

# **Encouraging Participation in Market Based Instruments and Incentive Programs: Literature Review**

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**Working Paper No. 2 from the Project “Impediments to the Uptake of Market Based Instruments”**

## **About the Authors**

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## **Impediments to the Uptake of Market Based Instruments: Project Description**

This project is funded by Land and Water Australia under their Social and Institutional Research Program. Support for this project is also being provided by the North Coast Catchment Management Authority (NSW), Central West Catchment Management Authority (NSW), Queensland Department of Natural Resources, Mines and Water, Charles Sturt University and CSIRO.

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 is being lead by Mr Ray Baker and Associate Professor Mark Morrison. Other members of the project team include Dr Jeannette Stanley (Queensland Department of Natural Resources, Mines and Water), Dr John Ward (CSIRO), Ms Jenni Greig (Charles Sturt University) and Professor Eddie Oczkowski (Charles Sturt University).

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### **Other working papers from this project:**

Jeanette Stanley, Beth Clouston and Ray Baker, *Understanding Land Manager Constraints to the Adoption of Changed Practices or Technological Innovations*, Working Paper No. 1.

## **Abstract**

The purpose of this working paper is to review the literature to identify what has been learnt about how to design and implement market-based instruments (MBIs) and incentive programs to achieve maximum participation of farmers. Three main questions are answered in this literature review. The first of these is what are the features or characteristics of MBIs and incentive programs that encourage participation? As might be expected, greater compensation and lesser required environmental outcomes will increase participation. However, it is found that other design features influence participation, including flexibility, simplicity, duration of contacts and use of group incentives.

The next question considered is how to communicate and deliver MBIs and incentive programs to maximise participation. Several different ways to communicate MBI and incentive programs are examined including the use of advertising, workshops, through facilitators/extension officers, use of experimental economics workshops and via existing networks. Each of the approaches has their advantages and limitations and there is evidence that they differ in their relative effectiveness. An important finding reported in this review is that the selection of an appropriate communication strategy depends on the characteristics of the market and the organisational constraints faced.

The third question that is answered 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, but also for informing instrument design and selection. Certain characteristics of those more likely to participate in MBIs or incentive programs are identified, relating to sociodemographics, attitudes to government and the environmental programs considered, as well as farm characteristics. However it was also apparent that different kinds of farms and farmers were more likely to be involved in different kinds of programs. This suggests that there is a role for targeting MBIs and incentive programs across catchments or sub-catchments as farm and farmer characteristics change.

Studies that have sought to identify farmer segments in terms of participation in natural resource management programs are also reviewed. These studies are reviewed because targeting of communication messages and tailoring of MBIs and incentives is easier if different groups of farmers with specific characteristics can be identified. These segmentation studies seek to group farmers in terms of their styles of farming, business attitudes, learning behaviour, environmental attitudes or other attitudinal constructs. The results suggest that there are farmer segments that differ in their preferences and propensity to be involved in incentive programs. However, given the limited nature of these studies further research is needed to identify the appropriate attitudinal or behavioural constructs for identifying these segments, as well as examine how participation in both incentive programs and MBIs differs across the segments.

## 1. Introduction

Participation rates in market based instruments (MBIs) and incentive programs differ widely. Some incentive schemes such as the Environmentally Sensitive Areas Scheme in the United Kingdom have achieved participation rates in excess of 70% (Brotherton 1991), while many other schemes have achieved participation of about 10% or less (eg Ducos and Dupraz 2006). What explains this wide divergence in farmers' participation in MBIs and incentive programs? The purpose of this working paper is to review the literature to identify what has been learnt about how to design and deliver MBIs and incentive programs to achieve maximum participation of farmers.

Three main questions are answered in this literature review. The first of these is what are the features or characteristics of MBIs and incentive programs that encourage participation? It would be expected that a carefully designed program would be more likely to lead to participation than one less well designed. However, it is often difficult to know which features are best in terms of encouraging participation. Certainly one would expect farmers to participate more if they are paid more, or if a program is more compatible with farmers existing practices. However, there are a number of other design issues where the effects on participation are less clear: which types of auction mechanisms are most preferred, for example, or what duration of contract is preferred? Literature from both Australia and overseas on how to design MBIs to maximise participation is reviewed in Section 2 of this working paper.

The next question considered is how to communicate and deliver MBIs and incentive programs to maximise participation. This is a different question to design; the focus is on how to communicate the program and help farmers to be involved, once the structure of the program has been designed. The question of how to best communicate and deliver an MBI or incentive program has received much less attention in the literature than questions of design, or who tends to participation in these programs. Nonetheless it is a particularly important issue in terms of participation. There are numbers of ways of communicating an MBI or incentive program, such as through the use of advertising, workshops, through facilitators/extension officers, use of experimental economics workshops and via

existing networks. The evidence from the literature about the merits of each of these approaches and their effect on participation is discussed in Section 3.

The third question that is answered focuses on understanding who participates in MBIs and incentive programs. A large part of the literature has focused on this question. Understanding who participates in programs is important as it can be helpful for providing information about how to target communication messages to those most likely to participate. It can also be useful for indicating the reach of a program. This information can then be used for program design. Thus if smaller or larger farms are not participating, it may indicate that there are aspects of the program that are not suitable for these farms, and that an alternative instrument or a modification to the existing design may be needed. The literature examining the characteristics of those who participate in MBIs and incentive programs is examined in Section 4.

One of the objectives of this project is to go beyond simply identifying the characteristics of those who participate in MBIs and incentive programs and attempt to identify market segments amongst farmers. Farmer segments represent different types of farmers that can be classified according to their attitudes to business, innovation, environment, government, their information seeking behaviour and possibly other constructs. An advantage of identifying different farmer segments is that this can provide more detailed information for the selection, design and targeting of MBIs and incentive programs. Knowing which segment predominates in a sub-catchment, and the preferences the segment has for a particular MBI or incentive program – and possibly the segment's preferences for specific design features as well – will allow for much better selection and tailoring of these programs. Therefore in Section 5 we review the existing literature relating to the segmentation of farmers in the context of natural resource management.

