



Socio-economic impacts of land use change
in the Green Triangle and Central Victoria

Preliminary summary of findings of the *Land Use Change* project

Report prepared for the *Socio-economic impacts of land use change in the Green Triangle and Central Victoria* project

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Contents

Introduction	1
What land use change occurred over 1991 to 2006?	3
How do residents perceive these changes?	7
What social and economic changes accompany different types of land use change?.....	11
How do residents experience impacts of change?	17
Blue gum plantations – summary of findings.....	19
Broad acre cropping – summary of findings	21
Dairy farming – summary of findings	23
Beef and sheep grazing – summary of findings.....	25
Rural residential development – summary of findings	27
Viticulture – summary of findings.....	30
Integrating findings	32
Conclusion.....	35
Appendix 1: How was the study conducted?.....	36

Figures

Figure 1: <i>Land Use Change</i> study region	2
Figure 2: Changes in area of land use for different purposes in the study region, 1991 to 2006.....	3
Figure 4: Percentage of respondents who considered the overall impact of increases in land uses to be negative, neutral or positive.....	7
Figure 5: Percentage of respondents who considered increases in selected land uses to lead to an increase, decrease or no change in population and employment in rural areas	8
Figure 6: Percentage of respondents who considered increases in selected land uses to lead to an increase, decrease or no change in business for local shops/traders, or community involvement.....	8
Figure 7: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in amount of water available and amount of native vegetation.....	9
Figure 8: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in road damage and soil erosion.....	9
Figure 9: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in wildfire risk and chemical risk.....	10
Figure 10: Average annual change in rural population in different parts of the study region, 1991-2006	12
Figure 11: Change in number of people working in agriculture, 1991-2006.....	14
Figure 15: Percentage of respondents who considered increases in cropping would lead to increase, decrease or no change in social benefits.....	22
Figure 20: Percentage of respondents who considered increases in rural residential development would lead to increase, decrease or no change in social benefits	28

Tables

Table 1: Employment generated per 100 hectares to farm gate in 2008.....	5
Table 2: Localities experiencing rural residential expansion, by local government area	28

Introduction

Land and its uses are essential to all human communities. This is particularly so for rural communities, where many people are directly dependent on land for their livelihood, and the way land is used has a central role in defining the identity of an area and its community.

Changes in land use change can have a profound impact on the personal, family, work and social lives of people living in rural communities, as well as those living in rural and regional towns. Many rural regions across Australia have experienced rapid land use change in recent decades. The region extending from the 'Green Triangle' in South Australia and western Victoria through to Colac in Central Victoria (Figure 1) is no exception, with multiple types of land use change occurring in recent decades. These have included expansion of plantation forestry, increase in rural residential properties, increase in cropping, decrease in wool production in some areas, increase in prime lamb production, and a range of changes to the dairy industry in different parts of the region.

Media reports and public comment suggest that many people are concerned about the social and economic impacts of these changes. There is, however, little research available to understand both the extent of these concerns and the possible social impacts of change.

Social research can inform land use debate and policy in a number of ways, including exploring how different people perceive and experience land use change, examining the social changes that accompany different types of land use change,

identifying where negative impacts should be mitigated, and identifying where education or community engagement processes might lead to a better understanding of the complex impacts of land use change.

To understand these diverse social facets of land use change requires multiple types of social research. In particular, it is important to understand the range of ways people perceive and experience land use change, and how this compares to what can be observed in independent data on land use change and its impacts on rural communities.

The *Socio-economic impacts of land use change in the Green Triangle and Central Victoria (Land Use Change)* study was established in 2006, with a goal of improving understanding the social and economic impacts of the following types of land use change in the study region, shown in Figure 1. The project used multiple methods to study the socio-economic impacts of land use change (Appendix 1). This report summarises and integrates key findings of the project. It is a preliminary summary report, which will be finalised in early 2009 after final results of the project have been peer reviewed.

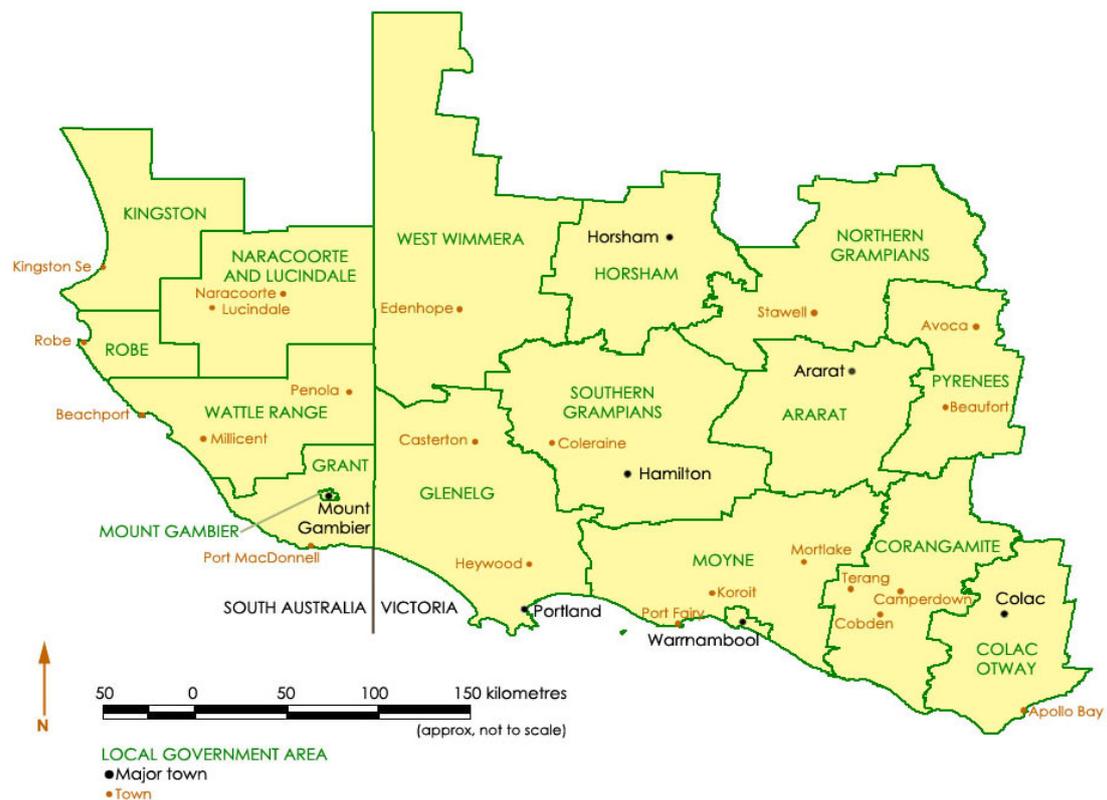


Figure 1: Land Use Change study region

The region is an important contributor to national agricultural and forestry production.

