

Building long-term commitment by landholders to conservation of native vegetation: Characteristics of successful programs

D. Race and A. Curtis

*Institute for Land, Water and Society – Charles Sturt University,
Albury, NSW. 2640. Australia (email: drace@csu.edu.au)*

Abstract Achieving practice change by private landholders on a scale sufficient to arrest the decline of native vegetation in Australia requires intervention by governments. Given the complex interaction of factors affecting landholder decision making, the heterogeneity of rural landholders, and the limited capacity of governments to invest directly in accomplishing policy objectives, it is not surprising that most researchers advocate a suite of policy options be employed. Our view is that too much attention has been focused on the short-term benefits and costs of different options and insufficient attention paid to the ability of different approaches to engender long-term commitment to outcomes that enhance native vegetation. Indeed, it is possible that consideration of long-term commitment might lead to a re-assessment of the value of different policy instruments. Even the very concept of ‘long-term commitment’ is poorly developed. In this paper we draw on a substantial review of relevant literature and our experience with natural resource management programs, including as evaluators of national programs, to:

1. Articulate the rationale for such a study;
2. Attempt to define ‘long-term commitment’; and
3. Identify a preliminary set of factors that would predict the success of programs in building long-term commitment by landholders to on-farm conservation.

Our research, undertaken within the Landscape Logic research hub funded by the Commonwealth Environmental Research Facilities program (CERF), will continue throughout 2009 with a review of case studies to test our conceptualization of ‘long-term commitment’, and explore the extent that it is possible for NRM programs to build long-term commitment amongst landholders.

Keywords: *landholder, participation, commitment, environmental programs, environmental policy instruments*

1. A rationale for exploring long-term commitment to NRM

This paper explores the likelihood that policy instruments can foster a long-term commitment by landholders to 'best practice' natural resource management (NRM). Exploring the long-term commitment by landholders to 'best practice' NRM appears important given the critical role of conserving native vegetation on privately owned land, the long-time frames required to ameliorate most degradation processes and that Australia's governments don't have the capacity to address these issues alone.

Recent research suggests that much of the existing investment in on-ground work on private land fails to build the commitment by landholders to on-going and active management that is often needed to improve vegetation condition (Race & Curtis 2007; Curtis *et al.* 2008a and b). That is, much of a program's on-ground investment may simply be one-off trials and not represent a long-term commitment to implementing recommended 'best practice'. At the same time, there are claims that approaches involving the direct purchase of environmental actions by landholders, such as Market Based Instruments (MBI) are effective and efficient at building long-term commitment (Cutbush 2006; Eigenraam *et al.* 2006; Whitten *et al.* 2007). However, it is possible that the claimed success of these new approaches is related to the effective implementation of programs (eg. the approach used by experienced staff, an organisation's credibility amongst landholders) rather than the specific attributes of a particular policy instrument.

In this paper we draw on relevant literature, our previous assessments of regional and national NRM programs, and current research we are undertaking in Victoria as part of the Landscape Logic research hub (www.landscapellogic.org.au) to articulate the rationale for such a study; explore the concept of 'long-term commitment'; and identify a preliminary set of factors that would predict the success of programs in building long-term commitment by landholders to conserving and enhancing native vegetation.

2. Avoiding further loss of native biodiversity

Given the sustained high level of industrial development since the mid-20th century, the estimate is that the world has now lost about 50% of natural habitats (Balmford *et al.* 2003). Although measures used to detect change have limitations, such as the resolution of status changes is fairly coarse and that delays may occur before some status changes are detected – there is a distinct trend that the world is losing its biodiversity (Butchard *et al.* 2004). Alarming, the status in Australia is consistent with the global decline. The authoritative State of the Environment 2006 (SoE 2006, p.i) reported '*Despite large investments and some promising responses, biodiversity in Australia continues to decline. Because of ongoing pressures and the legacy of past pressures, we cannot expect to see major reversals in this decline in the near future.*'

The ecological principles for increasing biodiversity in natural and planted forests are well established (Bennett *et al.* 2000; Lindenmayer *et al.* 2002; Salt *et al.* 2003). What is less certain is how to effectively engage with an increasingly heterogeneous population of landholders in strategies to increase the quantity and quality of native vegetation, particularly those with remnant native forests. Understanding the synergies and trade-offs for different landholders who manage remnant native forests remains a somewhat vexed issue, and can be particularly challenging when attempting to 'purchase' improved management by landholders.

