18th World IMACS / MODSIM Congress, Cairns, Australia 13-17 July 2009
http://mssanz.org.au/modsim09

EMS to achieve environmental outcomes: Fantasy land, political hope or real chance?

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Abstract: In this paper we examine a government and industry sponsored program to encourage the adoption of environmental management systems (EMSs) by farmers and assess the effectiveness of EMS in achieving desirable environmental outcomes. We assess the practices undertaken by farmer groups who have participated in EMS and the likely public and private benefits associated with EMS activities. Central considerations were whether EMS is likely to be widely adopted taking account of factors affecting adoption, including market drivers and identified barriers; and, consequently, whether voluntary adoption of land management practices is likely to achieve environmental outcomes at the catchment scale.

Data are presented on reported EMS activity and the perceptions and experience of selected groups of broad-acre farmers in central Victoria and dairy and beef farmers in Gippsland. The farmers were participants in a project designed to encourage more sustainable catchments through actions on individual farms. The pro-environmental behaviours of farmers were mediated through encouraging the voluntary adoption of government and industry sponsored EMSs, often with the provision of financial incentives and other support.

There were major industry differences in the comparative advantage of adoption of EMS. The low or negative net private benefits for many EMS activities were generally insufficient to bring about substantive and on-going adoption of EMS especially in broad-acre agricultural industries. Voluntary adoption of EMS practices with sufficient public benefits to justify government investment, in most cases, was unlikely at sufficient scale to have significant catchment-level impact. Generally farmers were most willing to adopt management practices which had sufficient private benefit to their farm businesses, reflecting monetary and other factors of private benefit, such as ease of management or improved landscape aesthetics. Many of the environmental management practices also had public benefits, such as improving stream water quality or enhancing biodiversity. There needs to be sufficiently large public benefits (sufficient environmental benefits) for government investment support for EMS to be warranted.

This study showed that factors influencing the decision to adopt EMS need to be considered at several levels. Firstly, consideration should be given to farmers' appraisals of the role of EMS in sustainable management and their assessment of the impact and assuredness of government interventions via financial or regulatory interventions. Second, it is necessary to evaluate potential public benefit to determine appropriate incentives as these will influence individual farmers' assessments of private benefit. Finally, individuals' behaviour will be influenced by self-interested rational choice factors such as the anticipated outcomes of a change in behaviour, and by social and inter-personal factors such as personal attitudes, community norms for behaviour change, and the strength of, and social support for, existing habits.

Keywords: *Environmental management systems, behaviour change models, resource management policy*

1. INTRODUCTION

There has been a growing interest in the potential for environmental management systems (EMSs) to establish and validate sustainable agricultural production systems. As food consumers become better informed about the environment, 'logic' has suggested that the assertion of 'clean and green' production should be backed up by evidence provided by an EMS, preferably accredited to the ISO 14001 standard (Chang and Kristiansen, 2006). In this paper we examine a government and industry sponsored program to encourage the adoption of EMS by landholders and consider the ability of models of human behaviour to explain adoption and non-adoption behaviour.

The environmental claims embraced in eco-labelling and certification for agricultural and food products are generally expressed through a process incorporating an EMS. EMSs are process tools to ameliorate environmental risk associated with production, business and marketing activity (Carruthers, 2005). Recent government-supported programs to encourage voluntary EMSs in agriculture were developed to improve biodiversity and the sustainability of ecosystems in agriculture. The rationale was that adoption of EMSs would lead to more sustainable catchments and ecosystems with attendant private and public benefits, providing low cost ecosystem benefits at a catchment level.

The promotion of pro-environmental behaviours, such as the adoption of EMS, has traditionally been based around broad categorisations of human behaviour, particularly:

- The rational choice model, where an individual requires only information relating to financial and performance advantages of alternative choices to enable them to act accordingly.
- The social-behaviour model, where an individual's behaviour is a function of their attitude towards a particular behaviour which, in turn, is determined by a suite of social and psychological antecedents.