Before commencing this review, it should be noted that this working paper does not examine the natural resource management literature relating to technology adoption. This literature has important messages for the design, implementation and targeting of MBIs and incentive programs, and has therefore been separately examined in the first working paper for this project. Secondly, it is appropriate to define what is meant by

‘market based instrument’ and ‘incentives’ as there is some ambiguity in the literature. We define market based instruments as any program where there is the creation of a market like mechanism for determining the price paid for an environmental outcome. Examples include tenders, offset schemes, cap and trade schemes. Incentive programs include any program which creates an additional incentive for an environmental outcome. This may or may not include the payment of money to farmers. Examples include devolved grants, stewardship payments, tax subsidies (eg Landcare) and provision of services or equipment.

## **2. Characteristics of Market Based Instruments and Incentives that encourage participation**

Careful design of MBIs and incentive programs is an obvious way to encourage greater participation in MBIs and incentives. There have been many instances where there has been poor participation in MBIs and the reason for this lack of participation has been poor instrument design. For example, almost all of the 37 water quality trading schemes in the USA have not yielded any trades, primarily because of poor instrument design (Randall 2003). Other market based instruments and incentives can also be subject to poor instrument design, and design can increase participation (see Windle, Rolfe, Whitten, Alam, and Street 2005 and Rolfe, Windle, Reeson and Whitten 2006).

MBIs can be considered to be bundles of attributes, similar to other products. These attributes include (see Hatton MacDonald, Connor and Morrison 2004, Clayton 2005):

- Target environmental outcomes
- Compensation payments
- Application process
- Duration of contracts
- Entry requirements
- Constraints imposed
- Management institution (eg government versus non-government)

When developing an MBI or incentive, design decisions must be made for some or all of these attributes. The decisions made would be expected to influence the benefits associated with implementing a MBI or incentive, and therefore its likely uptake.

### ***Australian Studies***

Several Australian studies have examined the characteristics of MBIs that encourage participation including Clayton (2005), Rolfe, McCosker and Windle (2005) and Rolfe *et al* (2006). Clayton (2005) conducted a study in support of the Western Australian pilot of the Auction for Landscape Recovery. Clayton (2005) reported the results from interviews conducted with farmers in the case study area indicating the factors that lead to participation, as well as some quantitative analysis of factors influencing participation. Rolfe *et al* (2005) and Rolfe *et al* (2006) also reported on a conservation auction process in the Southern Desert Uplands of Queensland. However, in contrast to Clayton (2005), Rolfe *et al* (2005) and Rolfe *et al* (2006) reported experimental results from an experimental economics application and choice modelling survey.

The results from these studies indicate that both payments and extent of environmental outcomes that must be achieved influence the probability of participating in an auction scheme. Clayton (2005) reported that farmers were more likely to participate when the government covers the full cost of nature conservation works. Similarly, Rolfe *et al* (2006) found that the magnitude of payment influenced participation. In terms of environmental outcomes, both the amount of environmental outcomes that must be achieved and flexibility in the type of outcomes that can be achieved influenced participation. In their choice modelling study, Rolfe *et al* (2006) found that the required width of buffer strip (-) and minimum biomass level (-) influenced participation. Both Rolfe *et al* (2005) and Clayton (2005) reported that inclusion of additional acceptable management options for achieving given environmental outcomes or broadening of possible environmental outcomes influenced participation.

Apart from insights on payments and environmental outcomes, these studies also explored other design features that promote participation. Simplicity was one attribute that was identified. Clayton (2005) noted the importance of a simple and

quick application process, while Rolfe *et al* (2005) and Windle *et al* (2005) highlighted the need for an easy-to-understand contract process, having a realistic monitoring process, appropriately defining the length of contract and the frequency of payments. Clayton (2005) also reported a problem with multiple-round auctions – those who were unsuccessful in the first round were much less likely to re-tender. Finally, Rolfe *et al* (2005) and Windle *et al* (2005) reported several other experimental findings, including that participation is much higher when group bidding mechanisms<sup>1</sup> are used, with single-stage rather than two-stage auctions<sup>2</sup>, and when limited cooperation (ie sealed bid) mechanisms are used.

### **Overseas studies**

A few overseas studies have examined the characteristics of MBIs that influence participation. These include studies by Wossink and van Wenum (2003) in the Netherlands, Horne (2006) in Finland, Ducos and Dupraz (2006) in France, and Esseks and Kraft (1988) in the USA. The first three studies investigated stewardship payments, while the final study involved a tender. The French and Dutch studies examined biodiversity incentives, the Finnish study focused on forestry, and the US study focused on conservation reserves. The French and Finnish study used choice modelling, while the other two studies used alternative survey based approaches.

There are several consistent findings across the four studies. Not surprisingly, the level of compensation was found to influence participation in all four studies. In addition, contract length influenced participation, with farmers favouring shorter contracts. Flexibility was also a theme across the four studies although the three studies used different measures of this construct (eg what land could be included, what the land could be used for, farmers having an opportunity to negotiate, cancellation policy). Horne (2006) also found that the identity of the initiator of the contract influenced participation. Finally, Ducos and Dupraz (2006) reported that the amount of paper work involved was negatively related to farmer participation.

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<sup>1</sup> An example of a group bidding mechanism is where a group of farmers rather than a single farmer submits a tender

<sup>2</sup> In a single stage auction bidders submit their bids once and the lowest price bid wins the contract. In a two stage auction the number of possible suppliers is reduced in the first stage of the auction and successful bidders are identified in the second stage of the auction.

Thus in summary, the literature reveals a number of different design characteristics of MBIs that can encourage participation. These include:

- Extent of compensation payments – higher payments are preferred to lower payments
- Contract flexibility – the ability to negotiate requirements, methods of achieving outcomes and environmental outcomes
- Contract length – preferably shorter rather than longer, and with the ability to opt-out
- Simplicity – easy for farmers to understand (both the process and its purpose), and minimum administration costs
- Use of group contracts

### **3. Methods of Communicating and Delivering Market Based Instruments and Incentive Programs**

While the characteristics of an MBI or incentive program are important, design features are not the only factor that will influence participation. The methods used to communicate and deliver the programs also critically influence participation. In the marketing literature a well known concept is the marketing mix, also known as ‘the 4Ps’. The marketing mix is a heuristic which summarises four important variables for encouraging sales, especially of fast moving consumer goods. The variables are product (i.e. the product features or attributes), price, promotion and place (i.e. the method of distribution or delivery). Using this terminology, the discussion in the previous section covers the issue of selecting product features and appropriate prices. However, the question of how to promote MBIs and incentive programs and distribute them, including the provision of appropriate support services, has not been considered. The empirical evidence suggests that these can be important issues for participation, and are therefore considered in this section.

