Encouraging Participation in Market Based Instruments and Incentive Programs

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The project seeks to provide information about how to design and implement incentives and market based instruments to increase participation of farmers.

The project team was lead by Professor Mark Morrison (CSU) and Mr Ray Baker (Queensland Department of Natural Resources and Water). Other members of the project team include Dr Jeanette Durante (Queensland Department of Natural Resources and Water), Ms Jenni Greig (Charles Sturt University) and Dr John Ward (CSIRO).

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Executive Summary

The goal of this research project has been to understand how to improve the design and delivery of MBIs and incentive programs to increase the participation of landholders. Low levels of participation can reduce the ability of programs to achieve their desired outcomes, as well as reduce their efficiency. To understand how to increase landholder participation, answers to three main research questions have been sought, namely 1) what are the characteristics of MBIs and incentive programs that encourage participation, 2) who participates in MBIs and incentive programs and 3) how can MBIs and incentives be better communicated to increase participation?

A mixed methods research design was used to provide answers to these questions. This included a literature review (two working papers), 25 expert interviews (one working paper), eight focus groups (one working paper) in four regions of NSW and Queensland, and a quantitative survey of about 6000 landholders from two Catchment Management Authority (CMA) areas in NSW (Central West and Northern Rivers), two regional body areas in Queensland (Condamine Alliance and Mackay-Whitsundays) and one CMA area in South Australia (Mt Lofty Ranges).

The results indicated that the features of MBIs and incentives could be modified to increase participation, and that options were available other than simply paying landholders more and accepting reduced environmental outcomes. The choice of program administrator can influence participation as can how the program is delivered. Features such as flexibility in required environmental outcomes and management practices, amount of paper work required, availability of technical assistance and clarity about such things as eligibility and how bids will be assessed all were found to affect landholder participation. Contracting arrangements were also demonstrated to be important; these include contract length, the approach used for monitoring, and the chosen payment schedule. Landholders were also sensitive to the type of program on offer, with landholders having much greater interest in applying for a fixed grant or a variable cost share program rather than a tender.

In terms of who participates in MBIs and incentives, the influence of socio-demographic, attitudinal, behavioural and situation variables on participation was investigated. For the

socio-demographics, it was found that age was negatively related and education was positively related to participation. For attitudes, trust in the organisations delivering natural resources management programs was found to be a particularly important predictor of participation. Other attitudes such as environmental responsibility, innovativeness and profit focus were investigated but were only found to be good predictors of behavioural intentions, and not actual participation. Behavioural variables were found to be particularly important for predicting participation, with social connectedness, business orientation and information seeking found to be amongst the best predictors of all variables investigated. Lastly, several situational variables were found to influence participation, including farm size, hours of time worked on farm and length of time on current property.

The four variables that overall had the largest and most consistent influence on participation – trust, social connectedness, business orientation and information seeking – were used to define landholder segments. Five segments were identified, including three mainstream landholder segments and two hobby farmer segments. These segments differed substantially in their socio-demographic and situational characteristics, as well in their business orientation, information seeking behaviour, connectedness in their communities and trust of NRM groups. The groups also differed in terms of their current participation in MBIs and incentives. Importantly, two of the segments which jointly comprise more than 50% of landholders in some regions – the "profit first" landholders and "smaller, disconnected, hobby farmers" – have very low awareness of existing programs and very low participation. GIS maps indicate that these two segments dominate certain local government areas within the case study areas. Both of these segments generally have a lower socio-demographic status than the other three segments. Also, their use of the information channels mostly used by NRM groups to communicate information about MBIs and incentives is very limited, so these two segments are very challenging to reach with promotional messages.

Thirdly, insight was provided into the effectiveness of various information channels and promotional messages. The literature provides some recommendations about how to design communication programs based on the market context, with factors such as the size of the market, funds and time available, and the receptivity of landholders influencing the choice of information channels. However, there was also evidence from the literature and our qualitative and quantitative research about the effectiveness of specific communication

channels. There was evidence that where landholders hear about a program via direct contact (eg through extension officers) they are more likely to participate. Similarly, although probably to a lesser extent, networks, field days, seminars and experimental economics workshops can be persuasive information channels. However, all of these channels are limited in their reach which also influences effectiveness, and hence it is recognised that there is a role for other information channels such as the use of newsletters, advertising or the internet. In general, advertising was found to have less of an influence on a landholder's decision to participate in a program than these other channels; however its effectiveness can be increased by tailoring messages to the local area and using case studies that landholders can relate to. Interestingly the internet was hardly mentioned in the literature and was not thought to be particularly important in our expert interviews, however it was found in our quantitative survey to be highly valued by landholders as an information source for farming related issues. This appears to be a channel that could be more fully exploited in the future. Furthermore, the evidence from the segmentation analysis suggests that channels such as industry newsletters, the internet, print media and radio, while generally considered to be less effective overall than some of the other channels, may be the most effective channels for targeting some of the more difficult to reach segments. As well as considering what information channels to use, the effectiveness of alternative messages was evaluated. The evidence from our qualitative research is that the most effective messages emphasise the benefits to landholders and how the program will improve the management of their property and their business.

1. Introduction

The purpose of this project was to improve our knowledge regarding how to design and implement market-based instruments (MBIs) and incentive programs to increase participation of landholders. Understanding how to increase landholder participation is important as various programs have in the past suffered from low landholder participation. Furthermore, participation is related to the dual goals of efficiency and equity. If few landholders participate in a market-based instrument, the potential for efficiency gains is likely to be reduced. In terms of equity, if only certain kinds of landholders participate out of a broader target audience (eg high end, business oriented landholders) then the equity outcomes from using a particular program may be negative. For these reasons it is important to understand how MBIs and incentive programs can be designed and delivered to increase participation.

To better understand how to increase landholder participation, three main research questions are answered. The first of these is what are the features or characteristics of MBIs and incentive programs that encourage participation? As might be expected, the literature indicates that greater compensation and lesser required environmental outcomes will increase participation. However, are there means that do not involve increased costs and do not compromise the environmental integrity of natural resource management programs that can be used to increase participation? The evidence from our literature review as well as our qualitative and quantitative research suggests that there are a range of modifications that can be made to the characteristics of programs that can increase landholder participation. This includes *inter alia* modifications to such things as who delivers the program, what activities are funded, how monitoring is done, the length of contracts, the spacing of funding, and simplicity of administration. Furthermore, we find that landholder participation is likely to be a function of the type of instrument/incentive that is used. We find that landholder interest in participating is lowest for tenders, and highest for simple fixed grants, with interest in variable cost-share programs in the middle.

The second question focuses on understanding who participates in MBIs and incentive programs. Understanding the characteristics of those who participate is important for better targeting of promotional efforts as well as for informing instrument design and selection. The advantage of knowing those who more often participate is that promotional efforts can be focused on those landholders. For example, if certain landholders (eg from larger properties) tend to favour one kind of program, while other landholders (eg from smaller properties who have more off-farm income) prefer other kinds of programs this information can be used for targeted promotions. Secondly, understanding who is not participating in programs can provide insight into the sorts of modifications to existing MBIs and incentives – or perhaps insight into what new instruments need to be offered – that may be needed to encourage involvement of non-participants.

While it is useful to identify the characteristics of those more likely to participate in an MBI or incentive program, when implementing an MBI or incentive it is helpful to be able to identify segments amongst farmers in terms of their characteristics and probable participation. The ability to group farmers with common characteristics, and common locations, is useful for selecting which MBIs or incentives are most appropriate for particular sub-catchments as well as for the application of communication strategies. However, there is limited literature in this area; little research has been conducted to identify the most appropriate attitudinal or behavioural constructs for identifying these segments and no previous studies have focused on identifying segments for the purpose of encouraging participation in MBIs and incentives. Therefore one of the main goals of this research is to understand how to segment landholders in such a way that is useful to NRM groups involved in designing and implementing MBIs and incentives.

The third and final question considered is how to communicate and deliver MBIs and incentive programs to maximise participation. This is not an area of research that has received much attention in the academic literature, however communication has a central role in our conceptual model, and in marketing more generally in explaining participation. There are several challenges in developing an effective communication strategy. These include firstly identifying effective communication channels for different segments in the landholder population. Some literature is available on this topic relating to the

effectiveness of advertising, workshops, through facilitators/extension officers, use of experimental economics workshops and networks, and when each should be used. However, there is less understanding of the type and content of messages that will have the greatest traction with landholders in terms of increasing participation. In advertising theory it is recognised that advertising messages have different goals (eg awareness, information, persuasion etc) (Rossiter and Bellman 2005), with the appropriateness of each of these message types being a function of a person's existing knowledge and whether they are currently "in the market" for the good in question. Fully understanding how to develop a communication strategy is beyond the scope of this project; however some steps are taken to identify communication channels that are likely to be most effective in reaching the various landholder segments and the sorts of messages that might be appropriate for these groups.

A mixed methods research design was used to answer these three research questions. After completion of a literature review (two working papers), extensive qualitative research was conducted including 25 expert interviews with NRM practitioners from Catchment Management Authorities and regional NRM bodies, academics, government officers and consultants, as well as 8 focus groups of farmers from two states. This was followed by a quantitative survey of about 6000 landholders (47.3% response rate) across three states (NSW, Queensland and South Australia) and five CMA/Regional Body areas (Central West CMA and Northern Rivers CMA in NSW, Condamine Alliance and Mackay-Whitsundays in Queensland and Mt Lofty Ranges in South Australia).

The structure of this report is based around these three research questions. In the next section, the literature review, the literature pertaining to each of these research questions is briefly summarised. Interested readers can find more detail in the two working papers available on the Institute for Land, Water and Society, Charles Sturt University website. The methodology used for this project is more fully described next in Section 3. The findings from the expert interviews and focus groups are then described in Sections 4 and 5 respectively. The results from the quantitative survey are then described in Section 6, Limitations are described in Section 7 and Conclusions and Recommendations are offered in Section 8.

2. Literature Review

The literature review for this project is contained in two separate working papers – (Stanley, Clouston & Baker; Morrison & Greig, 2007). The first considers the issue of drivers and constraints to involvement in natural resource management through the adoption of changed practices, technologies and NRM activities. The second considers the drivers for and constraints to the uptake of MBIs and incentive programs in particular. The following is a summary of the findings of both papers.

In the first literature review, Stanley, Clouston and Baker acknowledged that it is "imperative" to identify factors which may influence the uptake of sustainable practices by landholders *before* attempting to apply economic and social incentive instruments. The reason given is two-fold: firstly, without understanding the role of such factors, incentives may not address constraints, or take advantage of drivers, and therefore will not maximise the potential for change; and secondly, instruments may be perceived by landholders to be insensitive to their situations, thus making it more difficult to engage them in future programs. The literature highlighted a number of factors which explain adoption, these being related to the three central research questions which formed the basis of this project.

The characteristics of the practice landholders are being asked to adopt may be a barrier to adoption for landholders. Attributes that landholders will take into consideration include relative advantage, riskiness, complexity, compatibility, trialability and observability (Cary, Webb & Barr, 2002; Rogers, 2003). If a practice is seen as being difficult to implement, incompatible with current farming practices, if the costs to the landholder outweigh the perceived benefits, or if there is little opportunity to observe potential benefits, it will likely be unappealing to landholders, and will have low adoption rates (for example, see Vanclay & Lawrence, 1995; Cary *et al*, 2002; Vanslembrouck, van Huylenbroeck & Verbeke, 2002; Curtis & Robertson, 2003).

The methods used to communicate with landholders about a given practice will also play a role in adoption. Evidence suggests that there is a strong correlation between non-adoption

of changed practices and lack of confidence in the practice. This lack of confidence may be driven by the practice itself, by individual landholder characteristics (such as adversity to risk), or by previous negative experience with the agency – the literature emphasises negative experience with government agencies (Finlay, 2004). In these instances, communication methods may be used to encourage landholder confidence, or methods of delivery may include promoting the relationship between an agency and landholders. Poor access to trusted information about the problem and solutions, which is being addressed by the recommended changed practice, was also identified as a constraint to adoption rates (Vanclay, 1992). This also highlights the importance of communication methods which are tailored to the target audience in order to promote adoption of sustainable practices.

In terms of *who* is likely or unlikely to adopt changed practices, the literature provided some unexpected findings. For example, it is often thought that younger landholders, and those with more formal education, are more likely to adopt than older and less educated landholders. The literature review found little evidence to support this, suggesting instead that, at best, the relationship is unclear, particularly as these relationships cannot be examined in isolation (Guerin & Guerin, 1994; Curtis, Mackay, van Nouhuys, Lockwood, Byron, Graham, 2000; Cary *et al*, 2002). The one concession was that adoption does seem to be positively influenced by participation in ongoing education related to property activities (eg training courses and field days). Landholder attitudes towards natural resource management were also considered as a factor, as low rates of adoption are frequently believed to be caused by landholder attitudes. The literature suggests that landholders do need to have a positive attitude towards land stewardship, but that this alone is not sufficient - other constraints must be addressed to encourage adoption (Vanclay & Lawrence, 1994; Lockie & Rockloff, 2004). The literature regarding succession, social capital and financial factors of landholders was inconclusive. Both succession and social capital have been found to have either positive or negative impacts, and neither should be relied on as a predictor of adoption. Financial constraints emerged as much more complex than the traditionally held belief that financially constrained landholders are less likely to adopt changed practices than more affluent landholders. While there is some evidence that being financially constrained does decrease the likelihood of adoption, it does not follow that more financial resources will result in greater rates of adoption (Greiner, Stoeckl, Stokes, Herr, Bachmaier, 2003). Perception of financial situation and other socio-cultural

factors interact with actual financial status (Cary *et al*, 2002), and the existing literature was unclear about the exact relationship between these numerous influences.

In the second literature review, Morrison and Greig (2007) investigated the relatively new body of literature covering the constraints to the uptake of MBIs and incentive programs both in Australia and overseas. This body of literature again drew attention to the three central research questions.

The characteristics of MBIs and incentive programs have a role in influencing landholder participation (for example, see Windle, Rolfe, Whitten, Alam & Street, 2005). Obvious design features include increasing compensation and decreasing demands placed on landholders in order to make a program more attractive (Ducos & Dupraz 2006). However, similar to the previous literature review, the relationship is not as formulaic as this suggests, and landholders place value on other program features. The literature suggests that landholders are attracted to programs which have the flexibility to allow negotiation of on-ground actions and expected outcomes (Wossink & van Wenum 2003; Horne 2006). Other features which influence participation include the length of contract (eg Brotherton 1991), the program administrator (Breetz *et al* 2005; Rolfe *et al* 2005), use of group contracts (Rolfe *et al* 2005; Windle *et al* 2005) and reduced paperwork (eg Clayton 2005).

The literature also addresses the issue of individual landholder characteristics that might predict participation in MBIs and other incentive programs through the use of stated preference surveys and also by examining the characteristics of participants in existing programs. Socio-demographic characteristics yielded mixed results. In the majority of studies age was found to be negatively related to participation, though in one study by Rolfe, Windle, Reeson & Whitten (2006) it was found to be insignificant, and a second by Ducos and Dupraz (2006) found a non-linear relationship where participation was most likely for those between 40 and 55 years. The findings for education were more inconsistent, with some studies finding it to have a positive effect (eg Black and Reeve 1993) and others that it had a negative effect (eg Rolfe *et al* 2006). Having dependent children, however, was found to be a consistently positive predictor of participation (Ducos and Dupraz 2006; Rolfe *et al* 2006).

Like socio-demographics, there was much variation in the influence of attitudes on participation. Environmental or conservation attitudes was found to have a positive and significant effect in some studies (Vanslembrouck *et al* 2002; Ha *et al* 2003; Rolfe *et al* 2006), but negative or insignificant in others (eg Wynn *et al* 2001; Ducos and Dupraz 2006). However, attitudes towards a program produced more consistent findings – having a positive attitude was found to have a positive impact on participation (Brotherton 1991, Ducos and Dupraz 2006). Relatedly, trust in those delivering the program and having a positive relationship with government administrators was found to increase participation (Ducos and Dupraz 2006). Furthermore, a series of studies had demonstrated that familiarity with, or participation in previous programs significantly affected the likelihood of participation (Vanslembrouck *et al* 2002; Wossink and van Wenum 2003; Clayton 2005, Ducos and Dupraz 2006). Lastly, several studies noted that non-participation was related to the perception of government interference (Wossink and van Wenum 2003; Ducos and Dupraz, 2006)

Previous studies have demonstrated that property characteristics can influence the likelihood of participation. Property size is the most studied predictor, and has been found to have either a positive or negative influence on participation, depending on the nature of the program (Brotherton, 1991; Black and Reeve, 1993; Curtis *et al* 2006). While the influence of property size on participation in less clear *a priori*, a number of studies have found that the likelihood of participation increases when the program requirements fit well with the property (eg Rolfe *et al* 2006), whereas higher costs (eg financial, time, or reduced productivity) associated with participation lowers the likelihood of participation (Wynn *et al* 2001; Clayton 2005).

Finally, the literature review indicated that there are different landholder segments, and that these segments have different constraints and drivers in their decision to participate in MBIs and incentives. Three studies were considered, and these had considerable variation in both methodology and findings (Darbyshire, 1999; Watson & Pryor, 2002; Thomson, 2001). Two key lessons emerge from the literature – the first is that, in what few studies are publicly available, there are significant limitations, such as a lack of justification for constructs used to form segments. The second key lesson is that there appears to be a gap in the current knowledge of how to encourage uptake, specifically of MBIs, amongst different segments.

Some research has been undertaken on the types of information channels that encourage participation in MBIs and incentive programs. The most persuasive form of communication appears to be word-of-mouth, which operates through extension officers as well as existing networks and community opinion leaders (Lynch & Lovell, 2003; Rogers, 2003). Direct contact through extension officers has the advantage of building trust as well as providing the opportunity to deal with misinformation and provide appropriate technical advice on potential management actions. The use of networks has the advantage of being a cost-effective form of communication, however, the reach is often limited (Breetz, Fisher-Vanden, Jacobs & Schary, 2005). Seminars and workshops can also increase participation, and the empirical evidence suggests that those who heard about a program through attending a seminar or workshop are more likely to participate than those informed solely through advertising (Lynch and Lovell 2003, Frondel, Lehmann and Watzold 2006). While advertising has been shown to be less persuasive than other these other forms of communication it still has a role in reaching landholders who are not otherwise easy to reach. The literature also highlights that the effectiveness and hence appropriateness of using alternative information channels will depend on the market context. Factors such as the size of the market, time and funding constraints, initial farmer attitudes towards the program will all influence which of these channels are likely to be most suitable (Breetz et al 2005).

In conclusion, the literature demonstrates that the design features of MBIs and incentive programs do influence participation. Second, landholder and property characteristics can be used to predict the likelihood that different landholders will participate. However, only certain variables (eg age, trust, attitude towards and participation in previous programs, potential to gain) are robust predictors. Relatively little is known about landholder segments and how to define them, particularly in the case of MBIs and incentives. Third, information channels differ in their effectiveness at persuading landholder to participate in a program, however the relative effectiveness of the various channels does depend on the market context.

3. Methodology

A mixed methods research design was used for this project. This included a literature review (see Working Papers 1 and 2), qualitative research which included expert interviews (see Working Paper 3) and focus groups, and lastly a quantitative survey. Each of these aspects of the research design provided information relevant for answering each of the research questions. Further detail on the qualitative and quantitative components of the research design is provided in the following subsections.

3.1 Expert Interviews

The goal of the expert interviews was to provide initial qualitative insight from NRM practitioners, government officers, consultants and academics into each of the research questions. In the interviews, 15 questions were asked of the experts to provide insight into how MBIs and incentives could be designed to increase participation, to identify the sorts of people more likely to participate in MBIs and incentives and whether they differed across different types of instruments, and any ideas that experts had for improving communication of MBIs and incentives. The interviewer's outline is presented in Appendix 1.

A list of experts was initially constructed through the review of literature and through key stakeholders in this research. This list targeted individuals working as academics, regional practitioners, consultants and working in government. Further, experts being interviewed were invited to recommend other experts who were likely to have valuable insights into the areas covered in the survey (ie snowballing). Experts were invited to take part in an individual interview, although two of the participants were interviewed together. Two experts declined and two others were unable to be contacted. The interviews continued until theoretical saturation occurred.

A total of 22 interviews were conducted involving experts from Tasmania, Queensland, NSW and Victoria, as shown in Table 1. A number of these experts had experience in multiple fields. For example, many of the academics indicated they had previously worked

as practitioners and/or in government; and two of the consultants had previously worked in government. All interviews were conducted by Ms Jenni Greig.

Table 1: Experts by group

Academics	Government	Practitioners	Consultants
9	2	7	3

The programs that the experts were involved with were in various stages of being 'rolled out', from pilot phases to evaluation stages. Some of the experts were directly involved in the program, while others were associated only as an 'outsider' conducting research or evaluations. Furthermore, some experts could only comment on particular stages of the programs, such as the design stage, or the evaluation stage, rather than being able to comment on the program as a whole.

The data collected from the expert interviews were analysed using a thematic analysis approach (see Section 4 and Working Paper 3).

3.2 Focus Groups

After completion of the expert interviews eight focus groups were held in four Catchment Management Authorities (CMA)/Regional Body areas: Central West NSW (Oberon and Nyngan), Northern Rivers NSW (Dorrigo and Murwillumbah), Condamine Alliance Queensland (Warwick and Jandowae) and Mackay-Whitsundays Queensland (Proserpine and Sarina). These areas were selected based on advice from our partners in the Catchment Management Authorities and Regional Bodies that indicated that they were representative of different areas within their region.

Participants were recruited through the use of scouts. Scouts were asked to recruit landholders from a diversity of backgrounds (ie different enterprises, different ages, different socioeconomic status and different dispositions (eg some innovators, some followers). Scouts were asked not to recruit landholders who were from the same family or were very close friends. When recruiting, scouts were asked to advise participants that the

purpose of the discussion group was to discuss "farm management incentives". Participants were paid $100 each for participating. A total of 78 people participated in the focus groups and about three-quarters of participants were male. The number of people participating in each focus group and the gender split in each group are shown in Table 2.

Table 2: Summary of Focus Group Participants in Each CMA/Regional Body Area

Catchment	Location	Male	Female
Mackay Whitsunday	Proserpine	9	0
	Sarina	7	1
Condamine Alliance	Jandowae	8	4
	Warwick	4	4
Northern Rivers	Dorrigo	7	1
	Murwillumbah	8	2
Central West	Nyngan	5	3
	Oberon	13	2
		61	**17**

The focus groups had several purposes. The first goal was to obtain insights from the perspective of landholders into the three main research questions. The second and perhaps most important goal was to assist in refining the draft quantitative survey instrument. The survey instrument tested in the focus groups was informed by questionnaires developed by (1) Professor Mark Morrison and Dr John Ward which focused on identifying landholder segments that was previously used in the South Australian Murray Darling Basin, (2) Associate-Professor Lin Crase and Dr Darryl Mayberry focusing on technology adoption and (3) Professor Allan Curtis focusing on landholder values and management practices. However, none of these previous questionnaires had examined how the features of MBIs influence participation, and further issues were in need of more detailed investigation, particularly in the areas of segmentation and communication.