Environmental policy-making often implicitly favours one or the other of these models. There is a long history of social research to better understand adoption behaviour in agriculture and, more recently, related to the environment. Most approaches have sought to identify factors and influences relevant to adoption behaviour rather than to construct models explaining observed behaviour. In a multi-disciplinary review of adoption of conservation practices by rural landholders, Pannell et al. (2006) merged the rational choice and social-behavioural models by categorising three factors that influence adoption by farmers:

- Social, cultural and personal factors such as peer pressure, government awareness-raising programs, attitude of the potential adopter towards risk (reflecting social -behaviour model characteristics).
- Features of a practice influencing its relative advantage including its contribution to achievement of the adopter's goals, such as profitability or environmental benefits (reflecting rational choice characteristics).
- Features of a practice influencing its 'trialability' or the ease of observing its performance in a trial (reflecting components of both rational choice and social -behaviour models).

Of the three groups of factors, the attributes which contribute to relative advantage generally will tend to have a greater influence on the extent of adoption (Cary et al., 2002).

Farmers' appraisal and consequent adoption, or non-adoption of EMS can be considered at two levels: the adoption of the EMS process and the adoption of the separate environment-enhancing activities which comprise an EMS. The adoption of the suite of sustainable practices embraced in an EMS is not a uni-dimensional decision, but consists of assessments of a range of practices that are dependent upon cognitive appraisals by farmers. These appraisals are mediated by environmental, institutional, individual and social factors prior to any implementation (Figure 1). Differences in appraisal are determined by a range of individual, institutional and contextual variables and by complex interactions amongst these variables (Cary et al., 2002). In Figure 1 solid lines indicate more certain associations; broken lines indicate associations about which less is likely to be known, or where the association may be problematic.

The characteristics of locality and environment, and the characteristics of specific practices are both extremely significant in landholder appraisal of EMS. Institutional characteristics incorporate the regulatory environment, government agency support structures, and government policy reflected in incentive schemes and taxation arrangements. Individual and social characteristics include many factors instilled and maintained through social processes that will be elaborated below. The appraisal process also involves the assessment of the outcome of sustainable land management and, importantly, judgements as to whether various recommended practices embraced within EMS will contribute to sustainable management.

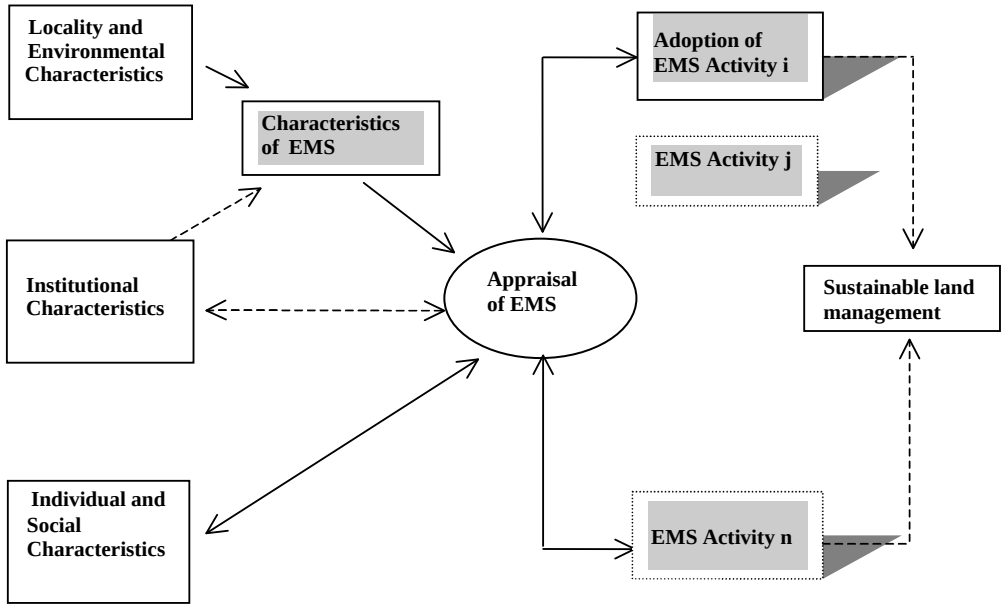

Figure 1. Landholder appraisal of EMS and component sustainable activities

2. AIMS

There were three aims in seeking to assess the effectiveness of EMS in achieving desirable environmental outcomes:

