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10. Bridging the gap between policy and management of natural resources

Allan Curtis and Emily Mendham

SUMMARY

This chapter provides insights for regional natural resource management (NRM) practitioners seeking to influence property management by rural landholders. We aim to bridge the gap between policy and management by providing improved understanding of changes in the social structure of rural areas and the impact of these changes and other influences on landholder decisions. We draw upon a number of theoretical frameworks, including the adoption literature. We also draw upon a substantial body of empirical research exploring the social structure of rural areas and landholder implementation of sustainable farming and biodiversity practices, including recent studies undertaken in the Corangamite and Wimmera regions of Victoria. Our research was intended to help regional NRM practitioners engage rural landholders; develop an effective mix of policy approaches; and evaluate the accomplishment of intermediate NRM program objectives. Key findings include: (1) only part of the implementation of conservation activities by landholders can be directly attributed to investment by NRM programs; (2) investing in NRM programs that engage human and social capital is an effective way of influencing the property management of landholders; and (3) NRM practitioners need to be aware that they will be engaging a very different cohort of rural landholders than in the past, with significantly increased proportions of non-farmers and absentee property owners.

10.1 INTRODUCTION

NRM in Australia is increasingly structured around a regional delivery model where planning and implementation is guided by national and state priorities. In such a geographically large country, there are compelling reasons for managing at a bio-regional level. The regional scale is considered the most appropriate to support NRM that is holistic (covers all landscape elements); systematic (considers the interactions between elements); and comprehensive (embraces the range of values attached to landscapes) (Bammer et al. 2005). The regional scale also has attractions for policy and program managers concerned about the efficient and effective management of public funds (Curtis and Lockwood 2000).

Given the scale of land and water degradation and the relatively small tax base from which to fund remediation, Australians have relied heavily on the voluntary work of around 120,000 farming families who manage most of the continent. In some instances, regional NRM practitioners deliberately seek to engage individual landholders in practice change. One example would be where a landholder manages all or part of a critical environmental asset. As Pannell et al. (2006) and the authors of other chapters explain, engaging landholders in practice change is complex and difficult, not the least because there is a potentially large set of factors influencing decisions and these vary according to each technology and landholder context. Even the concept of implementation is problematic. For example, when does a trial change in practice represent implementation? In many instances, personal engagement with individuals by regional NRM practitioners will not be feasible or even necessary. However, it should be possible for regional NRM practitioners to develop a suite of policy instruments that meet the diverse needs of landholders and are adapted over time. An effective suite of policy instruments might include one-to-one or group extension, offering to share the cost of work on private land; and regulation that ensures landholders meet a duty of care for the environment (Dovers and Mobbs 1997).

Despite the inherent appeal of regionalism, the 56 regional NRM bodies established in the Australian states since the early 1990s have faced a myriad of challenges (Paton et al. 2004). As the experience with watershed organisations in the United States confirms, regional NRM practitioners will find it difficult to engage landholders who typically identify and operate at the local scale (Curtis et al. 2005). Regional NRM practitioners have also struggled with the task of evaluating the outcomes of investments made through regional plans (Paton et al. 2004). Insufficient attention by federal and state agencies to the monitoring of trends in resource condition is part of the explanation of the strong critique delivered by successive Australian National Audit Office (ANAO 1997; 1998; 2001; 2008) reviews of major

NRM programs. The challenges of landholder engagement, implementation and evaluation are related. One way to measure program effectiveness is by using intermediate measures of program objectives, including the implementation of practices expected to lead to improved resource condition outcomes (Curtis et al. 1998).

The research findings presented in this chapter should provide the knowledge base to underpin improved performance by regional NRM practitioners as they engage rural landholders, develop a suite of policy instruments and evaluate NRM program outcomes. We draw upon a substantial body of empirical research where the lead author has explored the social structure of rural areas and landholder implementation of sustainable farming and biodiversity conservation practices. Instead of relying on the analysis of secondary data, this research has collected and analysed large samples of spatially referenced survey data provided directly by rural landholders. The most recent studies were undertaken in the Corangamite and Wimmera regions of Victoria (Curtis et al. 2006; Curtis et al. 2008b). With surveys in 2002 (Curtis and Byron 2002) and 2007 (Curtis et al. 2008b) in the Wimmera region, we are able to draw upon the only longitudinal study of this type in an Australian region. Our view is that the two regions we studied provide a robust snapshot of the majority of the Victorian Catchment Management Authority (CMA) regions, with the possible exception of the irrigated areas along the Murray.

In the next section, we explain our survey approach, including our reasons for collecting spatially-referenced data. We present our key findings including the importance of voluntary work by landholders, the efficacy of programs that engage and build human and social capital, and the challenge being faced by many NRM practitioners who are beginning to work with a significantly different cohort of rural landholders than previously.

10.2 BACKGROUND

Our experience working with regional organisations across three states suggests that social researchers can make important contributions to the knowledge base that underpins regional NRM. The groups we have worked with said that their first priority was for social research that would assist them to:

1. identify and refine investment priorities;
2. develop and improve engagement with private landholders;
3. choose from amongst the mix of policy instruments available to accomplish resource condition targets; and
4. evaluate the achievement of intermediate NRM objectives over time.

Of course, there are many ways to accomplish these tasks (Cavaye 2003; Curtis et al. 2005). The analysis of data collected through farm and household censuses can provide useful information, particularly about trends in the social structure of regions (Barr et al. 2000). However, as Shultz et al. (1998) and Curtis et al. (2001) have demonstrated, these data are unlikely to satisfy regional NRM practitioners who need to understand the factors influencing property management by private landholders. In the first instance, these national data collection processes are unlikely to address most of the topics for which data are needed. The second major limitation is that data is typically only available at aggregates of 200 households or so for each local government area. It is impossible to explore the factors affecting individual landholder implementation with these aggregated data sets.

With limited resources to fund social research, our regional partners chose to focus on gathering spatially-referenced socio-economic data using a mail survey to rural landholders that would enable them to address each of the four topics identified above. Drawing on our experience working with regional groups in Victoria, Queensland and New South Wales in the period 1998 to 2002 (e.g. Curtis et al. 2000; Byron and Curtis 2002a, 2002b); the extensive literature on adoption studies in Australia (e.g. Vanclay 1992, 2004; Barr and Cary 1992; Cary et al. 2002); our studies of adoption of sustainable farming practices (Curtis and De Lacy 1996), native grasses (Millar and Curtis 1997), farm forestry (Race and Curtis 1998), riparian areas (Curtis and Robertson 2003a) and native vegetation (Mendham et al. 2007); and our understanding of program evaluation theory (Cook and Shadish 1986; Patton 1990) and experience with NRM program evaluations (Curtis et al. 1998); we identified and refined a set of topics that would provide information to underpin key elements of the work of regional practitioners. This set of topics included each landholder's:

- level of awareness and concern about the social, economic and environmental issues affecting their property and region;
- values they attach to their property;
- knowledge and understanding of processes leading to land and water degradation and of how to implement practices expected to lead to improved resource condition outcomes;
- level of confidence in recommended practices;
- property size;
- on and off-property income and debt levels;
- involvement in short-courses;
- stage-of-life and involvement in succession planning;
- long-term plans for their property;
- information sources;
- current and future landuse;

- implementation of practices expected to lead to improved resource condition outcomes;
- access to government financial support for implementation; and
- responses to policy instruments expected to change landholder behaviour and achieve regional targets.