The focus groups went for two hours and all were moderated by Professor Mark Morrison. All focus groups were audio recorded and, similar to the expert interviews, were analysed using thematic analysis. A summary of the results from the focus groups is presented in

Section 5 of this report, and a more detailed explanation of the findings will be available shortly in Working Paper 4.

3.3 Questionnaire

The questionnaire used in the quantitative survey was titled "Improving Incentive Programs for Farm Management: A Survey of Landholder Attitudes". The survey was 17 pages in length and presented in an A4 booklet with a full colour cover. The questionnaires were largely the same for each CMA/Regional Body area, apart from a few questions that referred to specific programs in each of these areas. The questionnaire had seven parts, as follows:

- Part 1 collected background information on occupation, time worked on a farm per week, length of time in the district and on current property, area of property and employees.

- Part 2 sought to collect information on various attitudes. More specifically the questions were asked to enable measurement of constructs relating to environmental attitude, profit focus, tradition, perceived time constraints, perceived capital constraints, innovation, and information seeking behaviour.

- In Part 3, information was collected on incentive programs in each of the case study areas. This included information on awareness, programs that respondents had applied to participate in or had participated in, their satisfaction with various aspects of the last program that they had participated in and overall satisfaction. Furthermore, questions were also included to ascertain respondents' interest in two incentive programs and one MBI: a simple fixed grants program, a variable cost-share program where the amount paid to respondents depended on the extent of the environmental benefit achieved, and tenders. The actual description of the programs used in the questionnaire is provided below in Figure 1.

- In Part 4 respondents were asked a series of questions relating to their preferences for specific design aspects of MBIs and incentives, including who

they would like to deliver the program, what they would like to see funded, what they would like technical assistance for, how much time they are willing to spend preparing applications, their preferred contract length for ongoing programs, and how they would like monitoring to be conducted.

- In Part 5 questions were asked about landholders' business practices. The two main goals of this section were to get behavioural measures of landholders' degree of business orientation, their information seeking behaviour and their environmental orientation.

- The focus of Part 6 was community attitudes. Two main constructs were measured here: connectedness and trust in natural resource management agencies, which are both related to social capital.

- Lastly Part 7 asked a series of demographic questions relating to age, gender, income, profitability, education and farm equity.

Figure 1: Description of Fixed Grant Programs, Cost Share and Tenders Used in the Questionnaire

Next, we would like to describe to you some methods that your Regional Body - Mackay Whitsunday NRM Group - could use to provide financial incentives for various activities. These include improving biodiversity outcomes (eg habitat), native plant and weed management, erosion control, stock watering points and fencing. We would like to know how interested you would be in receiving an incentive if it was provided using the following methods.

FIXED GRANTS	
What is funded?	A fixed set of activities eg fencing, soil tests
How much are you paid?	Fixed amounts for each of these activities. For example, you may be paid $1000 per kilometre of fencing.The amount paid is usually only a part of the total cost of the activity.
Does everyone receive the same funding?	The amount paid is the same for everyone
How likely am I to receive funding?	It is very likely you will receive funding if you meet program requirements and the money in the program hasn't already been allocated to other landholders.

3.7 In the next three years, how interested would you be in participating in a **fixed grant** if it was the only incentive program available? *Please tick one box.*

Not at all interested	Some interest	Interested	Strong interest	Definitely interested
☐	☐	☐	☐	☐

COST SHARE	
What is funded?	Landholders submit a proposal which indicates what farm activities they plan to do. Eligible activities may be more wide-ranging than for a fixed grant program.
How much are you paid?	Landholders are paid a part or "share" of the total cost of a project as there are benefits to both the landholder and to the environment
Does everyone receive the same funding?	Projects are assessed and the percentage 'share' paid depends on the environmental benefits of the project. For example, a project with a high environmental benefit might receive a cost share of 70%, but only 30% if there was a low environmental benefit.
How likely am I to receive funding?	It is very likely you will receive funding if you meet program requirements and the money in the program hasn't already been allocated to other landholders.

3.8 In the next three years, how interested would you be in participating in a **cost share program** if it was the only incentive program available? *Please tick one box*

Not at all interested	Some interest	Interested	Strong interest	Definitely interested
☐	☐	☐	☐	☐

Figure 1: Description of Fixed Grant Programs, Cost Share and Tenders Used in the Questionnaire (continued)

TENDERS	
What is funded?	Landholders submit a proposal which indicates what farm activities they plan to do and how much they wish to be paid (their 'bid'). Similar to cost-share, eligible activities may be more wide-ranging than for a fixed grant program.
How much are you paid?	If successful in the tender, landholders are paid the amount that they asked for in their bid.
Does everyone receive the same funding?	The amount that you are paid depends on your bid.
How likely am I to receive funding?	Projects are assessed for the environmental outcomes they will achieve. Program funds are allocated to landholders whose projects will achieve the best outcomes for the money requested. Whether you receive funding depends on whether your bid is competitive. If other landholders put in lower bids that achieve the same or better outcomes you may not receive funding.

3.9 In the next three years, how interested would you be in participating in a **tender**, if it was the only incentive program available? *Please tick one box*

Not at all interested	Some interest	Interested	Strong interest	Definitely interested
☐	☐	☐	☐	☐

Summary of Incentive Programs

	Fixed Grant	Cost Share	Tender
What Can be Funded	Fixed set of activities	Any activity that achieves program outcomes	Any activity that achieves program outcomes
Amount Paid	Fixed amount for specific activities	Percentage of total cost, depending on environmental outcomes	Depends on your bid
Probability of Receiving Funding	High if money still available in program	High if money still available in program	Depends on your bid and environmental outcomes achieved

3.10 Please rank the following three incentive programs from 1 (most prefer) to 3 (least prefer).

☐ Fixed Grant
☐ Cost share
☐ Tender

3.4 Sampling

The sampling frame in New South Wales was provided by the NSW Department of Lands. In South Australia it was provided by the Adelaide Mt Lofty Ranges Natural Resource Management Board. It proved to be very difficult to obtain an accurate sampling frame in Queensland. In the Condamine Alliance area lists were provided by one of the larger Landcare groups, however the Commonwealth, State and local government agencies were unable to provide lists of landholders. Hence, the lists were supplemented by reverse searching the phone book using postcodes and location names. In the Mackay-Whitsunday region one of the three main local government areas provided us with a list of landholders and the sampling frame was also supplemented by reverse searching the White Pages.

Once the sample frames were compiled for each of the case study areas, the samples were selected using simple random sampling.

The surveys were then distributed by mail using a modified version of Dillman's Total Design Method. This was a six stage approach: 1) a hand signed and hand addressed introductory letter was sent, 2) the questionnaire was mailed with real stamps used for return postage, 3) a reminder postcard was sent, 4) the questionnaire was re-mailed, 5) a second reminder postcard was sent and 6) in the case of Mackay-Whitsundays an additional letter was sent urging those who had not responded to complete the survey. All letters sent were addressed and hand signed, and an incentive was also used to encourage participation, with all of those who completed the survey being sent a copy of a book on farm forestry produced by Greening Australia. Overall the response rate averaged 47.3%, and ranged from 43.9% in Mackay-Whitsundays to 50.8% in Northern Rivers.

A detailed description of the sample characteristics can be found in Appendix 3. Age, gender, occupation, education, years in district and on current property, family income, area of property, number of employees, farm equity and main farming activities are compared across regions, and where available, with population statistics.

Table 3: Response Rate Details for Each of the Five Case Study Areas

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Introductory letters sent out	1091	1071	1012	1079	1603[1]
Questionnaires sent out (in the first mail out)	1024	984	961	971	1402
Incorrect addresses/ those needed removing from the sample for other legitimate reasons	67	87	51	108	170
Questionnaires filled in and sent back, but haven't reached us		2		6	
Questionnaires returned	465	500	465	427	685
Final response rate	**45.4%**	**50.8%**	**48.4%**	**43.9%**	**47.8%**

3.5 Quantitative Data Analysis

In this section the methodology used to develop constructs and develop the landholder segments is described.

Construct Development

Reflective Constructs

Constructs were developed using reflective indicators for environmental attitude, profit focus, tradition, perceived time constraints, perceived capital constraints, innovation, information seeking behaviour, satisfaction and trust. A reflective indicator is one where a scale item reflects an underlying latent construct and therefore changes in the construct lead to changes in the scale items (Hair et al 2006). For reflective constructs the use of factor analysis to identify the latent construct is appropriate (Rossiter 2002).

[1] A larger sample was collected in the Mt Lofty region as this was requested by the CMA in that region and additional funding was provided for this purpose.

The items included in these scales were drawn from several sources. These include:

- An earlier questionnaire developed by Professor Mark Morrison and Dr John Ward that was used in the South Australian Murray Darling Basin which focused on identifying landholder segments. Only items that were found to load highly on relevant constructs from this study were included.
- Scales published in studies by Cook and Gronke (2002) and Cook and Gronke (2005).
- Focus groups were used to develop the scale on satisfaction and to refine the scale on trust.

Principal components factor analysis was conducted to develop each of these constructs. Factor analysis is a data reduction technique that is commonly used to convert multiple scale items into a single construct. A non-orthogonal rotation (oblimin) was used to improve the interpretability of the data. A non-orthogonal rotation was used as it does not require as strong structural assumptions as an orthogonal rotation. Results from the factor analysis are presented in Appendix 4.

Evidence of reliability of each of the constructs was produced using Chronbach alphas. Confirmatory factor analysis was used to test convergent validity of each of the scales (high and significant loadings) while discriminant validity was tested using the approach recommended by Hair et al (2006).

Formative Constructs

As well as the reflective indicators, several formative behavioural constructs were developed. A formative construct is the sum of its component parts. Behavioural constructs were developed for business orientation, environmental behaviour, use of information channels and connectedness. Apart from the construct relating to information channels which modified a scale developed by Associate Professor Lin Crase and Dr Darryl Mayberry, all of these behavioural scales were developed specifically for this project. Focus groups were used to identify the various aspects of property related business orientation, pro environmental behaviours and connectedness. Based on these responses,

questions were then asked in the draft questionnaire to provide insight into each specific aspect of these three constructs. The questions that were developed were tested in focus groups and only questions that produced reasonable variation were retained in the final questionnaire. Cross-tabulations and chi-square tests were then conducted to identify which of the individual questions relating to each of the behavioural constructs significantly explained participation. These were the questions that were included when developing the behavioural constructs. A summative procedure was used to develop the constructs in order to maximise the variation within the construct.

Regression Analysis

After the constructs were developed, binary and ordinal logit regression analysis was conducted to identify those constructs that have the most influence on awareness of the most common MBIs and incentives, participation in these programs, and interest in participating in fixed grants, variable cost share or tenders. In the literature it is recommended that only those constructs that have the greatest influence on the outcomes of interest be used for clustering; thus regression analysis was used for this purpose. All of the reflective and formative constructs described above, apart from tradition and stewardship, were included in the regression analysis. Tradition and stewardship were excluded as there was limited evidence of reliability and validity for these two constructs.

In addition, further regression analyses were conducted that only included socio-demographic and farm level characteristics. These regressions were conducted to identify additional variables useful for identifying those most likely to participate in MBIs and incentive programs.

Cluster Analysis

From the regression analysis, four constructs were found to consistently have a large and significant effect on the outcomes of interest. Moreover, no other variables came close to having as large and consistent effect on participation and the other outcomes of concern. These variables were trust, connectedness, property related business orientation and use of information channels for gathering information about farming. The first of these constructs (trust) was a reflective construct while the remaining three were formative.

Ward's method was used to identify the landholder segments. This is a commonly used hierarchical method of cluster analysis which groups together respondents with similar preferences. A five cluster solution was selected based on statistical and practical considerations (eg size of clusters). External validity was tested using chi-square tests for nominal data and ANOVAs for ratio data.

4. Findings from the Expert Interviews

The expert interviews consisted of 22, semi-structured, phone interviews with experts from academia, government, NRM groups and NRM consulting firms. An "expert" was considered to be someone who has had field experience in researching, designing, implementing or evaluating MBIs or incentive programs. The expert interviews sought further information on the same three research questions considered in the literature review, namely (1) what are the characteristics or design features of MBIs and incentives that lead to increased participation; (2) what are the characteristics (individual and farm level) of those who participate in MBIs and incentives programs; and (3) how can communication strategies be designed to increase participation.

In this section we briefly describe the findings from the expert interviews. These findings are described in much greater detail in Working Paper 3 from this project.

4.1 Characteristics of MBI and Incentive Programs that Increase Participation

According to the expert respondents, a number of key features should be considered when designing and delivering an MBI program to increase participation of the target audience. A carefully designed and delivered program with a greater relative advantage will garner greater interest, and is more likely to achieve higher participation over the longer term. These views are strongly supported by the literature (Clayton, 2005; Rolfe *et al*, 2005).

Design Features

The experts identified four key design features of a program that are critical to establishing whether it is worth a land manager's investment of time and resources in the application process. These are: providing adequate incentive to participate; being flexible in the application process and program requirements; keeping monitoring to an achievable level of activity; and designing contracts that are acceptable to land managers.

The experts all agreed that providing adequate reward to account for high transaction costs and opportunity costs is critical to the success of an MBI or incentive program. A program

with high expectations and little financial benefit is unlikely to be adopted. Important too is getting the cost share right, with many land managers unwilling to engage in programs if their own commitment outweighs that of the funding body. The experts also identified the importance of non-monetary incentives in the form of labour and advice, and in the provision of awards that acknowledge innovation.

Being too restrictive in the selection criteria for successful applicants, and being rigid in expectations, are both likely to deter participation. In concert with the literature, the experts agreed that providing participants with the opportunity to negotiate outcomes and deliverables will encourage increased participation. To garner the highest participation, the targeted practices will be consistent with current management practices.

While monitoring and evaluation is a critical component of any MBI or incentive program, the experts largely agreed that if the expectations placed on the participants are too onerous then participation will likely be affected. By designing simple, up-front monitoring programs, where information gathered is fed back to the community, participation can be increased and evaluation opportunities improved.

And finally, the details of any contract negotiated between a land manager and an incentive provider can greatly influence participation. Experts made particular note of the importance of balancing the need for long-term outcomes, with the unpalatable nature of long-term contracts, particularly covenants.

Program Delivery

In addition to getting the design of an MBI or incentive program right, is the importance of program delivery. The experts noted several aspects of delivery, including the importance of choice of the program administrator; the need for clarity, transparency and simplicity; and the importance of timing and coordination.

Carefully choosing the program administrator is essential according to both the expert respondents and the published literature (eg Horne 2006). All experts emphasised the need for credible, trustworthy and skilled administrators, and acknowledged the impact of previous policies and programs on how various agencies are perceived. Specifically,

government agencies are viewed with distrust while 'independent' organisations such as Greening Australia and Landcare are often seen as more benign. Hence an independent, non-government administrator may mitigate suspicion, but who that is, is dependent on the regionally specific context.

Providing clarity and transparency about specific design features of MBIs and incentives, and keeping the application process simple, are important to engendering trust and encouraging participation. Specifically, experts suggested the importance of clarifying: program objectives, targets, the application process, how applications or bids will be assessed, eligibility, monitoring expectations and the availability of technical advice on an ongoing basis.

There are several aspects to getting the timing and coordination right on an MBI or incentive program, beginning with providing land managers and administrators with enough time to familiarise themselves with the program. Another key timing issue is ensuring that the application process and the key deliverables are coordinated to avoid clashing with key farming and family commitments. Experts also noted that coordination and timing were a challenge given the range of organisations and individuals who might be involved at different stages.

4.2 Who Participates in MBIs and Incentives?

There was much consistency between the literature and the expert respondents regarding those personal characteristics that indicate an increased likelihood of participation in MBIs or other incentive programs, although some differences in perspective did emerge.

Two socio-demographic variables were raised by respondents to explain participation – age and education – and the respondents' conclusions were largely in concert with the literature. The expert respondents suggested that younger farmers are more likely to participate, while the literature suggests a little more complexity and implies that stage of life may be a more important characteristic (Byron, Curtis & Mackay, 2005; Ducos & Dupraz, 2006; Rolfe *et al*, 2006). The expert respondents also indicated that the more educated a farmer, the more likely they were to participate, while the literature suggests that

education is not a particularly useful indicator of participation as various studies have revealed highly divergent relationships.

Three behavioural characteristics were discussed by expert respondents as being of some importance. The quality of the relationship that a landholder has with the proponents of the incentive scheme is perceived to be an important influencing factor, with the better the relationship the more likelihood of future participation. This was strongly linked to issues of trust and was entirely consistent with the literature (Breetz *et al*, 2005; Rolfe *et al*, 2005; Ducos & Dupraz, 2006). Strongly interlinked and also raised by expert respondents was previous involvement in other incentive schemes. This was seen to be highly influential in a landholder's decision to participate. It was also noted, however, that the features of some programs (particularly auctions) attracted people who may not have been involved in other forms of MBIs or incentives, such as grant programs. Again, this was consistent with the literature. The 'connectedness' of a landholder, as demonstrated by participation in various networks, was also raised by several expert respondents as being an important characteristic for influencing participation.

There was significant variance among the expert respondents regarding the influence of attitudes. Some concluded that the more 'conservation conscious' a farmer the more likelihood of participation, while others suggested that it was the profit-driven farmers who were more likely to participate. The literature is ambiguous on this point, some suggesting that conservation attitude has little significance and may even be negatively related to participation (eg Vanslembrouck *et al*, 2002), while others found environmental attitude to have a positive effect (eg Ha *et al*, 2003; Rolfe *et al*, 2006). The expert respondents also suggested that innovative, progressive, and confident farmers are more likely to participate in an MBI or incentive program.

Several farm characteristics were raised by the expert respondents as having a relationship to participation in MBIs and incentive programs. The length of time in farming and the length of time on their properties were both considered to be important predictors of participation. Interestingly, it is considered that farmers are more likely to participate if they have not been farming long, or have not owned the property for a long period. Business orientation was also perceived as a characteristic likely to influence participation, with the more business driven and profit driven a farmer, the more likely is participation.

This however, was also linked to design features of an MBI, with several respondents commenting that some design features (such as contracts and in-perpetuity conditions) would discourage business oriented farmers.

Opportunity cost emerged from the expert respondents as an important characteristic influencing participation. They suggested that if the costs associated with participation are high, and/or the payments are low, participation is less likely. This was consistent with the literature (for example, see Brotherton, 1991 and Ducos & Dupraz, 2006). Finally, the possibility of "crowding out" was also raised in the expert interviews. It was suggested that many of the people who choose to participate in MBI or incentive programs are probably intent on proceeding with the activity anyway and are looking for some assistance and support to do so, raising some doubts on the cost-effectiveness of incentive and MBI programs.

The existence of landholder segments was also discussed in the expert interviews. The experts made some important observations about the importance of segmenting farmers for MBI or incentive program delivery. They suggested that the differences and similarities between individual farmers often influence participation in MBI schemes, and that recognising these characteristics and being able to group them provides a means for designing MBIs to achieve increased participation. The expert respondents also highlighted the need for a mix of instruments to more effectively engage the diversity of farmers that are being targeted for change.

Also noted by a small number of respondents is the importance of diffusion for increasing participation in schemes; as programs are 'tried and tested' by social leaders or trusted innovators, and observed by others, participation is likely to increase.

4.3 How to Communicate MBIs and Incentives to Increase Participation

From the expert interviews, a number of insights were provided into how to better communicate an MBI or incentive scheme. These insights related to how a program is advertised, how initial contact is made with the pool of potential participants, the importance of direct contact and extension, the role of existing networks, the importance of

sending the right message and avoiding technical language, and being prepared for potential problems or questions in advance.

The experts raised a range of methods that they had used to advertise MBI programs with an emphasis on the importance of using a range of approaches. Newspapers, radio, fliers and brochures were the most commonly used with *local* radio and *local* newspapers considered the most effective, particularly if used to promote past stories of success. This contrasts with some of the literature reviewed which suggested that radio particularly was linked to a decreased level of participation (Ha *et al*, 2003). Several experts suggested that advertising was an avenue of limited effectiveness for communicating incentive programs, if used in the absence of other communication strategies.

The experts saw personal contact and established relationships as being highly instrumental in encouraging participation. The experts and the literature both emphasised the importance of formal and informal networks to promote MBI or incentive programs (Lynch & Lovell, 2003; Breetz *et al*, 2005). The benefits of using existing networks are that it taps into people already interested in environmental based incentive programs, and utilises pre-existing trust. However, the downside is that it is likely to attract the same people over again, raising questions about cost effectiveness and equity.

Providing extension services to potential participants was a common theme to emerge with the expert respondents, with the view that it was one of the most important facets of an MBI or incentive program. Extension staff can assist in clarifying application processes, dealing with misinformation, and facilitating best practice, so investing time and resources into building trust is considered invaluable. However, the experts also stressed the importance of having skilled, experienced and locally based extension staff to engender trust and respect.

Lastly, the experts also emphasised the importance of using the right language in any communication, particularly avoiding jargon and inconsistencies in terminology.

5. Focus Group Findings

Eight focus groups were conducted with landholders in the four NSW and Queensland case study areas. The objectives in running the focus groups were: 1) to obtain qualitative information from landholders about the three main research questions which had been considered through earlier phases of the project, 2) to test the survey instrument and 3) to develop behavioural constructs for business and environmental orientation and community connectedness. The development of these constructs will be addressed in detail in a forthcoming working paper. In this section, we report findings from the focus groups, related to the three main research questions. That is, what program features are likely to encourage participation; who is most likely to participate in MBIs and incentives; and how to best communicate information, both in terms of media and the messages to use.

5.1 What are the Features or Characteristics of MBIs and Incentive Programs that Encourage Participation?

During each focus group, participants were asked about features of incentive programs that they would want to know about, or issues they would need to clarify before agreeing to participate. Responses echo many of the ideas identified in both the literature review and expert interviews.

Design Features

Focus groups participants consistently identified a number of design features of programs which would be important to them before committing to an MBI or incentive program. These included: the costs and benefits of participation, application and other paperwork requirements, flexibility, obligations and conditions, eligibility and monitoring.

In every focus group participants stated that the costs, and relative benefits were an important consideration. Participants expressed concern regarding financial outlay, tax implications, and effect on income for the family and farm business. Other costs were also mentioned, such as time, labour and other resource costs. Overall benefits were of interest, such as the amount of funding, how long the program would last, and what long terms gains might be made in production and profitability. Most focus groups participants also

expressed a desire to know that the program was going to achieve environmental goals. These findings are consistent with those from the expert interviews.

Concern about the amount of administrative work required for the application and during the life of the project was also voiced in every focus group, with the most common complaint being that paperwork for such programs is too long and complicated:

> *"Yeah the paperwork … make it as short as you can make it, and straight to the point"*

Focus group participants indicated that the time commitment required for paperwork, as compared to the potential benefit (likelihood of receiving funding and amount of funding on offer), was a major determinant of the likelihood of applying to participate. In some focus groups, the possibility of assistance in writing applications was suggested as increasing the attractiveness of a program. This is consistent with the literature (eg Clayton, 2005; Ducos and Dupraz, 2006).

Another finding consistent with the literature is that flexibility is positively associated with participation (Wossink & van Wenum, 2003; Horne, 2006). All focus groups mentioned that they wanted to know that the program would be "flexible" – usually in terms of being able to negotiate the required management practices, and also that the project manager be responsive to uncontrollable factors, such as weather. Relatedly, focus group participants were concerned about obligations and restrictions that might be built into the program, and they desired flexibility with these. Participants indicated that obligations needed to be very clear, and wanted to know if they might change during the life of the program. They also wanted to know about any consequences for breaching conditions, whether intentional or otherwise.