- To assess the practices undertaken by farmer groups who have participated in EMS and the likely associated public and private benefits.
- To assess whether EMS is likely to be widely adopted and to informally examine the impact of rational choice and social behaviour influences on adoption behaviour.
- Based on the above, to draw implications as to whether voluntary adoption of land management practices is likely to achieve environmental outcomes at the catchment scale.

3. METHODS

We assessed common resource improvement practices adopted as part of EMS in three farming industries – broad-acre cropping farmers in central Victoria, and dairy and beef farmers in Gippsland, Victoria. Four groups of case study farmers were selected for investigation – the Enviromeat group in Gippsland, the Natte Yallock cropping group, and 2 dairy groups (Poowong and Glen Alvie). Each group participated in a focus group and was asked the same questions. A schedule of questions to guide the focus group discussion was developed based on a review of EMS literature (see Cary et al., 2009). The focus group discussions identified the determinants of farmers' willingness to implement EMS activity and the barriers to increased adoption of EMS. Responses were recorded and transcribed. The public and private benefits of management practices associated with EMS were assessed after conducting the focus groups, and were checked by the group's usual facilitator, who had knowledge of local practices.

The Enviromeat group represented a specialist beef production in Gippsland implementing an ISO 14001 accredited EMS and an environmentally branded product – Enviromeat. The program was a Department of Agriculture Fisheries and Forestry funded EMS pilot project. Its early members had been supplying a quality-assured, branded beef product through Gippsland Natural Pty Ltd. Initially, sixty farm businesses participated in federal government-supported training workshops. Subsequently, 27 farms participated in external audits and formed the Gippsland EMS Cluster with 21 farms meeting the additional requirements to become accredited suppliers of Enviromeat. The group had strong leadership and a strong extension facilitator. A focus group of nine members of the Enviromeat group, conducted in September 2007, provided the observations presented below.

Members of the Natte Yallock Landcare Group, located in north central Victoria, participated in a trial of a Stage 3 EMS (ISO 14001 EMS, without a third party audit) based on the Australian EMS Manual and Workbook. The pilot project was developed in a partnership between the Australian Landcare Management System (ALMS). Members of the group operated mixed cropping and grazing properties. A focus group comprised 12 members of the Natte Yallock group was conducted in March 2007. All participants in the focus group had implemented significant components of the ALMS ISO 14001 compliant EMS during the program. Few participants had completed a peer audit and none sought full EMS ISO 14001 certification.

Two groups of dairy farmers in Gippsland were investigated. Two focus groups, one representing the Poowong Dairy Discussion Group and a group representing the Glen Alvie Discussion Group, comprised nine members and five members, respectively. These focus groups were conducted in March 2008. The principal focus was the place and use of DairySAT, a structured program which focuses on-farm environmental management activities relevant to dairy farming. DairySAT was used for self assessment, planning and modifying environmental management.

4. RESULTS

The common resource management practices that were linked to EMS participation are shown in Table 1. A consideration of EMS needs to assess private and public benefits and costs. Private benefits are benefits accruing from an activity which are captured or, if costs, incurred by an individual or business. Public benefits or costs are those which accrue to a wider group of individuals or to society. An assessment of the public and private benefits associated with EMS for the industry cases considered is presented in Table 1.