While the study region includes 1.1% of Australia’s agricultural land, in 2006 it had¹:

- 20.1% of Australia’s hardwood plantations and 18.2% of softwood plantations
- 14.9% of Australia’s dairy cows
- 14.6% of the national area of pasture/hay crops, and 17.7% of production of pasture/hay
- 13.6% of the national flock of sheep and lambs
- 12.9% of the grapes grown in Australia and 4.1% of national wine production
- 9.0% of Australia’s oilseed area and 9.8% of production
- 5.9% of Australia’s beef cattle, and
- 2.6% of Australia’s cereal grain crops and 8.0% of production.

This highly diverse region has experienced a range of land use changes in recent years.

¹ Data sources for figures in this section: Australian Bureau of Statistics (ABS) 2006 *Agricultural Census*; Bureau of Rural Sciences (BRS) *National Plantation Inventory*.

What land use change occurred over 1991 to 2006?

While a number of land use changes occurred in the region over 1991 to 2006, this study did not study every type of land use change occurring in the region in depth. Group interviews were held at the start of the study, in which residents of the region were asked which land use changes were the most important to examine. Based on these interviews, the study focused on land use change involving:

- expansion of bluegum plantations
- expansion of cropping
- growth in the number of rural residential properties
- changes to dairy farming, which declined in some areas and grew in others
- growth in beef grazing
- decline in grazing sheep for wool and growth in prime lambs
- growth in viticulture.

While the area of pine plantations did not change significantly over this period, some data were analysed about pine plantations to provide a better understanding of forestry in the region.

Over time, the area dedicated to some of these land uses has expanded, while for others it has contracted, as shown in Figure 2.

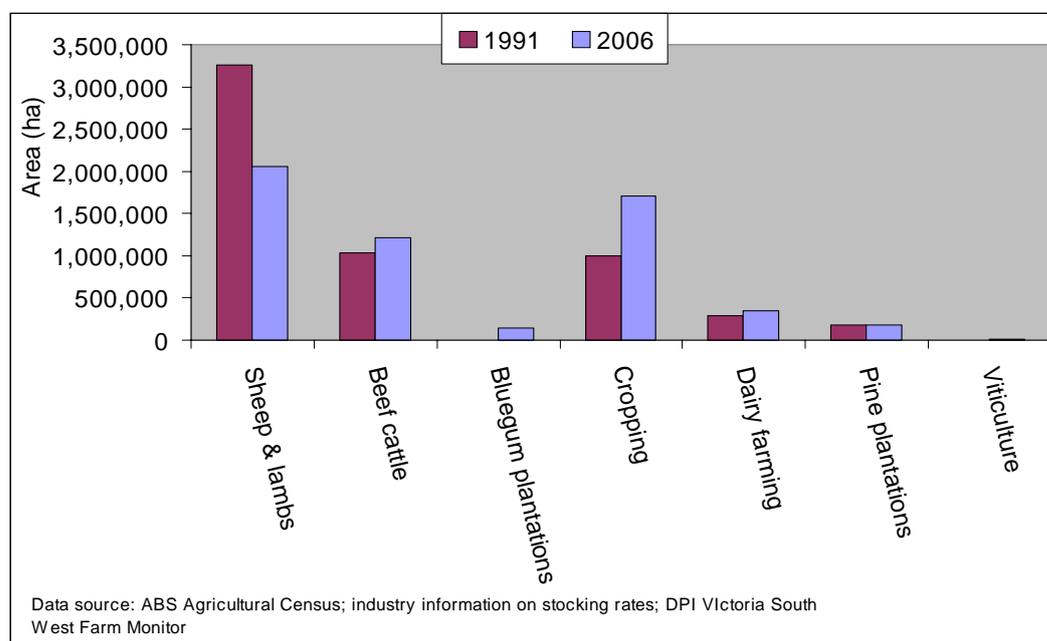


Figure 2: Changes in area of land use for different purposes in the study region, 1991 to 2006

Land use change is not solely about a change in the area of land used for a particular purpose. It often also involves change in how that land is used. For example, intensification of cropping might result in higher employment per hectare, and greater local economic activity due to more inputs being used and greater volume of outputs produced per area of land. Efficiency of production has increased over time for most of the land uses examined in this study, including cropping, with the result that fewer people are needed to produce the same

amount of output. This may have impacts as significant as those resulting from a change in the total area of land used for cropping. Where possible, it is therefore important to understand land use change in terms of change in area of land used for a particular purpose, volume and value of production, and the amount and type of employment generated, as changes in all of these can have important social and economic impacts.

Figure 3 shows how employment has changed for key land uses over time in the study region. Table 1 compares the employment generated by each land use per 100 hectares, up to the ‘farm gate’ (defined as the point at which products have been harvested or finished growing and are ready to be transported for sale or processing).