The Corangamite NRM region (13,340 km²) is located to the west of the city of Melbourne in the state of Victoria, Australia [Figure 1]. The region has a diverse economy with employment dominated by the manufacturing and services sectors. Land is principally used for agriculture and includes livestock grazing (beef and dairy) and cropping, although agriculture only employs five percent of the population (Corangamite Catchment Management Authority 2003). Access to and from the region to metropolitan Melbourne and the adjoining city of Geelong is enhanced by a fast train route and a high quality road network. Many parts of the region are within a one-hour commute of Melbourne.

The Wimmera catchment (23,500 km²) is located in western Victoria, north west of Corangamite [Figure 1]. The region has a diverse environment, including open forests, agricultural landscapes, the Wimmera River, wetlands, lakes and intermittent streams. The main landuse of the region is broadacre agriculture, with approximately 85 percent of the region cleared of native vegetation. The population of about 50,000 lives mainly in the regional centres of Horsham and Stawell, as well as smaller townships.

Corangamite and Wimmera were selected from the five Victorian regions where our research has been completed because they are the most recent surveys and together provide a robust representation or ‘slice’ of Victoria (save for Murray irrigation areas). These regions are representative of most of regional Victoria in that they include major cities (Geelong, Colac and Horsham); inland and coastal areas; extensive dryland and irrigation agriculture; areas of high amenity value (the Otways and Grampians National Parks) and areas largely focussed on production. Both regions have a mix of landholders with a full-time focus on production and an increasing influx of ‘hobby farmers’. Selecting two regions allows us to compare trends occurring across Victoria without attempting to present more data than space permits or is needed to explain our key findings.

Figure 1 about here

Local governments in the two regions provided access to ratepayer lists and these were used to compile a list of all rural properties greater than 10 hectares (used to separate rural and urban landuse). These lists included a property identification field that supported spatial referencing of the survey data. The survey design and mail-out employed a modified Dillman (1978) *Total Design Method* process that has been refined through the experience of

successive catchment surveys. Curtis et al. (2005) provides a detailed explanation of the collaborative research process undertaken. In summary, a 12-page survey booklet was developed in collaboration with regional partners, extensively pre-tested through workshops with landholders, and mailed to selected respondents. In the Wimmera 2007 survey, a list of 1,200 landholders was randomly selected from ratepayer lists provided by local governments. After removing multiple listings of properties and known deceased estates, the final mailing list contained 1000 landholders. A final response rate of 56 percent was achieved from this survey (useable n=503). In 2002, surveys were sent to 959 landholders in the Wimmera region from a random sample of 1000 selected from local government lists. A final response rate of 73 percent was achieved (useable n=619). In the Corangamite 2006 survey, the final mailing list contained 972 landholders. A final response rate of 57 percent was achieved (useable n=482).

The survey topics in the Wimmera and Corangamite projects were consistent with those described earlier, but were modified to reflect the context in each region. The practices expected to lead to improved resource condition included in the surveys were slightly different in the two regions [Table 1]. Survey respondents were asked about their implementation of Current Recommended Practices (CRP) for both sustainable agriculture and biodiversity conservation. CRP included in the surveys were identified by Catchment Management Authority (CMA) staff or by participants in the survey pre-testing workshops as those practices expected to lead to improvements in catchment condition. CRP included in the survey can be classified into two groups: those principally related to biodiversity conservation (such as area of trees/shrubs planted); and those related to sustainable agriculture (such as soil tests).

We were conscious that some CRP are relevant to most landholders (i.e. non-specific, such as tree planting), while others are more relevant to particular landholders (i.e. specific, such as implementing minimum tillage in cropping systems). For this research, we identified CRP specific to either cropping (such as direct seeding) or livestock grazing (fencing bush to limit stock access). All respondents were included in calculations of the percentage of respondents implementing the non-specific CRP but only those involved in cropping or livestock enterprises were included in calculations for the proportion of respondents implementing CRP specific to each type of enterprise, or in analyses exploring the factors linked to implementation of CRP. As will be shown in Table 2, specific survey items were included to explore implementation over the full period of a respondent's property management and others explored implementation over much shorter timeframes, mostly the last five years. Seven CRP were common to both surveys.

Table 1 about here

10.3 FINDINGS

Nurture the voluntary work of landholders

Challenges for NRM practitioners

The Corangamite survey explored the implementation of 12 CRP through 12 items [Table 2a] and the Wimmera survey 10 CRP through 15 items [Table 2b]. Seven items were common to both surveys. Overall, there were similar levels of implementation in both regions in that more than 50 percent of respondents said they had implemented about half of the CRP in each region (6 of 12 CRP in Corangamite and 4 of 10 CRP in Wimmera). However, there were only two items, both for Corangamite, where more than 60 percent of respondents had implemented the specific CRP. Thus, in both regions the level of adoption is lower than might be seen as desirable. It seems there are considerable challenges for NRM practitioners seeking to engage landholders in these practices.

Tables 2a and 2b about here

Importance of government funding

Just over half of the Wimmera respondents (56%) said that work undertaken to implement at least one of the CRP had been supported by the financial or technical resources provided by government, including work that was then implemented by the Wimmera CMA, local landcare group or networks, state government agencies or non-government organisations. Thirty-six percent of Corangamite respondents said government funding had supported work on their property in the past five years. Our analyses established the existence of significant positive relationships between government funding and the implementation of seven out of the 10 CRP in the Wimmera study (Curtis et al. 2008b) and all 12 CRP in the Corangamite study (Curtis et al. 2006), providing a strong evidence base to suggest that government support makes a difference to implementation.

More to the story: the importance of voluntary contributions

The remainder of this section focuses on the Wimmera region where we have longitudinal data and information about the support from government for implementation of specific CRP. A key finding is that there was no item where more than 50 percent of those implementing a practice said they had

been supported by government [Table 3]. In other words, most of those implementing work had done so without direct government support.

Table 3 about here

Evaluating intermediate NRM outcomes

An important aim of the survey was to assist regional practitioners evaluate the impact of their NRM programs. As social researchers, we worked with our regional partners to identify intermediate program objectives that were supported by theory and empirical evidence. Typically, these intermediate objectives included landholder awareness of issues, knowledge of degradation processes and practices expected to address these threats, confidence in CRP and implementation of CRP. In each of our studies, there has been a close alignment between the targets identified in regional catchment strategies and the intermediate objectives included in our survey. The items included in both the 2002 and 2007 Wimmera surveys enabled a comparison of trends over time. NRM investment is increasingly targeted to specific asset classes, such as a vegetation type or a specific wetland. With spatially-referenced survey data we were able to test for changes over time in intermediate objectives for all respondents and for those in locations with specific assets. We discuss findings from the regional-scale analysis first. In presenting key findings, we focus on the implementation of on-ground work.