Table 1. Public and private benefits and regulatory requirements associated with EMS management practices by beef, cropping, and dairy farmers

Practice	**Private benefits**	**Public benefits**	**Existing Regulatory requirement**[b]	**Implied policy tool**
Riparian management (B, D)[a]	Small to medium negative	Small to large positive	No	Positive incentives
Protecting remnants (B)	Small positive to small negative	Small to large positive	No, except for clearing	Positive incentives, extension or no action
Direct seeding or tree planting (biodiversity) (B, C, D)	Small positive to medium negative	Small to medium positive	No	Positive incentives, extension, or no action if public benefit is small
Tree planting (mainly shelter) (B,C,D) [a]	Small positive to medium negative	Small positive	No	No action or extension
Improved chemical use (B, C, D)	Medium to high positive	Small to medium positive	Yes	No action or extension
Chemical disposal issues (B, C, D)	Nil to small negative	Small to medium positive	Yes	Positive incentives or no action
Fencing off gullies (C)	Small to large negative	Small to large positive	No	Positive Incentives
Planting perennial pastures (C)	Medium negative to large positive	Small negative to small positive	No	Extension only in carefully targeted, specific situations. More commonly no action
Direct drilling crops (C)	Zero to large positive	Small to medium positive	No	Extension or no action
Appropriate Effluent disposal (D)	Zero to medium negative	Small to large positive benefits	Yes	No action or extension, needs underpinning regulation – benefits from compliance
Appropriate disposal of silage wrap (D)	Small positive to small negative	Small to medium positive	Yes	No action, needs underpinning regulation – benefits from compliance

[a] B refers to the beef group (Enviromeat in Gippsland); C is the cropping group (Natte Yallock); D refers to the dairy groups (Poowong and Glen Alvie).

[b] Pest and weed control is a requirement on all land.

Also shown in Table 1 is the most appropriate policy tool (Pannell 2008) which would be required for the practice to be sufficiently attractive for farmers to adopt. In the cases reported here some form of government support, more often than not, seemed necessary to ensure adoption of many of the practices undertaken as part of the EMS activity.

We also assessed the drivers and barriers to adoption of EMS. Overcoming the private costs faced by individuals was a barrier in all groups (Table 2). For governments to rationally provide significant financial investment or funding of EMS there would need to be an emphasis on farmers undertaking environmental asset protection above that which would be undertaken where there is only net private benefit. More detail of the focus group findings is presented in Cary et al. (2009).

For the Enviromeat group the net private benefits of the environmental activities undertaken were sufficient to ensure on-going adoption of EMS, with the group continuing to operate after cessation of support funding. Product branding and the strong environmental values held by the group were important drivers. For the cropping farmers, there were no market drivers and the net private benefits were insufficient to bring about widespread EMS adoption. Dairy farmers were unlikely to continue autonomous participation in DairySAT without facilitation and co-ordination. Furthermore, regulation of some environment degrading activities is appropriate because of the associated negative private and public benefits.

Table 2. Major drivers and barriers for EMS adoption for participating beef, cropping and dairy farmers

Farming group	Drivers	Barriers
Beef – Enviromeat	Product branding – Enviromeat. Higher product price from a niche market	Paperwork
	Environmental values	Private costs of implementation and marketing
Cropping – Natte Yallock	Involved in incentive programs with Catchment Management Authority	Lack of market signal – undifferentiated product
	Interest in environment	Paperwork
	Extension	Private costs of implementation
Dairy – Poowong and Glen Alvie	Participation in DairySAT (approach made through Landcare, not autonomous self-start) with extension support	Lack of market signals
	Availability of effluent and/or riparian incentives	Paperwork
	Fear of increased regulation – especially for effluent disposal	Private costs of implementation

5. DISCUSSION

Farmers are more likely to adopt a practice, either an individual land management practice or a process such as EMS, when it has fairly immediate positive outcomes, when it can be trialled on a small scale, it is not too risky; and when it is simple rather than complex (Cary et al., 2002). EMS provides adoption challenges with respect to some of the above attributes. For example early positive outcomes exist only if a market premium exists (usually only in niche markets). EMS can be trialled on a small scale, if a staged approach is used such as initial self assessment, with subsequent progression to more complex auditable systems such as ISO 14001 if there are sufficient benefits. EMS is not risky to adopt, requiring only time and persistence. It is however complex if done to an auditable standard, requiring good record keeping, paperwork, understanding and compliance with legal obligations, and other factors.