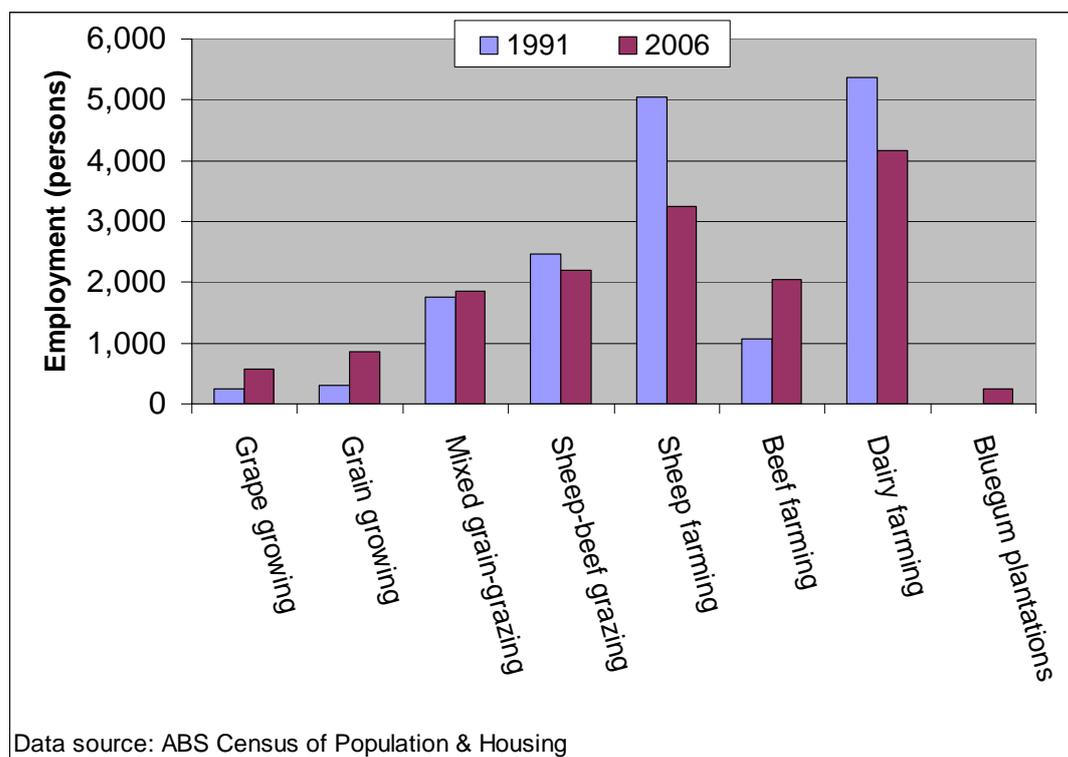


Figure 3: Changes in employment generated by different land uses to the farm gate, 1991-2006 (figures exclude downstream processing of products produced at farm gate)

The different land uses studied generate considerable different levels of employment per 100 hectares. Clearly a change in land use can have significant employment implications. However, increasing productivity within different land uses has also had a large impact on the amount of employment generated over time.

When changes in area used for different purposes, and numbers of people employed in these land uses, is compared, it can be seen that employment generated by each land use has sometimes changed in different ways to the change in the area of land used. For those land uses which have grown in area over time, employment typically grew more slowly than the area of land used – for example, dairy farming employment fell despite the total area used for dairy farming increasing substantially over 1991 to 2006.

Table 1: Employment generated per 100 hectares to farm gate in 2008

Land use	Employment generated per 100 hectares 2006-08, to farm gate		Other employment generated beyond farm gate in study region
	Median	Range	
Beef grazing	0.22 jobs/100ha	0.1-0.5	0.01-0.03 jobs/100ha (abattoirs, transport)
Bluegum plantations	0.15 jobs/100ha	0.1-0.2	0.35-0.50 jobs/100ha (once harvesting begins, based on Schirmer 2008 data from WA where harvesting currently occurs)
Broadacre cropping	0.23 jobs/100ha	0.1-0.5	0.01-0.03 jobs/100ha (storage, transport, sale)
Dairy farming	1.4 jobs/100ha	0.9-1.7	0.2-0.3 jobs/100ha (dairy product manufacturing)
Grape growing	7.7 jobs/100ha	5.0-10.0	6.5-7.0 jobs/100ha (wine making)
Sheep grazing	0.33 jobs/100ha	0.2-0.6	0.01-0.03 jobs/100ha (abattoirs, transport)
<p>Note: These data are preliminary results of a survey and will be updated in early 2009. While median figures may change slightly, overall trends will remain the same when comparing land uses Data source: Data gathered via a survey of primary producers and plantation companies; the South West Victoria Farm Monitor project; the ABS; and Schirmer, J. 2008. <i>Forestry employment and spending: Forest industry employment and expenditure in WA, 2005-06</i>. CRC for Forestry, Hobart</p>			

This trend is a result of increases in labour and production efficiency in the cropping, dairying, and to a lesser extent the beef and sheep grazing industries. For example:

- In dairy farming, the number of people employed per 100 milk cows fell from 1.91 in 1991 to 1.02 in 2006, while milk produced per cow rose just over 40%
- Average tonnes of cereal grains produced per hectare rose from 2.01 tonnes in 1991 to 2.92 tonnes in 2006; average production of canola rose from 1.4 to 1.6 tonnes over the same period
- Average beef cattle and sheep stocking rates increased from around 12 dry sheep equivalent (DSE) per hectare in 1991 to above 15 DSE/ha in 2006

Key changes over 1991 to 2006 in each of the land uses examined are summarised below:

- *Sheep and beef grazing* changed substantially, with a large decline in sheep numbers, an increase in prime lamb numbers, and substantial growth in cattle grazing. Employment in beef grazing grew over time, while employment in sheep farming fell. Decline in sheep farming was typically associated with a change in land use from sheep grazing to cropping, dairy farming, or plantation forestry
- *Cropping* for cereal, oilseeds and pasture/hay expanded substantially in the region. While there was an overall increase in employment, increasing efficiencies in cropping mean fewer people are now employed per hectare than in 1991
- *Bluegum plantations* were established in the region as a new industry, with bluegum plantation area growing from 675ha in 1991 to 148,900ha in 2006. By 2006, approximately 240 people were employed directly in the industry. Harvesting of these plantations is due to begin in the region in 2009
- *Dairy farming* has changed substantially. The number of milk cows rose rapidly over 1991 to 2001, before declining slightly to 2006. Increasing efficiency of production meant employment did not grow as fast as cow numbers
- The number of *rural residential properties* has expanded in the region. It isn't possible to estimate the total area of expansion, as growth in these small 'lifestyle farmers' has

occurred in multiple ways, including via subdivision and building of new housing on small rural blocks; non-farmers purchasing small blocks previously used for agriculture and using them for lifestyle purposes; and the subdivision of housing from rural properties which is subsequently purchased by people who live on the small subdivided block and use it for lifestyle, rather than production, purposes

- *Grape growing/viticulture* expanded rapidly in the region from 1991 to 2001, with a decline in the number of people employed after 2001 despite the area of vines growing

More information about how land use differed in different parts of the study region can be found in research reports available at www.landusechange.net.au.

