

Understanding behaviour: Social and economic influences on land practice change¹

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The Bureau of Rural Sciences has commenced a project to develop a nationally agreed classification of land management practices. Land management practices generally refers to the methods used in managing land resources – the ‘how’ of land use. These practices are a key mechanism for effecting change in the sustainable use and management of Australia’s land resources. Developing an agreed classification system will greatly enhance the collection and collation of data to allow better targeted natural resource management (NRM) investments and enhanced opportunities for monitoring and evaluating the effectiveness of NRM programs. Particular land management practices may be promoted as being ‘more sustainable practices’ or ‘best management practices’ and their adoption by landholders is encouraged to enhance NRM outcomes. This paper briefly reviews the factors that impact on the adoption of land management practices.

Figure 1 shows the groups of factors that may influence a landholder’s appraisal of land management practices. Central to the model is the notion of appraisal, the assessment of the ‘fit’ between a particular land management practice and the needs and desires of the landholder within a particular social, economic and environmental context. Appraisal has the elements of a ‘black box’ – it may be objectively difficult to know the relative influences of the factors that impact on a decision to adopt a practice or not.

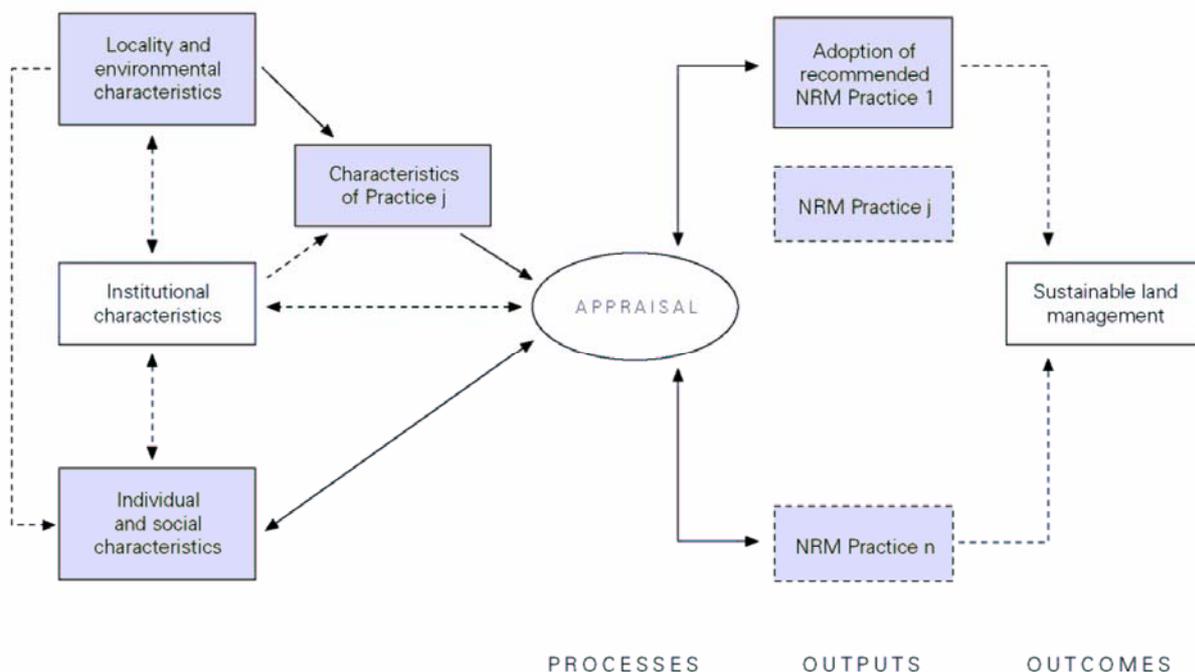


Figure 1: A model of land management practice appraisal (Source: Cary et al 2002)

