes. Management is treated as a human process, rather than one that can be replicated from farm to farm. Given the complexity of the farm business, considerable emphasis may be needed at the one-to-one level to understand the problems to be solved.

Economic and technical change is at least partly endogenous to the farm, whereas it is exogenous to the individual parcel of land. If a land management problem is treated as a farm management problem, then solutions to the problem can be sought by working on those sources of change that originate with the farm business. In this way, a land management issue can be directly placed in the context of the objectives of the owners and managers, and the survival and growth of the farm. This opens up questions about what the farm might look like in the future, and how affordable various land management options are likely to be if a different farm plan was adopted.

Further research is needed to establish how whole farm considerations might be best addressed within a management agreement system. Research is needed into:

- how the three key design issues of information asymmetry, cost and encouraging proactive behaviour can be addressed by taking whole farm considerations into account,
- the gains from doing so e.g. reduced costs, increased effectiveness,
- the extra transaction costs and other problems,
- whether the approach will work with some groups of farmers more than others,
- the extent to which action can be best taken in the assessment process, in preconditions, as part of the management agreement, or as complementary mechanisms, and
- whether there is an optimal approach

A study to test these questions might involve providing farm business assessment and training to one group of farmers expressing interest in Bush Tender, and not to another. It might involve a one-day visit by farm management consultant. Effect on bid price and agreed management would be monitored.

Apart from their direct cost, there appears to be little downside in what have been called complementary mechanisms like encouragement to attend relevant courses, such as business or grazing management, and in encouragement to take up one-to-one advice in these areas. The potential for including discussion and advice about whole farm issues as part of the agreement, at some cost obviously, has been discussed; this is likely to be more successful than including it in the bid assessment process.

Information revelation about the whole farm situation, and how it might impact on the site of public interest, can be achieved as a precondition to an agreement, if handled sensitively.

Not all farmers are profit-seekers, and once primary family needs are met, conservation is likely to be on the agenda. Consequently, encouraging farmers to invest elsewhere on the farm, as a means of achieving whole farm goals and as a means of indirectly funding conservation effort is worthwhile. Allowing farmers to jointly include such investment as well as provision of conservation services as part of the one bid within a scheme like Bush Tender could generate a more attractively priced bid. However, mixing up the two initiatives carries significant risks.

Finally, it is obvious that the whole farm perspective deserves consideration in the design and review of other policy approaches such as education and regulation. How farm business considerations influence the prospects for such policy is a vital question when the future of unique environmental assets is essentially in

private hands.