How do residents perceive these changes?

Residents of the study region were surveyed to understand attitudes towards selected land uses and land use changes. Questions focused on perceptions of four land uses that were increasing in the area: bluegum plantations, dairying, cropping and rural residential development. Two surveys were conducted and the methods used for each are described in Appendix 1. The results of the two surveys were consistent. The summary below draws on outcomes of the larger survey (Survey One).

Noticing land use change

Most survey respondents reported they had noticed increases in the area of bluegum plantations (78% of respondents) and rural residential development (70%) occurring over the past 10-15. Fewer participants had noticed increased in the area of dairying (22%) and cropping (18%) during the same time period.

Perceptions of overall impacts of land use changes

While views on all land uses were diverse, views on plantations tended to be more diverse and more often negative than for other land uses (Figure 4).

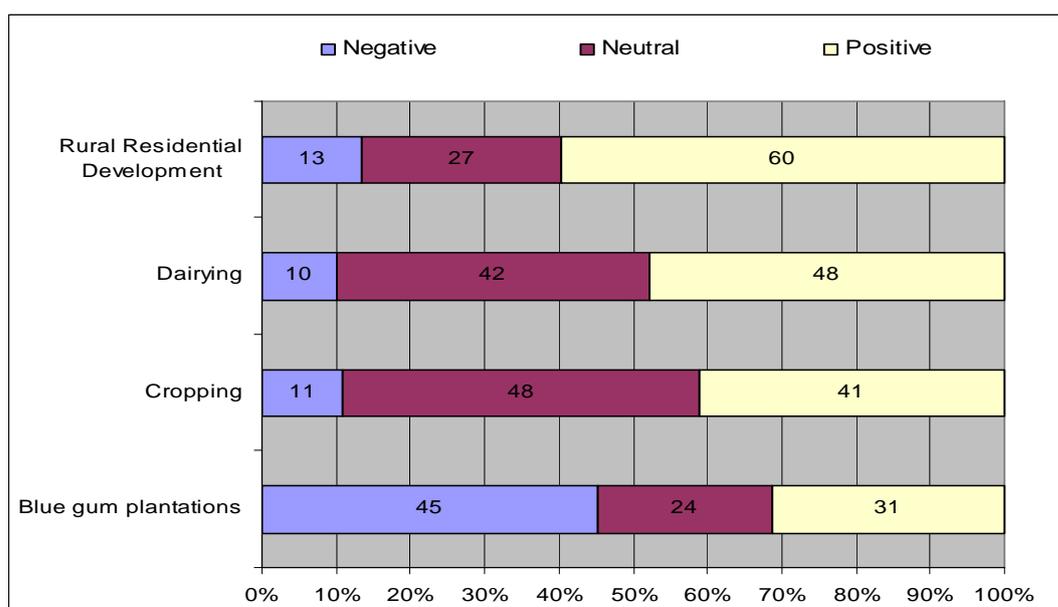


Figure 4: Percentage of respondents who considered the overall impact of increases in land uses to be negative, neutral or positive. Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)

Views on land uses varied across districts. For example, residents of southeast South Australia were more positive about plantations than residents of Victoria. Residents of areas around Colac and Warrnambool were more positive about dairying and rural residential development than residents of other parts of the study area.

On average, respondents considered increases in all land uses to have more positive outcomes for regional centres than for small towns and rural areas.

Perceptions of social impacts of land use changes

There were many different views on the way that increases in all land use would influence social outcomes such as population levels, employment, business levels and community involvement (Figures 5 and 6). Views on blue gum plantations were particularly diverse.

The majority of participants believed increased rural residential development would have social benefits. The most common view was that increases in cropping and dairying would have little impact on social outcomes. For blue gum plantations, the most common view was that increases in plantations would lead to poorer social outcomes.

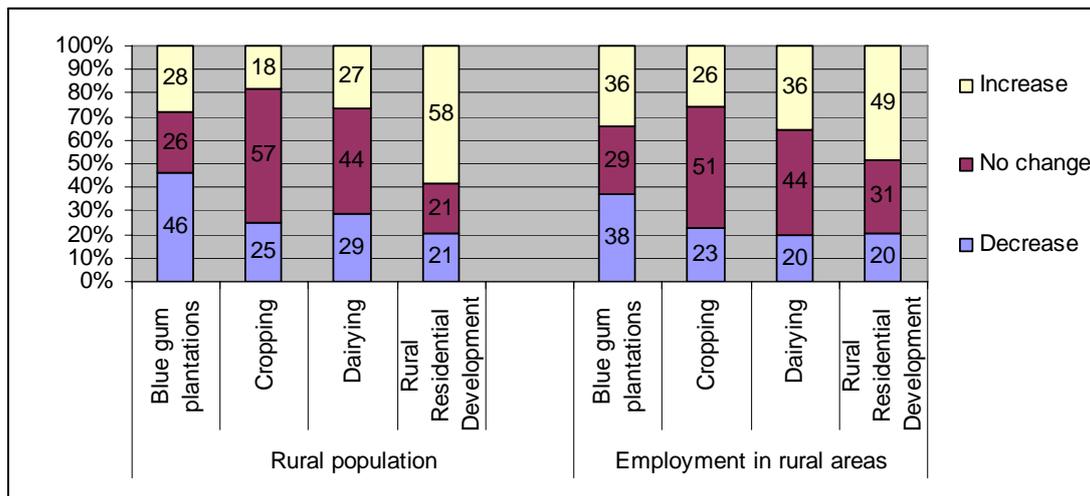


Figure 5: Percentage of respondents who considered increases in selected land uses to lead to an increase, decrease or no change in population and employment in rural areas Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)



Figure 6: Percentage of respondents who considered increases in selected land uses to lead to an increase, decrease or no change in business for local shops/traders, or community involvement Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)

Perceptions of physical impacts of land use changes

Views were also diverse regarding the impact increases in land uses would have on physical outcomes such as water availability, native vegetation, road damage, soil erosion, chemical and wildfire risk (Figures 7 to 9).