Characteristics of particular practices and their applicability to the landholders property are extremely significant in their appraisal. Different practices will have varying degrees of relevance to different landholders as a consequence of the practice itself and also as a consequence of local environmental factors. Institutional characteristics refers to the more formal structures that determine the ‘social’

¹ This discussion paper is compiled largely from Cary, Webb and Barr (2002) and Webb and Curtis (2003).

environment within which landholders makes decisions concerning land management practices. These include the regulatory environment, government agency support structures, and government policy as reflected in incentive and information schemes. In this discussion it also includes the broader structural characteristics of Australian agriculture that constrain or facilitate adoption. Individual and social characteristics include personal, family and demographic characteristics and the economic and property physical circumstances of a landholder.

Characteristics of land management practices

Land management practices will have different implications for those considering their adoption and those promoting that adoption. For example, some land management practices may just require simple modifications to practices currently used by landholders, while others may require farm-wide changes to the systems of production. Other practices may not require changes to farming systems but focus on testing and monitoring levels of nutrients or chemical use; others may simply involve bookkeeping changes and record keeping and then some may require retirement of land from agricultural production. The nature of each practice will have different impacts in their adoption. Reviews of innovation in agriculture and more broadly have highlighted the significance of the following characteristics in adoption behaviour (Rogers and Shoemaker 1971; Rogers 1983; Guerin and Guerin 1994).

- **Relative advantage:** This is normally interpreted in terms of financial advantage to the farm business. The perceived financial advantages of more sustainable agricultural practices have been shown to be one of the best indicators of their adoption. Reviewing the history of farm innovation adoption, Barr and Cary (1992) conclude that environmental innovations that were believed to be profitable were usually readily adopted, while those with a net financial cost were rarely adopted. Furthermore, the relative advantage of a more sustainable farming practice is unlikely to be similar in different localities. The relative advantage of given NRM practices will vary in geographic space to a large extent.
- **Risk:** Human behaviour is more complex than simply being profit driven. Some practices will encompass greater risks than others in their application to a new property, and individuals will be willing to manage greater or lesser levels of risk. Many Australian farmers are often motivated by a balance between the need for profit and a satisfaction with a comfortable living which minimises risk and some will trade off profit maximisation for risk reduction (Howden et al. 1997; Marks and O'Keefe 1996; Reeve and Black 1993; Rendell et al. 1996). Differing risk implications of different sustainable practices will be an important consideration in their adoption.
- **Complexity:** Sometimes agricultural innovations which appear simple may in fact imply significant and complex changes to the farming system. More complex practices are less likely to be adopted (Vanclay and Lawrence 1995). Integrated pest management is an innovation that is constrained by the management complexity of its implementation. Farmers often explain non-adoption of integrated pest management as being based upon concerns about its ease of use, speed and reliability (Bodnaruk and Frank 1997).
- **Compatibility:** This refers to the extent to which a new idea fits in to existing knowledge and existing social practice. If a new idea fits easily into an existing system it will be adopted more quickly. Two systems are important, the current farming system and the social system embracing the region's farming or broader community. If a practice is not readily incorporated into a farming system then its adoption may be attenuated. Similarly if the ideas encompassing the new practice do not fit with local norms that will also work against adoption.
- **Trialability:** Practices which can be trialed on a small scale prior to full implementation are more likely to be adopted. Trialing enables decisions about the utility of an innovation with minimal risk. Typically, farmers can easily assess a new crop variety by sowing one paddock to the new variety before deciding upon more extensive adoption. Dryland salinity control is clearly not amenable to trialing. Because the benefits of salinity control may not be achievable for up to 50 years, a trial process will delay more extensive salinity control for a century. Trialability is in turn dependent upon observability.
- **Observability:** More sustainable NRM practices whose advantages are observable are more likely to be adopted. Traditionally, new variety of crop is often quite visible to passing observers and this

visibility has been used to advantage. Many Landcare groups have attempted to locate demonstrations along major roads to enhance visibility.