9 References

- AFFA (1999) 'Managing Natural Resources in Rural Australia for a Sustainable Future. A Discussion Paper for Developing a National Policy'. Agriculture, Fisheries and Forestry—Australia: Canberra.
- AFFA (2000) 'Farmbis'. Agriculture, Fisheries and Forestry—Australia. Available: http://www.affa.gov.au/docs/4_industry_develop/rural/farmbis/. Accessed 11 August 2000.
- Alexander, P. (2000) 'Profit Is a Decision', *Proceedings Grassland Society of Victoria 41st Annual Conference 'Achieving a Balance'*. Grassland Society of Victoria: South Morang, Victoria.
- Alston, M. (1997) 'Socio-Cultural Factors and Family Farming', in J. W. Lees ed. *A Legacy under Threat? : Family Farming in Australia*. University of New England Press: Armidale, N.S.W., pp. 99-120.
- Arrow, K. J. (1974) *The Limits of Organization*. Norton: New York.
- Binning, C., and M. Young (1997) 'Motivating People - Using Management Agreements to Conserve Remnant Vegetation'. National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation Report 1/97. Land and Water Resources Research and Development Corporation: Canberra.
- Blaug, M. (1997) 'Competition as an End-State and a Process', in M. Blaug ed. *Not Only an Economist. Recent Essays by Mark Blaug*. Edward Elgar: Cheltenham, UK, pp. 66-86.
- Boland, L. A. (1997) *Critical Economic Methodology. A Personal Odyssey*. Routledge: London and New York.
- Bowers, J. (1999) 'Policy Instruments for the Conservation of Remnant Vegetation on Private Land'. *Biological Conservation* vol 87: 327-339.
- Colman, D., B. Crabtree, J. Froud, and L. O'Carroll (1992) '*Comparative Effectiveness of Conservation Mechanisms*'. Department of Agricultural Economics, University of Manchester: Manchester.
- Crosthwaite, J. & B. Malcolm (2000). *Looking to the farm business: Approaches to managing native grassland in south-eastern Australia*, National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation Research Report 5/2000, Land and Water Resources Research and Development Corporation, Canberra.
- Crosthwaite, J. (2001) A perspective on farm businesses and natural resources policy. PhD dissertation, Institute of Land and Food Resources, University of Melbourne.
- Crosthwaite, J., and Malcolm, B. (1998). An economic analysis of native pasture in the hills and tablelands of south-eastern Australia., Institute of Land and Food Resources, The University of Melbourne, Parkville, Victoria.
- Crosthwaite, J., and Malcolm, B. (1999). An economic analysis of native grassland on the Riverine Plain of south-eastern Australia., Institute of Land and Food Resources, The University of Melbourne, Parkville, Victoria.
- Demetz, H. (1995) *The Economics of the Business Firm. Seven Critical Commentaries*. Cambridge University Press: Cambridge.
- Down to Earth Research (2002) Grazing for Biodiversity and Profit: Farmer Segmentation Study & Evaluation of Research and Extension Worker Attitudes. A report commissioned for the Grazing for Biodiversity and Profit project (ESAI 05115): A project under the Ecologically Sustainable Agriculture Initiative, Department of Natural Resources and Environment.
- Foss, N. J. (1997) 'Resources and Strategies: A Brief Overview of Themes and Contributions', in N. J. Foss ed. *Resources, Firms, and Strategies : A Reader in the Resource-Based Perspective*. Oxford University Press: Oxford and New York, pp. 3-20.
- Fraser, I. & P. Hone (2002). 'Development and Implementation of Agri-Environmental Policy: English Experience and Lessons for Australia. *Australian Journal of Environmental Management* Vol 9, pp.228-242.
- Fraser, I. (1996) 'Quasi-Markets and the Provision of Nature Conservation in Agri-Environmental Policy'. *European Environment* vol 6: 95-101.
- Garrett, B. K. (1989) *Whole Farm Planning : Principles and Options*. Department of Conservation, Forests and Lands: Benalla, Vic.
- Georgescu-Roegen, N. (1972b) 'Process Analysis and the Neoclassical Theory of Production'. *American Journal of Agricultural Economics* vol 54: 279-294.
- Heiner, R. A. (1986) 'Uncertainty, Signal-Detection Experiments, and Modelling Behavior', in R. N. Langlois ed. *Economics as a Process. Essays in the New Institutional Economics*. Cambridge University Press: New York, pp. 59-116.
- Hodgson, G. (1999) *Evolution and Institutions. On Evolutionary Economics and the Evolution of Economics*. Edward Elgar: Cheltenham, UK.
- Kaine, G., V. Wright, and J. Lees (1993) 'The Strategic Management of Farm Businesses'. Report No. 182. The Rural Development Centre, University of New England: Armidale, NSW.
- Lane, R. E. (1991) *The Market Experience*. Cambridge University Press: Cambridge and New York.