There was little distinction between land uses with regard to water use and impact on native vegetation. Increased blue gum plantations and rural residential development were more often viewed as leading to negative impacts on road conditions. Increased cropping and plantations

were more often seen as leading to greater chemical risk. Increased bluegum plantation was viewed as leading to greater risk of wildfire. Increased cropping was most often viewed resulting in greater soil erosion while bluegum plantations were often seen as decreasing soil erosion.

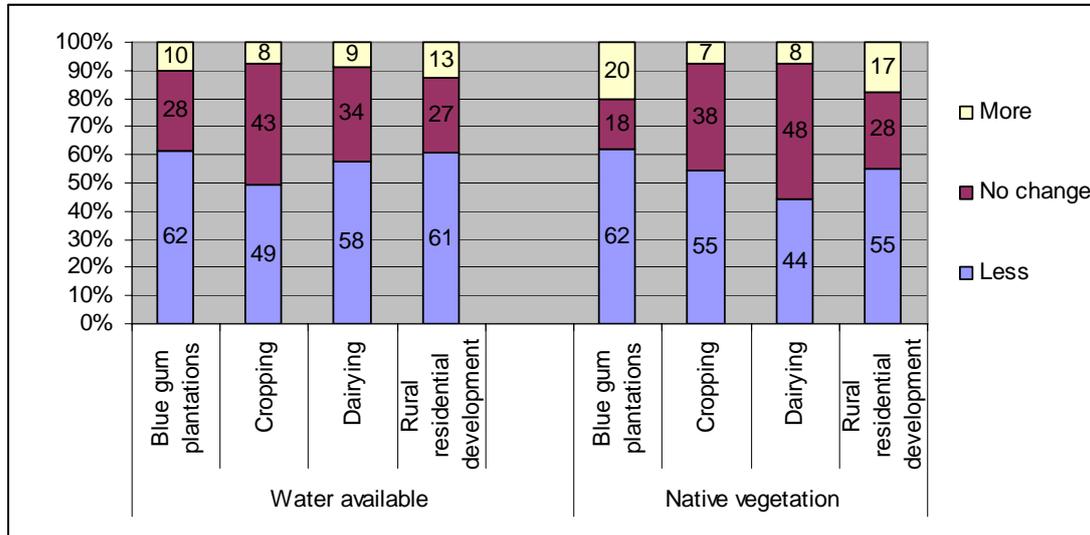


Figure 7: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in amount of water available and amount of native vegetation Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)

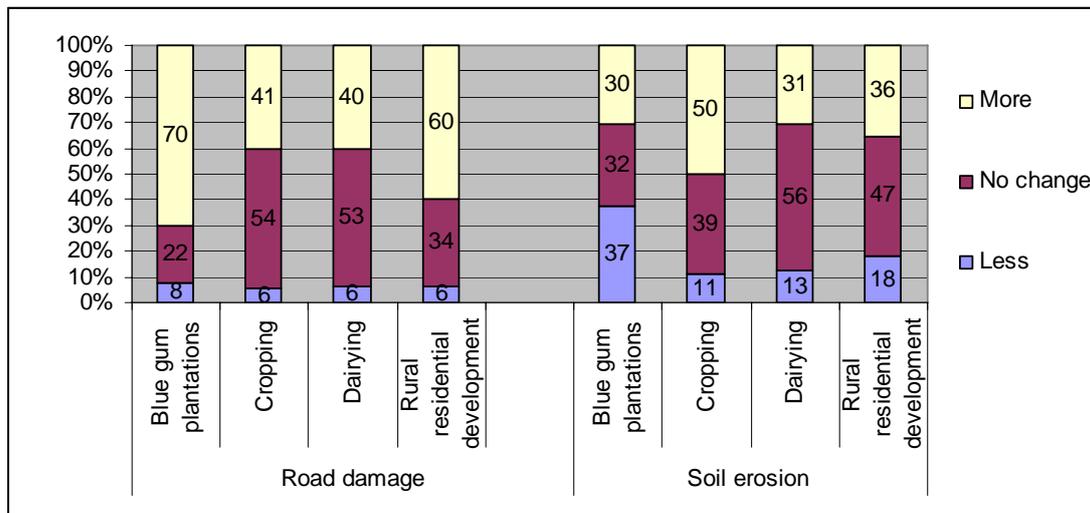


Figure 8: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in road damage and soil erosion Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)

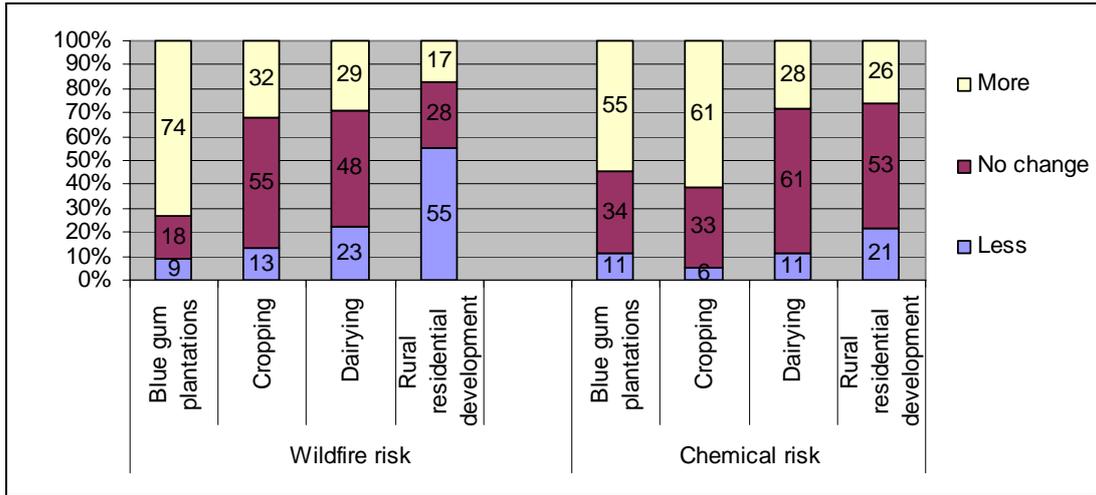


Figure 9: Percentage of respondents who considered increases in selected land uses to lead to more, less or no change in wildfire risk and chemical risk Data from Survey One (899 residents of region, views of residents aged 18-35 are underrepresented)

What social and economic changes accompany different types of land use change?