## ***Advertising***

The use of advertising would be expected to increase program awareness and interest, thus leading to greater participation. However, despite the potential importance of advertising, the effect of advertising on program participation is not well known. Moreover, much of the evidence currently available is anecdotal. In one study the achievement of particularly high participation rates was attributed to program design and the extensive promotion of the program (Brotherton 1991). However, other studies have reported contrary results – Ha, O’Neill, Strappazzan and Stoneham (2003) found that amongst those who were aware of the Bush Tender<sup>3</sup> program, hearing about it on the radio (rather than through other means) actually decreased participation. Similarly, Lynch and Lovell (2003) found that those who heard about the program through newspapers were less likely to participate than those who heard through farmer-to-farmer programs or landowner meetings. These findings indicate that advertising is perhaps not as effective as other forms of promotion in encouraging participation, although they may not be less cost-effective. Nonetheless, for those who are not well connected in the community or unable to attend meetings, advertising may still be important for creating awareness.

There is little information available about the relative effectiveness of alternative forms of advertising in this context. One of the few studies that have considered what forms of information farmers use in their decision making is Darbyshire (1999), who asked land managers where they mainly find out about environmental matters important to their property (Table 1). Radio and TV seem to be relatively ineffective. However, local papers, newsletters and agricultural publications are relatively important sources of information for decision making.

While this information is useful, many questions remain about the effect of advertising on participation. Further research is needed to understand the influence of increasing expenditure on advertising, and changing the methods used to advertise, on program participation.

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<sup>3</sup> Information regarding the Bush Tender program can be found at:  
<http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/15F9D8C40FE51BE64A256A72007E12DC8062D358172E420C4A256DEA0012F71C>

**Table 1: Farmers' Sources of Information**

Source of information	Number of farmers
Local Papers	38
Other Land managers	37
Agricultural Publications	43
Landcare Groups	58
Newsletters	46
Radio/TV	11
Government Departments	30
Council	11
Other	18

Source: Darbyshire (1999)

### ***Seminars and workshops***

The provision of seminars and workshops is another method that can be used to promote an incentive scheme or MBI. As noted above, Lynch and Lovell (2003) found seminars and workshops to be more effective than advertising for encouraging participation. Other studies have produced similar findings. Frondel, Lehmann and Wätzold (2006) examined the effects of information on rates of participation in the nature protection and conservation of cultural landscape (NAK) scheme in Saxony, Germany. While this study used a small sample (42 observations), the authors found that attendance at seminars provided by the local agricultural authority increased participation by about 1.6% - 1.9% (average participation was 13%). In contrast, the activities of non-government organisations did not increase participation.

The appropriateness of using educational strategies such as program seminars or experimental economics demonstrations (discussed next), depends on the characteristics of the MBI or incentive scheme being considered. Breetz, Fisher-Vanden, Jacobs and Schary (2005) examined communication strategies in the context of encouraging farmer participation in nonpoint source water trading schemes (Table

2). They recommend the use of education and outreach strategies for smaller projects, where the projects have few constraints in terms of time and cost, where farmers are receptive to the program and where it is important to reach a broad set of farmers. If educational strategies are to be used, time and a segment of the population that is initially receptive to the program are needed to build up trust in the program (Breetz *et al* 2005). The authors report several case studies where the response to education was initially slow, but where farmers became more interested in participating after seeing one successful pilot. They also noted a couple of projects where the seminars and other outreach activities were directed by farmers on the program committee, which was critical for encouraging participation. However education and outreach were not successful in all of the reported cases. Where there were strong community tensions or concerns about property rights, education and outreach was unsuccessful at encouraging participation.

**Table 2: Program Characteristics and Choice of Communication Strategy**

<b>Program Conditions</b>		<b>Education and Outreach</b>	<b>Third-Party Facilitation</b>	<b>Existing Networks</b>
Size	Small (X) Large (XX)	X	X	XX
Time constraints	Low (X) High (XX)	X	X	XX
Initial farmer attitudes	Less receptive (X) More receptive (XX)	XX	X	X
Long-term program flexibility	Less important (X) More important (XX)	XX	XX	X
Minimising transaction costs	Less important (X) More important (XX)	X	XX	XX
Reaching broad set of farmers	Less important (X) More important (XX)	XX	XX	X

Source: Breetz *et al* (2005)

### ***Demonstrations through Experimental Economics***

Experimental economics involves the study of economic behaviour in a controlled laboratory setting. These laboratories are sometimes housed within universities, but can be mobile and used in field situations (eg with farmers in their local area). These experiments often involve the use of simulation games which are designed to demonstrate how modifying the features of an MBI or incentive will affect properties such as efficiency or participation.

An area of innovation in implementation of MBIs has been the use of experimental economics to demonstrate to potential participants how MBIs work. Rolfe *et al* (2005) reported on the use of a workshop game, which helped land managers and other participants learn how the system works in a practical way prior to a live auction, as well as providing information for the researchers on appropriate design of the MBI. The workshop game appears to have functioned as a low-cost ‘trial’, and have been an effective method of increasing participation. They recommend the use of experiments as an awareness/information tool.

### ***Direct Contact***

Another more direct form of promotion is for an extension officer or program facilitator to visit farmers, explain the program, and possibly help them develop their application for participation. Several Australian researchers have commented on the benefits of using facilitators or extension officers. For instance, Clayton (2005) reported that the use of Community Support Officers (CSOs) substantially encouraged participation in the Auction for Landscape Recovery pilot. The CSOs provided assistance to farmers during the application process, making it more ‘farmer friendly’. They also conducted site assessments to evaluate tenders and discussed proposed projects with farmers. Clayton found that most farmers viewed this method of implementation very positively, as the CSOs provided an element of personal contact and made the process less bureaucratic. However, Clayton also notes that some farmers saw the CSOs as unnecessary, doubling-up on services and networks that were already in existence. Rolfe *et al* (2005) also suggested that participation can be influenced by providing facilitators who build trust with land managers. In the

context of tenders, they recommend providing technical assistance to help farmers understand the environmental issue of concern, appropriate management actions and how to structure their bid. Esseks and Kraft (1988) also recommend the use of direct contact for the Conservation Reserve Program (CRP) in the USA. They found that almost one-third to half of all non-participants did not participate because they did not believe their land to be eligible for the program, even though in almost all cases it was. They conclude that:

*“...a [labour]-intensive outreach apparently was required. Someone needed to identify the farms that likely would meet the physical criteria of eligibility. Then, the owners of those farms needed to be contacted and, for good measure, to have the ownership-eligibility criteria explained to them” (p.252).*

The authors also found that farmers were misinformed about the amount of incentive that they could reasonably expect to receive from the CRP, and that this negatively affected participation. One US Department of Agriculture (USDA) strategy used to remedy this problem is the advertisement of an *indicative* bid amount – without revealing the maximum accepted bid – and the acceptance of all bids up to this indicative amount.