These attributes of NRM practices will work to make that practice more or less attractive to particular landholders. Generally, landholders will seek to reduce the riskiness of adopting a new practice. Sustainable practices which are observable, triable and less complex are usually more quickly adopted than practices which are unobservable, untriable and complex. Furthermore the relative advantage of a practice will typically be site specific, and practices will need to be regionally and locally relevant to enhance their attractiveness.

Landholder and farm business characteristics

Landholder and farm business characteristics play an important role in the adoption of land management practices. Two aspects are worth noting here. The bulk of Australian farms are family operations where several individuals, and often several generations, make decisions or have input into decision-making regarding the management of their property. However most of the research on adoption of innovation has been conducted with an assumption of individualism, there is one individual decision-maker and their decision will determine whether an innovation is put into practice. The second aspect is that most research has focussed on farmer and farm managers running farming enterprises. A number of landholders will not be farmers or farm managers, but will never the less have important impacts on the regional sustainability of landscapes. The following discussion on landholder characteristics will reflect these deficiencies of the literature.

Socio-demographic considerations

- **Age:** The age of landholders may impact upon their capacity to adopt more sustainable NRM practices. Most research to date has focussed on farmers and farm managers. Some studies have found that younger farmers are more likely to be aware of land degradation on their property and recognise the need for conservation practices to be adopted (Fenton and MacGregor 1999). However, older farmers may have greater levels of experience and skills to adopt sustainable NRM practices (Anosike and Coughenour 1990). It is unlikely that the relationship between age and adoption is a linear relationship, rather a curvilinear relationship is more likely (Cary, et al. 2001). Age is also likely to be an important factor influencing decisions about farm exits and succession of farming enterprises (Barr 2001).
- **Gender:** Male and female farmers have different styles and preferences for learning and finding new information (Kilpatrick et al. 1999). This has implications for the adoption of more sustainable farming practices. Women and men also take on different roles in the community and thus have access to different sets of information. Women often play an important role in networking and transfer of ideas in social intercourse, and are often involved with environmental activities (RIRDC/DPIE 1998; Kilpatrick et al. 1999; Alston 2000).
- **Education:** Traditionally Australian farmers have had lower levels of formal education than the Australian average (Synapse Consulting (Aust) Pty Ltd 1992). However, observations about the level of education apply more to farming men than to farming women, where higher levels of formal education are reported (Garnaut and Lim-Applegate 1999). Additionally, formal education levels are linked to age. Despite the expectation that formal education attainment and adoption may be linked there is no clear link. However formal education may be linked to an enhanced ability to earn off-farm income and has been linked to increased farm incomes (Kilpatrick et al. 1999).

Farmer participation in training courses is more likely to assist the adoption of more sustainable NRM practices than formal education level (Cary et al. 2002; Curtis and Byron 2002; Mues et al. 1998). Participation in training courses may alleviate technical concerns that farmers hold concerning more sustainable NRM. Some forms of training are likely to be the preferred style of learning for farmers (Kilpatrick et al. 1999).

- **Values and attitudes:** Attempts to establish links between pro-environmental attitudes and adoption have generally been unsuccessful (Harvey and Hurley 1990; Sinden and King 1988; Vanclay 1988). However farmer's exposure to broader social norms conducive to adoption are more likely to have an impact. Participation in social groups, for example community landcare, particularly over long periods of time will have a significant impact on attitudes as members

become socialised to the group's norms and values and may go on to exert similar influence on other people within their social network.

Community landcare has served to raise awareness of land degradation issues, and in doing so has assisted the shift in individual values and community norms towards a more sustainable land management ethic (Cary and Webb 2001; Fenton et al. 2000). This does not necessarily lead to adoption of more sustainable practices, which also requires motivation, financial incentives and appropriate skills and resources. None-the-less higher levels of practice adoption has been attributed to community landcare membership (Mues et al. 1998).