A key goal of the *Land Use Change* study was to identify the socio-economic changes accompanying each type of land use change. This can be complicated, as it is difficult to identify whether socio-economic changes have been caused or influenced by a particular land use change, or have resulted from a different influence. This was identified by firstly analysing socio-economic changes likely to result from each type of land use change at the individual property scale, and then analysing statistical data at the ‘statistical local area’ (SLA) scale to see if the changes identified at property level were ‘visible’ at larger scales. Data at the SLA scale were analysed using a range of methods to identify whether the social changes observed at this scale were likely to be related to specific land use changes, or were similar to changes occurring in other regions experiencing different mixes of land use and land use change.

This process enabled an understanding of the changes happening at individual property scale, and identification of whether these property-scale trends led to community-wide changes.

The following sections examine the overall findings of the study relating to impacts of land use change on each of the following socio-economic characteristics at the individual property and the community scale:

- Rural population
- Land prices
- Employment
- Agricultural workers
- Community and service group membership

This is followed by summarising the key findings relating to each individual land use.

The study also examined change in other social and economic characteristics. The areas reported here are those in which the strongest association between land use change and socio-economic change were identified.

Rural population

A range of changes are impacting rural population levels in different parts of the study region. Figure 10 shows the change in rural population² over 1991 to 2006 in different parts of the region.

² Rural population refers to people living on rural properties, or in small villages with a population of less than 200 people. This definition is used to be consistent with Australian Bureau of Statistics definitions.

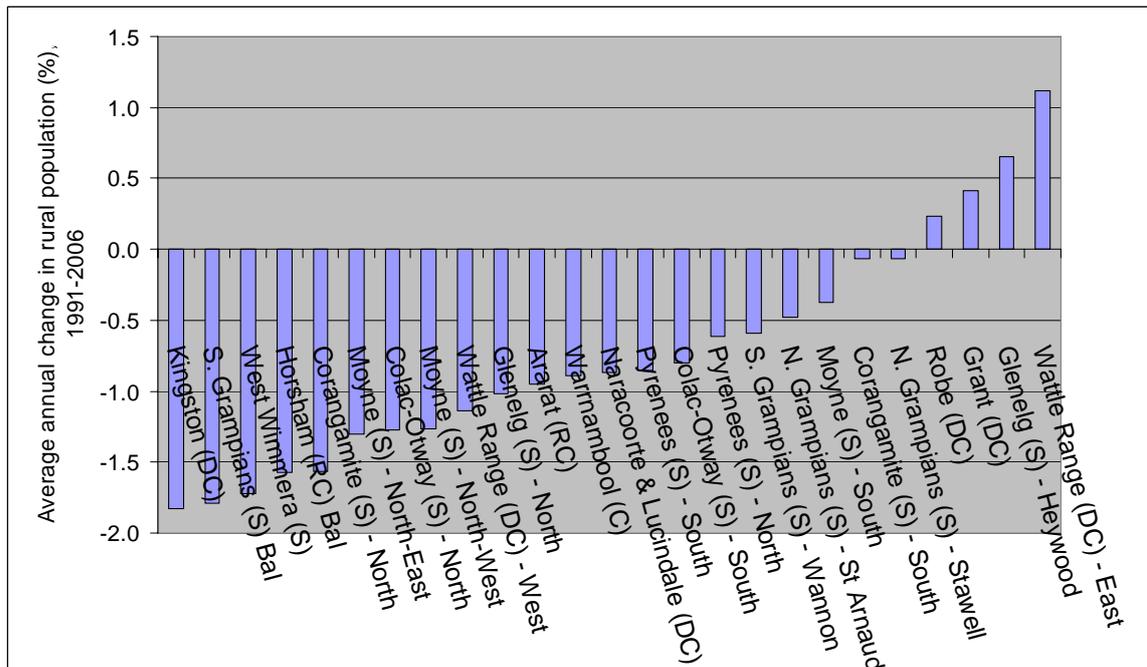


Figure 10: Average annual change in rural population in different parts of the study region, 1991-2006

Data source: ABS *Census of Population and Housing*

It can be seen that rural population changed very differently in different parts of the study region. Key factors influencing rural population changes in different local areas over 1991 to 2006 were:

- Increasing efficiency of production and farm amalgamation in a number of agricultural industries, particularly broadacre cropping and dairy farming, and to a lesser extent sheep and beef grazing. Increasing efficiency means fewer people are required to manage land, and tends to be associated with farm amalgamation and reduction of the number of people living and working on rural properties. This leads to decreased rural population at the individual property and the community scale
- Subdivision of rural land, with increasing numbers of ‘seachangers’ and ‘treechangers’ shifting to live on small rural residential blocks. This has increased rural population in some areas; it has also led to changes in the nature of residence, with a shift to ‘weekender’ populations in some locations which previously had a more permanent population living in rural areas
- Change from traditional agriculture to bluegum plantations. This is associated with a small decline in rural population, but more commonly with turnover in population, with previous residents often shifting away when properties are sold to plantation companies, and new residents shifting in (often sea/treechangers)
- Ageing of rural population. The median age of the population living in rural areas grew at a faster rate than the median age of those living in urban areas over 1991 to 2006, indicating more rapid ageing of the population in rural areas. An ageing population is typically associated with gradual decline in household size, as fewer households have children living in the house, and hence with decline in rural population. Ageing is itself linked to the changes in agriculture identified above, described as both a consequence and driver of changes to farming

These different influences have combined in different ways in different parts of the study region. In some, decline in rural population resulting from increasing efficiency of production

has been offset by an influx of rural residents (seachangers and treechangers). In others, this has not happened, and rural population numbers have declined more rapidly.