Findings from the expert interviews suggested that eligibility could deter participation if it was too restrictive. Eligibility was raised as an issue in half of the focus groups. While most participants agreed that they simply wanted clear information on what the exact criteria were, others raised related issues that would affect the attractiveness of programs, such as how flexible the criteria are, and if a landholder could negotiate eligibility if they were interested in a slightly different project.

"every farm has its own scenario, it is very hard for everyone to fit in the right bits, to fit with the criteria"

Finally, monitoring requirements were another design feature noted in the focus groups as influencing participation, which has also been found to be of importance in previous literature (eg Rolfe *et al*, 2005 and Windle *et al*, 2005). Participants suggested that requirements need to be reasonable, and not overly taxing. However, an interesting point that did emerge from the focus groups was that monitoring was seen as a means of improving outcomes of participation, by creating the opportunity to address incorrect actions or improve actions along the way. Participants also were concerned that some monitoring needed to occur to ensure the integrity of programs and were positive about on farm visits during, and at the end of the program.

Program Delivery

The focus groups raised a number of issues related to program delivery, although these differed somewhat to what had been identified in the expert interviews. Themes from the focus groups included time, advice and assistance and program administration.

Time was a prevailing theme throughout all the focus groups. Similar to the literature, (Breetz *et al*, 2005; Clayton, 2006) the issue of timing and timeframes were a crucial element to the attractiveness of a program. A number of participants referred to experiences applying for funding only to receive it months after they wanted to carry out the work. The timeframe of a program was also important for focus group participants – programs that are either too long, or too short were unappealing. Timeframes also need to be flexible due to the factors over which landholders have little or no control, but which can affect a landholder's ability to carry out management actions (for example, tree planting being dependant on rain). Finally, the time commitment involved influences how attractive a program might be. The majority of focus group participants indicated that they are time poor, so a program that will take up their time has to be worthwhile. These findings differ from the findings from the expert interviews; the experts identified different 'timing' issues to the focus group participants (eg such as being careful about when applications are due), suggesting that there is a range of timing issues that bring to bear on program delivery.

Focus group participants also identified that they wanted to know what sort of advice and assistance would be available. This included guidance in the development of projects as well as whether they would have someone to advise them throughout the project. In order for this advice or assistance to increase the likelihood of participation, this advice needs to be personalised, come from experts and be clear (ie not overly academic). Furthermore, anyone giving advice needed to have local knowledge, and not try to advise from "an office somewhere". This reflects the adoption literature which suggests that access to quality information is related to increased adoption of changed practices (Vanclay 1992).

The final issue of program delivery raised in the focus groups was that of program administration. Participants indicated that the agency responsible for administering the program affected attractiveness, and wanted assurance that a program would be well administered before committing themselves. These findings closely resembled those from the expert interviews.

Tenders

Focus groups participants were asked specifically about the use of tenders as a means of delivering MBIs and incentive programs. In some cases, the tender process needed to be explained as not all focus group participants were familiar with the term. Across all focus groups, negative perceptions of tenders were expressed, including the following:

- The benefit is uncertain, especially given the level of time and work involved
- Many landholders do not understand the process of a tender
- Tenders favour those who can fill out paperwork the "right way", rather than those who are going to produce the best on-ground outcomes.
- Tenders are unfair and cause rivalry within a district
- Tenders are a money-saving exercise:

"Governments are trying to push that because you know why. We will all individually tender, it'll be cheaper, see."

Although there were several participants who indicated they might participate in a tender, the majority indicated that they would not for these reasons.

5.2 Who Participates in Incentives Programs?

Focus group participants were asked about what type of landholders would be more likely than others to participate in incentive programs. The responses are summarised in Table 3. Similar to the literature review and expert interviews are the themes of business orientation and trust, and consistency with existing management practices. Also mentioned previously in the literature and expert interviews is that younger people are more likely to participate (Vanslembrouck *et al* 2002; Curtis *et al* 2006). Landholders also frequently mentioned environmental attitude, however the literature and to a lesser extent the findings from the expert interviews are equivocal about whether this is a good predictor of participation (Vanslembrouck *et al* 2002; Ha *et al* 2003; Wynn *et al* 2001; Ducos and Dupraz 2006).

Table 3: Characteristics of Landholders Identified as Likely to Participate in MBIs and Incentive Programs

Sociodemographic and Property Characteristics	Personal and Business Characteristics	Environmental Attitudes
Age (younger people more likely to participate)	Efficient managers – organised enough to have (or make) time to participate	Environmentally aware
Not financially constrained	Willing to try new things	Keen to improve the environment
Potential for change/development exists on the property	Motivated, and interested in specific projects	Already a member of environmental groups
The program fits in with what is already happening on the property	Do not have fears about control and interference - that 'normal business' will be affected by participation	Conscious of the generation to follow - want to leave the land better than they found it and community minded.
	Can see the 'big picture' - have initiative, goals and have a positive outlook	Interest in wildlife
	Willingness to learn from and work with others	
	Capable	

5.3 How can we Communicate MBIs and Incentive Programs to Increase Participation?

Focus groups were asked about how best to communicate and deliver programs, with a particular focus on what channels to use to reach landholders, and the most effective messages to use.

Media

Methods of advertising were suggested by participants as a useful means of reaching large groups of landholders. Popular methods were very similar to those mentioned in expert interviews, and included:

- Local radio – This was frequently mentioned, but it was emphasised that local and rural radio would reach a more targeted audience.
- Fliers in mailbox – it was pointed out that this method has a broad reach, but was still limited, especially as fliers are often disregarded.
- Local newspaper –having the program as part of an editorial or news article is more effective than advertisements or classified notices.
- Shop notice boards.
- Television advertising – it was mentioned that this media could be useful, though only in conjunction with other, more localised media, such as the methods mentioned above.

Comments made by participants suggest that advertising needs to use straightforward language, and not contain an overload of information in order to communicate clearly with landholders.

Participants indicated that personal and direct contact was the best way to interest individual landholders in participating in programs. Comments suggest that such contact should be on-going and regular, and preferably involves contact with a local person. Furthermore, participants indicated that successful channels for passing on information regarding an MBI or incentive program include well known and respected community members, professionals who are familiar with landholders in the area (bankers, industry consultants etc), existing landholder networks, and taking advantage of ‘word of mouth’:

"word of mouth, it is like it goes out and it comes back to you. You sort of get the key people interested … It's very hard to get that going, but once you do get that going, it is by far the best advertising you'll ever have … Bush Telegraph. It works pretty well, it does"

These suggestions are consistent with findings from previous phases of the project (eg Lynch & Lovell, 2003; Rogers, 2003).

Focus group participants indicated that as well as general advertising, community meetings should be held to provide further information, and allow an opportunity for specific questions to be asked. Small, localised meetings, with good explanations of the program were agreed to be ideal. It was further suggested that information could be provided through other events – for example, field days.

Messages

Focus group participants indicated that messages needed to be about the benefits to the landholder. Messages should ideally be personalised – helping the landholder to see how the program is relevant to them. It was also suggested that messages need to be exciting (*"sexy"*), and emphasise that it is something to benefit the landholder, their family and property or business (eg *"we can help you"*).

"a lot of them don't know what the benefit of it is, so the message of it would be maybe good explanation of what the benefit would be for the farmers."

Along similar lines, a popular idea was to use previous success stories and personalised case studies in order to make a program more appealing.

"I think the beauty is in the success stories. There has got to be some interest in success stories. People will see how it happened to that guy."

This is consistent with literature that suggests observability increases the likelihood of participation (Cary, Webb & Barr, 2002; Rogers, 2003)

Another suggestion was to emphasise the community benefits. This was regarded as a positive way to encourage whole communities to support a program, which in turn would affect the ease of implementation if everyone were working towards the same things.

Finally, an important message arising from the focus groups was to emphasise that landholders need not fear government interference or being overburdened by program commitments. This is consistent with literature that suggests the government agencies delivering the program can be a barrier to uptake (Finlayson, 2004; Rolfe, McCosker & Windle, 2005) and that a communication can be used to build trust strategy.

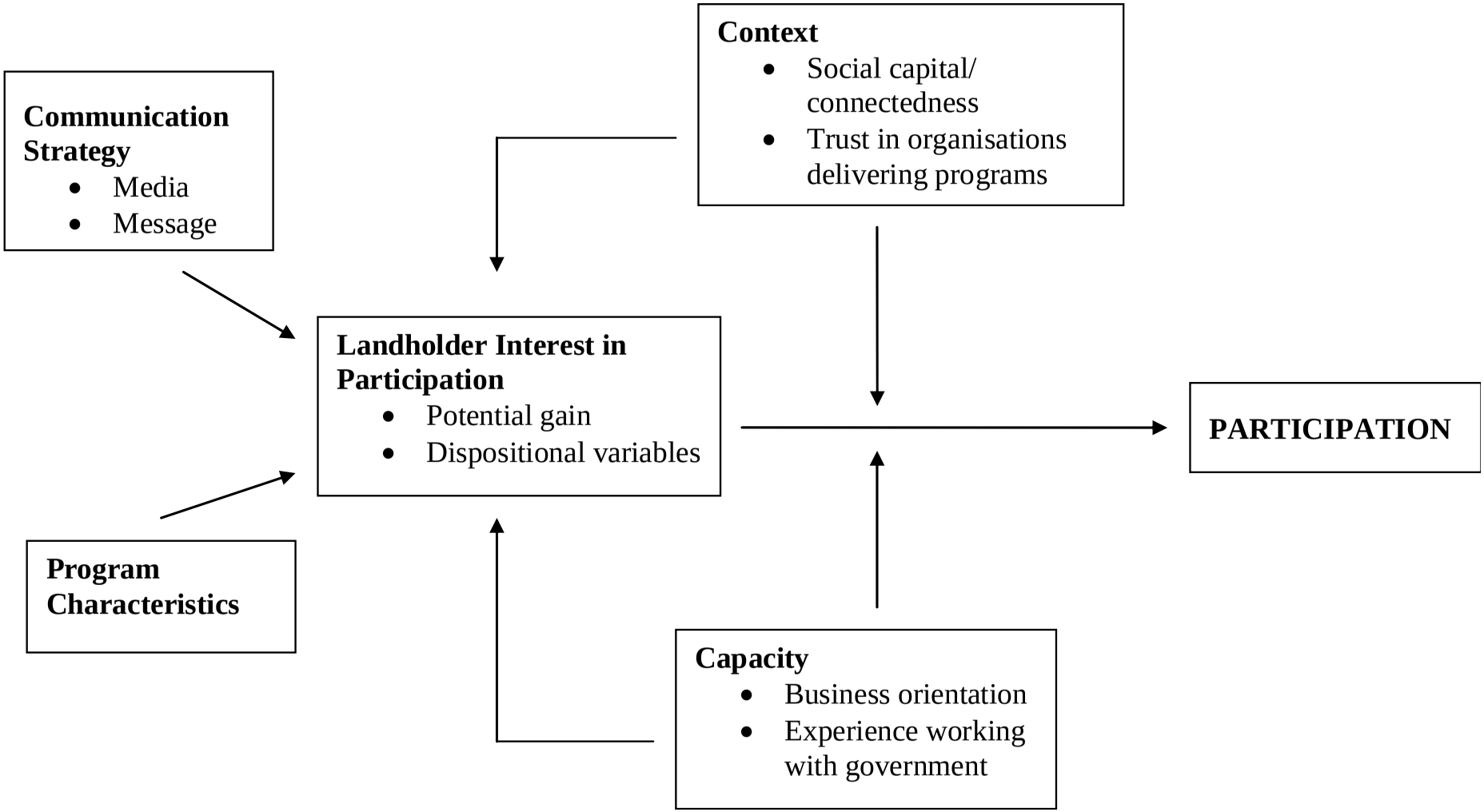
> *"take away the suspicion that the Government is coming to take away the farm, or they are going to be incumbent to do this for forever and a day. That it is a benefit to the environment and the business" (Oberon)*

5.4 Conceptual Model Showing the Factors Influencing Landholder Participation

Based on the findings from the literature review, expert interviews and focus groups a conceptual model was developed which demonstrates the factors that influence landholder participation in MBIs and incentive programs.

Landholders have an interest in participation which is a function of their potential gain and dispositional variables such as environmental attitude, innovativeness and profit focus. As shown by the two boxes on the left of the diagram, this interest in participation is influenced by both the communication strategy and the type of interest used and its features. Landholder interest in participation is also increased or constrained by the context and their individual capacity. The context is a function of social capital, and includes trust in those delivering the program and the amount of connectedness in the community. Capacity is a function of business orientation and experience in working with those delivering NRM programs. The empirical modelling conducted in the next chapter is based on this conceptual model.

Figure 2: Conceptual Model Showing the Factors Influencing Landholder Participation



6. Quantitative Results

In presenting the quantitative results we begin with a discussion of respondent satisfaction with existing NRM programs and the factors that influence this satisfaction in Section 6.1. The focus then turns to answering the three main research questions which are addressed in Sections 6.2 to 6.4.

6.1 Satisfaction

While not one of the original research questions, information about satisfaction with the last program respondents participated in was collected as the literature indicated that the quality of relationships with administrators can influence the probability of participation (Ducos & Dupraz 2006). Moreover, as the goal was to develop a construct to measure satisfaction, various aspects relating to satisfaction with a program were measured together with overall satisfaction. This allows the identification of what specific aspects of program delivery have the greatest influence on overall satisfaction.

In the questionnaire participants were first asked to indicate whether the last program they participated in: (1) was beneficial, (2) achieved its objectives, (3) had straightforward application procedures, (4) had rules and requirements that were easy to understand, (5) whether finding the contact person was easy and (6) whether it was well administered. After answering these questions they were asked about their overall satisfaction with the program.

Overall Satisfaction with Existing Programs

The overall rating tended towards being satisfied (possible answers ranged from 1 – not at all satisfied to 5 – very satisfied, with $M= 3.69$). Central West had a higher proportion of participants satisfied or very satisfied with the last program than other catchments, and Central West and Mackay-Whitsundays had slightly smaller proportions of participants slightly or not at all satisfied than other catchments, although overall these differences are not statistically significant ($\chi^2 = 18.495$, $p=0.296$). (See Table 5).

Table 4: Overall Satisfaction with Last Program Participated in Each of the Five Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Not at all satisfied	6 *4.5%*	6 *6.9%*	6 *3.5%*	7 *5.5%*	13 *6.3%*
Slightly satisfied	5 *3.8%*	8 *9.2%*	18 *10.6%*	9 *7.0%*	21 *10.2%*
Somewhat satisfied	19 *14.3%*	18 *20.7%*	29 *17.1%*	30 *23.4%*	49 *23.8%*
Satisfied	68 *51.1%*	37 *42.5%*	73 *42.9%*	57 *44.5%*	85 *41.3%*
Very satisfied	35 *26.3%*	18 *20.7%*	44 *25.9%*	25 *19.5%*	38 *18.4%*
Total	133	87	170	128	206

What Drives Satisfaction?

As noted, satisfaction with various aspects of each of the programs on offer was also measured for each of the case study areas. For four of seven measures, statistically significant differences were identified across the five areas. As shown in Table 6, differences in case study areas were identified for having straightforward application procedures, rules/requirements being easy to understand, finding the right contact person being easy, and sufficient funding being available. In terms of application procedures, Mackay-Whitsundays and Mt Lofty received higher ratings, while for easy to understand rules and requirements, Central West, Mackay-Whitsundays and Mt Lofty received the highest ratings. In terms of ease of finding the right contact person, the Mackay-Whitsunday region again rated most highly, however Mackay-Whitsundays rated lowest on the sufficiency of existing funding.

Table 5: Satisfaction with NRM Programs Across the Five Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	χ^2 value
The program was beneficial	4.19	4.07	4.12	4.06	4.14	11.15
The program achieved its objectives	3.98	3.67	3.89	3.71	3.78	14.09
Application procedure was straightforward	3.62	3.51	3.51	3.85	3.76	28.24**
Rules/requirements easy to understand	3.77	3.68	3.53	3.81	3.74	33.79***
Finding the right person to contact when there were problems was easy	3.67	3.69	3.61	3.90	3.56	24.56*
Program was well administered	3.64	3.53	3.63	3.81	3.71	15.631
Sufficient funding was offered	3.47	3.26	3.37	3.08	3.20	27.38**
Overall satisfaction with last program participated in	3.91	3.61	3.77	3.66	3.55	18.50

Notes: 1-not at all satisfied, 2-slightly satisfied, 3-somewhat satisfied, 4-satsified, 5-very satisfied
*** significant at 1%, ** significant at 5%, * significant at 10%
A significant chi square value indicates that the distribution of responses across catchments is significantly different

To assess the importance of each of these criteria, it can be informative to understand how changes in each of these criteria are related to overall satisfaction. A correlation analysis was therefore conducted, as shown in Table 7. The results indicate that there were medium correlations with all of the variables; thus all are of some importance in terms of explaining satisfaction.

Table 6: Pearson Correlation with Overall Satisfaction

	r
The program was beneficial	.609**
The program achieved its objectives	.685**
Application procedure was straightforward	.462**
Rules/requirements easy to understand	.503**
Finding the right person to contact when there were problems was easy	.496**
Program was well administered	.574**
Sufficient funding was offered	.558**

** Correlation is significant at the 0.01 level .

6.2 Preferred Program Characteristics

In the earlier phases of the project a range of program characteristics were identified in terms of being important in explaining participation. In this section we report on landholder preferences for these program design features, and examine differences across case study areas as well as variations due to age and identification as a primary producer.

Organisation Delivering the Program

In terms of preferences for which organisation should deliver programs, there were some that were better supported than others – such as Landcare/local catchment community groups, local CMAs or regional bodies and industry groups. There was substantially lower overall support for either non-government environmental organisations or state or federal governments being involved in program delivery.

Table 7: Preferences for Organisation Delivering the NRM Program

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	χ^2 value
Support for a non-government organisation	2.90	3.07	2.92	2.75	3.42	126.18***
Support for Landcare/ other community group	3.73	3.65	3.90	3.44	3.79	86.52***
Support for local CMA/regional body	3.76	3.56	3.73	3.45	3.66	60.169***
Support for State Government	3.06	3.08	3.04	3.09	3.17	20.87
Support for Federal Government	3.24	3.18	3.10	3.13	3.14	19.85
Support for relevant industry group	3.50	3.52	3.58	3.91	3.32	144.98***

Notes: 1-strongly oppose, 2-oppose, 3-neither support nor oppose, 4-support, 5-strongly support
*** significant at 1%, ** significant at 5%, * significant at 10%
A significant chi square value indicates that the distribution of responses across catchments is significantly different

In terms of preferences for who should deliver these programs there are some differences between regions. There was much higher support for the use of an industry group in the Mackay-Whitsunday region, and non-government environmental organisations would be better received in the Mt Lofty area. Landcare enjoyed highest support in the Condamine Alliance region and lowest support in the Mackay-Whitsunday region.

Interest in Receiving Funding for Alternative Activities

Questions were asked regarding what activities landholders would like to see funded. Overall the items that landholders were most interested in receiving funding for were on-ground works, technical advice and managing areas for environmental purposes. For each of these items there was variation in interest across catchments, as shown in Table 9. For

example, interest in receiving funding for on ground works was higher in the Central West, while interest in receiving funding for managing areas for environmental purposes was lower in the Mackay-Whitsundays.

Table 8: Interest in Receiving Funding for Different Activities Across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	χ^2 value
Interest in receiving funding for managing areas for environmental purposes	3.26	3.18	3.21	3.05	3.27	49.21***
Interest in receiving funding for on-ground works	3.55	3.22	3.53	3.34	3.17	48.11***
Interest in receiving funding for equipment hire	3.20	2.89	3.19	3.04	2.78	51.77***
Interest in receiving funding for training	3.11	2.90	2.93	2.90	2.74	26.28**
Interest in receiving funding for provision of technical advice	3.35	3.16	3.19	3.21	3.02	31.15***
Interest in receiving funding for attendance at workshops	3.05	2.85	2.94	2.92	2.66	42.88***

Notes: 1-not at all interested, 2-slightly interested, 3-somewhat interested, 4-interested, 5-very interested
*** significant at 1%, ** significant at 5%, * significant at 10%

Participants were also given the opportunity to suggest other activities they would like to see funded. The majority of responses were specific on-ground works, or specific management actions. Suggestions were also made for various forms of education (eg farm safety) and various forms of assistance in diversification. Other responses of note included 'weed control or management' (this was mentioned by 17 respondents, from each of the NSW and Queensland catchments). Money management was also mentioned by six respondents – five in the Central West, and one from the Condamine region.

Table 9: Other Suggested Activities for Funding.

Activity	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Total
Weed management/control	5	5	4	6	20
Money management	5	0	1	0	6
Erosion control	2	1	1	1	5
Labourers to help carry out programs	0	4	1	0	5
Soil sodicity	4	0	0	0	4
Pasture Improvement	2	0	1	0	3
Agri-tourism	2	1	0	0	3
Environmental Education	2	1	0	0	3
No till farming	2	1	0	0	3
Help to buy machinery	0	1	2	0	3
Feral animal control	0	0	0	3	3
Carbon Trading	0	0	1	2	3
Water Management/ Efficiency/Water saving technology	0	0	1	2	3

Technical Assistance

Participants were asked about the importance of technical assistance for three different aspects of programs which were identified in previous phases of the study: (1) help identifying potential management actions, (2) help writing the applications and (3) ongoing assistance throughout the program. From the figures in Table 10, it can be seen that assistance for each of these actions would be well-received, though there is slightly lower need for help in writing applications.

Differences between regions were minimal, although two findings of note are the low rating given to help in writing the application in the Mt Lofty region. Another finding of interest is that primary producers were more likely than non-primary producers to indicate that help in writing an application was important or very important.