- Personality: An individual's personality characteristics are also important in the adoption of more sustainable NRM practices. Personality characteristics such as conscientiousness or agreeableness play a large role in the decisions that landholders make. These aspects of personality are not amenable to change through the provision of information and extension services (Cruse 2002). However extension or information may be provided in such a manner so as to reduce any adverse impacts on others involved, for example the use of groups can effectively use group norms to sanction or proscribe particular types of behaviour.

Farm and farm business considerations

- Farm financial considerations: The impact of financial situation was introduced when considering relative advantage. Poor financial viability is a major constraint on the adoption of more sustainable farming practices that have limited productive advantage (Cary et al. 2002). Since the 1950s farmer's terms of trade have declined forcing producers to increase productivity and efficiency in order to maintain a desired standard of living. Studies have generally linked higher levels of farm income with higher levels of practice adoption (Camboni and Napier 1993; Curtis and DeLacy 1998; Curtis and Van Nouhuys 1999; Saltiel et al. 1994; Witter et al. 1996). Those farming businesses that have low levels of income and high levels of farm debt have less discretionary income to invest in sustainable farming practices, particularly where those practices do not deliver any efficiency or productive gains. Cary et al. (2002) found that the perception of future farm viability, the idea that the future looks rosy, has a larger impact on adoption than objective measures of farm business viability.
- Property size: The size of a property will often be linked to the ability of the farming enterprise to return a profit. Larger properties may be able to take advantage of economies of scale associated with their properties and adoption of practices may benefit. Curtis et al. (2000) found property size to be a major influence on adoption of sustainable practices in the Goulburn-Broken Catchment. Smaller properties were adopting some practices at levels representing higher proportions of their total property, while larger property owners had implemented most best practices over a larger area. While property size influences adoption of best practices, there was interest and adoption among both large and small property owners (Curtis et al. 2000).

Structural characteristics

The third group of characteristics relates to the broader environment in which Australian agriculture operates. This includes a range of factors and influences over which individual landholders may have little control. However they may play a fundamental role in enabling or constraining the capacity of individual landholders to adopt more sustainable farming practices.

- Declining terms of trade: Australian farmers have been under continual pressure from falling terms of trade. The acquisition of more land and the better use of technologies have been important means to offset the impact of declining terms of trade (Stayner 1997). However this downward trend has reduced farm incomes and limited capacity to adopt new practices.
- Structure of agriculture: Australia has a large number of financially small farms which tend to be located close to the seaboard, in hill country and surrounding major regional centres. For farming enterprises to stay ahead of declining terms of trade they need to capture production efficiencies, in part through amalgamation of properties. However expected levels of farm exit and property amalgamation have not occurred (Stayner 1997; Webb et al. 2002). Rather increasing numbers of farming families are being supported by off-farm income and this income has become crucial to the living standards of many farming families (Garnaut and Lim-Applegate 1999; Rasheed, Rodriguez and Garnaut 1998). Many farming enterprises are unable to operate at levels allowing investment in more sustainable farming practices.

- **Hobby farming:** In some areas, particularly surrounding regional centres, amalgamation may be blocked by amenity-based land values; farming lands are more valuable as retreat and hobby farms than as a productive base to run an enterprise. This increase in hobby farming will reduce availability of lands to surrounding farming operations. A change in the socio-demographic nature of the landscape will also be associated with an increase in hobby farming. Newer residents may bring in new skills and abilities to regional and local problems and issues. To date there has been little research focussing on the changing nature of these communities and their impacts on regional sustainability (Barr 2001).
- **Changing social norms:** Increases in hobby farming and rural weekenders reflect a general shift in social values and norms. Similarly urban Australia has adopted more pro-environmental values and is increasingly requiring such consideration in their consumption and electoral behaviours. Changes in the Australian diet and a more health-conscious public will manifest in the type and manner of agricultural products desired (Barr 2001). These slow changes will impact on farming communities though the impacts are unlikely to be even across the landscape.

Conclusion

Extensive studies have highlighted how the particular characteristics of land management practices will impact on their uptake. No single practice is likely to be widely applicable with high relative advantage to the landholder, low complexity, high compatibility, trialability and observability, and low risk. Moreover practices generally have spatial variation in their applicability and will return different levels of relative advantage to landholders operating in different regions.