Land prices

Land prices grew across the study region as a whole over time, following national trends. However, land use change did contribute to some observable differences in land price change. Rural land prices grew at a faster rate than average in:

- areas experiencing expansion in sea/treechanger population, often near the coast or in scenic areas such as the region surrounding the Grampians
- areas experiencing growth in dairy farming
- to a lesser extent, areas experiencing growth in bluegum plantations

Employment

Across the study region, unemployment rates fell over 1991 to 2006, while rates of full-time employment fell in most parts of the study region, and part-time employment grew. This mirrors national trends, and has been associated with difficulties in obtaining farm labour in many rural areas in recent years.

Individual land use changes were rarely associated with observable changes in labour force participation, employment and unemployment at the community scale, largely due to the fact that the overall decline in unemployment described above was much larger than any changes resulting from specific types of land use change. Therefore most observations about the impacts of specific types of land use change on employment come from analysis of changes at the individual property scale.

At individual property scale, several changes to rural employment were identified:

- As previously discussed, increasing efficiency of production in many rural industries has reduced overall employment needs on individual properties, and hence in rural areas
- Intensification of production – referring to increasing the volume of goods produced from a particular area of land - has occurred for some land uses, particularly cropping and dairy farming. However, intensification has usually been associated with increasing efficiency of production, and has not increased the employment generated per hectare, despite the increase in production per hectare
- Over time, there has been a shift to using more contractors to undertake work on agricultural properties, particularly in broadacre cropping. Contractors are often based in larger towns and undertake work across a wide area, leading to some shift in the location of agricultural employment to regional centres and away from workers based in small towns or on rural properties
- Shifts in land use from traditional agriculture to bluegum plantations have been associated with changes in the location of employment. Employees working in the plantation industry are more likely to be based in regional centres (larger towns in the study region) than smaller rural towns, compared to those employed in traditional agriculture

Shifts from one land use to another at any given point in time can impact on the total amount and nature of employment generated by the use of that land. Table 1, presented earlier in this report, compared the employment generated per 100 hectares in 2008 by different land uses. Based on this, it is apparent that any shift from land uses employing more people to those employing fewer people per 100 hectares will reduce the total employment generated by individual rural enterprises, and vice versa.

Agricultural workers

The study examined how changes in land use affected the number of people working in traditional agricultural industries. This is an important measure of social change in regions which have a history of high reliance on traditional agriculture as an employment base. A decline in agricultural employment does not necessarily mean there has been a decrease in overall employment, as new jobs may be generated in other industries that replace traditional agriculture (for example tourism or plantations), but does represent a change in the types of employment generated in a region.

Overall, numbers of agricultural workers fell most in regions experiencing decline in dairy farming, growth in rural residential properties, and in some cases decline in sheep farming involving a shift to broadacre cropping (Figure 11). Expansion of bluegum plantations was associated with decline in agricultural employment over 1996 to 2001, but not subsequently.

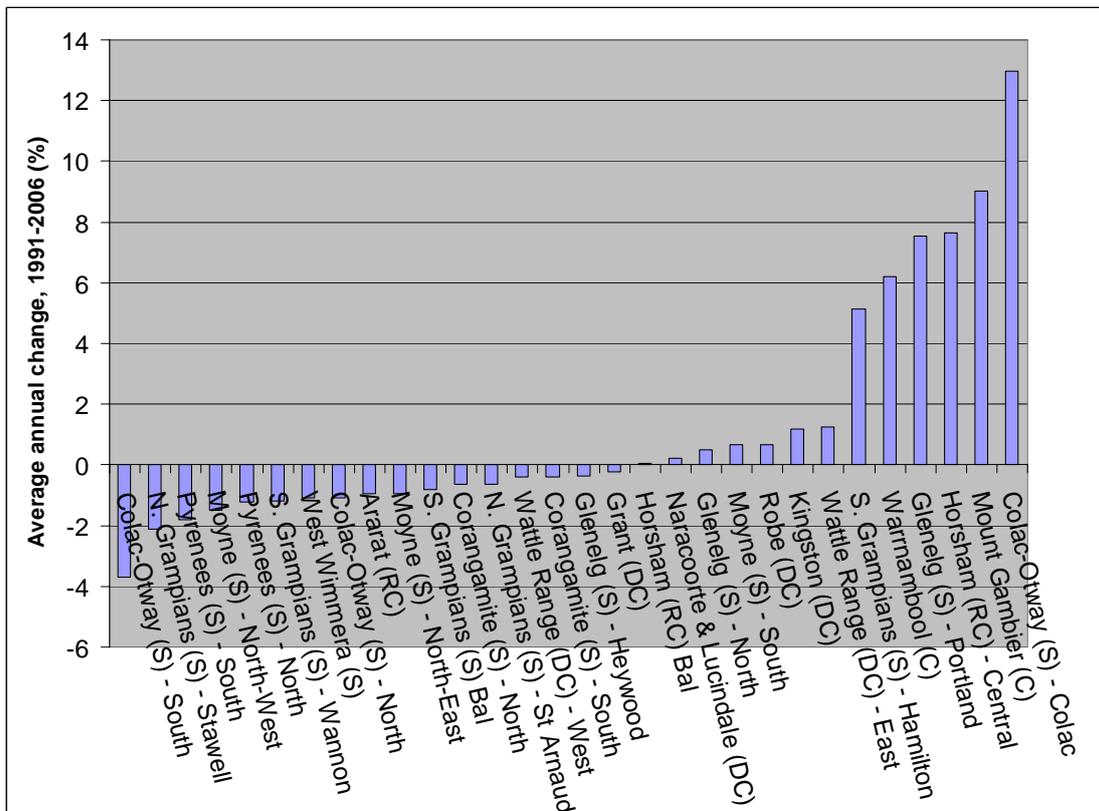


Figure 11: Change in number of people working in agriculture, 1991-2006

Data source: ABS *Agricultural Census*

Growth in agricultural employment occurred primarily in regions experiencing increase growth in viticulture and dairy farming. It also occurred in urban areas, with some farmers and agricultural contractors shifting to live in towns such as at Horsham, Mt Gambier and Hamilton and managing or working on rural properties while living in town. However, this typically involved small numbers of agricultural workers.

Community and service group membership

A key concern raised by many people living in the study region is concern about the vitality of rural communities. This was commonly expressed as a concern about decline in community and service group membership.