For specialist beef niche markets, the experience of the Enviromeat group was:

- The group was able to establish and develop markets for the Enviromeat product which provided positive feedback to encourage implementation of EMS activities.
- Industry and government subsidy was necessary for the initial establishment of Enviromeat.
- The Enviromeat product was a differentiated fresh food provided to a niche market by a collaborative and tight supply chain.

For cropping farmers, such as the Natte Yallock group:

- The lack of market drivers for implementation of EMSs for products such as commodity grains provided negative feedback (see Figure 1), discouraging continuation of EMS. The promotion of EMS in the broad-acre sector is constrained by supply chain arrangements where it is difficult to link market-place signals for differentiated products to individual properties.
- Support for implementation of EMS type programs will depend on identifying net public benefits which will frequently be dispersed and low and, thus, unlikely to warrant significant public investment.

For the majority of dairy farmers in the Poowong and Glen Alvie groups:

- On-going participation was likely to require on-going extension and industry support or government subsidy for activity for which there was insufficient privately-captured benefit.
- There was no concrete link between DairySAT participation and consumers or markets for dairy products.
- The discipline required for more formal credentialing and auditing did not appear to be attractive to participating dairy farmers.

5.1. Private and Public Benefits and Government Intervention

Some of the practices conducted as part of EMS may have small private benefits to landholders but significant benefits for the catchment – for example, extensive stream enhancement or extensive conservation of biodiversity. In such cases a self-interested perception of private benefit will be insufficient to produce optimal adoption of such practices. In these cases there will be a need for external incentives, regulation or other appropriate policy instrument involving public investment to assure participation. Such approaches may involve: (i) a centralised government, command and control approach; (ii) a market response model intended to lead to autonomous decisions by farmers; and (iii) a process and network approach facilitating learning networks and interaction between farmers and government agents (Elzen and Wieczorek, 2005).

Pannell (2008) has suggested four policy mechanisms: positive or negative incentives (using financial or regulatory instruments), extension, or technology development. The choice of appropriate mechanisms for encouraging environmentally beneficial change should depend on the relative levels of private net benefits and public net benefits. Pannell's (2008) framework is based on public environment managers requiring a benefit-cost ratio of at least 1.0. and preferably greater, to publicly invest in incentives or extension.

5.2. Synthesising Rational Choice and Social-Behaviour Model Approaches

The responses of farmers to EMS indicate that both rational choice and social-behavioural factors influenced decisions to adopt or not to adopt. This suggests the need for an integrative model of human environmental behaviour taking a multi-dimensional view incorporating both rational choice or contextual factors and social-behavioural factors. Stern (2000) suggests that such a model should integrate four types of causal variables – attitudes, contextual factors, personal capabilities and habits. A model adapted from Triandis' (1977) integrative of model of interpersonal behaviour, reflects most of these relevant factors and provides an inventory of likely elements influencing landholders decision making regarding EMS adoption (Figure 2).