There is some quantitative evidence that shows that direct contact increases participation. Frondel *et al* (2006) found that direct visits from program staff significantly influenced program participation (1.8% to 1.9%), and the effect on participation was larger than the effect of holding seminars or workshops. Ducos and Dupraz (2006) also report that farmers are more likely to have participated in incentive programs where they have regularly received technical and administrative advice.

### ***Use of Opinion Leaders and Networks***

Sociologists have long recognised that word-of-mouth can be an effective method of encouraging the adoption of new technologies. As shown in Table 1, other land managers are often a primary source of information. Moreover, this information is often an effective way of encouraging participation in incentive programs and MBIs. Evaluating participation in land preservation programs in the USA, Lynch and Lovell (2003) found that those who heard about the program through neighbours or word-of-

mouth were more likely to participate than those who heard through farmer-to-farmer programs or landowner meetings or through advertising.

The process by which adoption of innovations or participation in programs is influenced by personal contacts is analysed within diffusion theory (see Rogers 2003). According to diffusion theory, social systems typically contain individuals who are either 'opinion leaders' or 'followers', connected by communication channels (although individuals can be opinion leaders in some matters and followers in others). Opinion leaders tend to be exposed to ideas through mass media and contact with change agents (eg the organisers of a MBI); they have large interpersonal networks with followers within their social system; and they are innovative – but not so much that they break social norms – and are seen as trustworthy by followers.

The adoption of innovations (including incentive schemes and market based instruments) can be influenced by individuals hearing about, or observing the experiences of others. Opinion leaders model the use of a new innovation, and exert an influence on how it is perceived by others. Followers are influenced, and imitate adoption if they approve of what they observe. A limitation to the spread of information through personal networks is that people tend to communicate with those who are similar to them. If communication is restricted to a single social stratum, the spread of an innovation will be limited. In terms of MBI adoption, the implication is that it is important to characterise social systems and the clusters within them, as well as the opinion leaders within these networks and encourage their participation in order to impact adoption.

Breetz *et al* (2005) recommended the use of networks to communicate MBIs and incentive schemes as it can reduce both transaction (including negotiation) and information costs. They noted that this approach can be effective when there are cost and time constraints for implementation, and where farmers are initially less receptive. It can be effective where a large number of farmers need to be reached, and other forms of communication (eg direct contact) are impractical. However, Breetz *et al* (2005) also noted several caveats. First, the lowest marginal costs may not be achieved if networks are used because only network members are likely to participate. Second, greater success has been reported where the incentive or MBI has been

integrated into programs already delivered through the network (e.g. an existing subsidy program). Third, farmers have tended to participate more where they have had involvement in designing the program, as this increase acceptability of the program to those within the network.

### ***Use of Third Parties for Program Delivery***

In some areas, trust in government authorities can be an impediment to participation in MBIs. Rolfe *et al* (2005) reported qualitative evidence from focus groups of this issue. For this reason, Rolfe *et al* (2005) suggested using an independent rather than government body to implement MBIs, such as regional Natural Resource Management (NRM) groups. Breetz *et al* (2005) also recommended the use of non-governmental organisations, civic associations or even consultants because they are potentially seen as unbiased and independent of regulators; farmers may therefore be more receptive and trusting of them. As shown in Table 2, the authors consider third party facilitators are more effective than other approaches when farmers are generally less receptive and have more motivational constraints. Breetz *et al* noted that the characteristics of the third party facilitator are important, especially since direct contact with farmers is often required. It is important that these facilitators are somebody that farmers can relate to and trust. In a quote from one of their informants:

*farmers were receptive to [the third party facilitator] because they felt that they could trust [his] message...the farmers were unlikely to listen to anyone who seemed too much of a businessman, government agent, or environmentalist, but they felt that they could trust [the facilitator's] message because he was familiar with their landscape and understood their concerns (Breetz et al 2005, p.181)*

One study has empirically examined the effect of using third parties on participation. Horne (2006) used choice modelling to examine participation in a biodiversity incentive scheme in Finland. The most preferred option was for farmers to initiate participation themselves, conservation trusts and forest organisations being next most preferred, and environmental groups least preferred.

## **4. Characteristics of those Participating in Market Based Instruments and Incentive Programs**

While the attributes of an MBI can be modified to make it more popular, this approach does not necessarily achieve environmental goals. Despite higher rates of participation, efficiency and environmental gains can be lost because of these modifications. Another alternative approach to increasing participation that may not diminish environmental outcomes is to target MBIs, incentives and communication effort at groups of farmers who are more likely to want to participate due to their personal characteristics. There is evidence that the characteristics of those who will participate is program-specific. Understanding which programs attract which kind of farmer is important for selecting the appropriate mix of MBIs and incentives to implement in a particular catchment. Complementarily, identifying characteristics that are consistently associated with non-participation may reveal shortcomings in existing programs. Knowing who and who isn't participating is important information for selecting and designing the appropriate mix of incentives, MBIs and regulation for achieving environmental outcomes.

A number of relevant studies have been conducted in Australia and overseas. Several of these studies report the results of either contingent valuation or choice modelling stated preference surveys – these are reviewed first. The remaining studies report the characteristics of participants in pilot MBIs or actual incentive programs.