Table 10: Importance of Alternative Forms of Technical Assistance Across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	χ^2 value
Help identifying potential management actions	3.73	3.55	3.53	3.64	3.46	25.49*
Help writing application	3.48	3.34	3.47	3.59	3.03	83.34***
Ongoing technical assistance	3.68	3.57	3.54	3.69	3.35	44.47***

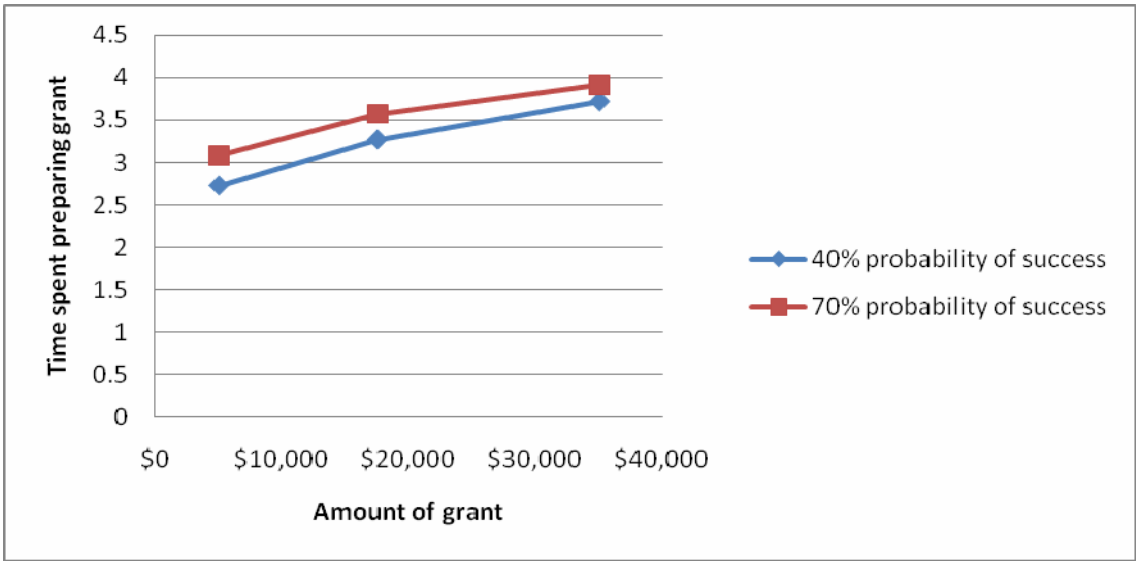
Notes: 1-not at all important, 2-slightly important, 3-somewhat important, 4-important, 5-very important
*** significant at 1%, ** significant at 5%, * significant at 10%

Willingness to Spend Time Completing Grant Applications

A dominant concern in focus groups was the amount of paperwork required to complete applications. Participants indicated that they thought the amount of time required to complete paperwork was too long, however they indicated that the amount of time that they considered reasonable would be a function of how much money was on offer, and the likelihood of achieving a grant. Consequently we asked questions to determine how much time they thought would be reasonable to spend preparing a grant application for different amounts of grant income, and different probabilities of success.

From the graph below, it can be seen that increasing the probability of success increases the average amount of time people are prepared to spend preparing a grant application by about a quarter of a day. However, increasing the amount of money available for the grant from less than $10K to above $25K increases time people are willing to spend by a day. Thus the quantity of funding available has a larger effect on willingness to complete paperwork than the probability of success. Though it is likely that landholders would jointly consider the amount of funding and the probability of funding in considering how much time to invest in an application.

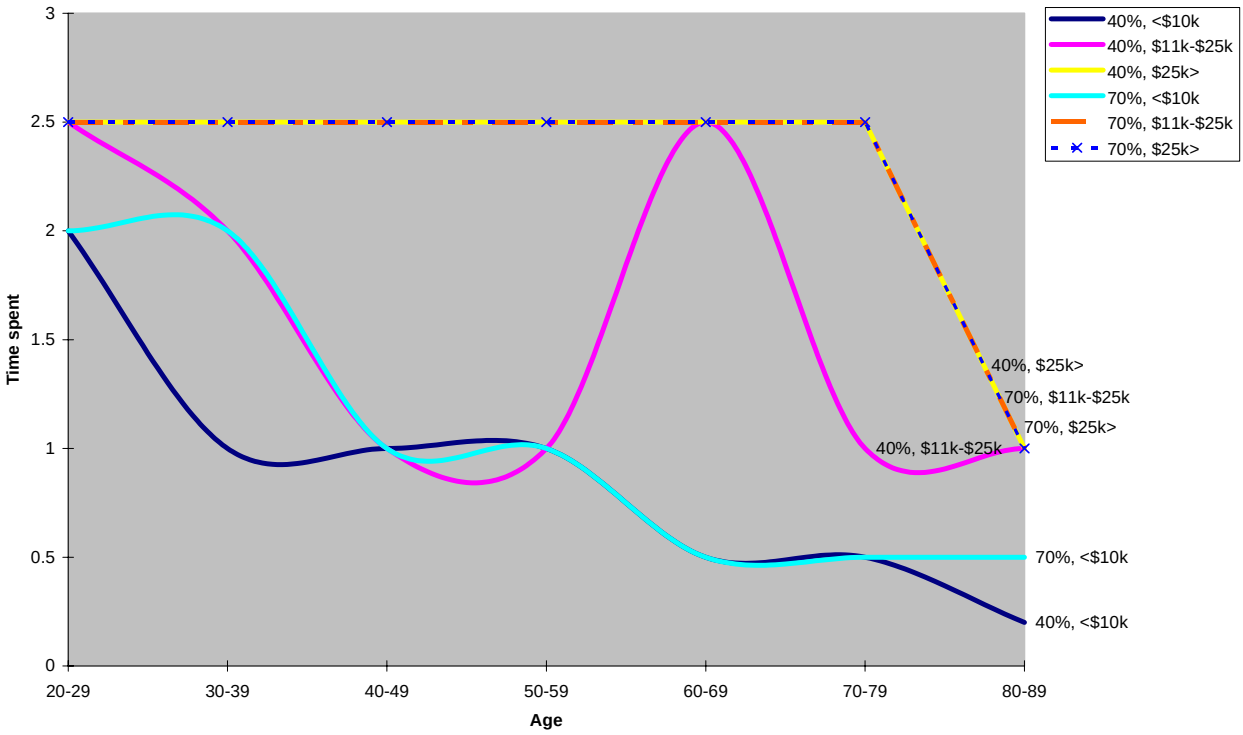
Figure 3: Relationship between Amount of Grant, Probability of Success and Time Respondents are Willing to Spend Preparing Grant Applications



Note: 1-up to 2 hours, 2-up to half a day, 3-up to one day, 4-up to two days, 5-more than two days

Several interesting differences in the amount of time different groups were willing to spend in preparing applications were identified. In Figure 4 the amount of time people from different age groups are prepared to spend on grants is illustrated. It is apparent that for all grants larger than $25K, and for grants from $10-25K but where there was a 70% probability of success, that respondents for most age groups (apart from those older than 80 years) are prepared to spend more than two days preparing the application. However, for the remaining grant amounts there is generally a negative relationship between willingness to spend time preparing grant applications and age. Secondly primary producers were less likely to spend longer periods of time on application paperwork than non-primary producers, regardless of the chance of success or amount of funding on offer.

Figure 4: Time spent on Incentive Application by Highest Percentage per Age Group



Preferences for Contracting Arrangements

Findings from earlier phases of the project suggested that various contractual arrangements can influence the likelihood of landholders participating in a program. Three particular areas of concern were the timing of payments, contract length and monitoring. Respondents' preferences regarding these contractual issues are discussed next.

i. Payment Options

Respondents were asked about three possible options for payment of funds: equal yearly payments; an upfront payment of 30%, with the rest in equal yearly instalments; or receiving payments after completion of each stage. Overall results revealed that the latter two were similar in popularity – 44.8% and 38.9% respectively. The equal yearly payments option received the least interest – only 16.3% of respondents preferred this option. The same pattern of preferences can be seen across each case study area, although landholders in the Northern Rivers and Mackay-Whitsunday regions both had a greater preference for the option with an upfront payment than other regions ($\chi^2 = 16.18$, $p=0.04$).

Table 11: Preferences for Payment Options Across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Equal yearly payments	13.66%	16.07%	16.67%	15.01%	19.09%
Upfront payment (say 30%) with remainder in equal yearly payments	45.61%	50.36%	41.91%	47.45%	40.46%
Receive payment for each stage after each stage has been completed	40.73%	33.57%	41.42%	37.53%	40.46%

Note: 14% of respondents did not answer this question

ii. Contract Length

Six options were presented to respondents in terms of contract length, as shown in Table 12. In contrast to the findings from the literature and expert interviews, but more consistent with the findings from the focus group, it was found that medium-term contract lengths were most popular, with 26.7% of respondents preferring a five year contract, and 20.2% preferring a three year contract. Seven year contracts received the least amount of interest (1.2% of respondents). Respondents from NSW and Queensland had similar preferences, however in Mt Lofty there was a much greater preference for a five year contract (χ^2 = 507.233, p=0.00)[2].

[2] In the Mt Lofty version of the questionnaire the not sure option was mistakenly excluded.

Table 12: Preferences for Contract Length across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
1 year	7.35%	7.80%	4.10%	5.29%	6.20%
2 years	6.87%	7.80%	7.95%	8.73%	7.37%
3 years	20.38%	18.58%	20.24%	16.40%	23.79%
5 years	20.62%	16.97%	19.04%	12.43%	52.60%
7 years	1.42%	0.69%	1.20%	1.32%	1.17%
10 years	5.92%	8.49%	5.30%	3.70%	8.88%
Not sure	37.44%	39.68%	42.17%	52.12%	0.00%

Respondents were also asked to choose between three possible options for a ten year program: 1) three years, plus an optional seven years; 2) five years plus an optional five years; or 3) a fixed ten years. The majority of respondents (66.4%) indicated a preference for the first option. A further 29.1% of respondents selected the 5 year option. Only 4.4% of respondents indicated a preference for a fixed ten years. These findings did not vary substantially across regions.

Table 13: Preferences for Contract Options Across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
3 year contract plus optional 7 years	64.81%	67.43%	64.72%	70.62%	65.38%
5 year contract plus optional 5 years	31.75%	26.21%	31.03%	25.82%	30.20%
Fixed 10 year contract	3.44%	6.36%	4.24%	3.56%	4.42%

iii. Preferred Monitoring

Respondents were also asked to choose between three possible options for monitoring: 1) have a site visit halfway and at the end of a contract; 2) having a site visit at the end of the contract only; or 3) sending in photos at key stages and a site visit at the end of a contract. The first option was preferred by 63.2% of respondents, the third by 29.5%. Interestingly, the option with the least amount of monitoring – having a site visit at the end only – was preferred by only 7.3% of respondents. This finding was again unexpected based on the findings from the expert interviews where a minimum amount of monitoring was recommended, but was consistent with the findings from the focus groups where farmers preferred more ongoing monitoring so that they could identify any problems early on and to guarantee the integrity of the program.

Table 14: Preferences for Monitoring Across Regions

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday
Site visit halfway and at end of contract	64.62%	63.88%	62.95%	61.17%
Site visit at end of contract	7.18%	6.14%	9.59%	6.42%
Send in photos at key stages and site visit at end of contract	28.21%	29.98%	27.46%	32.40%

6.3 Who Participates in Market Based Instruments and Incentive Programs

Binary logistic regression analyses were conducted with socio-demographic and farm level characteristics included as independent variables. These regressions were conducted to identify variables useful for identifying those most likely to participate in MBIs and incentive programs.

Regression Analysis

Binary logistic regressions were estimated to predict participation[3] in several of the main MBI and incentive programs[4] as a function of 13 socio-demographic and property level characteristics. Participation in two Australia wide programs was investigated: Landcare and Envirofund. Secondly, participation in four catchment specific programs was investigated: Central West CMA Incentives, Condamine Alliance Regional Investment Strategy Program, Rural Water Use Efficiency Program (Mackay-Whitsundays) and the Sustainable Landscape Program (Mackay-Whitsundays). Thirdly, participation was modelled for participation in any program in any catchment. The results for these regressions are presented in Table 16.

The summary statistics suggest that the predictive power of the equations varies, as shown by the percentage correct predictions and the rho-square values. Rho square values of 0.2 are equivalent to R^2 values of about 60-70% in standard regression analysis (Louviere, Hensher and Swait 2000).

The results in Table 16 suggest that total area of property, education, and hours worked on property are the most frequently significant variables in explaining participation. Variables significant in at least two equations include years lived in district, years lived on property, total area of property leased, age and gender.

The variable indicating whether a respondent identified themselves as a primary producer was only significant for the Rural Water Efficiency equation. 'Primary producer' was found to be a positive indicator of participation suggesting that primary producers are more inclined to take part in this program. This finding is contradictory to Curtis *et al* (2006) who found that identifying as a farmer was a negative predictor of participation, although the Curtis *et al* study focused on participation in a biodiversity tender rather than a water efficiency program.

[3] Additional regressions were run where the dependent variable was whether respondents had applied to participate in the programs listed in this paragraph. The results were substantively equivalent to what is reported here therefore have not been presented.
[4] Programs were only investigated if they were chosen by a reasonable proportion of the sample (>5%).

Table 15: Binary Logistic Regression showing the Influence of Characteristics of Respondents on Participation in an Incentive Program in the last 5 years

	Any program	Landcare	Envirofund	Central West CMA Incentives	CA Reg. Invest. Strategy	Rural Water Efficiency	Sustainable Landscapes
Constant	-3.932*** (0.489)	-5.088*** (0.641)	-6.093*** (1.046)	-3.670** (1.470)	-4.071** (1.797)	-6.641*** (1.717)	-4.543*** 1.564
Primary producer	0.192 (0.181)	0.300 (0.237)	0.201 (0.398)	0.989 (0.576)	-0.514 (0.645)	1.217* (0.689)	-0.103 0.601
Hrs/ wk worked on property	0.212*** (0.057)	0.216*** (0.073)	0.186 (0.119)	0.268 (0.173)	-0.077 (0.200)	0.273 (0.176)	0.311* 0.176
Years lived in district	0.102 (0.063)	-0.013 (0.085)	0.008 (0.141)	-0.226 (0.200)	0.412* (0.243)	0.567** (0.228)	-0.352 0.248
Years on current property	-0.002 (0.060)	0.061 (0.082)	0.009 (0.134)	0.300 (0.192)	-0.176 (0.210)	-0.290* (0.159)	0.439* 0.238
Farm Family Succession	0.053 (0.109)	0.058 (0.141)	-0.050 (0.242)	0.521 (0.344)	0.371 (0.378)	-0.439 (0.350)	-0.391 0.380
Total area of property	0.388*** (0.076)	0.112 (0.094)	0.501*** (0.131)	0.483** (0.196)	0.100 (0.282)	0.591** (0.238)	0.235 0.264
Total area leased property	0.055 (0.050)	0.062 (0.062)	0.066 (0.086)	-0.105 (0.103)	0.263* (0.149)	0.017 (0.133)	-0.307* 0.176
Age	-0.123** (0.057)	0.089 (0.072)	-0.043 (0.121)	-0.438*** (0.158)	-0.384 (0.223)	-0.017 (0.193)	-0.082 0.191
Gender	0.016 (0.167)	0.094 (0.218)	0.619** (0.316)	-0.484 (0.555)	-0.099 (0.528)	-0.859 (0.795)	0.980* 0.545
Proportion income earned off-farm	-0.003* (0.002)	-0.002 (0.003)	-0.001 (0.004)	-0.006 (0.006)	-0.011 (0.008)	-0.004 (0.007)	-0.013 0.007
Sufficiency of family income	0.065 (0.056)	0.188** (0.073)	-0.050 (0.120)	0.133 (0.160)	-0.053 (0.200)	-0.204 (0.174)	0.001 0.176
Education	0.121*** (0.028)	0.063* (0.036)	0.043 (0.059)	0.154* (0.084)	0.130 (0.105)	0.118 (0.091)	0.353*** 0.090
Farm Equity	0.004 (0.003)	0.004 (0.004)	0.010 (0.006)	-0.006 (0.008)	0.023* (0.012)	0.001 (0.007)	0.001 0.008
			Summary Statistics				
% Corr. Pred.	76.49%	88.44%	96.00%	84.91%	92.78%	84.94%	87.18%
Adj Rho2	0.09	0.06	0.10	0.29	0.16	0.22	0.20
N	1774	1774	1774	371	388	312	312

****Significant at 1%, **Significant at 5%, *Significant at 10%, SE are in brackets*

The amount of hours worked on the property was positively significant in three of the equations. Again this finding is opposite to that of Curtis *et al* (2006) who found that the number of hours worked on a property was negatively related to participation.

Participation was revealed to be positively influenced by the number of years a respondent had lived in their local district. Previous studies have not investigated the effect of this variable on likelihood to participate in an MBI or incentive program.

Mixed results were identified in regards to the effect the length of time respondents had lived on their current property had on their likelihood to participate in an incentive program. 'Years on current property' was significant and negative for the Rural Water Efficiency equation suggesting that more recent purchasers of property would be more likely to participate in incentive programs. This is consistent with Curtis *et al's* (2006) finding for the Victorian River Tender Project and the expert interviews conducted during the course of the study. Conversely, 'years on current property' was positively related to participation for the Sustainable Landscapes Program, indicating that longer term residents were more likely to participate in this project. Given that the Sustainable Landscapes Program focuses largely on biodiversity and involves an MBI, the explanation for the variability in these findings does not appear to be differences in the focus of the programs.

Total area of property was positively significant in four of the seven equations. This was similar to Black and Reeve (1993), who found that farm size was positively related to participation in Landcare. Conversely, Clayton (2005), Curtis *et al* (2006), and Brotherton (1991) all found that farm size was negative related to participation. Thus there is much uncertainty in the literature regarding the influence of this variable on participation.

Mixed relationships were also evident between participation and the total area of property leased to respondents. The amount of property leased to the respondent is positively related to participation in the Condamine Alliance Regional Investment Strategy Program. Alternatively, this relationship is negative for the Sustainable Landscape Program (Mackay-Whitsundays). The mixed results may be attributed to the long term results of the Sustainable Landscape Program which would not benefit those who leased their current property. A negative relationship is supported by Ducos and Dupraz (2006) who indicated that the amount of land in short term tenant farming was negatively related to participation.

Consistent with the findings of Wynn *et al* (2001) and Curtis *et al* (2006), age was found to be negatively related to participation. This relationship was significant and constant across two of the equations including participation in any program included in the questionnaire. This finding was also supported by the expert interviews and focus groups conducted in this study where respondents indicated that younger farmers are more likely to participate.

Gender was also significant in two of the equations. A positive relation was observed between gender (being female) and participation. This relationship had not been previously tested.

Interestingly, proportion of income earned off farm was negatively related to participation though it was only significant at the 10% level in one of the equations. This contradicts the finding of Curtis *et al* (2006) who observed a positive relationship between off farm income and participation.

Also relating to income and participation was the variable sufficiency of family income. This variable proved to be significant and positively related to participation in the equation for Landcare, indicating those who are more financially sound are more likely to participate in Landcare.

Education was positively significant in four of the equations. This finding is supported by Black and Reeve (1993) who identified a positive relationship between education and participation. Also the experts interviewed in the course of this study suggested that those with a higher level of education were more likely to participate. However, a more recent international study by Ducos and Dupraz (2006) found that education had a negative effect on the likelihood of participation.

Black and Reeves' (1993) finding of a positive relation between farm equity and participation was also found in one of the regressions reported, though the significance level was only marginal.

Therefore, the characteristics of those more likely to participate in an MBI or incentive program include being younger, more educated and male. They tend to work a larger

amount of time on their property, own larger properties, and have lived in their local district for a longer period of time.

6.4 Landholder Segments

As discussed in the methodology, the process of identifying landholder segments involves the use of factor, regression and cluster analysis. Factor analysis was used to identify the attitudinal constructs, and the results from this analysis are reported in Appendix 4, as are the tests of the validity and reliability of the attitudinal constructs. In this section we focus on firstly reporting the results from the regression analysis used to identify the attitudinal and behavioural constructs which best predict potential and actual participation in various MBIs and incentive programs. Four constructs are identified in this analysis as consistently having the greatest influence on participation: trust, connectedness, business orientation and use of information channels for gathering information about farming. These constructs were then used for the cluster analysis which is used to define the landholder segments. This is described after the cluster analysis.

Regression Analysis

Binary logit regressions were estimated to predict participation[5] in several of the main MBI and incentive programs[6] as a function of seven[7] of the eight attitudinal constructs and the four behavioural constructs. Participation in two Australia wide programs were investigated: Landcare and Envirofund. Secondly, participation in four catchment specific programs were investigated: Central West CMA Incentives, Condamine Alliance Regional Investment Strategy Program, Rural Water Use Efficiency Program (Mackay-Whitsundays) and the Sustainable Landscape Program (Mackay-Whitsundays). Thirdly, participation was modelled for participation in any program in any catchment. The results for these regressions are presented in Table 17. Standardised coefficients are reported in Table 17 so that the magnitude of the coefficients can be compared.

[5] Additional regressions were run where the dependent variable was whether respondents had applied to participate in the programs listed in this paragraph. The results were substantively equivalent to what is reported here therefore have not been presented.
[6] Programs were only investigated if they were chosen by a reasonable proportion of the sample (>5%).
[7] One of the eight attitudinal constructs (stewardship) was excluded as its reliability and validity was poor (see Appendix 4).

The summary statistics suggest that the regressions are relatively robust and have quite high predictive power as shown by the percentage correct predictions and the rho-square values. Rho square values of 0.2 are equivalent to R^2 values of about 60-70% in standard regression analysis (Louviere, Hensher and Swait 2000).

The results in Table 17 suggest that trust, business orientation, use of information channels and connectedness are consistently the most significant variables in explaining participation and they consistently have the largest coefficients.

To test the robustness of these results correlations were estimated because of the possibility of multicollinearity. There was a medium-large correlation (0.667) between business orientation and information seeking behaviour and a small-moderate correlation between information seeking behaviour and connectednesss (0.353). To further test for multicollinearity due to these two correlations, regressions were separately estimated with either business orientation or information seeking excluded. This testing indicated that business orientation and information seeking behaviour are individually significant in all of the regression equations, and connectedness is significant at the 1% level in the Rural Water Use Efficiency equation, and significant at the 10% level in the Central West Incentives and Sustainable Landscapes equations. Thus there is evidence of some multicollinearity in these regressions, however the evidence from this testing provides further support for the view that trust, business orientation, use of information channels and connectedness are together the most significant variables in explaining participation.

Table 16: Binary Logit Regressions showing the Influence of the Attitudinal and Behavioural Constructs on Participation

	Any program	Landcare	Envirofund	Central West CMA Incentives	CA Reg. Invest. Strategy	Rural Water Efficiency	Sustainable Landscapes
Constant	-1.602*** (0.135)	-4.053*** (0.303)	-5.102*** (0.422)	-2.321*** (0.209)	-3.362 (0.315)	-3.024 (0.302)	-3.431*** (0.234)
Business orientation	0.291*** (0.069)	0.195** (0.092)	0.339** (0.146)	0.530*** (0.201)	0.219 (0.231)	0.654*** (0.199)	0.503** (0.223)
Information seeker	0.531*** (0.072)	0.449*** (0.098)	0.450*** (0.159)	0.827*** (0.207)	0.434* (0.260)	0.549*** (0.201)	0.236 (0.241)
Connectedness	0.359*** (0.058)	0.318*** (0.078)	0.500*** (0.139)	0.037 (0.170)	0.353 (0.222)	0.265 (0.167)	0.259 (0.203)
Native vegetation management	0.104** (0.054)	0.027 (0.072)	0.310*** (0.118)	-0.206 (0.153)	0.212 (0.200)	0.030 (0.192)	0.013 (0.230)
Trust	0.474*** (0.063)	0.449*** (0.085)	0.419*** (0.138)	0.545*** (0.164)	0.392* (0.105)	-0.046 (0.166)	1.457*** (0.258)
Satisfaction	-0.088* (0.049)	-0.125** (0.061)	0.136 (0.101)	0.044 (0.122)	0.400** (0.177)	-0.390** (0.160)	0.789*** (0.231)
Environmental responsibility	-0.002 (0.059)	0.225*** (0.086)	0.111 (0.134)	-0.186 (0.135)	-0.260 (0.215)	0.049 (0.160)	-0.206 (0.211)
Profit focus	-0.129** (0.061)	-0.107 (0.082)	0.044 (0.133)	-0.064 (0.171)	-0.044 (0.235)	0.368** (0.188)	0.078 (0.217)
Innovative	0.061 (0.059)	-0.139* (0.078)	0.189 (0.140)	0.178 (0.173)	0.455** (0.223)	0.206 (0.182)	0.368* (0.226)
Capital constrained	-0.015 (0.057)	0.047 (0.076)	-0.057 (0.124)	-0.213 (0.160)	0.246 (0.191)	-0.140 (0.174)	-0.255 (0.231)
Time constrained	0.009 (0.056)	-0.085 (0.075)	0.229* (0.125)	0.133 (0.376)	-0.104 (0.202)	-0.169 (0.148)	-0.051 (0.785)
Central West	0.143 (0.178)	1.224*** (0.343)	1.154*** (0.450)				
Northern Rivers	-0.403** (0.197)	1.561*** (0.345)	1.338*** (0.447)				
Condamine	0.448*** (0.168)	2.526*** (0.315)	1.537*** (0.423)				
Mt Lofty	-0.041 (0.180)	1.249*** (0.341)	-0.405 (0.612)				
Adj. Rho2	0.189	0.183	0.251	0.310	0.255	0.217	0.418
% Corr. Pred.	80.5%	90.0%	96.8%	85.8%	93.3%	85.6%	90.5%
N	2535	2535	2535	466	461	430	430

In addition, ordered logit regressions were estimated showing the effect of the attitudinal and behavioural constructs on interest in fixed grants, cost-share and tenders. Similar to the previously reported regressions, trust, connectedness, business orientation and use of information channels are consistently significant in all three regressions.