Comparison of the 2002 and 2007 survey data suggests that at the regional scale there has been a general increase in awareness of river health, water quality, dryland salinity and soil erosion issues, as well as an increased preparedness of landholders to acknowledge the impact of their landuse on soils (Curtis et al. 2008b). Two topics exploring landholder confidence in CRP were included in both surveys and there was evidence of significantly increased levels of confidence in these items: fencing to control stock access as an essential part of work to revegetate waterways; and watering stock off-stream to improve bank stability, water quality and stock condition (Curtis et al. 2008b). Conversely, there were significantly lower self-reported levels of knowledge for 9 of the 12 topics included in both surveys. This trend remained for analyses focussed on the eight knowledge topics where the Wimmera CMA has targeted investments on specific assets. Indeed, there had been a significant decline for six of the eight topics (Curtis et al. 2008b). In summary, although landholder awareness and confidence in CRP appeared to be increasing, landholder knowledge on topics where the CMA had targeted investment was declining.

Assessing implementation of CRP

It was possible to compare 2002 and 2007 data for six items relating to five of the ten CRP [Table 4]. Significantly lower proportions of landholders in 2007 were involved in three CRP (trees and shrubs planted past 5 years; perennial pasture established during management period; cropping using minimum tillage past 5 years), significantly increased proportions involved in one CRP (farm forestry), and there was no clear trend for the remaining CRP (fencing to manage stock access to native bush or grasslands).

Calculations of the average (median) amount of work completed by respondents for the five CRP where comparisons could be made provided additional information for assessing the achievement of on-ground objectives. Although fewer respondents had established trees and shrubs, there was a significant increase in the median number of trees and shrubs established. For all other CRP, the median amount of work declined over time (significantly for perennial pasture established; fencing to manage stock access to native bush/grasslands) [Table 4]. The trend to lower levels of implementation remained for analyses focussed on specific assets [Table 5] in that there was a trend to lower levels of landholder involvement in four of the five CRP (with the exception of fencing to manage stock access to native bush/grasslands), with a statistically significant decline for two CRP (trees and shrubs planted; cropping using minimum tillage).

Tables 4 and 5 about here

In our discussion of preliminary research findings with Wimmera CMA staff, it became clear that the CMA was accomplishing its targets for work that was directly funded and managed by CMA staff or contractors. However, our findings indicated that it was possible to be achieving the targets for direct CMA investment in on-ground work, but be going backwards in terms of the proportion of landholders implementing CRP and the median amount of work implemented by landholders across the region.

Other survey findings provide at least part of the explanation for the trend to reduced involvement of landholders in implementation of CRP. There has been a severe drought in the Wimmera for most of the period since 2002. Survey data shows that median on-property income dropped from \$45,000 to \$15,000 per annum, and that only 35 percent of respondents had made a profit in 2006/07 compared to 86 percent in 2002. Drought conditions might also have made it impractical to implement some practices and resulted in farmers or their partners moving off-property for work. Indeed, just over three-quarters of the survey respondents said they or their partner had received a net off-property income in 2006/07, up from 66 percent in 2002. Again, there is a potential for this trend to reduce the capacity of landholders to implement on-ground work. This hypothesis appeared to be supported by

findings that on-property work was positively linked to implementation of CRP while off-property income was negatively linked to implementation. Given that most of the work implemented by Wimmera survey respondents was self-funded and that in 2007 on-property profitability was linked to significantly higher implementation of six CRP, it seems likely that the impact of drought is at least part of the explanation for lower levels of implementation across the Wimmera between 2002 and 2007 (Curtis and Byron 2002; Curtis et al. 2008b).

Build and engage human and social capital

Introduction

The ‘capitals’ concept is a widely accepted and useful framework (Australian Bureau of Statistics 2002; Black and Hughes 2001) and can be applied to the task of understanding the complex web of factors that affect landholder capacity (i.e. ability) to implement recommended practices (Webb and Curtis 2002; Pannell et al. 2006). The concept of capital recognises that there is a stock of resources that can be used to achieve some desired endpoint such as improved NRM. Economic resources and physical infrastructure are types of human-created capital. The skills, abilities and wellbeing of the population form our human capital, while social capital refers to the social relations, networks, trust and norms that arise between people when they interact and which can then lead to further benefits. Natural capital refers to the non-human parts of the world upon which human existence is premised (Sobels et al. 2001; Castle 2002; Webb and Curtis 2002).

As social researchers, our focus has been on exploring the assumed relationships between investments that engage or build human and social capital and landholder practice change. We use the terms ‘engage’ and ‘build’ advisedly. It is our view that researchers, and to a lesser extent NRM practitioners, often underestimate the existing capacity of landholders.

Through our research, including the Corangamite and Wimmera regional landholder surveys, we have explored relationships between landholder capacity, the policy instruments available to regional NRM practitioners, and implementation of CRP by landholders. Our work builds on an extensive body of Australian research examining links between human capital and landholder practice change (Barr and Cary 2000; Cary et al. 2002; Guerin and Guerin 1994). The topics included in our surveys have therefore been shaped by the findings of past research, including our own (e.g. Curtis and De Lacy 1996; Curtis and Robertson 2003b) and the imperative of focussing on variables that can be influenced by regional NRM practitioners, or at least

will provide useful information to inform their engagement with landholders.

Before moving to a discussion of key findings from the Corangamite and Wimmera surveys, it is important to address concerns that have been raised about the value of capacity building investments. In a recent review for the Department of Sustainability and Environment, Curtis et al. (2008a) drew on the Victorian experience with landcare to examine the ‘value proposition’ for government investment in approaches that engage and build human and social capital to achieve NRM outcomes. The authors drew on rural development and extension theory and empirical research evaluating landcare (see Curtis 2007) to articulate an evaluation framework and marshal the available evidence, mostly from Victoria. The authors concluded that there was substantial evidence suggesting that landcare has had a significant positive impact on human and social capital and that these changes had contributed significantly to practice change. The authors also acknowledged the limitations of capacity building programs and the importance of a mix of policy approaches to NRM.