- Langlois, R. N. (1986) 'Rationality, Institutions and Explanation', in R. N. Langlois ed. *Economics as a Process. Essays in the New Institutional Economics*. Cambridge University Press: New York, pp. 225-255.
- Latacz-Lohmann, U., and C. P. C. M. Van der Hamsvoort (1998) 'Auctions as a Means of Creating a Market for Public Goods from Agriculture'. *Journal of Agricultural Economics* vol 49: 334-45.
- Leibenstein, H. (1979) 'A Branch of Economics Is Missing: Micro-Micro Theory'. *Journal of Economic Literature* vol 17: 477-502.
- Leijonhufvud, A. (1986) 'Capitalism and the Factory System', in R. N. Langlois ed. *Economics as a Process. Essays in the New Institutional Economics*. Cambridge University Press: New York, pp. 203-224.
- Littlechild, S. C. (1986) 'Three Types of Market Process', in R. N. Langlois ed. *Economics as a Process. Essays in the New Institutional Economics*. Cambridge University Press: New York, pp. 27-40.
- Loasby, B. J. (1986) 'Organisation, Competition and the Growth of Knowledge', in R. N. Langlois ed. *Economics as a Process. Essays in the New Institutional Economics*. Cambridge University Press: New York, pp. 41-57.
- Lomas, J. (1994) 'The Role of Management Agreements in Rural Environment Conservation'. *Land Use Policy* vol 11: 119-124.
- Makeham, J. P., and L. R. Malcolm (1993) *The Farming Game Now*. Cambridge University Press: Cambridge.
- Malcolm, B., P. Sale, and A. Egan (1996) *Agriculture in Australia. An Introduction*. Oxford University Press: Oxford.
- Malcolm, L. R. (1990) 'Fifty Years of Farm Management in Australia: Survey and Review'. *Review of Marketing and Agricultural Economics* vol 58: 24-55.
- Mohr, E. (1994) 'Environmental Norms, Society and Ethics'. *Ecological Economics* vol 9: 229-240.
- Murray-Darling Basin Ministerial Council (2000) 'Basin Salinity Management Strategy 2001-2015'. Murray-Darling Basin Ministerial Council: Canberra.
- Nelson, R. R., and S. G. Winter (1982) *An Evolutionary Theory of Economic Change*. Harvard University Press: Cambridge, MA.
- Offutt, S (2002) 'The Future of Farm Policy Analysis: A Household Perspective', Presidential Address to the American Agricultural Economics Association. *American Journal of Agricultural Economics* vol 84: 1189-1200.
- Read, S., and D. Heinjus (1999) 'Planning for Sustainability and Profit - a National Strategy for Facilitating Change Management for Family Farm Business'. Sustainable Land and Water Resources Management Committee. Available: <http://www.landcare.gov.au/landcare/pmp-strategy.html>. Accessed February 2000.
- Robinson, J. (1971) *Economic Heresies: Some Old-Fashioned Questions in Economic Theory*. Macmillan: London.
- Rumelt, R. P. (1997) 'Towards a Strategic Theory of the Firm', in N. J. Foss ed. *Resources, Firms, and Strategies : A Reader in the Resource-Based Perspective*. Oxford University Press: Oxford; New York, pp. 131-145.
- Semple, W. S. (1990b) 'Vegetation', *Hay District Technical Manual*. Soil Conservation Service of NSW: Hay, NSW.
- Smith, A. (1976) *The Wealth of Nations*. J. M. Dent: London.
- Stiglitz, J. E. (1987) 'Principal and Agent', in P. K. Newman, J. Eatwell, M. Milgate, and R. H. I. Palgrave eds, *The New Palgrave : A Dictionary of Economics*. Macmillan: London, pp. 966-72.
- Stoneham, G., M. Crowe, S. Platt, V. Chaudhri, J. Soligo, and L. Strappazzon (2000) 'Mechanisms for Biodiversity Conservation on Private Land'. Department of Natural Resources and Environment: East Melbourne.
- Webster, S., and M. Fulton (1993) 'Targeting for Nature Conservation in Agricultural Policy'. *Land Use Policy* vol 10: 67-82.
- Williamson, O. E. (1975) *Markets and Hierarchies, Analysis and Antitrust Implications : A Study in the Economics of Internal Organization*. Free Press: New York.
- Young, M. D., N. Gunningham, J. Elix, J. Lambert, B. Howard, P. Grabosky, and E. McCrone (1996) *Reimbursing the Future : An Evaluation of Incentives for the Conservation of Biodiversity*. Biodiversity Series. Department of Environment, Sport and Territories: Canberra.