While there is considerable ecological knowledge about the link between forest management and biodiversity that has informed government programs and industry practices – both in Australia and internationally, it remains difficult to identify the critical 'ingredients' of NRM programs (Dwyer *et al.* 1993; Smith & Weinberg 2006). Even with high participation rates by landholders in an NRM program, this may not confirm the 'additionality' or success of the program, particularly if the program was designed to stimulate long-term commitment of new land-use practices beyond or outside a program (ie. Has a program increased the voluntary commitment to NRM?) (Morris & Potter 1995).

3. Defining 'long-term commitment'

Although it is often explicit in program documentation that policy instruments are seeking to lead to a long-term commitment, it is rare for there to be a clear definition of what is meant by 'long-term commitment'. From our

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

perspective, long-term could relate to a time-frame, such as ten-years or longer. Commitment might also be demonstrated by active management of an area that is consistent with the original management principles – although not necessarily the same practice (ie. adaptive management is usually recommended, so specific practices may change or evolve as conditions alter). A ten-year period is commonly accepted in the literature as a threshold for distinguishing between short and long-term social phenomena, including lengths of rural residence (Mendham & Curtis *in press*). It may be more problematic to assume that landholders should demonstrate commitment through active management over that time frame. For example, it is clear from adoption studies that non-adoption of best-practice NRM might be sensible for a particular landholder if circumstance change. It may also be problematic to expect a landholder to actively manage in a way that is consistent with the original practice if that would involve them in considerable out-of-pocket expenses. At this stage of our research, we are suggesting that long-term commitment could be defined as actively managing in a way that is consistent with the original management principles for a period of 10 years or longer, after active engagement with a specific policy instrument.

Many different mechanisms have been used by governments to influence landholders' approaches to property management to achieve conservation outcomes. For example, investment through Landcare in the human and social capital of landholders (eg. enhancing skills and knowledge, strengthening networks) appears to be an important contributor to achieving substantive changes to land management over 5-10 years (Curtis et al. 2008c). That is, it seems there is some evidence that this type of program leads to longer-term commitment. Of course, involvement in on-ground work can also lead to the development of human and social capital. From our perspective, questions also need to be asked about whether the direct purchase of environmental services (eg. through MBIs) also lead to longer-term commitment to active management. There is therefore uncertainty about the capacity of different policy instruments to engender long-term commitment amongst landholders to new approaches to NRM. Of course, it is also possible that the extent of long-term commitment is dependent on the application of best-practice program implementation rather than the specific attributes of policy instruments.

4. Does participation in programs reflect commitment?

Lobley and Potter's (1998) evaluation of environmental programs in the UK found that while having relatively undemanding entry conditions is likely to encourage a high level or rate of participation by landholders in a NRM program, these typically require little from farmers in terms of behavioural change. As such, programs can achieve a high level of participation and compliance but deliver little environmental 'additionality' (Lobley & Potter 1998).

According to Lobley and Potter (1998), guaranteed financial payments were important, but the key determinant of participation in an NRM program for landholders was the 'goodness of fit' between the program and the landholder's farming system and plans. However, Frahm et al. (2001) were more sceptical, suggesting people may respond to incentives by changing their behavior, but when the tangible incentive (eg. financial payment) is removed, they generally revert to their original behavior. This supports Dwyer et al.'s (1993) earlier view that policy instruments may be effective in the short-term in changing peoples' behaviour, but achieve little in terms of building a long-term commitment to a new approach to NRM. There can also be wide variation in commitment to NRM programs amongst participants, with some analysts talking about a 'participation spectrum' (Morris & Potter 1995). That is, participation in a program may not provide much insight into landholders' strength of commitment to the program (and its environmental goals) or intended behaviour post-program. Passive participation can be much higher than realized, and '... may conceal wide variations in the level of commitment of those actually enrolled' (Morris & Potter 1995, p.60).