However, three other variables, innovative, profit focus and environmental responsibility are also significant in all three equations. Moreover, the magnitude of the coefficients for 'innovative' in all equations is particularly large, and the coefficients for profit focus and environmental responsibility exceeded those for connectedness.

One of the primary objectives in conducting the regression analysis is to identify suitable variables for clustering. The dependent variables in these three equations are essentially subjective – they focus on respondents' perceived interest in participating in MBIs and incentive programs during the next three years. This contrasts with the earlier regressions which focused on objective outcomes. Given that the regressions using objective outcomes are likely to be more reliable, and thus should be given greater weight, and that innovative and profit focus were less consistently significant and correctly signed in the earlier regressions, they are not used as constructs in the cluster analysis[8].

[8] As a further test of the appropriateness of using these variables for the cluster analysis, experimental cluster analyses were estimated including these additional variables however they did not produce as robust outcomes.

Table 17: Ordered Logit Regressions showing the Influence of the Attitudinal and Behavioural Constructs on Interest in Fixed Grants, Cost Share and Tenders

	Fixed Grants	Cost Share	Tenders
Business orientation	0.223*** (0.052)	0.294** (0.052)	0.204*** (0.052)
Information seeker	0.152*** (0.052)	0.204*** (0.052)	0.098* (0.053)
Connectedness	0.077** (0.040)	0.103*** (0.040)	0.129*** (0.041)
Native vegetation management	0.051 (0.038)	0.038 (0.038)	0.017 (0.038)
Trust	0.422*** (0.042)	0.454*** (0.042)	0.294*** (0.042)
Satisfaction	-0.027 (0.038)	0.060 (0.038)	0.037 (0.038)
Environmental responsibility	0.073* (0.040)	0.218*** (0.040)	0.136*** (0.041)
Profit focus	-0.178*** (0.041)	-0.178*** (0.042)	-0.075* (0.042)
Innovative	0.646*** (0.042)	0.576*** (0.042)	0.405*** (0.042)
Capital constrained	-0.172*** (0.040)	-0.067* (0.040)	-0.100*** (0.041)
Time constrained	0.110*** (0.038)	0.090** (0.038)	0.022 (0.039)
Central West	0.559*** (0.127)	0.537*** (0.128)	0.466*** (0.129)
Northern Rivers	0.027 (0.127)	0.040 (0.128)	0.233* (0.131)
Condamine	0.272** (0.124)	0.208* (0.125)	0.234* (0.127)
Mt Lofty	-0.012 (0.124)	-0.024 (0.125)	-0.001 (0.128)
N	2535	2535	2535

Cluster Analysis

The results from the regression analysis indicated that one of the attitudinal constructs (trust) and three of the behavioural constructs (connectedness, business orientation and use of information channels) were the most consistent predictors of participation and interest in MBIs and incentive programs. Therefore these variables were used for the cluster analysis. As discussed in the section on methodology, Ward's method was used for clustering. A five cluster/segment solution resulted. The distribution of segments across regions is shown in Table 18. Three of the segments were comprised of predominantly main stream farmers, while the remaining segments were made up primarily of those with lifestyle blocks or were hobby farmers. The five segments are now each described.

Table 18: Distribution of Segments across Case Study Areas

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Mainstream, but not well connected	95 20.4%	92 18.7%	126 27.3%	96 22.3%	183 26.7%
Quality operators	119 25.6%	88 17.8%	155 33.5%	159 37.0%	92 13.4%
Profit first	92 19.8%	108 21.9%	99 21.4%	106 24.7%	86 12.6%
Smaller, disconnected, hobby farmers	110 23.7%	158 32.0%	57 12.3%	55 12.8%	234 34.2%
High end, community minded, hobby farmers	49 10.5%	47 9.5%	25 5.4%	14 3.3%	90 13.1%
Total	465 100.0%	493 100.0%	462 100.0%	430 100.0%	685 100.0%

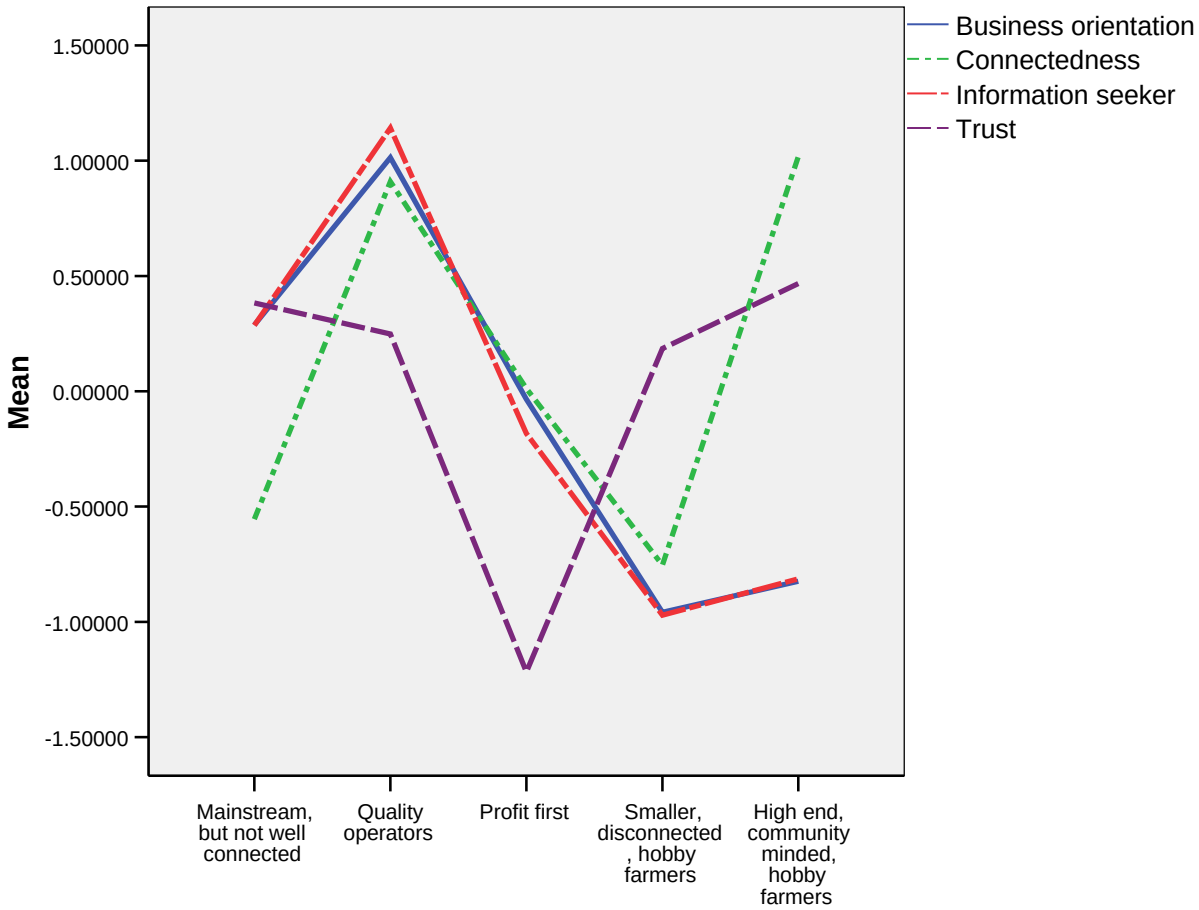
Segment 1: Mainstream farmers yet disconnected (23.2% of the sample)

The first segment consists of predominantly full-time farmers who, relative to the other mainstream farmer segments, have moderate levels of business orientation, trust and information seeking behaviour. However, this group is distinguished by their low level of connectedness, hence the name for this segment (see Figure 5). This low level of connectedness may partly be explained by the high proportion of landholders (40%) in this group who have lived on their current property for less than 10 years (see Table 19). This

group has the smallest average farm size of the three segments that compromise predominantly full time farmers.

Regarding MBI and incentive programs, landholders in this segment have moderate awareness relative to landholders in the other full-time farmer segments (see Table 20). This group has the overall the second highest level of participation in the various MBI and incentive programs, with 25% of landholders in this segment participating in at least one program (see Table 21). Consistent with this finding, this group has the second highest level of interest in fixed grants, cost share programs and tenders (see Table 21).

Figure 5: Average Standardised Values for Business Orientation, Connectedness, Information Seeking and Trust across the five Landholder Segments



Segment 2: Quality operators (24.2% of the sample)

This landholder segment have been called quality operators because they have particularly high average scores for business orientation, information seeking behaviour and connectedness as well as a moderately high score for trust. This group consists primarily of larger, wealthier and more innovative and profit focused farmers, who employ more full time and part time workers then any other segment. They are neither capital nor time constrained. They have the highest percentage of landholders of any segment that consider themselves full-time farmers. They have a moderately high level of education. They are relatively neutral in terms of environmental responsibility. They have the smallest percentage of native vegetation on their property and do not anticipate that this percentage will change greatly in the future.

In terms of MBI and incentive programs, this segment has the highest levels of awareness of all of the segments and these are the landholders most likely to participate in a program. Currently 46% or almost a half of these landholders have participated in a program over the past five years. This group dominates participation in each of the programs listed in Table 22, and it is apparent that their interest in all available programs, whether it be fixed grants, cost share or tenders, is higher than for any other segment.

Segment 3: Profit first (24.2% of the sample)

The third landholder segment is characterised by having a strong profit focus, despite having the lowest scores for business orientation and information seeking of the three full-time farmer segments. It has a high value for time constrained, and a low value for innovation. This segment has very low trust in those involved in delivering NRM programs and, not surprisingly, satisfaction in the last program they participated in is low. This group has a very low score for environmental responsibility and does not plan to substantially increase the area of their farm covered in native vegetation over the next 30 years.

In terms of situational and socio-demographic variables, the group has the lowest average education level of any segment, on average they has lived in the district for the longest of any of the segments, and they has the second largest farm size.

Table 19: Attitudes, Behaviours and Situational and Socio-demographic Characteristics of the Landholder Segments

	Mainstream, but not well connected	Quality operators	Profit first	Smaller, disconnect-ed, hobby farmers	High end, community minded, hobby farmers	χ^2 value/ F Statistic
Attitudes						
Trust	.38	.25	-1.22	.18	.47	361.87***
Satisfaction	.06	.08	-.24	.01	.11	9.51***
Profit focus	-.06	.31	.31	-.35	-.39	58.69***
Innovator	.08	.32	-.14	-.23	-.15	29.77***
Capital constrained	.03	-.08	-.17	.13	.16	8.83***
Time constrained	.03	-.18	.15	.03	.03	8.33***
Environmental responsibility	.08	-.07	-.40	.22	.23	33.35***
Behaviours						
Business orientation	.29	1.01	-.03	-.96	-.82	775.21***
Information seeker	.29	1.14	-.18	-.97	-.81	1067.21***
Connectedness	-.56	.91	.01	-.75	1.02	636.09***
Area of farm currently covered in native veg.	27.60%	25.34%	31.67%	40.44%	35.33%	177.02***
Area farm ideally covered in native veg. in 30 years	37.41%	29.46%	33.76%	49.90%	47.98%	31.54***
Situational variables						
Property managed solely as a lifestyle block	9%	1%	10%	61%	56%	751.82***
Primary producer	42%	75%	52%	14%	20%	524.71***
Professional	17%	7%	8%	22%	28%	101.96***
Trade/manual labour/heavy industry	12%	4%	12%	16%	11%	51.64***
Retired/pensioner/student	11%	5%	15%	27%	24%	134.70***
Hours worked on property per week	31.87	48.69	38.79	17.62	20.59	148.39***
Total area of property (ha)	431.70	1093.67	576.56	181.34	376.51	10.69***
Area leased, share farmed or agisted (ha)	101.71	200.25	89.15	39.75	13.86	2.43**
FT workers (excl. resp.)	.34	.84	.44	.13	.35	27.61***
PTworkers (excl. resp.)	.66	1.13	.80	.51	1.24	8.25***
Years lived in local district	28.70	37.01	38.39	25.91	31.11	37.61***
Years lived on current property	20.08	27.74	27.71	18.17	21.06	31.98***
Lived property < 10 years	39%	25%	26%	39%	40%	51.92***
Socio-demographic variables						
Age	54.63	52.69	56.34	55.25	56.97	82.49***
Gender (% Female)	19%	15%	12%	22%	21%	23.25***
Profit last financial year (%)	33%	54%	44%	15%	24%	214.91***
Proportion of family income earned off-farm	46.96	36.73	41.76	46.08	46.45	157.75***
Family income	3.11	3.04	2.90	3.20	3.41	76.04***
Education	6.24	6.05	5.21	6.24	6.61	185.76***

This group has the lowest awareness of any of the full time farmer segments of any of the MBIs and incentive programs currently on offer, and only slightly higher awareness than the smaller, disconnected, hobby farmers (see Table 20). Together with the smaller, disconnected, hobby farmers this group has the lowest participation in almost all of the MBI and incentive programs on offer. They are most likely to participate in programs clearly related to profitability such as the Rural Water Use Efficiency Program.

The Profit first segment is least likely of all of the groups to participate in fixed grants, cost share and tenders (see Table 21). Landholders in this group are particularly unlikely to participate in a tender, with only 4% indicating that they are definitely interested in participating in a tender in the next three years. This group is most likely to participate in a fixed grant, with 19% indicating that they are strongly or definitely interested in a fixed grant.

Segment 4: Smaller, disconnected, hobby farmers (19.4% of the sample)

As the name given to this segment suggests, this segment largely constitutes landholders who primarily manager their property as a lifestyle block and do not earn any income from it (61%), they have the smallest average property size (181 ha), and the lowest level of connectedness. They also score very low on profit focus, innovation, business orientation, and use of information channels to find out information about farming. However, they have a relatively neutral score for trust in the groups delivering NRM programs, and they are relatively high on environmental responsibility. Consistent with this perspective they currently have the highest percentage of their property covered in native vegetation (40.4%) and anticipate increasing this to 49.9% over the next 30 years.

Only 14% of respondents in this segment consider themselves to be primary producers. About 50% of the segment are either retired or are professionals.

This group has very low awareness of any of the MBI and incentive programs on offer, and the lowest rate of overall participation. Their future interest in participating in a program is low, but slightly higher than the profit first landholders.

Table 20: Awareness and Knowledge of MBI and Incentives across Segments

	Mainstream, but not well connected	Quality operators	Profit first	Smaller, disconnected, hobby farmers	High end, community minded, hobby farmers
Landcare	1.68	1.44	1.84	1.94	1.73
Envirofund	2.96	2.52	3.15	3.27	3.00
Central West CMA Incentives	2.23	1.50	2.52	3.08	2.52
Watersmart Australia Program	2.94	2.90	3.00	3.18	2.93
Community Water Grants	2.94	2.53	3.06	3.12	2.85
Water Use Efficiency Program	2.93	2.60	2.98	3.06	2.89
Environmental Trust Program	3.03	2.78	3.31	3.14	3.09
Bush Recovery Program	2.92	2.76	3.07	3.03	2.83
Community Water Grants	2.60	2.27	2.97	2.89	2.92
Condamine Alliance Regional Investment Strategy programs	2.44	2.12	2.92	2.88	2.75
Rural Water Use Efficiency Program	2.09	1.51	2.07	2.75	2.36
Land for Wildlife	2.12	2.06	2.33	2.25	1.86
Sustainable Landscape Program	2.30	1.99	2.54	2.69	2.43

Segment 5: High end, community minded hobby farmers (8.9% of the sample)

The final segment is the smallest of the five segments, being only 8.9% of the sample, however its size differs across the case study areas. In the Mackay-Whitsunday region it is 3.3% of the sample, in Condamine Alliance it is 5.4% and in Mt Lofty it represents 13.1% of the sample.

Like segment 4, this group largely comprises hobby farmers with 56% of landholders managing their property solely as a lifestyle block. And also like segment 4, the business orientation and information seeking behaviour of this group is relatively low. However, this group consists of wealthier and more community minded landholders. Respondents in this group have much larger properties (376.5 ha on average) than the other hobby farmer segment (181.3 ha), and the highest level of family income and education of any segment.

Furthermore, while 40% of landholders in this group have lived on their current property for less than 10 years they are highly connected in their community. Their level of trust in those delivering NRM programs is the highest of any segment and they also have the highest level of satisfaction with the last program they participated in. Again like segment 4, this group has a high level of environmental responsibility and the second highest percentage of their property currently covered by native vegetation.

Regarding MBIs and incentives, landholders in this segment have the third highest level of awareness of existing programs after the 'quality operators' and the 'mainstream but not well connected' segments. They also have the third highest level of participation (15% participated in at least one program), although this is only one third of the level of the participation of the 'quality operators' and about half that of the 'mainstream but not well connected' landholders. Their interest in fixed grants and cost share is less than both the 'quality operators' and the 'mainstream but not well connected' landholders, but they have a similar interest in tenders to the 'mainstream but not well connected' landholders (see Table 22).

Distribution of Segments within Regions

Of particular interest to regional managers is the distribution of segments within CMAs and Regional Body areas. For Mt Lofty, Central West and Northern Rivers we have been able to develop graphs showing the distribution of segments within local government areas. These maps, however, are currently not available for Queensland. It would be possible in the future with further research to develop these maps for Queensland by merging cadastral coordinates from existing databases with the addresses used in the Queensland case studies if access to appropriate databases became available.

Table 21: Participation in Existing MBIs and Incentives, and Interest in Fixed Grants, Cost Share Programs and Tenders across Segments

	Mainstream, but not well connected	Quality operators	Profit first	Smaller, disconnected, hobby farmers	High end, community minded, hobby farmers
Participation in Existing Programs					
Any program	25%	46%	11%	8%	15%
Landcare	12%	19%	5%	4%	8%
Envirofund	2%	9%	1%	0%	3%
Central West CMA Incentives	20%	43%	6%	3%	4%
Watersmart Australia Program	1%	2%	0%	0%	0%
Community Water Grants	1%	6%	1%	0%	0%
Water Use Efficiency Program	1%	7%	0%	0%	0%
Bush Recovery Program	5%	7%	1%	1%	2%
Community Water Grants	3%	3%	1%	2%	0%
Condamine Alliance Regional Investment Strategy programs	8%	15%	2%	0%	4%
Rural Water Use Efficiency Program	7%	28%	8%	2%	7%
Land for Wildlife	2%	4%	0%	4%	7%
Sustainable Landscape Program	17%	23%	1%	5%	0%
Interest in Fixed Grants, Cost Share and Tenders					
Strongly or definitely interested					
Fixed grants	37%	46%	19%	24%	30%
Cost share	31%	40%	14%	18%	24%
Tenders	16%	20%	8%	10%	16%
Definitely interested					
Fixed grants	23%	25%	11%	14%	16%
Cost share	17%	21%	7%	11%	13%
Tenders	10%	11%	4%	7%	9%

Figure 6: Landholder Segments within Local Government Areas of the Mt Lofty Region

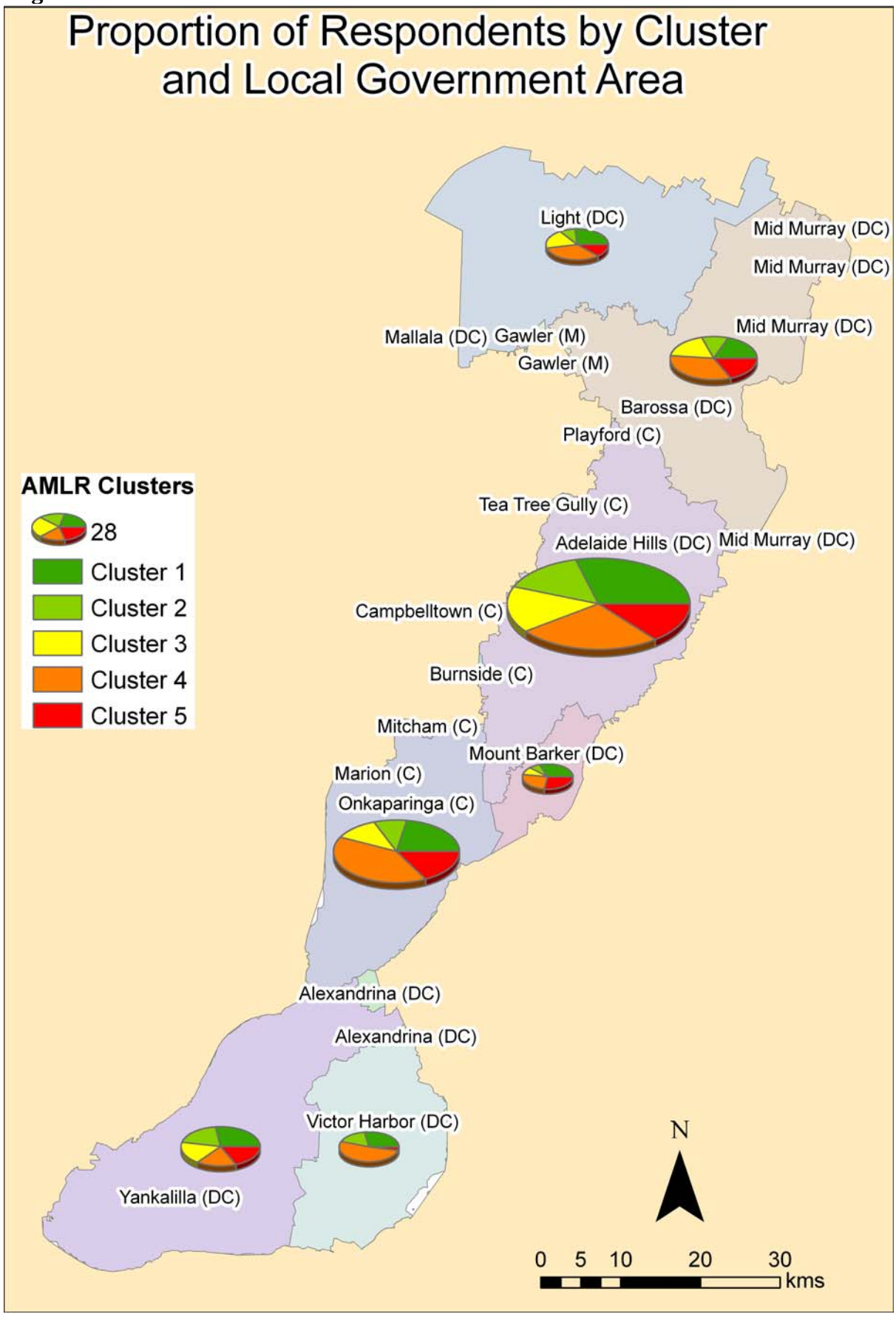


Figure 7: Landholder Segments within Local Government Areas of the Central West Region