### ***Stated Preference Surveys***<sup>4</sup>

The following three stated preference studies report on several quite different MBIs or incentive programs. Vanslebrouck, Van Huylenbroeck and Verbeke (2002) reported on the factors that influenced participation in two different incentive programs that used stewardship payments. The first incentive program promoted

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<sup>4</sup> Stated preference surveys are surveys that designed to estimate non-market values. Non-market values include values held by the community for improved environmental quality. In this context however they are used to identify how much farmers need to be paid for them to be willing to participate in an MBI or incentive program. The most commonly used stated preference techniques are contingent valuation and choice modelling. Contingent valuation produces estimates of the total amount farmers require to be paid to participate in a given MBI or incentive program. Choice modelling in contrast produces estimates of how changes in program features as well as payment amounts influence planned participation.

farm beautification and could be undertaken without high implementation costs or effort. The second involved the use of unsprayed field margins in cropland or grasslands (FM) – which would affect farmers’ income more than the other incentive programs as it would lead to reduced output, required more effort and the benefits went to the public rather than the farmer. The next study, by Wossink and van Wenum (2003) also involve the use of stewardship payments. Finally, the MBI considered by Rolfe *et al* (2006) involved the use of offsets<sup>5</sup> to improve water quality in a farming area.

The results from the three stated preference surveys are summarised in Table 3. There is limited consistency in the predictors of participation. In both of the Flemish incentives, analysed by Vanslembrouck *et al* (2002), age had a negative effect on participation, but this variable was insignificant in the study by Rolfe *et al*. Education had an inconsistent effect across the case studies. Environmental attitude was significant in two of the three case studies. Although Wossink and van Wenum found that farm type had a significant effect, the effect of farm factors (eg farm size, potential successor) had an inconsistent effect on participation. The inconsistency of farm size is not unexpected, given the different focus and effects of the two Flemish case studies. Where there is a higher opportunity cost to participation, it could be anticipated that smaller farms would be less likely to participate. Familiarity with a scheme, or previous participation was found to increase the likelihood of participation in two instances. Perceptions of risk were also found to affect participation in the study by Wossink and van Wenum. Perhaps of greater interest to the Australian context was that non-participation was strongly motivated by the perception of government interference in farming (as based on explanatory comments returned with survey responses).

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<sup>5</sup> Environmental offset programs require developers to offset their impacts on environmental quality by paying for improvements in environmental quality elsewhere. Often developers purchase environmental credits from offset banks. These banks are set up either by the government or private entrepreneurs who pay land managers to improve environmental quality or directly undertake other environmental works.

**Table 3: Characteristics Influencing Participation in MBIs and Incentives: Results from Stated Preference Surveys**

	<i>Vanslebrouck et al (2002)</i>		<i>Wossink and van Wenum (2003)</i>	<i>Rolfe et al (2006)</i>
	<b>Farm beautification</b>	<b>Unsprayed field margins</b>	<b>Biodiversity</b>	<b>Water Quality Offsets</b>
<i>Sociodemographic variables</i>				
Age	-	-		NS
Education	+	NS		-
Language	-	+		
Dependent children				+
<i>Attitudinal variables</i>				
Attitude re environmental effects of MBI	NS	+		
Environmental attitude				+
Perception of risk			+	
Perception of government interference			+	
<i>Behavioural variables</i>				
Potential succession	+	NS		
Previous participation in MBI/Familiarity	NS	+	+	
<i>Farm characteristics</i>				
Farm size	-	+		
Farm type			+	
Size of river				NS
Extent of clearing				+

Note: NS – not significant. Blank cells indicate that the variable was not tested.

## ***Studies of Actual MBIs and Incentives***

### *Australian MBIs and Incentives*

The three studies by Ha et al (2003), Clayton (2005) and Curtis *et al* (2006) that investigated participation in pilot studies all focus on experimental auctions or tenders, while the remaining study by Black and Reeve (1993) examined participation in a fully implemented MBI that uses a tax-rebate (Landcare). The first study by Ha *et al* (2003) considered the first round of the Victorian Bush Tender. This study is based on a statistical analysis of the data from interviews of the 380 land managers in Victoria. Clayton (2005) investigated the Auction for Landscape Recovery conducted in Western Australia, and interviewed a smaller sample of 61 farmers, including 31 participants and 31 non-participants. Finally, Curtis *et al* (2006) compared the characteristics of 34 participants of the River Tender Project in Victoria with a control group of 58 non-participants.

The three studies have considered quite different variables, so it is difficult to synthesise the results of these three studies. Nonetheless, several observations can be made. The results from Ha *et al* (2003), which assessed the introductory phase of the Bush Tender trial, suggested that those most likely to participate were more environmental conscious farmers. Surprisingly, variables that typically lead to greater participation such as better access to information, did not lead to greater participation in this scheme.

The study by Clayton (2006) suggests that more traditional economic and sociological variables influence participation. Concerns about time or cost limitations were found to negatively influence participation. Interestingly, farm size had a negative (though only marginally significant) influence on participation, which is similar to the result for the farm beautification project reported by Vanslebrouck *et al* (2002) as well as Curtis *et al* (2006). However, yield – which Clayton suggested is a proxy for income – had a positive effect on participation. Previous participation in Landcare had a large and positive effect on participation, which is similar to the finding of Vanslebrouck *et al* for the unsprayed field margins incentive. Thus Clayton's results suggest that wealthier and less constrained (in terms of time and financially) farmers and those

that have previously been involved in MBIs or incentive programs are more likely to participate in future schemes.

The results from Curtis *et al* (2006) indicate that the participants in the River Tender Project were primarily smaller – primarily hobby – farmers, who were wealthier, younger, had not lived as long on their property, were less likely to be professional farmers and generally worked fewer hours on their farm. Thus, mainstream farmers were not primarily involved in this pilot project. There is also evidence from Curtis *et al* (2006) that the River Tender Project has attracted a different set of farmers that would be attracted to the standard Fixed Grants Incentive Scheme. Curtis *et al* (2006) asked respondents to the control group whether they would apply for funding in the Fixed Grants Incentive Scheme. They found that these latter respondents differed significantly from those who were involved in the River Tender Project in terms of farm size (+), river frontage (-), area of remnant bush (-), percentage farmers by occupation (+), length of residence in district (+), hours of on property work (+) and don't have a succession plan (-).