Passive participation may not be a problem for a program, particularly if it acts as a 'stepping stone' by encouraging landholders to participate in more ambitious programs that might be offered in the future. However, Morris and Potter (1995) suggested there can be some uncertainty about whether 'passive' participants are simply 'trying out' (trialing) the system, rather than having 'adopted' a more enduring land-use. 'Active' participants may be valuable to programs beyond their own properties in that they could act as promoters or recruiters of other landholders for the program. Also, 'active' participants may also be targeted for more challenging or innovative land-use changes (Morris & Potter 1995).

5. Mechanisms for achieving desired NRM outcomes

There is a wide range of instruments or mechanisms that aim to alter landholders' land-use practices in favour of governments' preferred NRM (Binning & Young 1997, Miles et al. 1998; Lockwood & Walpole 1999; Earl et al. 2005; York et al. 2006; Curtis et al. 2008c). These instruments or mechanisms include:

- Fixed grants – financial and/or materials covering partial costs of on-ground activity as guided by a management agreement (eg. Victoria's LPIS);
- Market-based instruments – negotiations between the 'purchaser' (state agency, CMA) and 'seller' (landholder) for specified environmental services as guided by a management agreement (eg. Victoria's Bush Tender);
- Tax concessions – approved costs associated with on-farm NRM and agribusiness opportunities may be offset against taxable income from other sources (authorised by the ATO) (eg. MIS for agribusiness);
- Rate rebates – deductions to annual rate payments offered by some local governments for approved land-use;
- Labour support – where landholders cover the direct expenses for on-ground NRM activities and state agencies/CMA/NGO will organise a team of labourers (eg. fencing, tree planting);
- Conservation covenants – where landholders choose to place an enduring legal covenant on the property title to preserve existing native vegetation;
- Certification – where landholders choose to join a special interest group that applies a degree of certification that a preferred NRM philosophy and/or practice is demonstrable (eg. Victoria's Land for Wildlife);
- Regulation or legislation – legal requirement for specific NRM practices or standards to be adhered to by landholders (eg. formal approval required if seeking to clear native vegetation); and
- Enhancing human and social capitals – education and training programs (eg. Property Management Planning) and supporting Landcare groups (eg. strengthening local networks).

It is common for landholders to reside in a locality where multiple instruments and programs are operating simultaneously. While it may appear advantageous to offer a suite of mechanisms to landholders, it can be challenging to accurately assess the efficacy of individual mechanisms (Smith & Weinberg 2006). Indeed, it is likely that there are complex interactions between multiple mechanisms operating simultaneously in the one locality – not necessarily in a synergistic manner (Dwyer et al. 1993). For example, landholders in an area may have developed sufficient confidence to express interest in an MBI advertised through the media as a result of gaining knowledge of NRM and trust in agencies through exposure to other mechanisms and instruments.

In addition, the operating environment for landholders typically has other influences beyond the suite of NRM mechanisms implemented by governments. Some of these influences (eg. fluctuating agricultural commodity markets, increasing land prices, prolonged drought, demographic change) are typically much stronger influences on landholder behavior than policy instruments (Race et al. 2007; Merritt et al. 2009; Mendham & Curtis *in press*).

6. Market-based instruments

There's strong support for MBI in Australia (Eigenraam et al. 2006; Whitten et al. 2007), with this mechanism (eg. market-based auction system) viewed as achieving more efficient environmental outcomes than the traditional mechanisms (eg. fixed grants) – primarily because there is an incentive for both parties to truthfully disclose costs and actions they can undertake, otherwise risk non-participation in the MBI. In this sense, NRM agencies can maximize the participation of landholders with the target environmental asset/service, by avoiding 'over-payment' to landholders that a fixed-grant may do. There are several MBI currently used by State agencies in Australia to enhance the management of native vegetation on private land to achieve biodiversity outcomes, such as Land Management Tenders in New South Wales; BushTender and its successor EcoTender in Victoria, Vegetation Incentive Program in Queensland (Cutbush 2006).