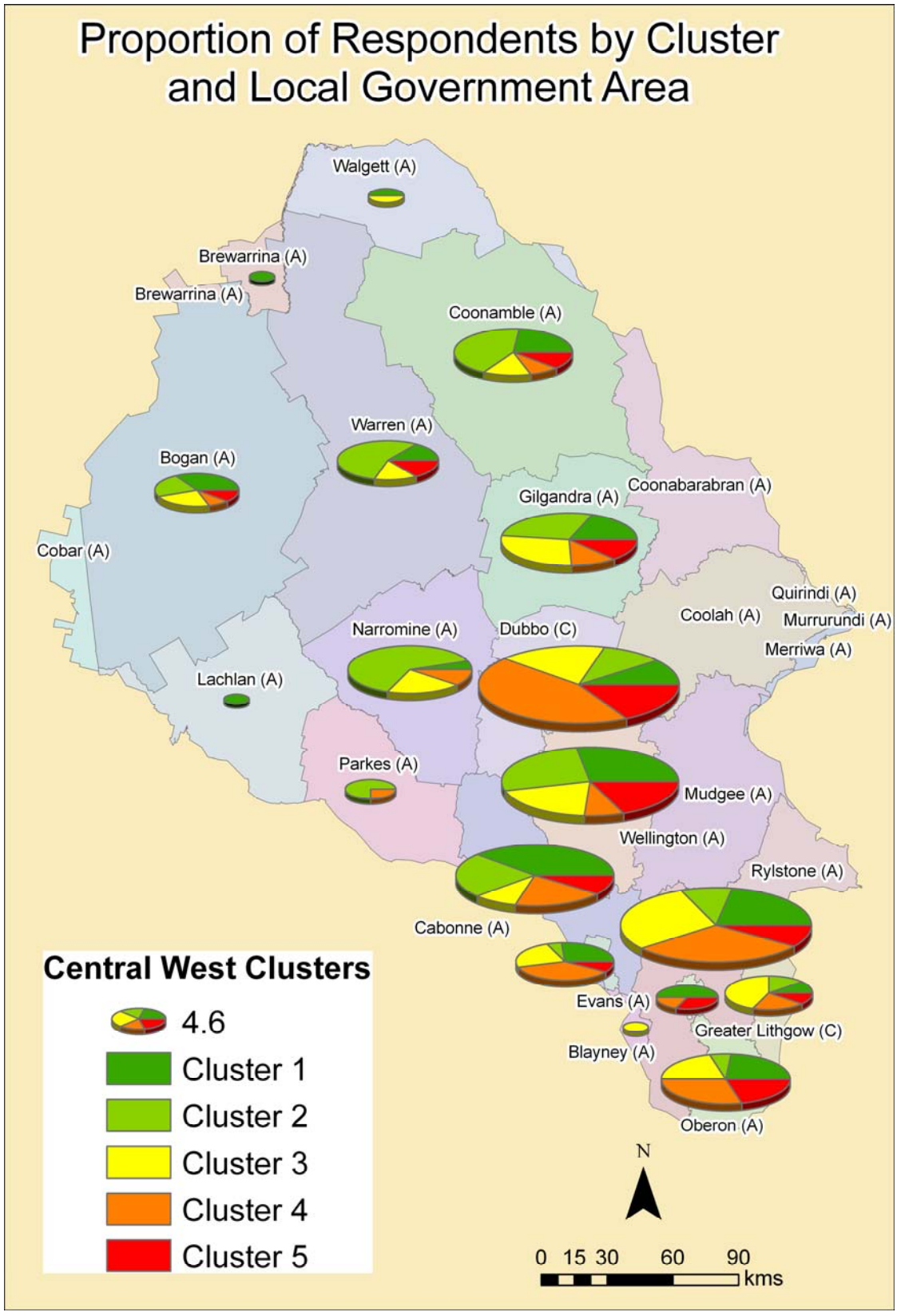
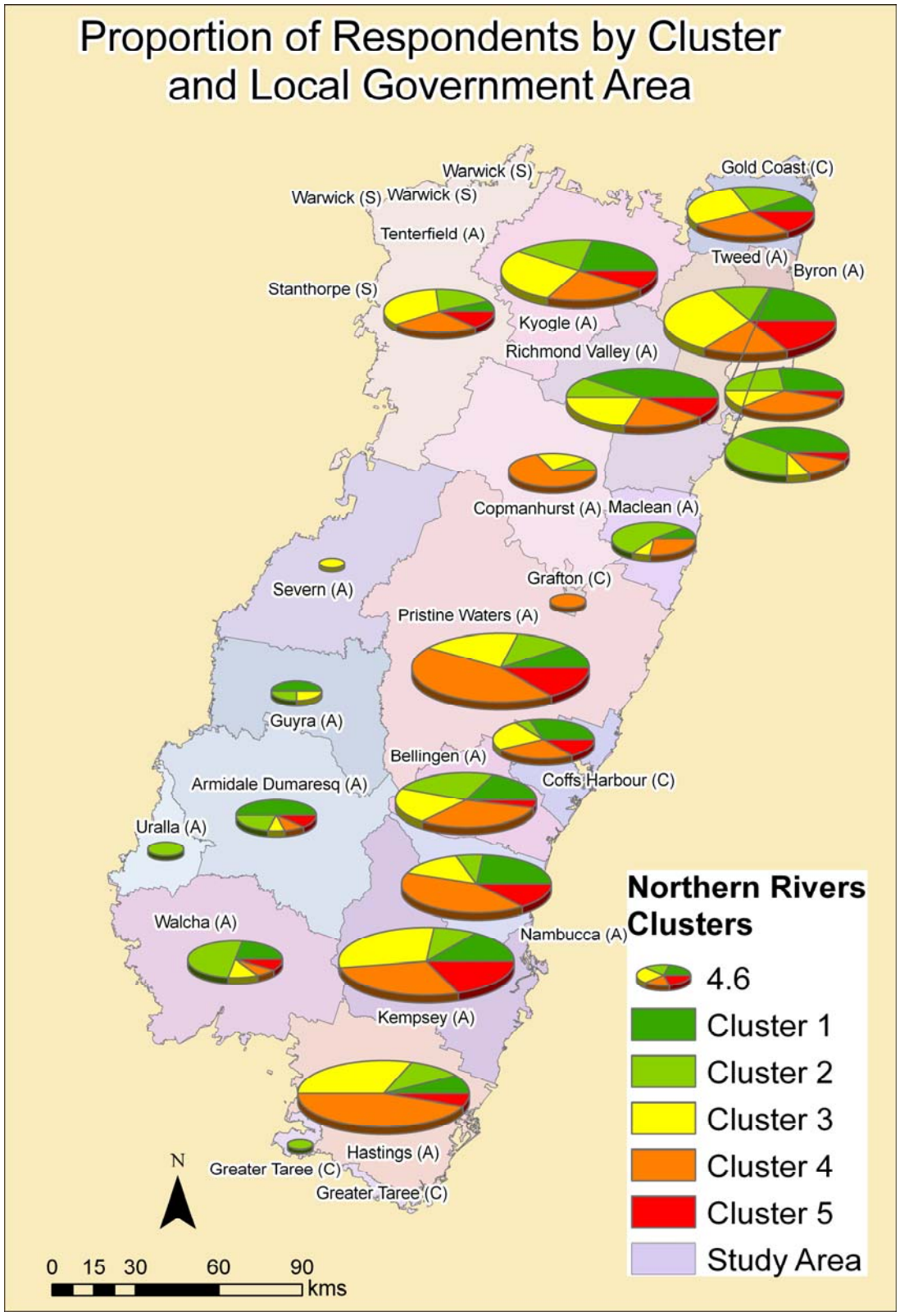


Figure 8: Landholder Segments within Local Government Areas of the Northern Rivers Region



6.5 Effective Methods of Communication

The focus of the third research question is on how to communicate and deliver MBIs and incentive programs to maximise participation. Therefore in the questionnaire information was sought regarding which information channels landholders have previously used to obtain information about farming, and the usefulness of each of these sources. In this section we report on these findings, and also identify how the usage of these channels varies across regions and landholder segments.

As shown in Table 22, respondents were presented with a list of 16 information channels and asked to rate their usefulness. In terms of print media, across the entire sample the most useful channels were rural press, DPI/DNR brochures and industry newsletters, while in terms of people 'other farmers' particularly and field days stand out as the sources most used, and most useful. Regarding electronic media, the radio and internet are perceived to be more useful than television. Lastly, those information channels with the greatest proportion of participants identifying that they have *never* used them were Landcare groups, specialist training programs and extension officers/advisory staff from any source, and private agronomists or consultants.

Variations in the Usefulness of Information Channels across Regions, Professions and Age Groups

Several region-specific differences in the methods of communication were identified. In the Mt Lofty region there was a higher proportion of participants indicating they had *never* used a number of information channels than in the other catchment areas, most likely reflecting the higher proportion of hobby farmers in this catchment. Secondly, a larger proportion of landholders from the Mackay-Whitsunday region rated industry-based sources (newsletters, extension officers) as useful or very useful. Further details about differences in the use of information channels across regions are presented in Appendix 5.

Several other differences in the use of information channels were identified. Chi square tests indicate that primary producers are more likely to use and find each of the information channels useful than others. Several aged based differences were also identified. For instance, older and middle-aged farmers (ie 40-69) tended to find industry newsletters more

useful than younger farmers (ie 20-39). Farm journals were used more as the age of the respondents increased. Middle-aged farmers tended to find Landcare/CMA/Regional body newsletters more useful than younger and older farmers. Younger and middle-aged farmers perceived communication with other farmers as more useful than older farmers. The majority of young to middle age farmers found the Internet useful or very useful, while the majority of those over 60 had never used the Internet.

Table 22: Usefulness of Farming Information Sources

	Never Used	Of little Use	Useful	Very useful	Useful or Very useful
Print Media					
Rural Press	17.2%	9.4%	38.2%	16.5%	54.7%
DPI/DNR brochures	19.8%	11.7%	38.7%	9.9%	48.6%
Industry Newsletters	22.1%	10.0%	35.3%	12.4%	47.7%
Landcare/Regional body newsletters	27.0%	15.9%	30.8%	5.6%	36.4%
Farm Journals	25.9%	10.3%	34.1%	9.3%	43.4%
People					
Private agronomist/consultant	40.0%	5.8%	18.3%	14.6%	32.9%
Landcare group	41.3%	11.4%	20.6%	5.2%	25.8%
CMA/Regional Body extension officers	46.2%	9.5%	16.6%	5.8%	22.4%
DPI/DNR extension officers	38.7%	11.0%	23.2%	6.3%	29.5%
Industry Extension officers	46.2%	9.6%	16.3%	5.7%	22.0%
Other farmers	8.8%	6.3%	45.4%	20.6%	66.0%
Specialist training programs	41.0%	8.4%	22.1%	6.2%	28.3%
Field days	21.6%	8.2%	37.6%	13%	50.6%
Electronic Media					
Internet	25.1%	8.8%	32.9%	12.2%	45.1%
TV	17.2%	24%	33.6%	5.8%	39.4%
Radio	17.6%	17.6%	35.8%	9.7%	45.5%

Variations in the Usefulness of Information Channels across Landholder Segments

We also investigated the use of information channels across the five landholder segments. Not surprisingly, the quality operators were relatively easy to reach, with most channels getting ratings close to three (which represents that they found the channel "useful"). The mainstream but disconnected landholders were the next most easy to reach, having five channels with ratings 2.5 or larger (Rural Press, DPI/DNR brochures, field days, industry newsletters and internet). It however becomes more difficult to reach the profit first segment, with only two channels getting ratings above 2.5 (Rural Press and Radio), and the ratings for the remaining channels are generally all lower than for the two just mentioned segments. For the two hobby farmer segments, the use of all information channels was substantially lower, with the highest rated channels being other farmers and Rural Press. However Rural Press only received a rating of about two on average for both segments, which represented 'of little use'. It is apparent that reaching the hobby farmer segments with currently used information channels presents a major challenge.

Table 23: Usefulness of Information Channels Across Landholder Segments

	Mainstream, but not well connected	Quality operators	Profit first	Smaller, disconnected, hobby farmers	High end, community minded, hobby farmers
Print Media					
Rural press	2.78	2.99	2.68	2.03	2.18
DPI/DNR brochures	2.66	2.94	2.30	1.78	1.90
Industry newsletters	2.54	3.14	2.44	1.48	1.60
CMA/Regional body newsletters	2.32	2.67	1.74	1.71	2.00
Farm journals	2.39	2.93	2.28	1.49	1.55
People					
Private agronomist/consultant	2.04	2.96	1.85	1.21	1.26
Landcare group	1.96	2.39	1.47	1.30	1.67
CMA/Regional Body extension officers/advisory staff	1.77	2.42	1.42	1.16	1.29
DPI/DNR officers/advisory staff	1.98	2.60	1.72	1.24	1.42
Industry extension officers/advisory staff	1.64	2.54	1.50	1.11	1.11
Other farmers	2.99	3.27	3.01	2.37	2.65
Specialist training programs	1.87	2.71	1.64	1.14	1.18
Field days	2.64	3.15	2.38	1.56	1.80
Electronic Media					
Internet	2.50	2.85	2.23	1.87	1.89
TV	2.36	2.55	2.38	2.01	2.10
Radio	2.45	2.84	2.53	1.87	2.08

Note: 1-never used, 2-of little use, 3-useful, 4-very useful

7. Limitations

In any research project there are limitations associated with methodology. It is important when interpreting the results to be aware of these limitations.

Of particular concern, and particularly when the goal is segmentation, is the possibility of sampling error. For this study a response rate of 47.3% was achieved. While this compares favourably with other social research surveys conducted with landholders, it does not preclude the possibility of sampling error. It is possible, even likely, that the non-respondents are not randomly distributed. Previous research of non-respondents suggests that they tended to have a lower socio-demographic status than respondents. Of the five landholder segments identified in this research, the profit first group had the lowest socio-demographic status in terms of education and income. Therefore it would follow if there is sampling error that non-respondents are more likely to be from this segment than other segments. Further research could test the veracity of this deduction.

A second limitation relating to sampling is the lack of access to sample frames in the Queensland case studies. As noted in the methodology section, we had to rely on use of the phone book and lists supplied by Landcare and local government where available.

8. Conclusions and Recommendations

The overriding goal of this research project has been to understand how to improve the design and delivery of MBIs and incentive programs to increase the participation of landholders. Low levels of participation can reduce the ability of programs to achieve their desired outcomes, as well as reduce their efficiency. To understand how to increase participation in these programs, answers to three main research questions have been sought, namely: 1) what are the characteristics of MBIs and incentive programs that encourage participation, 2) who participates in MBIs and incentive programs and 3) how can MBIs and incentives be better communicated to increase participation? We now briefly review the findings for each of these questions from each of the stages of our research before presenting some recommendations for the delivery of MBIs and incentive programs.

Research Question 1: What are the Characteristics of MBIs and Incentive Programs that Encourage Landholder Participation?

Not surprisingly, the evidence from both the literature and from our qualitative research suggests that increasing the net benefits through increasing the amount paid to landholders and decreasing expected outcomes will lead to increased participation. However this is arguably not the most desirable way to increase landholder participation, and our findings indicate that there are number of modifications to program design that can be made that will achieve the same effect.

Program Delivery

From the literature review and our qualitative research there were common themes about how this might be done. A number of these themes relate to program delivery. Being flexible and allowing negotiations relating to environmental outcomes and required management practices was demonstrated to increase participation. Simplifying the application process is also important. There is a limit to what landholders are both willing and able to complete, although landholders are willing to do more paperwork for grants that involve larger funding and have higher probability of success. Thirdly, landholders value technical assistance: in identifying potential management actions, writing applications, and for dealing with others issues through the life of the project. Fourth, clarity and

transparency about key design features such as eligibility, how bids will be assessed, monitoring, and the availability of ongoing technical advice encourages participation. Landholders also wanted clarity about how program requirements such as deliverables and timelines could be changed in adverse circumstances such as poor weather or illness. Fifth, as noted in the expert interviews, program administrators need to be aware of timing issues, and ensure that the timing of applications or key deliverables do not clash with key farming or family commitments.

Program Administrator

As well as how programs are delivered, who delivers the program can have a sizeable influence on participation. The potential influence of the choice of administrator was first noted in the literature review. Horne (2006) found that using environmental organisations as an administrator would lead to lower participation than either a conservation trust or an industry body. In Australia, the evidence from the expert interviews suggested that many landholders do not trust government agencies, and that participation is likely to be higher if the programs are offered by Landcare or through an environment group such as Greening Australia. These claims were tested in the quantitative survey, and the evidence from landholders indicated that the greatest support was for delivery via Landcare, CMAs/Regional Bodies and industry groups. The support for delivery through government agencies was low, as was support for delivery through environmental groups. Only in catchments where there are large proportions of hobby farmers does the latter appear to be a viable alternative. However, from the perspective of suppliers of funds or those who are accountable for the outcomes of potential programs, the capacity of the organisations to deliver a program in a desired way will also be an important factor in selecting the program administrator.

Contracting Arrangements

A variety of contracting arrangements were noted in the literature and our qualitative research as potentially influencing participation. This included length of contracts, payment schedules and monitoring requirements. From the literature and expert interviews it was expected that landholders would prefer shorter contracts and a minimal amount of monitoring. However, the results from both the focus groups and the quantitative survey suggested otherwise. These results indicated that respondents prefer mid-length contracts (3-5 years) with an option to extend the contract, and that they prefer monitoring that

involves site visits to ensure the integrity of the programs and to resolve any problems before the end of the contract.

Choice of Instrument

Evidence emerged from the expert interviews that different types of farmers are more likely to prefer different types of instruments, with more business oriented and innovative farmers more likely to prefer the use of the more sophisticated instruments such as tenders. A couple of the experts interviewed noted that the adoption of tenders may follow a diffusion type process, with some farmers becoming more interested after they have observed the innovators and early adopters. In the focus groups farmers were questioned about the use of tenders, and many concerns were noted such as the uncertainty involved in applying for a tender, the difficulty of understanding the process, concern that those successful were those who knew how to fill out an application well rather than deliver well in terms of outcomes, and that they create rivalry between landholders. In the quantitative survey landholders were questioned about their interest in applying to participate in three programs: fixed grants, variable cost-share and tenders. Landholders had the highest interest in applying for fixed grants, followed by variable cost-share, with interest in tenders substantially lower than the other two instruments.

Research Question 2: Who Participates in MBIs and Incentives?

Understanding who participates in MBIs and incentives programs is important for designing communication programs, as well as for designing the best mix of MBIs and incentives. To answer this question through each of the stages of our research project we investigated the socio-demographic, attitudinal, behavioural and situational factors influencing participation, and found the following.

Socio-demographic Variables

In the literature the socio-demographic variables that have received greatest attention in terms of their effect on participation are age and education. In the literature, age has been shown in a number of studies to have a negative effect on participation, a finding confirmed by our qualitative and quantitative research. For education, the literature suggests that education can have a positive or negative effect, although ongoing education in areas related to farm management can have a positive effect on participation. The findings from

both the expert interviews and focus groups however suggested that education is positively related to participation, a finding confirmed in the quantitative analysis.

Attitudinal Variables

The influence of several attitudes on participation has been examined in the literature and as part of this research project. The evidence from the literature and the expert interviews was that environmental attitude has an ambiguous effect on participation. We tested this variable and found that it was not an effective predictor of actual behaviour, but was a good predictor of behavioural intentions in terms of interest in participating in fixed grants, cost share and tenders. While there is uncertainty about the usefulness of environmental responsibility in explaining participation, a positive attitude to the program and trust in those administering the program were found in the literature and mentioned in the expert interviews as being very influential in explaining participation. In the quantitative analysis trust was consistently found to be a primary determinant of participation.

The possibility of several other variables in explaining participation were also noted in the literature, expert interviews and focus groups, such as being innovative, profit focused, and satisfaction with past programs. These variables were investigated in the quantitative analysis however their effect on past participation proved to be either minimal or ambiguous. However, both being innovative and profit focused were found to be good predictors of intention to participate in future fixed grants, cost share programs or tenders.

Behavioural Variables

In the literature the main behavioural variable noted to influence participation was involvement in other or previous programs. The importance of this variable was confirmed in the expert interviews, however two other behavioural variables – business orientation and connectedness – were also noted to increase participation. Several experts noted that those who were more business oriented had more capacity to participate in MBI and incentive programs, and were more likely to participate in the more sophisticated instruments. Those who were more connected, such as through their involvement in various networks, were also more likely to participate, a point supported more recently in the literature (eg Molinas 1998). In our quantitative analysis we examined the effect of business orientation, information seeking behaviour and connectedness on participation and found each of these variables to be closely related to participation.

Situational Variables

Lastly, the influence of various situational variables on participation was investigated. In general our findings are opposite to what we expected based on the literature and our qualitative research. In the literature farm size was shown to have an ambiguous effect on participation, however in our quantitative analysis we found that it is positively related to participation. One study by Curtis *et al* (2006) found that hours worked on farm is negatively related to participation, however we find the opposite. The findings from the expert interviews indicated that length of time on current property has a negative effect on participation, however we found for one program it has a negative effect and for another a positive effect, and for most programs no effect on participation.

Identifying Landholder Segments

One of our objectives in identifying the variables that allow us to identify who is most likely to participate in MBIs and incentive programs was to determine variables suitable for creating landholder segments. For this purpose four constructs were identified as appropriate: trust, business orientation, information seeking behaviour and connectedness. These are four of the main variables found to distinguish those most likely to participate in an MBI or incentive program discussed above. Using these variables, five landholder segments were identified, three of which were mainstream farmer segments and two were comprised mostly of hobby farmers.

These five segments differed substantially in their socio-demographic and situational characteristics, as well in their business orientation, information seeking behaviour, connectedness in their communities and trust of NRM groups. Importantly, the groups also differed in terms of their awareness and knowledge of existing MBIs and incentives, current participation in MBIs and incentives, and likely future participation. One of the five segments stands out in terms of actual and likely future participation. This is the "quality operator" segment, which is made up of strongly business oriented, information seeking and well connected landholders who have a relatively high socio-demographic status. Two other segments also have reasonable levels of participation, though to a lesser extent than the "quality operators". These are the "mainstream farmers, but not well connected" segment, and the "high end, community minded, hobby farmers". However, there are two segments, the "profit first" and "smaller, disconnected, hobby farmers", that have very low awareness or knowledge of existing programs, have very low participation

and are much less likely to participate in future programs. Both of these segments generally have a lower socio-demographic status than the other three segments. Also, their use of the information channels mostly used by NRM groups to communicate information about MBIs and incentives is very limited, so these two segments are very challenging to reach with promotional messages. And these two segments cannot be ignored - they are sizeable segments, together making up from 33.7% to 53.9% of landholders, depending on the region under investigation. Moreover, the GIS maps indicate that these two segments dominate certain local government areas within the case study areas.