The final study by Black and Reeve (1993) investigated participation in Landcare, which involves payment of a tax-rebate. They conducted a nation-wide survey, and examined the association between Landcare group membership and attitudes, farmer and on-farm factor. They found nationally that larger farm areas, proportion of total net income from the farm, higher levels of education and a level of equity in the 70-89% range were significantly and positively associated with membership in a Landcare group. In terms of attitudes, Black and Reeve found that Landcare members may be more prepared to accept some decrease in farm profits in exchange for environmental outcomes, were less likely to see farming lifestyle as compensation for periods when it is difficult to make a profit, and more likely to perceive Landcare as important to future profitability than non-members. Landcare members were also more likely than non-members to perceive land degradation as a widespread, serious problem, and to disagree that *“on the whole, the benefits of applying Landcare practices on-farm are being generally over-rated”*.

**Table 4: Results from Australian MBI Pilots**

	<b>Black and Reeve (1993)</b>	<b>Ha <i>et al</i> (2003)</b>	<b>Clayton (2005)</b>	<b>Curtis <i>et al</i> (2006)</b>
MBI	Landcare (Nationally)	Bush Tender	Auction for Landscape Recovery	River Tender
<b><i>Sociodemographic variables</i></b>				
Age				-
Hours worked on farming related activities				-
Length of residence				-
On-farm income	+			
Off-property income				+
Farming main occupation				-
Level of equity	+			
Education	+			
<b><i>Attitudinal variables</i></b>				
Time limiting			-	
Costs limiting			-	
Negative attitude biodiversity		-		
<b><i>Behavioural variables</i></b>				
Landcare involvement			+	
Heard about MBI on radio		-		
Regularly read industry journals		-		
Member of environmental organisation		+		
Plant native vegetation		+		
<b><i>Farm characteristics</i></b>				
Full costs covered			+	
Farm size	+		-	-
Wheat yield			+	
River frontage				+
Proportion of nature bush cover				+

### *Overseas MBIs and Incentives*

A number of overseas studies have examined the characteristics of those who have participated in incentive programs, particularly in Europe. These include Brotherton (1991) and Wynn, Crabtree and Potts (2001) who have examined participation in the Environmentally Sensitive Areas (ESA) scheme in the UK which involves the use of stewardship payments for voluntary management practices. Crabtree, Chalmers and Eiser (2001) and Crabtree, Chalmers and Barron (1998) examined the factors that influenced participation in the Farm Woodland Premium Scheme (FWPS) which is an incentive scheme in Scotland. Finally, Ducos and Dupraz (2006) examined the characteristics of those participating in agro-environmental contracts in France. Broadly, the characteristics found to influence participation can be grouped as relating to either socio-demographic, behavioural or attitudinal variables, or farm characteristics.

Sociodemographic variables have some ability to explain participation. Wynn *et al* (2001) found that non-participants tended to be over 40, suggesting that age is negatively related to age. However, Ducos and Dupraz (2006) found a non-linear relationship between age and participation. Like Wynn *et al* (2001) they found that farmers younger than 40 years were more likely to participate than those between 40-55 years, yet they also found that those older than 55 years were more likely to participate than those who were between 40 and 55 years of age. Ducos and Dupraz (2006) also examined the influence of education on participation and surprisingly found that it was negatively related to participation. Finally, Ducos and Dupraz (2006) found that having children under 18 years was positively related to participation, which is consistent with other studies (eg Rolfe *et al* 2006).

Of particular interest is the influence of behaviour and attitudinal variables on participation. Interestingly Crabtree *et al* (2001), Wynn *et al* (2001) and Ducos and Dupraz (2006) found that having an interest in conservation or having altruistic motives were either insignificantly or negatively related to participation. However, having a positive attitude towards the program was found to be positively related to participation. As mentioned earlier, Brotherton (1991) contends that the high participation rate in certain ESAs in the UK resulted from positive attitudes towards

the scheme as well as extensive promotion of the scheme in that area. Consistent with Brotherton's findings, Ducos and Dupraz (2006) found that trusting the delivery process of the program was positively related to participation. Ducos and Dupraz (2006) also examined several behavioural variables related to previous interaction with government and non-government organisations. They found that having a bad relationship with government administrators reduced the likelihood of participation, having regularly received technical and administrative advice increased participation, and being involved in agricultural organisations increased participation.

Farm characteristics also affected participation. The opportunity cost of participation appears to have been a critical motivator for farmers, with farmers far more likely to participate if payments are large (eg Ducos and Dupraz 2006). Furthermore, many of the other farm related characteristics that influence participation are in some way related to opportunity cost. Brotherton (1991) reported that when farmers owned smaller eligible areas of land farmers would receive smaller total payments, which meant that entering the scheme was not worthwhile thus lowering participation (Brotherton 1991). Other studies such as Crabtree, Chalmers and Eiser (2001), Crabtree, Chalmers and Barron (1998) and Ducos and Dupraz (2006) have found that participation was significantly related to the potential economic gains from participation. These studies found that participation was related to the area that could be made available for inclusion in the program. Wynn *et al* (2001) also found that farmers in the Scotland ESAs were less likely to participate when the costs associated with implementation were higher – that is, the financial attractiveness of the scheme was lowered. This generally occurred on farms with more intensive farming, which was less compatible with management prescriptions than more extensive farms with lower proportions of arable cropping and lower stocking rates.

Participation also appears to have been influenced by consistency with existing farming practices. Both Wynn *et al* (2001) and Crabtree *et al* (2001) found that farmers who used their land more intensively were less likely to participate. Furthermore, Crabtree, Chalmers and Eiser examined additionality – the planting that took place as a direct result of the scheme, as opposed to the planting that would have taken place even if the funding was not offered. While not necessarily desirable, lower levels of additionality were found to increase participation. Lastly, Ducos and

Dupraz (2006) found that those involved in organic farming were substantially more likely to participate.

Tenure conditions have also been found to influence participation. Crabtree, Chalmers and Eiser (2001) and Crabtree, Chalmers and Barron (1998) found that tenure influenced participation. Ducos and Dupraz (2006) found that the share of land in sole ownership was positively related to participation, and that the share of land in short term tenant farming was negatively related to participation.