Some doubts about the effectiveness and efficiency of MBI have emerged (Morrison et al. 2008). For instance, MBI presumes that landholders will want to form a contractual agreement with the agency promoting the MBI,

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

and participate in the 'market' for environmental services – a market that typically has few competing purchasers. Some have suggested that one reason that MBI aren't always effective is that landholders may not trust market forces to produce fair and beneficial results which is of heightened concern if they sign a binding long-term management agreement or contract (Luzar & Diagne 1999). Long-term agreements can be a disincentive for some landholders to be involved in NRM programs, particularly if they have plans to sell or for inter-generational transfer of the property, as the agreement would then place a burden on the new owners (Luzar & Diagne 1999). Also, markets change (altering the opportunity cost of long-term contracts); the time needed to increase biodiversity may be much longer than contract/program period and this may lead governments to take action that impinges on property rights; substantial property changes in property ownership are occurring and new owners often have different values and plans to existing owners; and there is often uncertainty about the commitment of future government's to 'purchase' biodiversity.

Ferraro (2008) also suggests that typically landholders and agencies don't have the same type or level of information (asymmetric information) to negotiate an efficient and effective MBI. Native forests are ecologically complex systems and it is very difficult for landholders to understand the value of their remnants or the extent and type of management required to enhance their condition (Eigenraam et al. 2006). If a landholder's lack of knowledge leads them to "under-bid" for their provision of management services, they are more likely to be disappointed in the arrangements they have entered into and this may undermine their long-term commitment to improved management.

Programs that have some flexibility and allow landholders to negotiate details of MBIs are likely to be more effective, but may cost more to implement per landholder and per hectare. To overcome this 'inefficiency', Lobley and Potter (1998) suggested there might be merit in a localized group of landholders forming their own association or cooperative, devising their own arrangements and negotiating an agreement with funding from the NRM agency, providing an MBI with an 'economy of scale'. This might also achieve greater cooperation between neighbouring landholders, and be more likely to achieve NRM change at the landscape-level, rather than at a smaller and more fragmented property-level.

Knowledge about the link between forest management and biodiversity has informed government programs and industry practices, both in Australia and internationally. For example, a pilot project in Finland trialed an MBI for non-industrial private forest (NIPF) owners to manage their native forests in a way that increases or safeguards biodiversity (METS0 2006). The MBI requires forest owners to voluntarily enter into a 10-year contract with the government for a financial payment to manage their forests to increase biodiversity. In effect, forests owners and the government negotiate in a market to 'supply' and 'purchase' biodiversity. Essentially payments to forest owners are higher for sites of greater ecological value than for sites of lesser value, similar to the Victorian government's *EcoTender* MBI (Eigenraam et al. 2006).

Similarly, if the forest owner and government don't agree on the level of financial payment, or the value of biodiversity, then no contract is issued. This project has been trialed in southern Finland where most forests (comprised of the native pine, spruce and birch) are in private ownership. An interesting insight from the experience in Finland is that forest owners' ability to make informed decisions and negotiate the terms of agreement was critical to whether a contract was signed. While the level of payment was important, the more the forest owner retained 'ownership' over the assessment and negotiating process, the more committed they were to undertaking forest management for long-term conservation (METS0 2006). This isn't so surprising, given that the personal values of owners of forests, especially native forests, are often reflective of a strong stewardship ethic of environmental care.