10 Appendix 1: Whole farm issue by options for addressing them within a management agreement system

Whole farm issue	Options for addressing whole farm issue
<p>1. how consistent farmer goals are with conservation management of parts of the farm; might their goals lead them to investment or management decisions that impact on the public site, and whether a long-term vision consistent with their goals can be developed that is also compatible with conservation goals</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Discussion about goals and implications <p>Precondition</p> <ul style="list-style-type: none"> - Goal statement - Farm business plan - Whole farm plan <p>Management agreement</p> <ul style="list-style-type: none"> - Cross-reference to farm business plan and/or whole farm plan - Requirement to undertake relevant course (farm bus, planning, farm transfer etc) <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses
<p>2. what is the current and expected profitability and cash flow situation; is it possible that this will lead them to investment or management decisions that impact directly or indirectly on the public site,</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Discussion about financial position and implications - External assessment of financial position and implications <p>Precondition</p> <ul style="list-style-type: none"> - Farm business plan <p>Management agreement</p> <ul style="list-style-type: none"> - Cross-reference to farm business plan - Requirement to undertake relevant course (farm bus, planning, farm transfer etc) - Requirement to notify any significant change in position or major decision <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses
<p>3. What is the likelihood that management of the property, or key part of it, will change hands through sale or succession</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Discussion about goals and future of property - Review of financial position, incl debt level - Identification of family members, age structure and likely future manager(s) <p>Precondition</p> <ul style="list-style-type: none"> - Statement of intent - Succession plan <p>Management agreement</p> <ul style="list-style-type: none"> - Cross-reference to succession plan - Covenant - Requirement to notify any major decision - Requirement for new manager (if part of current business) to undertake relevant course (conservation management, farm bus, planning, etc) <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of potential new managers on properties with significant biodiversity assets with relevant assistance – one-to-one advice, courses
<p>4. what investment opportunities are available on-farm that will help in achieving overall goals, and what obstacles are there to</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Discussion about investment opportunities and obstacles - External assessment of investment opportunities and obstacles <p>Precondition</p> <ul style="list-style-type: none"> -

<p>pursuing these opportunities (assuming no adverse impacts on biodiversity – these are dealt with under profitability/cash flow)</p>	<p>Management agreement</p> <ul style="list-style-type: none"> - Provision for farmer’s bid price to deliver specified conservation services to reflect costs of whatever they want to do on the farm, such as an investment that will help pay for conservation actions - Assistance to undertake investment (if it will result in demonstrable biodiversity gains) <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses, applications for funding from other sources
<p>5. what are the management capabilities of the managers, are they likely to be able to manage the site in new ways and integrate this effectively into the farm system</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Assessment of capability (against relevant criteria e.g. level of experience & training, recent examples of implementing new things, range of activities being profitably undertaken, returns on labour and capital, signs of stress, quality of stock and pastures) - Assessment of flexibility in how the farm system operates - Assessment of how well the people involved function as a team <p>Precondition</p> <ul style="list-style-type: none"> - Farm business plan <p>Management agreement</p> <ul style="list-style-type: none"> - <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses,
<p>6. what labour resources are available now and will be in the future, and could this influence site management directly or indirectly</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Assessment of who is available now and in the future, hours worked, contractors used etc - Assessment of how well the people involved function as a team <p>Precondition</p> <ul style="list-style-type: none"> - <p>Management agreement</p> <ul style="list-style-type: none"> - <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses, incl time management, labour management
<p>7. what are the livestock types and what is the grazing system, and what constraints/flexibility does this mean for how the site is managed</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Assessment of enterprises, grazing system, fencing system, recent changes and plans - Assessment of options that would suit the farm - Assessment of scope for and interest in rotational grazing and other relevant options - Assessment of labour availability to move stock as required <p>Precondition</p> <ul style="list-style-type: none"> - Whole farm plan - Environmental management system (EMS) - Farm business plan <p>Management agreement</p> <ul style="list-style-type: none"> - Requirement for grazing management practices across whole farm to be specified - Requirement to notify changes - Requirement to undertake relevant course (grazing management) <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses,
<p>8. what other enterprises are there on the property, and are any new ones being considered, and could the demands of these</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Assessment of enterprises, recent changes and plans - Assessment of options that would suit the farm - Assessment of implications for management of the conservation area <p>Precondition</p> <ul style="list-style-type: none"> - Whole farm plan