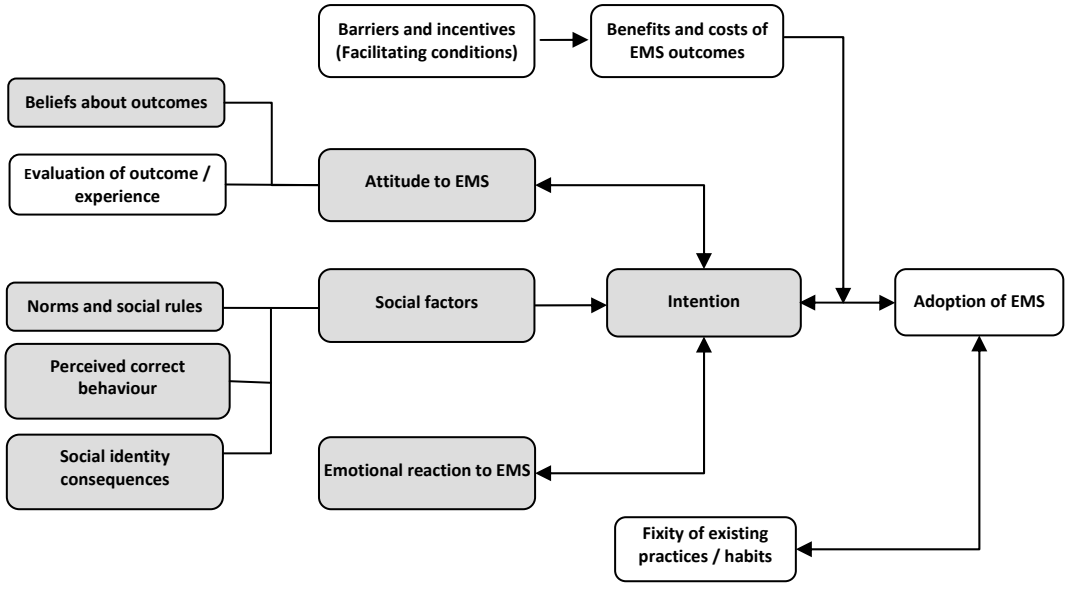

Figure 2. An integrative model of factors influencing individuals' adoption of EMS (after Triandis, 1977). (Gray boxes reflect social-behavioural factors; other boxes rational choice, contextual factors and habit)

In the case of Enviromeat, farmers considered participation in EMS a vehicle for expressing perceived correct behaviour. Participants' favourable attitudes to EMS were supported by strong beliefs about outcomes, reinforced by the experience of positive outcomes and strong emotional commitment to environmental improvement. For the Natte Yallock cropping group, social factors – particularly perceived

correct behaviour and social identity consequences encouraged interest, and participation, in the EMS pilot and influenced adoption behaviour. But social factors were insufficient to bring about on-going adoption.

For the elements in the integrative model of factors influencing adoption behaviour, effluent management and use of milking shed chemicals tend to be fairly habitual and fixed practices requiring significant incentives to bring about behaviour change. Improved riparian management seemed to require the provision of external incentives or regulation to bring about behaviour change. The availability of subsidy grants for improved dairy effluent disposal and for riparian revegetation seemed to be necessary to encourage adoption and, in turn, informed participants' attitudes that subsidisation was necessary before these management changes could be implemented. For the Poowong group, correct social behaviour regarding effluent disposal was identified, and established as feasible, by well regarded field demonstrations. Local norms for tree planting, and membership of Landcare, were important factors in influencing tree planting behaviour.

6. CONCLUSIONS

The conclusions from the work are:

- EMS as a voluntary environment-enhancing activity has a relatively few enthusiastic adherents but is unlikely to lead to large or wide-scale change in NRM practice.
- While voluntary-based NRM approaches are attractive for government, in contrast to use of regulatory based approaches, the low or negative net private benefits (and any available government support) for EMS activities were generally insufficient to bring about substantive and on-going adoption, especially in broad-acre agricultural industries.
- There are major industry differences in the comparative advantage of adoption of EMS.
- Voluntary adoption of the EMS process is unlikely to have sufficient public benefits to justify government investment.
- Government investment would be more effective by being directed to specific practices which have the highest positive public net benefits and being more serious about enforcing regulation of practices having negative public net benefits.

The frameworks developed in this paper help categorize variables that are influential in determining whether EMS will be adopted by farmers. Although the cases reported in this investigation reflect a small number of farmers, who were participating – to varying extent – in pilot EMS programs, we are confident that the conclusions drawn are realistic and conservative. The participants selected were early adopters willing to participate in EMS pilot schemes. It is likely that any negative conclusions drawn about the 'adoptability' of EMS would be more negative for the wider population of farmers.

ACKNOWLEDGMENTS

The authors acknowledge the help of Emily Tee who undertook the case study field work.

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