7. Engaging diverse landholders

There has been considerable research into social change in rural Australia with some rural landscapes depopulating and others re-populating (Hugo 1996; Lawrence 1996; Curtis et al. 2000; Smailes et al. 2002; Barr 2003; Alston 2004). In areas where rural populations are increasing there is often an increase in the diversity of both the socio-economic composition of rural populations and property ownership types (Berkessy et al. 2006; Mendham & Curtis *in press*). This phenomenon in Australia is consistent with change in parts of Europe (Antrop 2000) and North America (Boody et al. 2005). Understanding the capacity and willingness of a homogeneous

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

population of landholders could be argued to be relatively straightforward, and so allow a strong match to be developed with relevant NRM mechanisms. By contrast, engaging a highly heterogeneous population of landholders is far more challenging.

Understanding the relevant characteristics of the target population is essential for achieving a 'close fit' between landholders and NRM programs. Indeed, some researchers have argued that better differentiation (screening) of landholders prior to implementation will improve the efficiency and effectiveness of programs. For example, Ferraro (2008) discusses the value of segmenting landholders into 'low-cost' and 'high-cost' landholders, with labels referring to the level of cost required to gain and maintain the active participation of landholders.

'Low-cost' landholders are those who are likely to undertake land management that provides a similar environmental service, regardless of payments for environmental services (eg. through fixed grants, MBI). That is, their land management is providing environmental services similar to that sought by an agency's environmental program, so little additional investment is required by the agency (ie. low-cost). By contrast, 'high-cost' landholders are those who are not likely to provide the desired environmental services without investment by an agency's environmental program. Dwyer et al. (1993) suggest it will only be those landholders who have modified their NRM for personal reasons who will make a long-term commitment to new approaches to NRM (ie, beyond an agency's intervention). That is, it appears that 'low-cost' landholders are those most likely to have a long-term commitment to new approaches to NRM; however the challenge is that they will provide little 'additionality' in terms of environmental services.

Positive or pro-environmental attitudes by landholders to agency-preferred NRM increases the probability that they'll participate in agency-sponsored environmental programs (Luzar & Diagne 1999), and that their NRM will be enduring (Dwyer et al. 1993). However, effective implementation rests on getting all the incentives right – the combination of economic incentives and the program's alignment with landholders' attitudes and values. Particularly for commercial farmers, finding the balance between environmental and farm income objectives is needed (Claassen et al. 2004).

Even when landholders clearly express attitudes that are aligned with NRM programs, understanding their willingness and capacity to be actively involved in a specific program, or adopt recommended practices, can be complex with many factors involved (Vanclay 2004, Pannell et al. 2006). While most landholders already have a strong 'land care' ethic, there is a tenuous link between their ethic and actions (Vanclay & Lawrence 1995). Costly, difficult or onerous changes in land management are less likely to be adopted by landholders, even if the long-term benefits of such changes reflect their aspirations and attitudes. Changes that can be made easily by landholders have a far greater likelihood of being adopted. Erickson et al. (2002) talk about 'active' and 'passive' management of forests on private land, with landholders more likely to adopt and maintain NRM practices that are relatively 'passive' (ie. low-input). Aesthetic appreciation is often reported as the strongest motivator for owning and protecting forests on private land in the USA – both among farmers and non-farming landholders. While farmers reported economic values were more likely to influence their actions than non-farmers, economic factors were reported to be less important than aesthetic or environmental values. Indeed, receiving a financial payment was rated as the least influential factor motivating NIPF owners (Erickson et al. 2002).

8. Factors expected to lead to long-term commitment by landholders to conservation

The authors suggest that programs that incorporate the following factors are more likely to be successful in building the long-term commitment by landholders to new approaches to NRM:

- both commercial farmers and non-farmers are most likely to engage in, and be committed to, 'preferred' NRM if it can be achieved with 'passive' management (eg. low-input NRM);
- encouraging landholders to participate voluntarily is preferred rather than compulsory participation, although in extreme situations compulsory changes to land-use may be unavoidable (eg. unacceptable pollution, threats to endangered species);
- allowing landholders to negotiate the 'terms of agreement' (fair cost-sharing arrangements, period of agreement, clarity of roles in agreement) between agencies and landholders;

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

- engaging 'low-cost' landholders in NRM programs may serve as an initial 'stepping stone' before seeking their engagement in more ambitious or challenging NRM;
- agencies that support and work through local community-based groups and networks (eg. Landcare), however this approach alone may be insufficient if seeking to engage with a new cohort of landholders;
- high quality and frequency, and extended duration, of communication by agencies with landholders (two-way and responsive communication);
- sufficient technical advice and support (eg. support when submitting a proposal, implementing on-ground works, on-going management); and
- if an agency's program has achieved a voluntary change in NRM, then having follow-up purposeful communication (eg. site-specific feedback) is critical if this change is to be sustained.