Capacity building enhances NRM outcomes

Findings from the recent Corangamite and Wimmera studies provide considerable evidence of the positive impact of investments in capacity building – including through short-courses such as those related to property management, landcare and commodity groups – that focuses on raising awareness, improving knowledge and building confidence in CRP [Table 6]. These capacity building platforms, and others, are typically supported by direct government investment. It is also important to acknowledge that in most instances these platforms would not exist or succeed without substantial input from landholders and other volunteers. Because direct government investment can occur outside these platforms, we have included government funding received as a variable in the list of other factors that practitioners should consider when seeking to engage landholders in practice change. As explained, the Corangamite survey explored the implementation of 12 CRP and the Wimmera survey 10 CRP [Table 2]. All relationships reported in Tables 6, 7, 8 and 9 were statistically significant at the 95 percent confidence level using a variety of pair-wise tests, including the Kruskal-Wallis Rank Sum Test; Spearman rank order correlations and proportions test. Given the weight of evidence provided by the large number of statistically significant relationships summarised in Tables 6 and 7, we have not included findings from multi-variate analyses.

Tables 6, 7, 8 and 9 about here

What we cannot change but need to consider

We need to acknowledge that there are factors beyond the control of NRM practitioners that affect landholder implementation and these need to be considered when developing policy approaches and particularly when engaging individual landholders. For example, the values that landholders attach to particular assets on their property or the district are powerful influences on behaviour [Table 7] and yet these values remain relatively stable. There are some consistent trends here in that respondents who attached strong environmental values to their property are significantly more likely to implement conservation practices. For example, Wimmera respondents who gave a high rating to the value 'native vegetation on my property provides habitat for native animals' were significantly more likely to fence rivers/streams/wetlands to manage stock access and plant trees and shrubs. This was also the case for production values and CRP with a production focus. For example, Wimmera respondents who gave a high rating to the value 'the property provides most of the household income' were significantly more likely to crop using both minimum and no-til practices, sow perennial pasture and test the quality of the main water source for stock or irrigation purposes. However, there were some values that cut across the conservation-production divide. For example, those who gave a high rating to the value 'being able to pass the property on in better condition' were significantly more likely to implement almost all practices.

Occupational identity

In both the Corangamite and Wimmera studies, there were significant differences between landholders who identified as farmers by occupation and those who stated they were not a farmer. These differences included respondent concerns about issues, values, knowledge of NRM, attitudes about NRM roles and responsibilities, confidence in CRP, sources of information, property size, on-property work commitment, absentee ownership and implementation of practices [Table 8 and 9] (Curtis et al. 2006; Curtis et al. 2008b). The narrative emerging from the analysis of survey data is consistent, if a little counter-intuitive. It was not surprising to find that farmers gave higher ratings than non-farmers to the production values of their property, were more concerned about issues affecting production and were more likely to implement production related CRP. Similarly, one might have expected to find that non-farmers were more concerned than farmers about conservation issues and gave a higher rating to conservation values. However, going against these intuitive expectations was the finding that farming was linked to higher implementation of some conservation practices [Table 7]. Part of the explanation for this counter-intuitive finding is that farmers are more knowledgeable about NRM, spend

more time on their property [Tables 8 and 9] and are more connected to the local community and the networks that facilitate the exchange of information and the establishment of local norms about what a “good farm looks like in this district”. Occupation identity is also important because many non-farmers are newcomers to the area and are unable to benefit as much from existing networks.

Non-farmers represent a substantial and increasing proportion of landholders and there are significant spatial concentrations of non-farmers in particular areas. For example, 47 percent of Corangamite and 33 percent of Wimmera respondents identified as non-farmers and in the Wimmera region, the proportion identifying as a farmer declined significantly from 80 percent of all respondents in 2002. The proportion of non-farmers in the Wimmera study varied from 9 percent in the Grampians to 85 percent in the West Wimmera Plains and in Corangamite from 13 percent in Otway Coast to 88 percent in Lismore.

Government funding

As explained earlier, the severe drought in the Wimmera region between 2002 and 2007 contributed to significantly reduced levels of on-property profitability and median incomes. Higher levels of profitability are linked to significantly higher implementation of most CRP included in the Wimmera survey [Table 7]. Given the relationships between income and implementation, and evidence of a decline in the proportion of landholders implementing most CRP, and the median amount of work they have completed between 2002 and 2007 in the Wimmera (most of which was not funded by government), there appears to be a strong case for increases in government funding for work with a high public benefit, including by raising the cost-share contributed by government during drought. While a range of delivery mechanisms might be used, a substantial part of this increased funding should be delivered through existing, effective platforms, including landcare and commodity groups.

NRM practitioners will be engaging a very different cohort of rural landholders

Rural property turnover

In this section, we describe the emerging trend of increased rural property turnover and explain its link to the influx of a different cohort of rural landholders. Our research suggests that the reconfiguration of rural space identified by others (Holmes 2002, 2006; Barr 2003), which is expected to lead to more heterogeneous ‘social landscapes’ (Barr 2003) and ‘occupance modes’, is occurring faster and more widely than anticipated. It seems that

rural Australia is indeed moving towards multifunctional landscapes where a mix of production, consumption and conservation values shape land use and the landscape (Smailes 2002; Holmes 2006; Argent 2002; Cocklin et al. 2006). Our modelling of property turnover across a number of regions, including Corangamite and the Wimmera, suggests up to 50 percent of rural properties will change ownership in the next decade, that the new owners will be substantially different to the longer-term owners, and that these differences will impact on their land management. It is unlikely that 'business as usual' approaches will be effective in engaging this new landholder cohort.

A thorough explanation of the modelling approach adopted to predict turnover in property ownership is provided in Mendham and Curtis (2010) and our various technical reports (e.g. Curtis et al. 2008b). Since 1998, the lead author (Curtis et al. 2000) has been using landholder survey data (respondent's long-term plans for their property and their age) and ABS Life Expectancy Tables to model rural property turnover. An important element of the modelling is the assumption that most farmers will retire by 65 years of age. This is justified by the observation that in 2006 only 13.9 percent of people employed in agriculture, fishing and forestry are over 65 years (ABS 2006).

It seems that in recent decades most of rural Victoria has had relatively stable populations. For example, our survey data show that in both the Wimmera and Corangamite regions, the median length of property ownership is close to 35 years, with very few new owners (owned property for <10 years – 15% in Wimmera; 19% in Corangamite) (Curtis et al. 2006; Curtis et al. 2008b). These findings are supported by the second author's analysis of Victorian state-government property sales data for the two regions for the decade 1995-2005 (Mendham and Curtis 2010). Approximately 21 percent of properties in the Wimmera had been sold in the past 10 years, while 25 percent had been sold in Corangamite. Turnover rates per year varied from 1.5 percent to 3.5 percent and the rate of turnover was trending up over time. With a median age of 54 years for Wimmera and 55 years for Corangamite respondents, it is not surprising that our modelling suggests that 50 percent of properties in Corangamite and 45 percent in the Wimmera are likely to change hands in the next 10 years (Mendham and Curtis 2010).