Landholders differ in their stage of life, their level of education, their values and attitudes, the financial position of their farming business and the scale and nature of their farming operation. These will all impact on the likelihood of behaviour change among individuals. Characteristics that have been linked to enhanced capacity to adopt more sustainable land management practices include level of relevant occupational training, level of farm income and perceptions of future farm financial outlook, possessing a farm plan and involvement in community landcare. However low levels of on-farm profitability throughout many sectors will work against adoption of practices that do not return any productive advantage or are costly to implement.

The decisions and actions of landholders and farmers are limited by the broader structural constraints operating upon Australian agriculture. The importance of financial limitations has been previously highlighted however these may be outside control of individual farmers. Farmer's terms of trade have been declining since the 1950s, for operations in many areas increased efficiencies through property amalgamation are limited. Increasing diversity of land use, in particular, for rural residential and hobby farming will price land beyond the use as viable farming operations.

References

- Alston, M. 2000. *Breaking Through the Grass Ceiling: Women, Power and Leadership in Agricultural Organisations*. Amsterdam: Harwood Academic Publishers.
- Anosike, N. and C. Coughenour. 1990. 'The Socio-Economic Basis of Farm Enterprise Diversification Decisions.' *Rural Sociology* 55(1):1-24.
- Barr, N. and J. Cary. 1992. *Greening a Brown Land: The Australian Search for Sustainable Land Use*. South Melbourne: Macmillan.
- Barr, N. 2001. *Structural Change in Australian Agriculture: Implications for Natural Resource Management (Report on Theme 6 Project 3.4 for the Land and Water Resources Audit)*. Canberra: Land and Water Resources Audit.
- Bodnaruk, K. and B. Frank. 1997. 'Factors Influencing the Acceptance of IPM in the Australian Apple Industry.' Pp. 232-38 in *Proceedings of the 2nd Australasia Pacific Extension Conference*, Albury: Australasia Pacific Extension Network.
- Camboni, S. and T. Napier. 1993. 'Factors Affecting Use of Conservation Farming Practices in East