9. Conclusions

Achieving practice change by private landholders on a scale sufficient to arrest the decline of biodiversity in Australia requires intervention by governments. Given the complex interaction of factors affecting landholder decision making, the heterogeneity of rural landholders, and the limited capacity of governments to invest directly in accomplishing policy objectives, it is not surprising that most researchers advocate a suite of policy options be employed. While it appears that 'low-cost' landholders (i.e. those who require little cost to engage in NRM programs) are those most likely to have a long-term commitment to new approaches to NRM, yet a challenge is that they may provide little 'additionality' in terms of environmental services. Our view is that too much attention has been focused on the short-term benefits and costs of different options and insufficient attention paid to the ability of different approaches to engender long-term commitment to conservation outcomes. Indeed, it is possible that consideration of long-term commitment might lead to a re-assessment of the value of different policy instruments. Even the very concept of 'long-term commitment' is poorly developed. Our research will begin with a definition of long-term commitment as occurring where there is evidence of active, ongoing management for a period of ten years that is consistent with the intent of the original NRM investment. In the next phase of our research we will examine a range of NRM programs to assess the extent they resulted in long-term commitment and identify the key ingredients of specific policy instruments and of programs generally, in building long-term commitment.

10. Acknowledgements

The authors' thank the two reviewers who provided valuable comments on an earlier draft of this article. Also, the authors are grateful to the support provided for this research from the Landscape Logic research hub, funded by the Australian Government Department of Environment, Water, Heritage and the Arts (DEWHA) through the Commonwealth Environment Research Facility program.

11. References

- Alston, M. (2004) Who is down on the farm? Social aspects of Australian agriculture in the 21st century, *Agriculture and Human Values*, vol. 21 (1): 37-46.
- Antrop, M. (2000) Changing patterns in the urbanized countryside of Western Europe. *Landscape Ecology*, 15: 257-270.
- Balmford, A., Green, R.E., and Jenkins, M. (2003) Measuring the changing state of nature. *Trends in Ecology and Evolution*; 18 (7): 326-330.
- Barr, N. (2005) *The Changing Social Landscape of Rural Victoria*, Department of Primary Industries, Bendigo, VIC.
- Bennett, A., Kimber, S. and Ryan, P. (2000) *Revegetation and Wildlife: A guide to enhancing revegetated habitats for wildlife conservation in rural environments*. Environment Australia: Canberra.
- Bekessy, S., Budge, T., Buxton, M., Coote, M., Mercer, D., Morcombe, J. and Tieman, G. (2006) Change and Continuity in Peri-urban Australia: Monograph 1. State of the Peri-Urban Regions: A Review of the Literature. Report to Land and Water Australia: ACT.