Newer and longer-term owners are different

Should this high level of ownership turnover occur, it is likely to lead to profound changes in the landscape (social and physical) of both regions because the new owners are typically very different from the longer-term owners. A key difference is that many of the new owners previously lived

outside the district where their rural property is located. For example, analysis of Victorian property sales data indicated that 61 percent of new owners of rural property over the past 10 years in Corangamite and 42 percent in the Wimmera lived outside the local government areas where the purchased property was located. Analysis of the landholder survey data suggested that a majority of new property owners (67% in the Corangamite and 76% in the Wimmera) lived in a different district prior to purchasing their rural property.

Newer and longer-term owners were also significantly different on a range of other social and farming variables, including values attached to their property, attitudes about roles and responsibilities of NRM stakeholders, concerns about issues, confidence in CRP, knowledge of NRM and sources of NRM information [Table 10] (Curtis et al. 2006; Curtis et al. 2008b). Many of these differences appear to be attributable to differences between respondents with farming and non-farming occupations and the fact that most new owners identified themselves as non-farmers [Table 10]. As explained previously, farmers and non-farmers are significantly different in terms of their concern about NRM issues; their values, knowledge attitudes and sources of information; confidence in CRP and implementation of practices. Consistent with their non-farming occupations, newer owners were more likely to own smaller properties, spend less time working on property, more time working off property, and were less likely to make an on-property profit [Tables 10 and 11]. Newer owners were also less likely to be a member of landcare or other commodity and industry groups [Table 10]. An important finding was that a significantly larger proportion of newer owners listed their principal place of residence as being off-property.

Table 10 about here

While the dominant landuse in both regions was dryland pasture, there were some significant differences between the on-property enterprises of newer and longer-term landholders. In the Wimmera, longer-term landholders were more likely to be involved in cropping (78% for longer-term compared to 46%; $p < 0.001$) and to be producing sheep for wool (68% compared to 42%; $p < 0.001$) or meat (70% compared to 52%; $p = 0.004$). Newer owners were significantly more likely to be involved in alternative forms of livestock (16% compared to 7%; $p = 0.016$). Similar trends were observed in the Corangamite region, where longer-term owners were likely to be involved in broadacre farming (29% compared to 16%; $p = 0.027$), sheep (47% compared to 28%; $p = 0.003$) and dairy (24% compared to 11%; $p = 0.01$). Newer owners in Corangamite were more involved (as in the Wimmera) with other livestock (14% compared to 7%; $p = 0.036$) as well as viticulture (12% compared to 5%; $p = 0.029$).

The information sources used by new and longer-term owners are also different. As explained, newer owners were less likely to be members of traditional NRM networks [Table 10]. Instead, newer owners appeared to be using more contemporary sources of information than longer-term owners, including the internet (although both groups mostly used newspapers, books and mailed brochures) [Table 11].

Table 11 about here

Newer owners were more likely to value their properties as a place for recreation, as a break from their normal occupation, and for providing habitat for native animals. On the other hand, longer-term owners were more likely to value their properties for the social and economic outcomes linked to farming such as for providing most of the household income, providing a sense of accomplishment from building or maintaining a viable business and being able to employ family members.

There was a clear split between the two groups concerning their assessment of the importance of issues affecting their local district, with newer landholders in the Wimmera expressing significantly greater concern for nine out of the ten environmental issues. In the Corangamite survey, newer landholders were significantly more concerned about four of the five environmental issues affecting their property and five out of the eight environmental issues affecting the district. On the other hand, longer-term owners expressed greater concern about lower returns limiting their capacity to invest on-property.

In the Wimmera and Corangamite surveys, newer landholders were significantly more likely to agree with all three statements supporting the introduction of a landholder duty of care for the environment that was likely to impinge on private property rights (for example, “it is fair that the wider community asks landholders to manage their land in ways that do not cause foreseeable harm to the environment” and “in future, landholders should expect to be legally responsible for managing their land in ways that do not cause foreseeable harm to the environment”). Nevertheless, there was majority support from both groups for the proposition that “new owners should abide by agreements entered into by previous owners where public funds have been paid for land protection or conservation work”.

Longer-term owners had significantly higher self-assessed knowledge of many of the NRM topics included in both regional surveys (12/18 items in the Corangamite survey; 7/17 items in the Wimmera survey). The small number of items where newer owners rated their knowledge higher than longer-term owners invariably related to habitat conservation. Consistent with their stronger conservation orientation, newer owners expressed significantly more interest in conservation covenants (Wimmera: new 17%,

longer-term 8%; $p=0.020$; Corangamite: new 14%, longer-term 7%; $p=0.033$). Compared to longer-term owners, newer owners in the Wimmera were significantly more likely to say they would be willing to undertake environmental works on their properties without any external financial support (64% compared to 48%; $p=0.020$).

Analysis of survey data highlighted a trend for longer-term owners to implement CRP at higher levels (statistically significant for planting native vegetation, establishing perennial pastures and applying minimum tillage cropping techniques). These differences extended across CRP linked to both sustainable agriculture and biodiversity conservation. As with the farmer/non-farmer dichotomy, it seems that the more knowledgeable longer-term owners, who spend more time on their property and are better connected to local information and norm establishing networks, are more likely to implement most CRP.

There were also differences between new and longer-term owners in their levels of interest in a range of options for engaging landholders in NRM. In Corangamite, newer owners were more likely than longer-term owners to express interest in annual payments (37% compared to 27%; $p=0.030$) or a grant scheme administered by a government department (34% compared to 22%; $p=0.004$). In the Wimmera, newer owners were more interested than longer-term owners in training that would help them identify (35% compared to 14%; $p<0.001$) and establish and manage (28% compared to 17%; $p<0.001$) native vegetation. This interest in training is an important finding given that newer owners generally said they had lower knowledge than longer-term owners. The implications of these and other findings are explored further in the conclusions section that follows.

10.4 CONCLUSIONS

Our aim in this chapter was to assist regional NRM practitioners engage rural landholders, develop a suite of policy instruments and evaluate NRM program outcomes. In concluding, we will summarise our key findings and reflect on some of their implications for regional NRM practitioners.

Survey findings suggest that the voluntary contributions of landholders are critical to the success of regional NRM programs. NRM practitioners need to at least ensure they don't undermine these efforts and, if possible, they should seek to nurture them. For example, most of those implementing each CRP in the Corangamite and Wimmera studies had not received financial or technical support from government for that work. Comparison of the 2002 and 2007 Wimmera survey data showed declines in both the proportion of landholders implementing work related to most CRP and the

median amount of work undertaken to enhance the condition of priority assets. It seems that this decline in landholder implementation largely resulted from a decline in voluntary efforts linked to drought and declining on-property incomes. At the same time, there was a significant positive relationship between government support and implementation. These findings support calls to increase the public share of the cost of implementing work with a high public benefit, especially during droughts.

While a range of delivery mechanisms might be used, a substantial part of this increased funding should be delivered through existing, effective platforms, including landcare and commodity groups. Again, research presented here provides considerable evidence of the positive impact of regional NRM investments in capacity building focused on raising awareness, improving knowledge and building confidence in CRP – including through short-courses such as those undertaken as part of property management planning.