These findings raise some several important issues relating to both efficiency and equity. First, the results indicate that those most likely to participate in MBI and incentive programs are those with the highest socio-demographic status. This raises the possibility of "crowding out" of private investment in NRM works. In other words, would the funded activities have occurred even if funding had not been received? There is evidence in the literature that this occurs to some degree (Crabtree, Chalmers and Eiser 2001), potentially eroding the efficiency of MBIs in particular. Secondly this raises concern about equity. Röling (1988, p.66) noted that "extension workers and progressive farmers attract each other like magnets" and that this created the potential for reinforcing privilege, as progressive farmers received the benefits of such contact. While there has been much emphasis in recent years on improving the efficiency with which NRM funds are expended, less attention has been given to the equity implications of the programs. The results indicate that instruments such as tenders are likely to have low uptake amongst these more difficult to reach segments. Reaching these segments will require the use of instruments such as fixed grants and variable cost-share for which they have greater interest, and carefully selected information channels with appropriately designed messages. Other instruments that have not previously been used in Australia such as cross-compliance requirements may also be effective for reaching these groups.

Research Question 3: How to Communicate MBIs and Incentives to Increase Participation?

Communicating MBI and incentive programs was recognised both in the literature and the expert interviews as being important for encouraging participation, and for dealing with problems such as a lack of trust. However, the amount of careful research on the question

of how to improve the design of communication programs was surprisingly small, particularly when compared to the amount of effort that has gone into improving the design features of MBIs and incentives. Much of the research that has gone into communication programs has been anecdotal and incidental, for example, inclusion of a couple of dummy variables in a regression to see how hearing about a program influences participation. In these studies what is being measured is the persuasiveness of individual channels rather than effectiveness, as overall effectiveness also depends on the reach of particular channels. There has been limited systematic work regarding the effectiveness of alternative information channels, the effectiveness of these channels for reaching alternative landholder segments, and the sorts of messages that are likely to be most effective for reaching each of these segments. The one exception to this is the study by Breetz *et al* (2004) who developed a theoretical model demonstrating how communication strategies should be developed based on the market context (eg number of landholders, receptivity, budget, time available etc).

Nonetheless, some insights were gained from our research about the effectiveness of alternative information channels. From the literature review and qualitative research, direct contact (word of mouth) was believed to be the most persuasive information channel. The use of personal contact by extension staff was emphasised as it could be used to clarify the application process, deal with misinformation, facilitate best practice and build trust. However, it was recognised that it is challenging to find and keep staff that are sufficiently skilled and experienced for this purpose. Interestingly, while the findings from the literature review and qualitative research were in accord about the importance of direct contact, the evidence from the quantitative survey indicated that only a relatively small proportion of landholders found visits by extension officers to be useful or very useful.

The effectiveness of networks was also recognised in both the literature and qualitative research. This can include the use of opinion leaders for promoting programs. The use of formal and informal networks has the advantage of building on pre-existing trust but is also potentially limited in terms of reach. The results from the quantitative survey indicated that industry newsletters were considered valuable by almost half of the landholders surveyed, and they were relatively effective at reaching the *profit first* farmers who are generally difficult to reach.

Other channels considered to be reasonably effective were field days, seminars and experimental economics workshops. Seminars and workshops have been found to be more effective empirically than advertising (Lynch and Lovell 2003; Frondel, Lehmann and Wätzold 2006). Experimental economics workshops have also been recommended as they can provide for farmers a simulation or trial of what participating in a program involves, although there is little empirical evidence yet available about the effect of these workshops on participation. In the focus groups landholders recommended the use of localised community meetings to provide further information about the program and to answer specific questions. In the quantitative survey, questions were included about the usefulness of field days and specialist training programs. The former was rated as useful or very useful by about half of the respondents, however only 28% of respondents indicated that they found specialist training programs useful suggesting that the use of seminars and workshops may also be limited in terms of potential reach.

Perhaps the area of most contention in terms of promotion is the use of advertising. Empirically, advertising has been demonstrated to be less persuasive than other methods in increasing participation, however it was recognised that a range of communication tools (including advertising) are needed to reach a broad range of landholders, particularly if the extent of networks are limited. In the expert interviews, while some experts thought that advertising was likely to be of limited effectiveness, particularly if it is the only channel used, they suggested that fliers and brochures as well as local radio and newspapers could be effective, particularly if they promoted stories of past successes. The experts generally frowned upon the use of television for promotion. In a similar vein, focus group participants recommended fliers, local radio and local newspapers, particularly where the program is described in an editorial or news article. In preparing such articles they emphasised the need to connect with the target audience by using understandable and straightforward language, with an article of appropriate length. Focus group participants also recommended the use of shop noticeboards. In terms of quantitative evidence, radio and newspapers were rated quite highly in terms of usefulness as information sources about farming, and higher than television. Nonetheless overall the evidence appears to suggest that advertising is most effective when tailored to the local area, involves case studies that landholders can relate to, and uses language that landholders can understand.

A further information channel that rated highly with landholders in the quantitative survey was the internet. This appears to have good potential as an information source, though in the expert interviews it was considered to be more of a "back-up" information source. One important insight from the focus groups was that landholders often find it difficult to source information on the various funding programs that are available. Participants emphasised the need for a centralised website where landholders can source information on available programs. In some regions such sources of information already exist, but may be better promoted in order to engage landholders.

Lastly, the qualitative research provided some insight into how to deliver promotional messages rather than which channels to use. In both the expert interviews and the focus groups the point was made that the "right message" needs to be sent to landholders, one that will capture their interest. The benefits available to the landholder, their property and their business need to be stated. It needs to be clear to landholders how the program will improve their farm management. In doing so expectations also need to be managed – both experts and focus group participants indicated that the probability of success in receiving a grant should be stated and not oversold. Both experts and focus group participants also noted the importance of using the right language and avoiding jargon when developing promotional messages.

Recommendations

Following is a list of recommendations arising from this research. In providing these recommendations it is acknowledged that the objectives of particular MBI and incentive programs differ, and that these objectives need to be considered when interpreting these recommendations.

1. Mixing of instruments

Given that certain segments are relatively unlikely to adopt specific instruments (eg tenders) consider having a mix of instruments available. This may include fixed grants for relatively low cost projects and tenders for higher cost projects. In choosing the appropriate mix of instruments, factors that influence the suitability of specific instruments for use in an

area, such as the availability of necessary scientific information and sufficient variation in the costs and impacts of abatement options, would also need to be considered.

2. ***Design programs for specific segments***

Establish programs aimed at specific segments to improve equity in the distribution of funds or to engage known target groups. For example, this may include programs for properties of specific size eg focused on hobby farms or mid-sized properties.

3. ***Develop new instruments that may be effective at reaching segments with low participation***

In the USA cross-compliance instruments (eg Sodbusters) have been effective at reaching groups that have otherwise been unwilling to participate in NRM programs. These programs may be effective in Australia as a means of promoting behavioural change among particular segments, for example in encouraging the profit first farmers to participate in NRM programs.

4. ***Evaluate the efficiency of variable cost-share***

Much academic research has sought to evaluate the efficiency of tenders. The empirical evidence indicates that strategising and crowding out reduces the efficiency of tenders over time. However, variable cost-share programs have received less attention, though they have efficiency properties that are likely to lead to better outcomes than fixed grants and the the evidence from this study is that they are preferred to tenders.

5. ***Preferred program characteristics***

Insight was provided into the landholders' preferred options for a number of design features of MBIs and incentives, which can be adopted to increase participation. These preferred features are as follows:

- Use Landcare, local CMAs/regional bodies or industry groups to deliver the programs
- Provide technical assistance particularly for identifying potential management actions and ongoing technical assistance. Provide help writing applications if possible.
- Indicate the probability of success with past grants
- For payments, landholders prefer to receive a larger upfront payment with the residual paid in equal yearly payments or payment after each stage has been completed rather than equal yearly payments
- For ongoing projects, contracts of 3-5 years with an optional extension are preferred to projects of fewer years in length
- For monitoring, include site visits half way and at the end of the project rather than just at the end of the project, or sending in photos at key stages.

6. Communication strategy – what channels to use

There are a number of channels that can be used for promotional purposes. This includes the use of direct contact, networks, workshops and seminars, newsletters, and advertising. The choice of which mix of instruments is most appropriate to use depends on the context, including the budget and time available, the number of landholders in the area of concern, and their receptivity to the program. In general, direct contact is recognised to be particularly persuasive method for encouraging participation in MBIs and incentive programs, and should be continued. However, it is also a costly alternative and can have limited reach, so it may not always be the most cost-effective approach. Using networks and opinion leaders is likely to be effective where there are problems with trust. Networks can also be a lower cost method of promotion. Experimental economics workshops, seminars and other community meetings are likely to be useful where the program is relatively complicated and landholders will require the program to be carefully explained. Advertising is also likely to be useful, particularly for increasing the reach of the communication program, however it needs to be localised and the message carefully developed so it includes a message that is both understandable and of interest to landholders eg through the use of case studies. Further research however is needed to

understand the cost-effectiveness of the alternative channels, taking into account both the persuasiveness and reach of each of the channels.

7. ***Communication strategy – be aware of what channels the difficult to reach segments use***

The *quality operators* and to a lesser extent the *mainstream but disconnected landholders* make use of most information channels and are therefore relatively easy to reach. If the goal is to reach the other segments, such as *profit first* and the two hobby farmer segments, then channels may need to be carefully chosen. This could include the use of Rural Press, Radio, industry newsletters, DPI/DNR brochures, TV and radio as well as direct contact.

8. ***Communication strategy – what message to use***

In developing promotional materials, these should be developed with the values and interests of landholders in mind. Thus they should emphasise wherever possible the benefits to landholders from participation in terms of improved farm management.

This, however, is an area in need of further research, in particular to identify the messages likely to be most effective in reaching each of the five segments.

9. ***The importance of social capital***

Trust and connectedness were two of the most important predictors of participation. This suggests that further work needs to be undertaken to understand how both trust and connectedness can be developed between landholders and between landholders and those delivering NRM programs.

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Appendix 1: Interviewer's Outline for Expert Interviews

Introduction

We're contacting you because we've been told that you're interested in MBI and that you have had experience in them.

We are conducting a survey of experts as part of a project funded by Land and Water Australia titled "*Understanding landholder constraints to the uptake of market-based instruments*". As somebody who is experienced with market based instruments (MBIs), we would like to ask you a few questions about your experience with how to encourage increased participation in MBIs.

Participation is voluntary, and the survey will take about 20 minutes to complete. The project has approval from CSU's ethics in human research committee.

Would you be willing to participate in this survey? Is now suitable for the interview, or could I call you back at a more suitable time?

Types of MBIs

1. What MBIs or incentives have you previously been involved with either implementing or testing through experiments or surveys. (By MBIs we mean incentive programs such as tenders, stewardship payments or devolved grants, or subsidy schemes such as Landcare.)

Characteristics of MBIs

2. What do you consider to be the most important design features of a MBI or incentive program (note: if needed give examples - duration of contract, constraints, who runs the MBI, type of incentive, application process etc)?

3. What do you consider to be the main features of a MBI that influence participation?

4. Are you aware of any literature that has investigated how the design of an MBI influences participation?

Who participates in MBIs

5. In the MBIs that you have implemented or investigated, did you examine or notice whether certain types of farmers were more likely to participate? If yes, could you please describe their characteristics?

6. Do you think that different types of farmers are more likely to participate in different MBIs? Why?

7. Are you aware of any literature that has investigated the types of farmers that participate in MBIs?

Implementing and promoting MBIs

8. Could you please describe the implementation and promotion process for the MBIs that you were involved in implementing? By implementation process we mean the method you used to let farmers know about the MBI, and encourage involvement in the MBI)
   (If have not previously implemented as indicated from Q1, go to Q12)

9. What parts of this process do you consider to have been most effective in encouraging farmer participation?

10. What would you do differently next time to encourage farmer participation?

11. From your knowledge of MBIs, what implementation and promotion strategies would you follow to encourage maximum participation in an MBI?

12. Are you aware of any literature that has examined how to implement and promote MBIs in order to encourage maximum participation?

Monitoring and evaluating MBI/incentive programs

13. In the MBIs that you have implemented or investigated, was there a monitoring and evaluation component that assessed such aspects as the effectiveness of the program, the transaction costs, participation rates, reasons for becoming or not becoming involved, whether the on-ground actions or biophysical outcomes were achieved etc?

14. If so, could you provide details including what aspects were monitored and what were the key findings? Are these summarised in an available report?

15. Are you aware of any attempts to collect information on the effectiveness of an MBI program?

Appendix 2: Focus Group Organisation Details

1. Please organise two focus groups of 10 landholders.

2. Landholders should be from a diversity of backgrounds
   - Different enterprises (eg grazing, field crops, horticulture, dairy etc)
   - Different ages
   - Different socioeconomic status
   - Different dispositions (eg some innovators, some followers)

3. Landholders should not be from the same family or very close friends.

4. When recruiting, please advise that the discussion group will go for about two hours and will be to discuss "farm management incentives". Tell them it is a research project being funded by Land and Water Australia and two NRM groups if they ask. Also the research is being conducted by CSU and CSIRO with contributions from QDNRW.

5. For recruiting, suggest you use an agent. This is a well connected person who can get a range of people you **don't know**. Emphasise we don't just want people from their existing network if they are, say, a Landcare Officer. We can pay this person $250 for recruitment

6. Participants' reimbursement. This, as discussed, is up to you. Options are:
   - Cash payment of up to $100
   - Dinner or other gift voucher
   - Free dinner for them (and their spouse) after the focus group

7. One week prior to the group you will need to send each person a reminder letter, indicating the time and location of the focus group.

8. For the venue, we will need a quiet room where we can have a relaxed discussion – for example, like a room in an RSL, a nice pub or a motel, or a community centre.

We need a table and 11 chairs around it, plus a couple of extra in the corner for observers.

We will need drinks – water, soft drinks, tea, coffee.

Also, we will need some food – eg, finger food, lollies, biscuits, cakes (ample, but not over the top).

Each person will need a pen and pad, as well as a name tag – the labels that can be stuck on a shirt are fine.

On the day, we will need a typed list of those attending if we are paying money, so they can sign off that they have received the money.

Appendix 3: Sample Description

The questionnaire contained a number of questions which sought to collect socio-demographic and farm-level data. The following is a summary of results from these questions.

Age: respondents ranged from 20 to 93 years, with a mean age of 54.8 years. As can be seen in Table 25, approximately three quarters of the respondents were aged between 40 and 70 years. The age distributions between catchments are statistically different (χ^2 =142.59, p=0.00) this variation occurs in the under 40 and over 80 age groups. The age distribution of the landholder population for the catchment areas was compared to Australian Bureau of Statistics 2006 Census Data for those working in Agriculture, forestry and fishing, and was found to be statistically different (χ^2 =241.65, p=0.00). As not all working in Agriculture, forestry and fishing will be landholders, it was expected that some difference in age distribution would be apparent.

Table 24: Age Distribution of Respondents Across Catchments

Age Group	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
20-29yrs	4 (0.89%)	5 (1.05%)	3 (0.67%)	4 (0.96%)	3 (0.46%)	19 (0.7%)
30-39yrs	44 (9.84%)	30 (6.32%)	47 (10.44%)	45 (10.79%)	35 (5.38%)	201 (7.9%)
40-49yrs	104 (23.27%)	108 (22.74%)	113 (25.11%)	124 (29.74%)	155 (23.81%)	604 (23.8%)
50-59yrs	130 (29.08%)	176 (37.05%)	145 (32.22%)	128 (30.70%)	207 (31.80%)	786 (31.0%)
60-69yrs	115 (25.73%)	91 (19.16%)	98 (21.78%)	82 (19.66%)	168 (25.81%)	554 (21.9%)
70-79yrs	39 (8.72%)	53 (11.16%)	38 (8.44%)	29 (6.95%)	66 (10.14%)	225 (9.0%)
80+ yrs	11 (2.46%)	12 (0.03%)	6 (1.33%)	5 (1.20%)	17 (2.61%)	51 (2.0%)
Total	447	475	450	417	651	2440

Gender: respondents were predominantly male (79.7%). There was a marginally significant difference in gender distribution across catchments (χ^2 =7.97, p=0.09). The sample significantly higher percentage of males than is expected based on the Australian Bureau of Statistics 2006 Census Data for those working in Agriculture, forestry and fishing, where the percentage male was 70.9% (χ^2 =153.51, p=0.00) (see Table 26).

Table 25: Gender of Respondents Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
Male	380 (84.63%)	394 (82.77%)	362 (80.27%)	356 (84.96%)	528 (79.76%)	2020 (82.21%)
Female	69 (15.37%)	82 (17.23%)	89 (19.73%)	63 (15.04%)	134 (20.24%)	437 (17.79%)
Total	449	476	451	419	662	2457

Main occupation: the most frequently listed occupation category by participants was 'primary producer' (eg 'farmer' or 'grazier') this was consistent across the catchment areas (see Table 27). The remaining participants listed a wide variety of occupations including professionals and semi-professionals, trade and heavy industry, government, self employed, and retirees or pensioners. The Northern Rivers and Mt Lofty regions had a much higher proportion of participants identifying as retired/ home duties/ other farm duties /non-specific than other catchments. Also, Mt Lofty had a higher proportion of professionals and semi-professionals than other catchment areas. The differences between catchment areas were significant (χ^2 =490.31, p=0.00).

Table 26: Occupation of Respondents Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Professional/small business/service industry	88 (19.73%)	86 (17.95%)	57 (12.42%)	32 (7.73%)	212 (31.69%)
Trade/labour/heavy industry (non-agriculture related)	39 (8.74%)	65 (13.57%)	36 (7.84%)	68 (16.43%)	71 (10.61%)
Government/agricultural /NRM related	26 (5.83%)	27 (5.64%)	18 (3.92%)	5 (1.21%)	42 (6.28%)
Primary producer (eg farmer, grazier, viticulturist)	222 (49.78%)	179 (37.37%)	300 (65.36%)	271 (65.46%)	128 (19.13%)
Retired/home duties/other farm duties/non-specific	71 (15.92%)	122 (25.47%)	48 (10.46%)	38 (9.18%)	216 (32.29%)
Total	446	479	459	414	669

Formal education: the largest education categories were "Some secondary" (36.12%), and "Tertiary degree, other tertiary, or diploma in agriculture" (22.41%). These proportions were reasonably consistent across catchments, although there were several significant differences (χ^2 =358.89, p=0.00). Mt Lofty had more participants who had completed postgraduate studies than the other regions. Also, the Condamine Alliance area had 10% of participants whose highest level of education was technical or trade, compared with 18% to 22% in the other case study areas.

Table 27: Highest Level of Formal Education Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
No formal schooling/primary	3 (0.68%)	16 (3.38%)	53 (11.86%)	48 (11.46%)	23 (3.52%)
Some secondary	152 (34.31%)	176 (37.13%)	190 (42.51%)	191 (45.58%)	171 (26.19%)
Completed year 12/form 6/HSC/VCE	54 (12.19%)	40 (8.44%)	59 (13.20%)	44 (10.50%)	56 (8.58%)
Technical/trade	81 (18.28%)	103 (21.73%)	45 (10.07%)	76 (18.14%)	136 (20.83%)
Tertiary/diploma in agriculture	125 (28.22%)	105 (22.15%)	90 (20.13%)	48 (11.46%)	178 (27.26%)
Postgraduate	28 (6.32%)	34 (7.17%)	10 (2.24%)	12 (2.86%)	89 (13.63%)
Total	443	474	447	419	653

Length of time lived in district: Tables 29 summarises the years respondents had lived in their local district. Many of the survey respondents were long-term residents of their local district (mean = 32.1 years). This is particularity evident in the Mackay Whitsunday region where the majority of respondents had lived in the district for over 40 years, which is significantly different from the over catchment areas (F=22.69, p=0.00).

Table 28: Years Lived in District Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
Less than 10 years	78 (17.53%)	122 (25.42%)	89 (19.47%)	60 (14.46%)	174 (25.40%)	523 (21.07%)
10-20years	69 (15.51%)	77 (16.04%)	84 (18.38%)	44 (10.60%)	158 (23.07%)	432 (17.41%)
21-40years	132 (29.66%)	117 (24.38%)	112 (24.51%)	68 (16.39%)	196 (28.61%)	625 (25.18%)
41+ years	166 (37.30%)	164 (34.17%)	172 (37.64%)	243 (58.55%)	157 (22.92%)	902 (36.34%)
Total	445	480	457	415	685	2482

Length of time lived on property: Similarly, many survey participants had lived on their property for over 20 years (mean =23.1years). Once again there where significant differences between catchments (F=8.93, p=0.00). Mackay Whitsunday had significantly more respondents who had lived on their property for more than 40 years, while Northern Rivers had significantly more respondents who had lived on their property for less than 10 years.

Table 29: Years Lived on Property Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
Less than 10 years	150 (34.17%)	195 (40.79%)	147 (32.24%)	115 (27.91%)	232 (33.87%)	839 (33.97%)
10-20 years	95 (21.64%)	92 (19.25%)	103 (22.59%)	79 (19.17%)	191 (27.88%)	560 (22.67%)
21-40 years	118 (26.88%)	126 (26.36%)	102 (22.37%)	79 (19.17%)	182 (26.57%)	607 (24.57%)
41+ years	76 (17.31%)	65 (13.60%)	104 (22.81%)	139 (33.74%)	80 (11.68%)	464 (18.79%)
Total	439	478	456	412	685	2470

Family income: respondents were asked about the proportion of family income earned off-farm, with the modal frequency being 0-25%. Only in the 76-100% category was there a significant variation across catchments – Mackay Whitsunday had only 23.7% of its participants in this category where Mt Lofty had 37.4% of its participants in it (χ^2 =78.50, p=0.00).

Table 30: Proportion of Family Income Earned Off-farm Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
0%	3 (0.68%)	4 (0.85%)	7 (1.58%)	4 (0.98%)	0 (0.00%)
1-25%	208 (46.95%)	223 (47.55%)	217 (49.10%)	205 (50.00%)	337 (52.33%)
26-50%	44 (9.93%)	42 (8.96%)	47 (10.63%)	53 (12.93%)	26 (4.04%)
51-75%	53 (11.96%)	60 (12.79%)	61 (13.80%)	51 (12.44%)	40 (6.21%)
76-100%	135 (30.47%)	140 (29.85%)	110 (24.89%)	97 (23.66%)	241 (37.42%)
Total	443	469	442	410	644

Participants were also asked about their perceived sufficiency of their family income, Table 32 summarises the results. There where significant differences in responses across the catchments (χ^2 =112.63, p=0.00). Mt Lofty had significantly more respondents indicate that they had 'enough for everything you want' while Mackay Whitsunday had significantly more respondents indicate they had 'not enough to buy necessities'.