### *Summary of MBI and Incentive Studies*

There is some convergence in the literature in terms of the farmers that are more likely to participate in MBIs or incentives. However, there are also indications that certain types of farmers are more likely to participate in certain types of schemes. In terms of those in general who are more likely to participate, a few socio-demographic variables have explanatory power. Those who are younger and have dependent children are more likely to participate. However, there is no clear relationship between other variables such as education and participation. The influence of environmental attitude on participation is also unclear. Several Australian studies suggest that having a pro-environmental attitude increases participation, however this relationship has not been found in studies undertaken in other countries. However, having a familiarity with and a positive attitude towards the program and its delivery process is associated with participation. Trust in government and having had an ongoing relationship with government officers (eg through the receipt of technical advice) are also associated with participation. Similarly, previous participation in other incentive programs is a predictor of participation. Various farm characteristics are also predictors of participation. The existence of constraints (eg time, capital or ownership limitations) can reduce participation. Increasing opportunity costs of participation also reduce participation. This can be because the type of farm means that the required management practices are not consistent with existing practices, or because there is limited area available on the farm that is suited for inclusion in the program (eg limited grazing land). Across the studies reviewed, size of farm had differing effects on participation. It appears that sometimes larger farms are more likely to participate, while at other times smaller farms are more likely to participate.

The characteristics of the scheme appear to be modifying the relationship between farm size and participation. Similarly, full time farmers appear to be more likely to participate in some schemes than others. There is some evidence from Australia that full time farmers prefer the use of incentive payments where there is greater certainty, rather than tenders where there is less certain and more complexity.

## **5. Segmentation of Farmers**

While it is useful to identify the characteristics of those most likely to participate in MBIs and incentive programs, in practice it is helpful if different groups of farmers with specific characteristics can be identified. Targeting of communication messages and tailoring of MBIs and incentives is more difficult if there is a large number of groups of farmers in a catchment. However, where it is possible to identify several different groups, each of which in general has certain characteristics, locations and propensities to participate in specific MBIs or incentive programs, tailoring and targeting is much simpler. These broad farmer groups can be described using marketing parlance as ‘farmer segments’. Farmer segments represent different groups or types of farmers that can be classified according to their styles of farming, business attitudes, learning behaviour, environmental attitudes or other attitudinal constructs. Sociological researchers have recognised the existence of differences between farmers for many years in terms of their adoption behaviour (eg Rogers 2003), and tradition-business orientation (Vanclay and Lawrence 1995). While some of these typologies are well known – particularly the Rogers model – their applicability and predictive power depends on the context and issue of concern (Röling 1988 and Morrison 2004). This is important as the concern of this project is the identification of farmer segments that differ in terms of the uptake of incentives and MBIs, and their preferences in terms of design attributes. While the Rogers model makes predictions about the types of farmers that are generally more likely to be innovators or early adopters, Rogers recognises that the characteristics of innovators and early adopters will be product or issue specific, which is supported by empirical evidence (Morrison 2004, Pannell, Marshall, Barr, Curtis, Vanclay and Wilkinson, forthcoming). Thus there is a need to tailor segmentation exercises for specific products, particularly those which are relatively unique such as involvement in MBIs and incentive programs.

There has been a number of segmentation studies of farmers conducted in Australia and overseas. Unfortunately many of these are industry specific and are proprietary knowledge so are not publicly available. However, several studies are publicly available including Angus Reid (1998), Darbyshire (1999), Watson and Pryor (2002) and Thomson (2003). Angus Reid (1998) is a large scale Canadian study which focused on segmenting farmers according to business orientation, which is therefore of limited relevance to this study. The remaining three studies, however, seek to segment farmers to understand their involvement in natural resource management and uptake of conservation practices and are therefore are of greater interest.

The focus of Darbyshire's (1999) study was to identify land manager segments in the Corangamite Region of Victoria in terms of sustainable land management practices. Darbyshire sought to identify the involvement of various farmer segments in Landcare as well as implementation of other positive land management behaviours. Darbyshire surveyed 300 farmers using a telephone survey. The questionnaire included 31 scale items using a five point Likert scale, that represented nine constructs. Four behavioural constructs were included (innovative sustainable landcare behaviour, frequency of sustainable landcare behaviour, communication behaviour related to sustainable landcare and information-seeking behaviour related to sustainable landcare). The five other constructs were economic benefit sought from landcare, resources available, social responsibility for land management, perceived efficacy (of effort on the environment) and perceived threat (of environmental degradation to the farmer's property). Cluster analysis (complete linkage) based on the nine constructs was used to derive the segments. Five segments were identified using this methodology. These were:

- *The Stewards* – committed to sustainable land management practices;
- *The Contented* – do not address NRM issues due to a lack of urgency and responsibility and a disbelief that it will yield an economic benefit;
- *The Laggard* – minimal financial resources, and little or no willingness to participate in NRM activities;

- *The Embattled* – have a sense of social responsibility to undertake NRM activities to a degree, but have not the time or financial resources to investigate further; and
- *The Independent* – moderate resources, moderate levels of participation in NRM.

A further qualitative study was conducted by Watson and Pryor (2002) with extension officers and graziers from the Volcanic Plains and Riverina regions of Victoria. Some 20 in-depth interviews were conducted with extension officers and others who advise graziers. Four focus group discussions with graziers were also conducted. Watson and Pryor (2002) sought to investigate whether the five segments identified by Darbyshire (1999) were relevant for the Volcanic Plains and Riverina Region graziers. Similar to Darbyshire (1999) they identified two segments that they also called Stewards and Embattleds. However, they identified three different groups as follows:

- *Opportunists* – have little sense of responsibility and are production focused – this production correlates to retaining native pastures. They respond well to financial incentives, but prefer information to come from other farmers or their own trial and error.
- *Traditionalists* – use conventional methods of farming, are production focused, do not have long-term management plans and feel threatened by government intervention. They lack knowledge of, and respond negatively to messages of biodiversity, even when financial incentives are on offer.
- *Unaware* – not represented in the participants of the study, as they do not have contact with extension officers. However, once this group is ‘made aware’ through such contact or other means, they then slot into one of the other four groups.