There are also factors beyond the control of NRM practitioners that affect landholder implementation. Landholder values are powerful influences on behaviour and yet remain relatively stable. Accordingly, NRM practitioners need to be aware of the range of landholder values and ensure that their communication and policy approaches embrace those values. While there is an apparent division between conservation and production values, some values cut across the conservation-production divide. For example, those who gave a high rating to the value ‘being able to pass the property on in better condition’ were significantly more likely to implement almost all CRP included in the surveys.

In both the Corangamite and Wimmera studies, there were significant differences between landholders who identify as farmers by occupation and those who say they are not a farmer. Farmers consistently gave higher ratings to the production values of their property, were more concerned about issues affecting production and were more likely to implement production related CRP. Compared to farmers, non-farmers were more concerned about conservation issues and gave a higher rating to conservation values. However, there was higher implementation of some conservation practices amongst farmers than non-farmers. Part of the explanation for this counter-intuitive finding is that farmers are more knowledgeable of NRM, spend more time on their property and are more connected to the local community and the networks that facilitate the exchange of information and the establishment of local norms about what a “good farm looks like in this district”.

Evidence presented suggests that we can expect a significantly higher rate of change in the ownership of rural properties in Victoria over the next

decade. This is likely to have profound implications for communities, industries and NRM. The scale and nature of predicted property ownership change can be expected to reduce the effectiveness of local groups and their networks if they lose key leaders or they don't have sufficient numbers of people living and working full-time in the local community to share the burden of community work. These changes are likely to impact on the capacity of landcare groups to function and implement on-ground work, but also on the viability of local fire brigades and service groups that are critical elements of rural life.

The new owners are typically very different from the longer-term owners in that most of them are not farmers by occupation, are more likely to have resided outside the district prior to purchasing their rural property and to be absentee owners. Newer and longer-term owners were also significantly different in terms of the values attached to their property, attitudes about roles and responsibilities of NRM stakeholders, concerns about issues, confidence in CRP, and sources of NRM information. While newer owners can be expected to bring new ideas, skills and access to resources, they will be less knowledgeable about NRM and have less experience of local conditions, including droughts.

Our contact with NRM practitioners indicates they are experiencing difficulties engaging many newcomers in NRM. A 'business as usual' approach involving appeals and policy instruments designed for full-time farmers largely motivated by a desire to increase production and profitability is unlikely to motivate the increasingly important cohort of newcomers. Appeals that address the newcomers' pro-conservation values are more likely to be successful. New landholders also expressed a specific interest in conservation covenants and in training that would address their need for more knowledge of how to identify, establish and manage native vegetation. If NRM agencies have limited resources for native vegetation management, they might therefore be advised to invest in training programs rather than covering the cost of on-ground work for a relatively affluent cohort of landholders, most of whom say they would undertake conservation work without government funding.

The high proportion of new owners who are absentee residents also presents a challenge for NRM practitioners. Many absentees are unable to participate in typical evening meetings or the daytime workshops and field days held as part of traditional group or agency extension programs. An obvious strategy is to hold these activities on weekends and to promote activities and access to information using a variety of media, including web-based formats. Even then, absentees may be reluctant to invest time in meetings or workshops unless they address their specific needs. NRM practitioners need to be active in identifying newcomers, perhaps at the time

of a property sale, and then make personal contact to identify their needs and provide them with ways to engage local networks and wider information sources.

Figure 1: Location of Corangamite and Wimmera regions in south eastern Australia

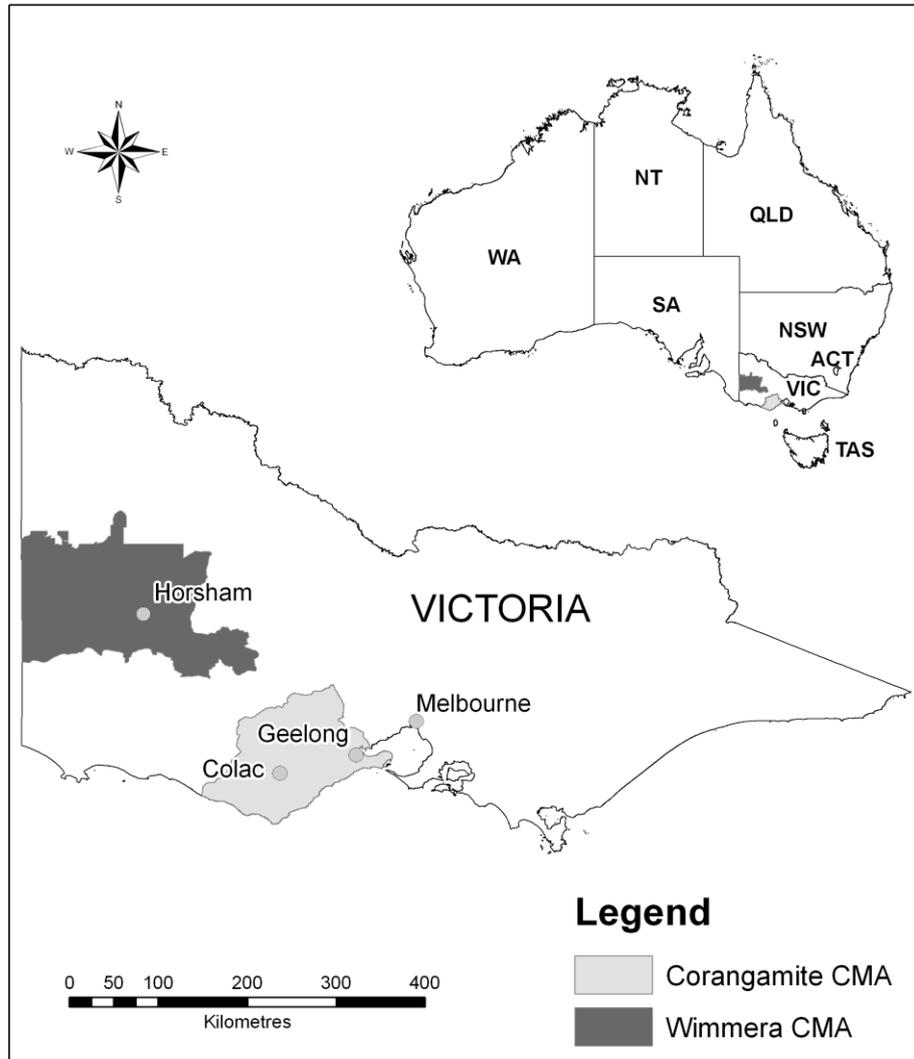


Table 1: Current Recommended Practices (CRP) included in the Wimmera 2007 and Corangamite 2006 surveys