Table 31: Sufficiency of Family Income Earned Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty
Not enough to buy necessities	35 (8.03%)	46 (9.98%)	35 (7.88%)	45 (11.00%)	46 (7.35%)
Enough to meet necessities only	94 (21.56%)	92 (19.96%)	119 (26.80%)	108 (26.41%)	84 (13.42%)
Enough for only some things you want	165 (37.84%)	176 (38.18%)	156 (35.14%)	155 (37.90%)	179 (28.59%)
Enough for about everything you want	98 (22.48%)	93 (20.17%)	87 (19.59%)	69 (16.87%)	188 (30.03%)
Enough for about everything you want plus some saving	44 (10.09%)	54 (11.71%)	47 (10.59%)	32 (7.82%)	129 (20.61%)
Total	436	461	444	409	626

Property Area - The properties owned by the survey sample ranged from 1ha to 64,860ha (*M*=556ha). There were only six participants who possessed properties of 20,000ha of

more – 4 from Central West and 2 from Mackay Whitsunday. When these outliers were removed, the mean was reduced to 458ha. There were significant differences between catchments (F=298.79, p=0.00). – 52.9% of Mt Lofty respondents lived on properties under 10ha, and a further 36.8% lived on properties of 10-100ha. The largest property from this catchment was only 2,880ha. Northern Rivers also stood out, having just over 70% of its participants in one category – 10 to 100ha. The Central West had the greatest percentage of participants – 26.5% - with properties over 1000ha, which was significantly more than other catchments; Northern Rivers, Mackay Whitsunday and Mt Lofty each having less than 6% of participants with properties over 1000ha.

Table 32: Area of Property Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
Under 10ha	4 (0.91%)	1 (0.21%)	5 (1.10%)	0 (0.00%)	354 (52.91%)	364 (14.80%)
10-100ha	179 (40.59%)	339 (70.33%)	128 (28.13%)	158 (38.26%)	246 (36.77%)	1050 (42.68%)
101-1000ha	141 (31.97%)	125 (25.93%)	252 (55.38%)	233 (56.42%)	61 (9.12%)	812 (33.01%)
1001-5000ha	91 (20.63%)	13 (2.70%)	62 (13.63%)	14 (3.39%)	8 (1.20%)	188 (7.64%)
5,001-10,000ha	16 (3.63%)	2 (0.41%)	3 (0.66%)	0 (0.00%)	0 (0.00%)	21 (0.85%)
10,001+ ha	10 (2.27%)	2 (0.41%)	5 (1.10%)	8 (1.94%)	0 (0.00%)	25 (1.02%)
Total	441	482	455	413	669	2460

Numbers of full-time and part-time workers on the property, in addition to the survey respondent were also considered and are summarised in Tables 33 and 34. Just over 26% of landholders had additional full-time workers, the majority of these had one to three additional full-time workers (24.65%). There where marginally significant differences between catchment responses (F=4.09, p=0.03). Mt Lofty had a greater proportion of respondents indicate that they had no additional full time workers.

Table 33: Number of Full Time Workers other than Respondent per Farm Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
0	328 (73.71%)	350 (78.83%)	302 (65.94%)	274 (67.16%)	387 (83.41%)	1641 (73.95%)
1 to 3	109 (24.49%)	93 (20.95%)	151 (32.97%)	129 (31.62%)	65 (14.01%)	547 (24.65%)
4 to 6	5 (1.12%)	1 (0.23%)	4 (0.87%)	5 (1.23%)	9 (1.94%)	24 (1.08%)
7 and over	3 (0.67%)	0 (0.00%)	1 (0.22%)	0 (0.00%)	3 (0.65%)	7 (0.32%)
Total	445	444	458	408	464	2219

Greater numbers of respondents had part time workers. Once again the majority had one to three part-time worker (see Table 35). There were no significant differences between the catchments (F=0.88, p=0.45)

Table 34: Number of Part Time Workers other than Respondent per Farm Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
0	247 (55.38%)	226 (50.11%)	256 (55.90%)	190 (46.57%)	344 (67.98%)	1263 (55.66%)
1 to 3	181 (40.58%)	212 (47.01%)	192 (41.92%)	210 (51.47%)	138 (27.27%)	933 (41.12%)
4 to 6	14 (3.14%)	7 (1.55%)	7 (1.53%)	6 (1.47%)	12 (2.37%)	46 (2.03%)
7 and over	4 (0.90%)	6 (1.33%)	3 (0.66%)	2 (0.49%)	12 (2.37%)	27 (1.19%)
Total	446	451	458	408	506	2269

At the end of the last financial year, 59% of survey respondents had more than 80% equity in their property. Mt Lofty had 67.2% of participants responding to this question in this category, while Mackay-Whitsunday had only 45.4% (χ^2 =116.57, p=0.00).

Table 35: Percentage of Farm Equity Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
below 20%	27 (6.29%)	27 (6.18%)	27 (6.49%)	30 (7.79%)	33 (5.41%)	144 (6.32%)
21-40%	10 (2.33%)	32 (7.32%)	17 (4.09%)	43 (11.17%)	26 (4.26%)	128 (5.62%)
41-60%	40 (9.32%)	49 (11.21%)	71 (17.07%)	83 (21.56%)	65 (10.66%)	308 (13.53%)
61-80%	83 (19.35%)	58 (13.27%)	82 (19.71%)	54 (14.03%)	76 (12.46%)	353 (15.50%)
More than 80%	269 (62.70%)	271 (62.01%)	219 (52.64%)	175 (45.45%)	410 (67.21%)	1344 (59.03%)
Total	429	437	416	385	610	2277

Respondents were asked to specify the main farming activities undertaken on their property. Across the catchment areas grazing was nominated as the major farming activity undertaken. A summary of all responses in included in Table 36. Significant differences can be seen across the catchment areas, this is to be expected as the regions are efficient in a verity of different activities.

Table 36: Main Farming Activities Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	χ^2 value
Grazing	287 (55.73%)	254 (54.39%)	290 (44.68%)	162 (31.52%)	234 (46.89%)	358.22***
Intensive livestock	11 (5.05%)	25 (17.56%)	51 (4.16%)	7 (7.98%)	25 (30.66%)	56.63***
Horticulture	26 (5.05%)	82 (17.56%)	27 (4.16%)	41 (7.98%)	153 (30.66%)	90.67***
Native veg/timber	23 (4.47%)	51 (10.92%)	23 (3.54%)	15 (2.92%)	65 (13.03%)	53.11***
Farming	147 (28.54%)	13 (2.78%)	222 (34.21%)	71 (13.81%)	22 (4.41%)	548.88***
Other	21 (4.08%)	42 (8.99%)	36 (5.55%)	218 (42.41%)	0 (0.00%)	796.98***
Total	515	467	649	514	499	

Note: Respondents could tick all that applied therefore respondents can fall into more than one category

Table 37 illustrates that the majority of properties included in this study where not managed as lifestyle blocks. There was a significant differences in the proportions of properties being managed as lifestyle blocks across the catchments (χ^2 =254.77, p=0.00). The majority of respondents from the Central West managed their property as a lifestyle block. Conversely, over 90% of the Condamine Alliance and Mackay Whitsunday properties where not managed as lifestyle blocks.

Table 37: Property Managed as a Lifestyle Block Across Catchments

	Central West	Northern Rivers	Condamine Alliance	Mackay Whitsunday	Mt Lofty	Total
Not a lifestyle block	95 (44.60%)	348 (72.05%)	415 (90.81%)	372 (91.85%)	459 (67.01%)	1689 (75.30%)
Lifestyle block	118 (55.40%)	135 (27.95%)	42 (9.19%)	33 (8.15%)	226 (32.99%)	554 (24.70%)
Total	213	483	457	405	685	2243

Appendix 4: Results from the Factor Analysis and Other Validity Tests

Factor Analysis

A principal components factor analysis with a non-orthogonal rotation was used to derive attitudinal constructs for use in both the regression and factor analysis. The KMO indicator of 0.828 demonstrated that the use of factor analysis was appropriate. Items with loadings less than 0.5 and communalities of less than 0.48 were excluded. An eight factor solution was justified based on total variance explained of 61.3% and a visual inspection of the scree plot. An eight factor solution resulted, and the very small percentage of residuals with absolute value larger than 0.05 (14%) suggest that this is a robust solution.

The pattern matrix was used to identify the various constructs, as shown in Table 39. The constructs are identified by examining which variables load most highly on the each construct. It is apparent that there are few cross-loadings and that most variables have high loadings with their respective constructs which is indicative of both discriminant and convergent validity. However, more formal tests of both of these forms of validity are reported below.

The eight constructs identified in the pattern matrix are:

1. Trust
2. Profit focused
3. Dissatisfaction
4. Cash constrained
5. Innovator
6. Environmental responsibility
7. Time available
8. Stewardship

Table 38: Pattern Matrix from the Factor Analysis

Pattern Matrix [a]

	Component							
	1	2	3	4	5	6	7	8
Programs are run by a few big interests looking out for themselves	-.779							
Programs waste a lot of taxpayer money	-.766							
Can trust organisations involved in delivering programs to do what is right most of the time	.762							
It's a mistake to get involved with these programs because they change	-.724							
People running programsare smart and usually know what they are doing	.703							
Farming is about dollars and cents		.817						
Max annual return most important aim		.803						
Farm is a business enterprise		.780						
Focus on profitiability when planning future farming activities		.734						
Program was well administered			-.839					
Application procedure was straightforward			-.789					
Finding the right person to contact when there were problems was easy			-.785					
The program achieved its objectives			-.767					
The program was beneficial			-.751					
Like to try new things, finding cash to enable them is difficult				-.787				
Can not afford to make even a small poor decision				-.768				
Can not afford to experiment due to low prices/high costs				-.758				
Can afford to take some risks/experiment with new ideas				.657				
Willing to try new things					.824			
Open to new ideas					.812			
Knowing about new technology is important					.647			
My right to do what I want with my property balanced with enviro concerns						.860		
Community can expect landholders to adopt practices leading to enviro improvements						.712		
Reduced production (short-term) justifiied for long-term enviro benefits						.506		
Have time to improve farm as I would like to							.804	
Have time to participate in field days							.735	
Difficult to find time to complete existing farm tasks							-.721	
Land stewardship more important than anything else in farming								-.793
Try to preserve the beauty of countryside								-.558
Like to leave land in better condition than I found it								-.523

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Validity and Reliability Tests

Reliability

Reliability was tested by estimating Chronbach alphas for each of the scales. Chronbach alpha is the most common method used to test reliability. It is calcualtd by estimating the average of all of the split half reliabilities, and should at least be above 0.6 (Hair *et al* 2006). The results indicate that all of the constructs are reliable apart from Stewardship. However, the reliabilities for Environmental Responsibility and Time Available, while acceptable, are relatively low.

Table 39: Chronbach Alphas for all of the Attitudinal Scales

Construct	Chronbach Alpha
Trust	0.812
Profit focused	0.816
Dissatisfaction	0.846
Cash constrained	0.753
Innovator	0.714
Environmental responsibility	0.626
Time available	0.647
Stewardship	0.462

Validity

Confirmatory factor analysis was used to test both convergent and discriminant validity using the approaches recommended by Hair *et al* (2006). For the convergent validity tests, as shown in Table 40, all variables significantly loaded on to their respective constructs. However, there was moderately high variation for the Time Constrained construct, with loadings ranging from 0.546 to 1. The loadings for Stewardship and Environmental Responsibility also have moderate variation. Thus for most constructs there is evidence of convergent validity, however for the three constructs mentioned there is some but limited evidence of convergent validity.

Table 40: Tests of Convergent Validity

			Estimate	S.E.	C.R.	P
q6.10d_R_1	<---	Factor 1	1			
q6.10b_R_1	<---	Factor 1	0.913	0.03	30.672	***
q6.10c_1	<---	Factor 1	0.687	0.026	26.503	***
q6.10a_1	<---	Factor 1	0.796	0.026	30.053	***
q6.10f_R_1	<---	Factor 1	0.84	0.028	29.53	***
q2.1p_1	<---	Factor 2	1			
q2.1r_1	<---	Factor 2	1.338	0.044	30.169	***
q2.1j_1	<---	Factor 2	1.408	0.045	31.261	***
q2.1f_1	<---	Factor 2	1.128	0.04	27.989	***
q3.5b_1	<---	Factor 3	1			
q3.5e_1	<---	Factor 3	1.194	0.038	31.537	***
q3.5c_1	<---	Factor 3	1.152	0.037	30.972	***
q3.5f_1	<---	Factor 3	1.253	0.037	33.664	***
q3.5a_1	<---	Factor 3	0.871	0.031	27.695	***
q2.2aR_1	<---	Factor 4	1			
q2.2c_1	<---	Factor 4	1.277	0.059	21.502	***
q2.2e_1	<---	Factor 4	1.448	0.066	21.793	***
q2.2j_1	<---	Factor 4	1.089	0.052	20.935	***
q2.1k_1	<---	Factor 8	1			
q2.1h_1	<---	Factor 8	1.374	0.146	9.431	***
q2.1t_1	<---	Factor 8	1.439	0.166	8.655	***
q2.2l_1	<---	Factor 7	1			
q2.2f_1	<---	Factor 7	0.637	0.042	15.135	***
q2.2hR_1	<---	Factor 7	0.692	0.045	15.391	***
q2.1o_1	<---	Factor 6	1			
q2.1q_1	<---	Factor 6	0.546	0.04	13.689	***
q2.1n_1	<---	Factor 6	0.734	0.052	14.197	***
q2.1d_1	<---	Factor 5	1			
q2.1i_1	<---	Factor 5	0.771	0.037	20.603	***
q2.1b_1	<---	Factor 5	0.989	0.044	22.402	***

Discriminant validity was tested by comparing the variance-extracted for each of the two constructs with the square of the correlation estimate between the two constructs. For discriminant validity to hold, the variance extracted estimate should exceed the squared correlation estimate. This testing indicated that discriminant validity was present for all pairs of constructs apart from environmental responsibility and stewardship, and stewardship and innovator (see Table 42). If the stewardship construct were removed, the remaining two variables would have discriminant validity.

Thus overall the testing of both reliability and validity supports the further use of all constructs apart from stewardship.

Table 41: Variance Extracted and Squared Correlation Results for the Discriminant Validity Tests

	Variance Extracted			
Factor 1	0.467			
Factor 2	0.531			
Factor 3	0.526			
Factor 4	0.452			
Factor 5	0.490			
Factor 6	0.388			
Factor 7	0.402			
Factor 8	0.281			
			Correlations	**Squared Correlations**
Factor 1	<-->	Factor 2	-0.296	0.088
Factor 1	<-->	Factor 3	0.268	0.072
Factor 1	<-->	Factor 4	-0.228	0.052
Factor 1	<-->	Factor 8	0.217	0.047
Factor 1	<-->	Factor 7	0.155	0.024
Factor 1	<-->	Factor 6	0.473	0.224
Factor 1	<-->	Factor 5	0.209	0.044
Factor 2	<-->	Factor 3	-0.044	0.002
Factor 2	<-->	Factor 4	0.432	0.187
Factor 2	<-->	Factor 8	-0.074	0.005
Factor 2	<-->	Factor 7	0.038	0.001
Factor 2	<-->	Factor 6	-0.372	0.138
Factor 2	<-->	Factor 5	0.040	0.002
Factor 3	<-->	Factor 4	-0.021	0.000
Factor 3	<-->	Factor 8	0.055	0.003
Factor 3	<-->	Factor 7	0.085	0.007
Factor 3	<-->	Factor 6	0.128	0.016
Factor 3	<-->	Factor 5	0.073	0.005
Factor 4	<-->	Factor 8	0.051	0.003
Factor 4	<-->	Factor 7	-0.326	0.106
Factor 4	<-->	Factor 6	-0.235	0.055
Factor 4	<-->	Factor 5	0.032	0.001
Factor 8	<-->	Factor 7	0.102	0.010
Factor 8	<-->	Factor 6	0.608	0.370
Factor 8	<-->	Factor 5	0.612	0.375
Factor 7	<-->	Factor 6	0.134	0.018
Factor 7	<-->	Factor 5	0.138	0.019
Factor 6	<-->	Factor 5	0.375	0.141

Appendix 5: Differences in the Use of Information Channels Across Regions

In this appendix the use of information channels within each of the five regions is explored.

Central West

Sources of information which Central West respondents indicated were useful or very useful include other farmers (86.77%), the rural press (86.33%), and field days (78.90%). Sources of information which were 'never used' by large proportions of respondents were all 'people' sources: extension officers from industry (60.88%), or from the CMA (57.1%), and landcare groups (55.76%).

Table 42: Usefulness of Farming Information Sources in the Central West Region

	Never Used	Of little Use	Useful	Very useful
Print Media				
Rural Press	6.99	6.69	48.94	37.39
DPI/DNR brochures	21.95	13.41	47.26	17.38
Industry Newsletters	21.67	14.86	52.94	10.53
Landcare/Regional body newsletters	35.71	19.25	38.82	6.21
Farm Journals	28.79	15.79	42.72	12.69
People				
Private agronomist/consultant	38.13	6.56	29.06	26.25
Landcare group	55.76	18.38	22.74	3.12
CMA/Regional Body extension officers	57.10	12.04	25.62	5.25
DPI/DNR extension officers	47.06	13.31	29.72	9.91
Industry Extension officers	60.88	14.20	21.77	3.15
Other farmers	4.00	9.23	57.23	29.54
Specialist training programs	43.08	10.06	33.96	12.89
Field days	11.01	10.09	59.33	19.57
Electronic Media				
Internet	26.79	7.17	45.79	20.25
TV	16.00	31.69	43.69	8.62
Radio	13.76	19.88	49.24	17.13

Northern Rivers

In this region, 'other farmers' stood out as the most useful source of information (rated as useful or very useful by 82.84% of respondents). Other useful sources of information include the rural press (64.2%), field days (61.9%) and radio (60.12%). Other 'people' sources were reportedly never used by large proportions of respondents (54% to 74%).

Table 43: Usefulness of Farming Information Sources in the Northern Rivers Region

	Never Used	Of little Use	Useful	Very useful
Print Media				
Rural Press	19.23	16.57	44.08	20.12
DPI/DNR brochures	29.04	15.57	44.91	10.48
Industry Newsletters	29.13	15.02	37.84	18.02
Landcare/Regional body newsletters	49.70	21.04	25.00	4.27
Farm Journals	33.84	15.24	42.38	8.54
People				
Private agronomist/consultant	55.05	7.95	23.55	13.46
Landcare group	60.49	13.98	20.97	4.56
CMA/Regional Body extension officers	74.31	10.09	11.01	4.59
DPI/DNR extension officers	56.88	12.84	23.24	7.03
Industry Extension officers	65.12	12.65	17.59	4.63
Other farmers	9.47	7.69	58.58	24.26
Specialist training programs	54.29	11.04	26.69	7.98
Field days	25.30	12.80	45.24	16.67
Electronic Media				
Internet	37.46	7.12	38.70	16.72
TV	18.13	27.79	45.32	8.76
Radio	19.35	20.54	46.43	13.69

Condamine Alliance

In the Condamine Alliance region, the most useful were other farmers (86.6%), the rural press (73.33%) and DPI brochures (70.53%). Sources never used by over 50% of respondents included regional body extension officers or advisory staff, industry extension officers or advisory staff, and specialist training programs.

Table 44: Usefulness of Farming Information Sources in the Condamine Alliance Region

	Never Used	Of little Use	Useful	Very useful
Print Media				
Rural Press	14.81	11.85	51.11	22.22
DPI/DNR brochures	13.35	16.12	54.91	15.62
Industry Newsletters	19.40	14.93	50.50	15.17
Landcare/Regional body newsletters	27.16	20.30	43.15	9.39
Farm Journals	22.61	13.82	51.51	12.06
People				
Private agronomist/consultant	39.43	9.02	25.26	26.29
Landcare group	35.13	14.62	38.21	12.05
CMA/Regional Body extension officers	55.35	19.84	19.06	5.74
DPI/DNR extension officers	34.52	18.53	40.61	6.35
Industry Extension officers	52.97	18.60	23.26	5.17
Other farmers	4.96	8.44	59.31	27.30
Specialist training programs	51.17	14.10	27.68	7.05
Field days	20.20	11.11	54.80	13.89
Electronic Media				
Internet	31.46	14.83	40.92	12.79
TV	13.57	36.18	43.97	6.28
Radio	13.32	18.59	54.52	13.57

Mackay Whitsunday

Respondents in this region found a much wider range of sources to be useful or very useful. The most useful were other farmers (93.58%), industry newsletters (84.72%), field days (77.17%) and farm journals (73.84%). Sources never used by respondents included Landcare group (56.18%) and private agronomist or consultant (46.81%).

Table 45: Usefulness of Farming Information Sources in the Mackay Whitsunday Region

	Never Used	Of little Use	Useful	Very useful
Print Media				
Rural Press	25.89	10.08	49.59	14.44
DPI/DNR brochures	17.58	16.76	51.10	14.56
Industry Newsletters	8.58	6.70	53.62	31.10
Landcare/Regional body newsletters	34.46	22.03	37.57	5.93
Farm Journals	15.26	10.90	51.77	22.07
People				
Private agronomist/consultant	46.81	7.48	26.04	19.67
Landcare group	56.18	17.13	23.60	3.09
CMA/Regional Body extension officers	37.18	10.99	32.68	19.15
DPI/DNR extension officers	31.42	16.12	37.70	14.75
Industry Extension officers	27.15	10.25	38.23	24.38
Other farmers	2.94	3.48	59.63	33.96
Specialist training programs	39.49	15.06	37.22	8.24
Field days	14.40	8.42	52.17	25.00
Electronic Media				
Internet	22.82	14.65	46.76	15.77
TV	17.62	29.81	43.90	8.67
Radio	11.26	23.06	50.67	15.01

Mt Lofty Ranges

In the Mt Lofty region, 'other farmers' was the most useful source of information, though it was rated as useful or very useful by a much smaller proportion of respondents than in other regions (66.88%). Other useful sources of information include the rural press (56.98%), Landcare newsletters (52.44%), internet (52.37%), and DPI/DNR brochures (52.06%). 'People' sources other than 'other farmers' were reportedly never used by large proportions of respondents (48% to 79.45%).

Table 46: Usefulness of Farming Information Sources in the Mt Lofty Region

	Never Used	Of little Use	Useful	Very useful
Print Media				
Rural Press	30.98	12.04	43.34	13.64
DPI/DNR brochures	35.58	12.36	44.81	7.25
Industry Newsletters	47.80	12.03	32.88	7.29
Landcare/Regional body newsletters	28.99	18.57	44.30	8.14
Farm Journals	50.92	10.98	31.95	6.16
People				
Private agronomist/consultant	64.94	6.51	17.03	11.52
Landcare group	55.89	11.28	24.75	8.08
CMA/Regional Body extension officers	67.40	9.29	18.92	4.39
DPI/DNR extension officers	65.49	10.39	19.77	4.36
Industry Extension officers	79.45	8.22	10.27	2.05
Other farmers	23.91	9.21	49.43	17.45
Specialist training programs	66.16	6.43	21.66	5.75
Field days	48.03	9.34	32.46	10.16
Electronic Media				
Internet	36.82	10.80	38.63	13.75
TV	32.90	25.65	35.97	5.48
Radio	39.44	24.71	30.11	5.73