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

- Binning, C. and Young, M. (1997) Motivating people: using management agreements to conserve remnant vegetation. Final report to LWRRDC and Environment Australia. CSIRO, ACT.
- Boody, G., Vondracek, B., Andow, D.A., Krinke, M., Westra, J., Zimmerman, J. and Welle, P. (2005) Multifunctional Agriculture in the United States. *BioScience*, 55 (1): 27-38.
- Butchart, S.H.M., Stattersfield, A.J., Bennun, L.A., Shutes, S.M., Akçakaya, H.R., Baillie, J.E.M., Stuart, S.N., Hilton-Taylor, C. and Mace, G.M. (2004) Measuring Global Trends in the Status of Biodiversity: Red List Indices for Birds. *PLoS Biology*; 2 (12): e383 doi:10.1371/journal.pbio.0020383
- Claassen, R. et al. (2004) Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Landscape. Economic Research Services, USDA (AER-794): USA.
- Curtis, A., Race, D., Sample, R. and McDonald, S. (2008a) Management of waterways and adjoining land in the Mid-Goulburn River: landholder and other stakeholder actions and perspectives. Institute for Land, Water and Society report #40, Charles Sturt University: Albury, NSW.
- Curtis, A., Sample, R. and McDonald, S. (2008b) Social research evaluating River Tender Program outcomes. Institute for Land, Water and Society report #41, Charles Sturt University: Albury, NSW.
- Curtis, A., Lucas, D., Nurse, M. and Skeen, M. (2008c) Achieving NRM outcomes through voluntary action: lessons from landcare. Discussion paper, Department of Sustainability and Environment: Melbourne, VIC.
- Curtis, A., MacKay, J., Van Nouhuys, M., Lockwood, M., Byron, I. and Graham, M. (2000) *Exploring landholder willingness and capacity to manage dryland salinity: the Goulburn Broken catchment*. Johnstone Centre report #138, Charles Sturt University: Albury, NSW.
- Cutbush, G. (2006) Incentives for natural and cultural heritage conservation. Paper prepared for the 2006 Australian State of the Environment Committee, Department of the Environment and Heritage, Canberra, <http://www.deh.gov.au/soe/2006/emerging/incentives/index.html>
- Dwyer, W.O., Leeming, F.C., Cobern, M.K., Porter, B.E. and Jackson, J.M. (1993) Critical review of behavioural interventions to preserve the environment: Research since 1980. *Environment and Behavior*, 25: 275-320
- Earl, G., Allan, C. and Curtis, A. (2005) Evaluation of the North east Catchment Management Authority Rural Land Stewardship project: Promoting sustainable agriculture through landscape change and payments for environmental services. Institute for Land, Water and Society report #3, Charles Sturt University: Albury, NSW.
- Eigenraam, M., Beverly, C., Stoneham, G. and Todd, J. (2005) Auctions for environmental outcomes, from desk to field in Victoria, Australia. 80th Annual Western Economic Association International Conference. 4-8 July 2005, San Francisco, USA.
- Erickson, D.L., Ryan, R.L. and De Young, R. (2002) Woodlots in the rural landscape: landowner motivations and management attitudes in a Michigan (USA) case study. *Landscape and Urban Planning*, 58: 101-112.
- Ferraro, P.J. (2008) Asymmetric information and contract design for payments for environmental services. *Ecological Economics*, 65 (4): 810-821.
- Hugo, G. (1996) Counterurbanisation. In: P. Newton and M. Bell (eds) *Population Shift: Mobility and Change in Australia*. Australian Government Publishing Service: ACT. Pp: 126-146.
- Kraham, S. (2005) Landowner Incentives. New Jersey Audubon Society (NJAS), NJAS Opinion, December 2005: NJ, USA.
- Lawrence, G. (1996) Rural Australia: Insights and Issues from Contemporary Political Economy, In: G. Lawrence, K. Lyons, and S. Momtaz (eds) *Social Change in Rural Australia*, Central Queensland University, Rockhampton, QLD: 332-349.
- Lindenmayer, D.B., A.D. Manning, P.L. Smith, H.P. Possingham, J. Fischer, I. Oliver and M.A. McCarthy (2002) The Focal-Species Approach and Landscape Restoration: A critique. *Conservation Biology*; 16 (2): 338-345.
- Lobley, M. and Potter, C. (1998) Environmental stewardship in UK agriculture: A comparison of the Environmentally Sensitive Area Programme and the Countryside Stewardship Scheme in south east England. *Geoforum*, 29 (4): 413-432.
- Lockwood, M. and Walpole, S. (1999) A Revised Incentive Policy for Remnant Vegetation Conservation. The Johnstone Centre Report #131, Charles Sturt University: Albury, NSW.
- Luzar, E.J. and Diagne, A. (1999) Participation in the next generation of agriculture conservation programs: the role of environmental attitudes. *Journal of Socio-Economics*, 28: 335-349.