Current Recommended Practice (CRP) survey questions	Wimmera	Corangamite
Area of trees and shrubs planted/direct seeded	✓	✓
Area of farm forestry established	✓	✓
Length of fencing erected to manage stock access to rivers/streams/wetlands	✓	✓
Area of native bush/grasslands fenced to manage stock access	✓	✓
Area sown to perennial pasture and lucerne	✓	✓
Maximum area of crop (of any type) sown in any year using minimum tillage techniques	✓	✓
Have you tested the water quality of the main water source for stock or irrigation purposes	✓	✓
Number of off-stream watering points established	✓	✗
Area of gully erosion addressed	✓	✗
Maximum area of crop sown in any year using no-till techniques	✓	✗
Number of paddocks for which you have a record of soil test results	✗	✓
Area with at least one lime application	✗	✓
Area cropped using a rotation with pasture (e.g. lucerne)	✗	✓
Area where you used time controlled or rotational grazing	✗	✓
Estimated time spent by you or others to control pest animals and non-crop weeds	✗	✓

Table 2a: Implementation of CRP, Corangamite 2006 (n=482)

Corangamite 2006: Practices undertaken during your management	n=	% adopt	median
Area of trees and shrubs planted (incl. direct seeding) [ha]	445	75%	4ha
Area of farm forestry established [ha]	449	17%	5ha
Area of native bush/grasslands fenced to manage stock access [ha]	436	31%	5.5ha
Length of fencing erected to manage stock access to rivers/streams/wetlands [km]	444	49%	3km
Have you tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 yrs?	461	27%	N/A
Number of paddocks where have a record of soil test results for past 5 years	435	55%	6
Area sown to perennial pasture and lucerne [ha] past 5 yrs	451	52%	40ha
Area cropped in past 5 years using a rotation with pasture eg lucerne	446	49%	50ha
Area where used time controlled rotational grazing in past 12 months	448	52%	97.5ha
Area with at least one lime application past 5 years	449	54%	50ha
Max area of crop sown in any year using min-tillage techniques [ha] past 12 months	450	42%	38.5ha
Time spent by you/others to control pest animals & weeds in past 12 months	449	88%	10 days

Table 2b: Implementation of CRP, Wimmera 2007 (n=503)

Wimmera 2007: Practices undertaken during your management	n=	% adopt	median
Area of trees and shrubs planted (incl. direct seeding) [ha]	487	54%	5ha
Area sown to perennial pasture and lucerne [ha]	490	36%	75ha
Area of gully erosion addressed [ha]	487	11%	5ha
Area of farm forestry established [ha]	489	10%	5ha
Area of native bush/grasslands fenced to manage stock access [ha]	393	37%	10ha
Length of fencing erected to manage stock access to rivers/streams/wetlands [km]	392	27%	4km
Number of off-stream watering points established [number]	393	23%	5.5
Have you tested the water quality of the main water source for stock or irrigation purposes on your property in the last 5 yrs?	428	58%	N/A
Area of trees & shrubs planted (incl. direct seeding) [planted annually]* past 5 yrs	491	37%	200
Area sown to perennial pasture and lucerne [ha] past 5 yrs	489	30%	60ha
Area of farm forestry established [ha] past five yrs	491	4%	5ha
Length of fencing erected to manage stock access to rivers/streams/wetlands [km] past 5 yrs	395	21%	3km
Area of native bush/grasslands fenced to manage stock access [ha enclosed annually] past 5 yrs	490	20%	2ha
Maximum area of crop sown in any year using no-til techniques [ha] past 5 yrs	32	56%	200ha
Max area of crop sown in any year using min-tillage techniques [ha] past 5 yrs (during past 12 months Corangamite)	33	52%	200ha

**Data provided in survey recalculated as number of trees per year and shown as such in this table*

Table 3: Implementation of CRP and government support, Wimmera 2007 (n=503)

Practices undertaken during your management	n=	% adopt	work median	% receiving govt support
Area of trees and shrubs planted (including direct seeding) [ha]	487	54%	5 ha	44%
Area sown to perennial pasture and lucerne [ha]	490	36%	75 ha	10%
Area of gully erosion addressed [ha]	487	11%	5 ha	16%
Area of farm forestry established [ha]	489	10%	5 ha	10%
Area of native bush/grasslands fenced to manage stock access [ha]	393	37%	10 ha	32%
Length of fencing erected to manage stock access to rivers/streams/wetlands [km]	392	27%	4 km	33%
Number of off-stream watering points established [number]	393	23%	5.5	6%
Practices undertaken in last 5 yrs				
Area of trees and shrubs planted (including direct seeding) [ha]	491	37%	4 ha	32%
Area sown to perennial pasture and lucerne [ha]	489	30%	60 ha	12%
Length of fencing erected to manage stock access to rivers/streams/wetlands [km]	395	21%	3 km	23%
Area of native bush/grasslands fenced to manage stock access [ha]	490	20%	10 ha	20%

Table 4: Implementation of CRP, Wimmera 2007 (n=503) and 2002 (n=619)

Practices undertaken	Survey year	% adopt	p =	Work done median	p =
Area sown to perennial pasture and lucerne during period of management [ha]	2007 (n=490)	36% (n=174)	0.0001	75ha	0.0011
	2002 (n=590)	47% (n=279)		120ha	
Area of native bush/grasslands fenced to manage stock access during period of management [ha]	2007 (n=393)	37% (n=145)	0.0776	10ha	0.022
	2002 (n=292)	30% (n=88)		20ha	
Area of farm forestry established during period of management [ha]	2007 (n=489)	10% (n=36)	0.0439	5.5ha	0.411
	2002 (n=587)	6% (n=28)		10ha	
Area of native bush/grasslands fenced to manage stock access during the past 5 yrs (2007) or past 3 yrs (2002) [ha enclosed annually]	2007 (n=195)	32% (n=54)	0.1803	0.75ha	0
	2002 (n=416)	27% (n=139)		5ha	
Area of trees and shrubs planted (incl. direct seeding) during the past 5 yrs (2007) or past 3 yrs (2002) [planted annually]*	2007 (n=491)	37% (n=183)	0	200	0
	2002 (n=580)	60% (n=346)		83.3	
Max area of crop sown in any year using minimum tillage techniques during the past 5 yrs (2007) or past 3 yrs (2002) [ha]	2007 (n=351)	66% (n=224)	0.0002	300ha	0.1959
	2002 (n=471)	77% (n=271)		360ha	

Note: *Area recalculated as number of trees per year

Table 5: Implementation of CRP by strategic investment areas, Wimmera 2002 (n=619) and 2007 (n=503)

CRP	Investment asset/area	% involved 2002	% involved 2007	P value*
Area of trees and shrubs planted (including direct seeding) last 5 yrs	3 priority ground flow systems	48% n=33	43% n=51	0.7976
	Yarriambiack & Hindmarsh	56% n=282	32% n=220	0.000
Area sown to perennial pasture and lucerne	3 priority ground flow systems	64% n=33	45% n=51	0.1405
Max area of crop sown in any year using minimum tillage techniques	Wimmera cropping areas	77% n=471	66% n=351	0.002
Area of farm forestry established	3 priority ground flow systems	15% n=33	4% n=50	0.1659
Area of native bush/grasslands fenced to manage stock access [ha]	Wimmera region	30% n=88	37% n=145	0.0776