The final study by Thomson (2003) sought to investigate the propensity of farmers from different segments to be involved in Landcare, adopt conservation works and make use of funding incentives. In terms of methodology, Thomson surveyed 366 respondents using a mail survey (42% response rate) with a questionnaire that

included 31 scale items about farming using a five-point Likert scale. The 31 items represented eight attitudinal constructs, including finance, farming practice – business, farming practice – tradition (‘lifestyle’), knowledge, labour, land (environment), planning/risk and technology/innovation. Indices were calculated for each of these constructs and a K-means cluster analysis was used to identify 10 segments. Some of these segments were a very small percentage of the population (2-4%), and the largest segment was 16% of the population. Unfortunately limited reporting in this study makes it difficult to identify the unique characteristics of each of the segments identified, and the attitudinal factors that may be influencing greater uptake of Landcare. However, Thomson does report that participation in industry training, adoption of QA, adoption of conservation works and use of funding incentives were all significantly related to Landcare membership, while adoption of farm planning was not significantly related.

In summarising these three farmer segmentation studies several observations can be made. First, a range of very different methodologies have been used to identify farmer segments which makes comparison across studies difficult. Not surprisingly, there is only limited consensus across the three studies about the nature of farmer segments, although some variation would be expected across regions. Second, only two of the three studies are quantitative. Importantly, in the quantitative studies the selection of constructs for segmenting has not been carefully justified within the reported papers, though this is a crucial aspect of market segmentation. Third, the studies have focused on Landcare and not on any specific MBIs. This suggests that further research is required to identify market segments for encouraging participation in MBIs and incentive programs.

## **6. Summary and Implications**

The literature provides a number of lessons about how to design, communicate and target MBIs to encourage participation. In terms of design, as might be expected, greater compensation and lesser required environmental outcomes will increase participation. However, an important finding is that simply paying more and requiring less is not the only way to modify design to encourage participation. Farmers value both flexibility and simplicity. Providing the ability to negotiate about

which environmental outcomes must be achieved, what management techniques can be used, as well as minimising the transaction costs associated with involvement can also increase participation. There are also other design features that can be modified to increase participation. Duration of contracts appears to be an important determinant for farmers, with farmers generally preferring shorter contracts. For auction type MBIs, experimental results suggest that features such as the use of group incentives, single-stage (rather than two-stage) auctions and sealed bids can increase participation. However, it should be noted that few experimental studies were identified that have examined the influence of design features on participation, most consider the question of efficiency. Further research to corroborate and extend existing findings regarding the effect of design features on participation is needed.

The relatively embryonic literature on implementation of MBIs and incentive programs revealed a number of approaches that can be used for encouraging participation. Direct advertising was generally not as effective at encouraging participation as other approaches, however it can be useful for informing farmers that are difficult to reach through other means. The use of seminars or workshops can be effective, particularly when farmers who have credibility with participants are involved in facilitation. Other more novel approaches for running workshops also appear to have potential. Specifically, experimental economics workshops appear to have potential as a demonstration tool, helping farmers to understand how an incentive or MBI will operate. This approach may be particularly useful for more complicated instruments. While workshops appear to be useful in encouraging participation, direct contact with farmers appears to be even more important for achieving high levels of participation. The empirical evidence suggests that many farmers often get basic facts about programs – such as their eligibility and the price they might be paid – incorrect. Direct contact can reduce this misinformation as well as reduce the transaction costs associated with participation. Another approach available is the use of opinion leaders and networks. This approach appears to have some significant advantages, but it does have some weaknesses. The empirical evidence suggests that – when it occurs – word-of-mouth can be more persuasive than either direct advertising or the use of seminars, and it is also a low cost option. However, participation will be limited to those who are members of a network, which can affect the efficiency of a program. It is apparent that there a number of

communication strategies that can be used to implement MBIs and incentive schemes. An important finding from the literature is that there are criteria that can be used to identify which one or more communication strategies will be appropriate for a particular MBI and incentive. The selection of an appropriate communication strategy depends on the characteristics of the market and the organisational constraints faced. Thus, for example, when there are time or cost constraints and farmers are less receptive to an MBI or incentive, then the use of existing networks is a more appropriate strategy than education or facilitation.

Apart from choosing what communication strategy to use, a related concern is identifying who should deliver the MBI or incentive program. Choosing a trusted organisation for this purpose can increase participation. There is anecdotal and empirical evidence from both Australia and overseas that distrust of government can reduce participation. The use of a trusted non-government organisation for implementation is potentially one alternative for overcoming this problem.

This review also produced evidence about the type of farmers who tend to participate in MBIs. Understanding the characteristics of those who participate is important for better targeting of promotional efforts, but also for informing instrument design and selection. One advantage of knowing those who more often participate is that promotional efforts can be focused on those farmers. However, it may be the case that certain farmers (eg from larger farms) tend to favour one kind of program, while other farmers (eg from smaller farms and have more off-farm income) prefer other kinds of programs. This information is also useful for targeting, as well as for developing a range of MBIs and incentives that will achieve the best and most cost-effective environmental outcomes. Thirdly, understanding who isn't participating in programs can provide insight into the sorts of modifications to existing MBIs and programs that may be needed to encourage involvement of non-participants. The literature review provided some findings about those more likely to participate in MBIs and incentive programs. Those who were younger, had dependent children, were familiar and had a positive attitude to the program on offer, had previously participated in government programs, trusted the government and were used to working with government field officers were all more likely to participate. Farm characteristics also influenced participation, and these in one way or other appeared to

be related to the opportunity costs of participation. If farmers stood to gain more from participation (ie had more suitable land), and the costs associated with participation were less (in either a relative or absolute sense) then they were more likely to participate. Thus farmers with more eligible land and who had to make fewer changes to management practices were more likely to be involved. There was also some evidence that different kinds of farms and farmers were suited to being involved in different kinds of programs. Some insight of this can be gleaned by the finding that farm size and education positively influence participation in some programs, and negatively influence participation in others. Only one study has systematically sought to test this, and found that tenders were more suited to smaller farms where farmers have substantial off-farm income, while larger and full time farmers prefer stewardship type payments. There could be various explanations for this, including the greater certainty provided by the stewardship programs which suits time poor full time farmers, or possibly the greater ability of part-time farmers (who have substantial off-farm experience) to work with government on more complicated instruments.

While it is useful to identify the characteristics of those more likely to participate in an MBI or incentive program, for actual implementation of an MBI 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 their location, is useful for selecting which MBIs or incentives are most appropriate for particular sub-catchments as well as the application of communication strategies. A few studies were reviewed that indicated that there are various segments that have differing constraints, business focus, attitudes to the environment and social responsibility, as well as propensities to participate in incentive programs. 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 encouraging participation in MBIs.

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