Race and Curtis, Building long-term commitment by landholders to conservation of native vegetation:
Characteristics of successful programs

- Mendham, E. and Curtis, A. (*in press*). Taking over the reins: Trends and impacts of changes in rural property ownership. *Society and Natural Resources* (accepted March 2009).
- Merritt, W.S., Duncan, D., Kyle, G. and Race, D. (2009) Using local knowledge to identify drivers of historic native vegetation change. Proceedings of the 18th World IMACS/MODSIM Congress, 13-17 July 2009, Cairns, QLD.
- METSO (2006) *Research report of the Forest Biodiversity Program for Southern Finland*. METSO Program: Finland www.mmm.fi/metso/international
- Miles, C.A., Lockwood, M. and Walpole, S. (1998) Incentive Policies for Remnant Native Vegetation Conservation. The Johnstone Centre Report #108, Charles Sturt University: Albury, NSW.
- Morris, C. and Potter, C. (1995) Recruiting the New Conservationists: Farmers' adoption of agri-environmental schemes in the UK. *Journal of Rural Studies*, 11 (1): 51-63.
- Morrison, M., Durante, J., Greig, J. and Ward, J. (2008) Encouraging Participation in Market Based Instruments and Incentive Programs. Final Report prepared for Land and Water Australia: ACT.
- Pannell, D., Marshall, G., Barr, N., Curtis, A., Vanclay, F. and Wilkinson, R. (2006) Understanding and promoting the adoption of conservation technologies by rural landholders. *Australian Journal of Experimental Agriculture*, 46 (11): 1407-1424.
- Race, D. and Curtis, A. (2007) Adoption of farm forestry in Victoria: Linking policy with practice. *Australasian Journal of Environmental Management*, 14 (3): 166-178.
- Race, D., Curtis, A., Birkhead, J. and McDonald, S. (2007) Understanding the social context of land-use in the Boorowa catchment: Lessons for measuring and managing the social implications of changes in rural land-use. DPI Report #3, New South Wales Department of Primary Industries: NSW.
- Salt, D., Hobbs, R. and Lindenmayer, D. (2003) *Farm forestry and biodiversity: A guide for farm foresters wanting to improve nature conservation in their plantings*. Rural Industries Research and Development Corporation: Canberra.
- Smailes, P.J., Argent, N. and Griffin, T.L.C. (2002) Rural population density: its impacts on social and demographic aspects of rural communities. *Journal of Rural Studies*, 18: 385-404.
- Smith, K. and Weinberg, M. (2006) Measuring Success of Conservation programs. *Amber Waves*, 4: 14-21. USDA Economic Research Service: USA.
- State of the Environment (SoE) (2006) Theme commentary: Biodiversity (Executive Summary), *State of the Environment 2006*. Department of the Environment, Water, Heritage and the Arts: Canberra.
- Vanclay, F. 2004 Social principles for agricultural extension to assist in the promotion of natural resource management. *Australian Journal of Experimental Agriculture* 44(3): 213-222.
- Vanclay, F. and Lawrence, G. 1995, *The Environmental Imperative: Eco-social Concerns for Australian Agriculture*, Central Queensland University Press, Rockhampton, QLD.
- Whitten, S.M., Coggan, A., Reeson, A. and Gorrard, R. (2007) Putting Theory into Practice: Market failure and market based instruments (MBIs). Socio-Economics and the Environment in Discussion, CSIRO Working Paper Series 2007-02. CSIRO: ACT.
- Wunscher, T., Engel, S. and Wunder, S. (2008) Spatial targeting of payments for environmental services: A tool for boosting conservation benefits. *Ecological Economics*, 65 (4): 822-833.
- York, A.M., Janssen, M.A. and Carlson, L.A. (2006) Diversity of incentives for private forest landowners: An assessment of programs in Indiana, USA. *Land Use Policy*, 23: 542-550.