- Central Ohio.' *Agriculture, Ecosystems and Environment* 45:79-94.
- Cary, J. and T. Webb. 2001. 'Landcare in Australia: Community Participation and Land Management.' *Journal of Soil and Water Conservation* 56(4):274-78.
- Cary, J., N. Barr, H. Aslin, T. Webb, and S. Kelson. 2001. *Human and Social Aspects of Capacity to Change Sustainable Management Practices: Combined Report for the National Land and Water Resources Audit Theme 6 Projects 6.2.2 and 6.3.4*. Canberra: Bureau of Rural Sciences.
- Cary, J., T. Webb, and N. Barr. 2002. *Understanding Landholders' Capacity to Change to Sustainable Practices: Insights About Practice Adoption and Social Capacity for Change*. Canberra: Bureau of Rural Sciences.
- Cruse, L. 2002. *Social research to underpin the regional catchment plan implementation for the NSW Murray Catchment*. Albury: School of Business, Latrobe University.
- Curtis, A. and I. Byron. 2002. *Understanding the Social Drivers of Catchment Management in the Wimmera Region*. Albury: Charles Sturt University.
- Curtis, A. and T. De Lacy. 1998. 'Landcare, Stewardship and Sustainable Agriculture in Australia.' *Environmental Values* 7(1):59-78.
- Curtis, A., J. MacKay, M. Van Nouhuys, M. Lockwood, I. Byron, and M. Graham. 2000. *Exploring Landholder Willingness and Capacity to Manage Dryland Salinity: The Goulburn Broken Catchment*. Albury: Johnstone Centre Charles Sturt University.
- Fenton, M., C. MacGregor, and J. Cary. 2000. *Framework and Review of Capacity and Motivation for Change to Sustainable Management Practices*. Canberra: BRS.
- Garnaut, J. and H. Lim-Applegate. 1999. *People in Farming*. Canberra: ABARE.
- Guerin, L. and T. Guerin. 1994. 'Constraints to the Adoption of Innovations in Agricultural Research and Environmental Management: A Review.' *Australian Journal of Experimental Agriculture* 34(4):549-71.
- Harvey, J. and F. Hurley. 1990. *Cropping and Conservation*. Ballarat, Victoria: Regional Studies Unit, Ballarat University College.
- Kilpatrick, S., S. Johns, R. Murray-Prior, and D. Hart. 1999. *Managing Farming: How Farmers Learn*. Canberra: Rural Industries Research and Development Corporation.
- Mues, C., L. Chapman, and R. Van Hilst. 1998. *Landcare Promoting Improved Land Management Practices on Australian Farms: A Survey of Landcare and Land Management Related Programs*. Canberra: ABARE.
- Rasheed, C., G. Rodriguez, and J. Garnaut. 1998. 'Patterns of Employment of Men and Women in Farming.' Pp. 43-47 in *Australian Farm Surveys Report*, Canberra: ABARE.
- Reeve, I. and A. Black. 1993. *Australian Farmers' Attitudes to Rural Environmental Issues*. Armidale: The Rural Developments Centre, University of New England.
- Rendell, R., P. O'Callaghan, and N. Clark. 1996. *Families, Farming and the Future: Business Performance Indicators for Farming Systems in the Wimmera and Mallee of Victoria*. Bendigo: Agriculture Victoria.
- RIRDC/DPIE. 1998. *Missed Opportunities: Harnessing the Potential of Women in Australian Agriculture (Volume 1 Social Survey and Analysis)*. Canberra: RIRDC/DPIE.
- Rogers, E. 1983. *Diffusion of Innovations*. 3rd ed. New York: The Free Press-Collier Macmillan.

- Rogers, E. and F. Shoemaker. 1971. *The Communication of Innovations: A Cross Cultural Approach*. New York: Collier-Macmillan.
- Saltiel, J., J. Bauder, and S. Palakovich. 1994. 'Adoption of Sustainable Agricultural Practices: Diffusion, Farm Structure and Profitability.' *Rural Sociology* 59:333-49.
- Sinden, J. and D. King. 1988. 'Who Adopts Conservation Practices.' *Australian Journal of Soil and Water Conservation* 1(1):32-36.
- Stayner, R. 1997. 'Families and the Farm Adjustment Process.' Pp. 121-45 in *A Legacy Under Threat? Family Farming in Australia*, Ed Jim Lees. Armidale: University of New England Press.
- Synapse Consulting (Aust) Pty Ltd. 1992. *Report of the Review of the Rural Adjustment Scheme: Prepared for the Department of Primary Industries and Energy*. Brisbane: Synapse Consulting (Aust) Pty Ltd.
- Vanclay, F. 1988. 'Socio-Economic Characteristics of Adoption of Soil Conservation.' Griffith University, Brisbane, Queensland.
- Vanclay, F. and G. Lawrence. 1995. *The Environmental Imperative: Eco-Social Concerns for Australian Agriculture*. Rockhampton: Central Queensland University Press.
- Webb, T., J. Cary, and P. Geldens. 2002. *Leaving the Land: A Study of Western Division Grazing Families in Transition*. Canberra: Rural Industries Research and Development Corporation.
- Webb, T. and A. Curtis. 2003. *Promoting behaviour change among landholders: A literature review and background paper for 'Engaging the rural community in sustainable natural resource management (ADM 23-0042)' commissioned by the Corangamite Catchment Management Authority Australia*. Canberra: Bureau of Rural Sciences.
- Witter, S., M. Robotham, and D. Carrasco. 1996. 'Sustainable Adoption of Conservation Practices by Upland Farmers in the Dominican Republic.' *Journal of Soil and Water Conservation* 51(3):249-54.