Table 6: Significant positive relationships between capacity building approaches and implementation of CRP, Corangamite 2006 (n=482) and Wimmera 2007 (n=503)

Capacity building topics	Corangamite n=482 (12 CRP)	Wimmera n=503 (10 CRP)
Awareness of salinity on property	10 practices (all except trees & shrubs planted, used time controlled/rotational grazing) and said areas property affected by dryland salinity	3 practices (trees & shrubs planted, gully erosion control, sowing perennial pasture) and said areas property affected by dryland salinity
Self-assessed knowledge of NRM	12 practices and 11 of 17 landholder knowledge items	7 practices (all except testing water quality, establishing off-stream watering, gully erosion control) and all 17 landholder knowledge items
Confidence in CRP (Survey items focussed on fencing to manage stock and tillage practices)	2 practices (fencing waterways, fencing native vegetation) and confidence in benefits of managing stock access to waterways and native vegetation	1 practice (min-tillage) and confidence in benefits of stubble retention
Property planning	10 practices (all except trees & shrubs planted, time controlling pest plants & animals)	7 practices (all except cropping using no-til or min-til, or gully erosion control)
Landcare participation	11 practices (all except tested water quality of main water source)	7 practices (all except tested water quality, establishing off-stream watering, farm forestry)
Commodity group participation	10 practices (all except native vegetation fenced, time controlling pest plants & animals)	7 practices (all except fencing wetlands, gully erosion control, establishing off-stream watering)

Table 7: Significant positive relationships between topics NRM practitioners have limited capacity to influence but should consider, and implementation of CRP, Corangamite 2006 (n=482) and Wimmera 2007 (n=503)

Topics	Corangamite n=482 (12 CRP)	Wimmera n=503 (10 CRP)
Direct government support for work	All 12 practices	8 practices (all except min-til, testing water quality),
Occupation (farmer compared to others)	10 practices (all except farm forestry, fencing native vegetation)	6 practices (all except establishing off-stream watering, gully erosion control, farm forestry, fencing wetlands)
Property profitability (reporting a profit and level of profit)	9 practices (all except farm forestry, fencing native vegetation, time controlling pest weeds and animals)	6 practices (all except trees & shrubs planted, fencing native vegetation, gully erosion control, testing water quality)
Property size (larger)	11 practices (all except time controlling pest weeds and animals)	8 practices (all except farm forestry, gully erosion control,)
Values attached to property	9 of 11 practices (all except trees & shrubs planted) across 15 of 16 landholder values items	7 practices (all except establishing off-stream watering, gully erosion control, farm forestry) across 16 of 18 items

Table 8: Differences between farmers and non-farmers: Wimmera 2007
(n=484)

Topics	Farmers	Non-farmers
Property size	880 ha	270 ha
Absentee residence	8%	50%
On-property work	50 hrs/wk	10 hrs/wk
Concern about NRM issues	Different on 14 of 21 items	
Attitudes to NRM roles & responsibilities	Different on 8 of 11 items	
Knowledge of NRM	Different on 11 of 18 items	
Values attached to property	Different on 14 of 18 items	

Table 9: Differences between farmers and non-farmers: Corangamite 2006
(n=453)

Topics	Farmers	Non-farmers
Property size	286 ha	40 ha
Absentee residence	12%	34%
On-property work	60 hrs/wk	10 hrs /wk
Concern about NRM issues	Different on 9 of 25 items	
Attitudes to NRM roles & responsibilities	Different on 10 of 17 items	
Knowledge of NRM	Different on 14 of 17 items	
Values attached to property	Different on 16 of 21 items	

Table 10: Comparing newer (<10 years) and longer-term (>10 years) landholders: social and farming variables, Corangamite 2006 (n=482) and Wimmera 2007 (n=503)

Topic	Wimmera		Corangamite	
	New (n=70)	Longer-term (n=408)	New (n=92)	Longer-term (n=381)
Median area of land managed	145 ha	722 ha ***	44 ha	160 ha ***
Occupation (% farmers/non-farmers)	35%	73% ***	23%	61% ***
Property principal place of residence	58%	81% ***	61%	81% ***
Median age	48 years	55 years ***	47 years	57 years ***
Median hours per week on property	20 hours	50 hours ***	16 hours	40 hours ***
Median days off-property per year	50 days	0 days **	200 days	0 days ***
Made an on-property profit	17%	38% **	35%	68% ***
Median level of equity in property	61-80%	81-100% *	61-80%	81-100% ***
Member of landcare	17%	43% ***	24%	37% *
Completed a short course related to property management	37%	50%	33%	38%
Commodity group membership	8%	27% **	13%	20%
Employed a consultant	31%	35%	29%	21%
Property management plan	Early stages	Early stages	Not started	Not started
Family members interested in taking on the property	49%	61%	36%	53% **
Succession plan	Early stages	Early stages	Not started	Early stages *

Significance denoted by: * p<0.05; ** p<0.01; ***p<0.001

Table 11: Sources of information for newer (<10 years) and longer-term (>10 years) landholders, Corangamite 2006 (n=482) and Wimmera 2007 (n=503)

Information sources	Wimmera (n=503)		Corangamite (n=461)	
	New	Longer -term	New	Longer -term
Television	41%	45%	34%	33%
Books/magazines/journals	65%	77%	73%	63%
CMA	43%	55%	33%	48%
Children	5%	15%	8%	11%
Victorian Farmers' Federation (VFF)	11%	33% ***	11%	32% ***
Bureau of Meteorology	29%	31%	30%	30%
Local council	41%	45%	24%	22%
Radio	54%	61%	41%	47%
Landcare group	40%	57% *	39%	54% *
Extension officers	30%	27%	14%	26% *
Department of Primary Industries (DPI)	41%	42%	24%	30%
Waterwatch	5%	18% *	3%	9%
Newspapers	65%	83% **	70%	78%
Field days	44%	56%	26%	36%
Environmental organisations	32%	26%	29%	24%
Industry groups	13%	16%	10%	13%
Friends/neighbours/relatives	59%	54%	60%	50%
Department of Sustainability & Environment (DSE)	43%	46%	37%	35%
Landcare coordinator	26%	36%	29%	36%
Agricultural consultants	24%	22%	16%	15%
Universities	5%	5%	14%	5% **
Internet and email	29%	19%	43%	18% ***
Workshops/seminars	13%	23%	16%	19%
Mailed brochures/leaflets/community newsletters	70%	69%	57%	61%
Training courses	8%	14%	17%	8% *

Significance denoted by: * p<0.05; ** p<0.01; ***p<0.001

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