<p>enterprises influence the site management</p>	<ul style="list-style-type: none"> - Environmental management system (EMS) - Farm business plan <p>Management agreement</p> <ul style="list-style-type: none"> - Requirement to notify changes <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses,
<p>9. is the farm being managed in a way that would be regarded as meeting a duty of care – loosely defined as being what is generally expected by and of farmers in that area</p>	<p>Bid assessment process</p> <ul style="list-style-type: none"> - Assessment of land condition against relevant criteria, perhaps using a tool like Landscape Function Analysis - Assessment of implications for management of the conservation area <p>Precondition</p> <ul style="list-style-type: none"> - Whole farm plan - Environmental management system (EMS) <p>Management agreement</p> <ul style="list-style-type: none"> - Requirement to undertake agreed changes in management <p>Complementary mechanisms</p> <ul style="list-style-type: none"> - Availability of relevant courses - Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses

11 Appendix 2: Advantages and disadvantages of options for addressing whole farm issues within a management agreement system

	Advantages	Disadvantages
Bid assessment process		
Discussions with farmers about some or all of: goals (*1), financial position (*2), future of the property (*3), investment opportunities (*4), self-assessment of capabilities (*5), labour (*6), livestock/grazing system (*7), new enterprises (*8), and self-assessment of land management standard (*9)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - potential saving over life of agreement if it identifies issues which would later consume time of extension officers (not necessarily those connected to the scheme) • Effectiveness - potentially identifies major influences that need to be addressed, or points to farmer who should be excluded; potential for sceptical farmer to become more proactive because of attention given to whole farm considerations • Acceptability - interest in the whole farm by extension officers is generally welcomed, though some issues e.g. finances may be off-limits 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - extra skills needed by assessor; extra time for assessor in discussions with farmer and report writing • Effectiveness - no disadvantage • Complication - introduces factors into the assessment that are difficult to standardise across assessors (unless they have specialised training) • Acceptability - no disadvantage, unless poorly trained assessor becomes intrusive
External assessment of some or all of: goals (*1), financial position (*2), future of the property (*3), investment opportunities (*4), capabilities (*5), labour (*6), livestock/grazing system (*7), new enterprises (*8), and land management standard (*9)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - same as for Discussions with farmers • Effectiveness - experienced farm consultant would have more time and greater capacity to identify relevant issues (and possible solutions) • Acceptability - independent consultant is more likely to be welcomed 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - cost of consultant • Effectiveness - no disadvantage • Complication - may introduce factors into the assessment that are difficult to standardise across consultants • Acceptability - no disadvantage, unless poorly trained assessor becomes intrusive
Precondition		
Provision by farmer of some or all of: goal statement (*1), farm business plan (*1, *2, *5, *7, *8), whole farm plan (*1, *7, *8, *9), statement of intent re. future of the property and succession plan (*3), evidence of EMS (*7, *8, *9)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - potential saving over life of agreement if it identifies issues which would later consume time of extension officers (not necessarily those connected to the scheme) • Effectiveness - implicitly puts emphasis on being proactive because of alignment with business and farm goals; reduce information asymmetry because at least some key information about factors potentially affecting capacity to provide conservation services would be documented; screen out farmers who hadn't done, or who weren't prepared to do, the required level of planning (assuming correlation between that and capacity to provide management services) • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - small cost for farmer in providing documents, or in setting up plan; cost to agency of assessing the documents • Effectiveness - likely to screen out farmers who had significant biodiversity assets, but who weren't prepared to do, the required level of planning • Complications - potential adverse public reaction against the scheme • Acceptability - will not be acceptable to many farmers

Management agreement		
Provision for bid price to reflect investment elsewhere on farm that will fund conservation service (*4)	<ul style="list-style-type: none"> • Direct cost - potentially lower bid price • Transaction cost - relative to promotion of other whole farm options, this leaves all considerations in farmer hands • Effectiveness - potentially better outcome if investment or new management system creates secure future for farm and encourages effort to provide conservation services • Acceptability - likely to be acceptable to many farmers 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - extra effort in explaining system • Effectiveness - mixing up actions to achieve private goals with actions to achieve public goals of Bush Tender could lead to poor outcome, especially if investment is high risk and attention is focussed elsewhere • Complications - no disadvantage • Acceptability - no disadvantage
Assistance to undertake investment elsewhere on farm (*4)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness - potentially better outcome if investment or new management system creates secure future for farm and encourages effort to provide conservation services • Acceptability - likely to be acceptable to many farmers 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - extra effort in evaluating claims • Effectiveness - even though mechanism - outcome distinction is clear, some mixing up is likely potentially leading to reduced achievement of specific goals of Bush Tender • Complications - no disadvantage • Acceptability - no disadvantage as no obligation to enter this part of agreement
Cross-reference to farm business plan, whole farm plan or succession plan (*1, *2)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness – explicitly putting achievement of goals in context of whole farm is likely to increase prospect of success • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - extra effort in reviewing plans • Effectiveness – no disadvantage • Complications - no disadvantage • Acceptability – will not be acceptable to some
Requirement to undertake relevant course (*1, *2, *7)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness - potential for increasing capacity to run farm, and to reduce barriers to effective achievement of agreed outcomes • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage, cost of such courses is already heavily subsidised (up to 90%) • Transaction cost - extra effort required to explain value over time if farmer is to gain value from courses that they would undertake on their own initiative • Effectiveness - no effect • Complications - potential adverse effect on participation • Acceptability - relevance may be difficult to explain leading to reluctance to participate
Requirement to notify: any significant changes in position or decisions (*2, *3, *8), changes in grazing/livestock (*7)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness - allows principal to check for adverse effects on conservation site that farmer may not be aware of or treat as significant • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - no disadvantage • Effectiveness - no disadvantage • Complications - potential adverse effect on participation • Acceptability - relevance may be difficult to explain leading to reluctance to participate
Requirement to undertake agreed changes in management across the farm (*9)	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - • Effectiveness - may see improvement in 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - no disadvantage

	<p>practices across the farm that could benefit the site of conservation interest</p> <ul style="list-style-type: none"> • Acceptability - no advantage 	<ul style="list-style-type: none"> • Effectiveness - mixing up required outcomes could diffuse effort and reduce achievement of specific goals of Bush Tender • Complications - assessment of whole farm required • Acceptability - likely to be unacceptable to many farmers
Complementary mechanisms		
Availability of relevant courses	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness - great gain is difficult to see as courses are now available on heavily subsidised basis. If taken up, there may be improvement in practices across the farm that could benefit the site of conservation interest • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - no disadvantage • Effectiveness - no disadvantage • Complications - no disadvantage • Acceptability - no disadvantage
Targeting of farmers with significant biodiversity assets with relevant assistance – one-to-one advice, courses	<ul style="list-style-type: none"> • Direct cost - no advantage • Transaction cost - no advantage • Effectiveness - depends on numbers who take up the offer; has potential to see improvement in business management and in practices across the farm that could benefit the site of conservation interest • Acceptability - no advantage 	<ul style="list-style-type: none"> • Direct cost - no disadvantage • Transaction cost - depends on scale of exercise and extent to which existing extension resources are redeployed. Assume \$1,000/day for expert farm management consultant • Effectiveness - no disadvantage • Complications - no disadvantage. Farmers can simply take it or leave it • Acceptability - likely to be welcomed by many,