An attempt was made to identify how membership of community and service groups changed over time in different regions. It was found that most groups do not keep records of

membership in a format which would enable accurate analysis of how membership is changing in different local regions. This meant analysis of change in membership of these groups was limited to results of a specific study of landholders who had changed land use to plantation forestry (discussed when this land use is summarised), and discussions in group interviews.

The results of these parts of the project suggest that community and service group membership changes when rural population declines, but also changes when there is significant population turnover in rural areas, and when employment patterns change. In particular, the following types of change were described as causing change to community group membership:

- Rural population decline, with fewer people available to keep groups running
- Farmers and contractors working longer hours, leading to less time availability for community activities
- Land use change to plantations and rural residential properties. In some cases, the new people shifting into communities as a result of these land use changes were described as being isolated and having little interaction with community groups; in others, the new residents had joined local groups and were viewed as bringing positive change
- Young people shifting away, again associated with fewer new people joining sporting groups and other groups and difficulty keeping groups alive as a result.

These results suggest that a key aspect of encouraging continuation of groups such as rural fire brigades, sporting groups etc is to identify ways to encourage the new people shifting into many areas to join groups.

Social changes associated with different types of land use change

Specific findings on social change and land use change are summarised below. More detail is provided on each land use in subsequent parts of this report.

Some land use changes were associated with a variety of differing social and economic changes – for example, increase in dairy farming can lead to both growth and decline in rural population (similar to the pattern described earlier for employment). This is because the varying ways that a particular land use has changed may have different social impacts. In the case of dairy farming, two changes have had very different effects on population. Increases in efficiency within the dairy farming industry have reduced the number of people employed in the industry – meaning that in some regions highly dependent on dairy, farms have grown in size and stock numbers while rural population has declined. However, dairy farming employs more people per hectare than many other land uses. This means that a shift from another land use such as beef or sheep grazing to dairy farming often results in a net increase in employment and population. Hence an increase in dairy farming may lead to increase or decrease in rural population depending on whether it involves changes on existing dairy farms, or a shift from another land use into dairy farming.

The key social changes associated with different land use changes were:

- *Land use change from sheep grazing to cropping* was associated with rural population decline, ageing population, and lower than average median household income
- *Land use change from sheep to beef grazing* was associated with lower rural population decline than average, a population which did not age more rapidly than average, and higher than average household income
- *Land use change from dairy to beef/sheep grazing or bluegum plantations* was associated with a higher than average decline in rural population, and more rapid ageing, compared to other region

- *Land use change from grazing or cropping to grape growing* was associated with population and employment growth, and higher than average household income
- *Land use change from sheep/beef grazing to dairy farming* was associated with rural population growth (or slower than average decline in rural population), a younger than average population, higher income, higher employment and labour force participation
- *Land use change from sheep/beef grazing to bluegum plantations* was not associated with an observable impact on rural population numbers at the community scale, although results of a survey did identify a small net population loss at individual property scale. It was, however, associated with higher than average population turnover, with more new residents shifting into bluegum plantation regions than average
- *Growth in rural residential properties, no matter what the previous land use was*, is associated with higher household income, but with variable changes in median age. Continuing analysis is examining these trends in finer detail to better understand differences between different types of rural residential expansion.

How do residents experience impacts of change?

Statistical data can provide a picture of the social changes occurring in a region, and the percentage of people holding particular perceptions of it, but it doesn't provide an understanding of the diverse ways different people will experience that change. Two examples are used below to illustrate the range of ways a single type of change may affect different people: change in land prices, and new rural residents shifting into communities (primarily sea/treechangers).

A rise in land prices (which in the study region happened particularly in areas experiencing growth in dairy farming, rural residential properties, and bluegum plantations), is likely to be experienced as a negative change for those wanting to acquire land, while for those wanting to sell land, it can have positive impacts, as the following quotes from focus group participants illustrate:

...other people are very concerned about the fact that the blue gum operations have pushed the land value so high that the ordinary farmer is more or less shut out apart from the amount of land... [Group interview participant 1]

Well we are quite pleased actually that the trees came along. We had our farm on the market for two to two and a half years and we couldn't sell it and they came along and they offered us exactly what we had asked [Group interview participant 2]

People experienced both negative and positive impacts when sea/treechangers shifted into their community, related to how the new residents understood rural regions, interacted with other residents, affected population levels and influenced availability of agricultural land and employment opportunities:

...what I don't like about them, a lot of them aren't aware of their responsibilities, or their community responsibilities with weeds and pests and just what they are expected of, what is expected of you...[Group interview participant 8]

Positive ones, lots of positive ones. Like people coming in with real energy, with different education backgrounds, money helps with stuff as well. Knowledge, how to revitalise rural communities and so on. [Group interview participant 9]

a lot of them are absentee owners which means we have fewer families in [town] [Group interview participant 10]

I saw rural residential development at [town] where they carved up the prime dairy country and that's affected, it had an ongoing effect through the whole community because dairying is a pretty intensive industry. [Group interview participant 11]

Admittedly you have got to work on weekends but it [rural residential development] does generate jobs over weekends for younger people with part time jobs [Group interview participant 12]

The quotes above illustrate how diverse experiences of change can be – land use change to rural residential properties will have different impacts depending on how people value the previous uses of agricultural land, the type of people who shift into communities, and the types of jobs generated, amongst other things. It is therefore not possible to give a generalised answer to the question of how rural residential expansion impacts people's lives, as it varies considerably depending on the individual situation.

In some cases, particular aspects of a land use change were experienced as social impacts by some people and not others. For example, when discussing concerns about decline and change in rural population resulting from farm amalgamation and expansion of bluegum plantations, some group interview participants focused on the net loss of population, others on discussing

changes in the type of people who live in rural areas, and others on the impacts this change has on participation in community activities. All of these are differing but related ways of experiencing the same types of change in rural population:

You are taking family farms out of production... For every family that leaves it causes an adverse impact on four others, so there is already a downward spiral in so many of these communities and if you are taking family farms out of the picture, you are going to exacerbate... the decline in rural populations. [Group interview participant 3]

The houses are left empty. The people that come... into those houses, you wouldn't want to know them. We have... people that arrived the other day with five children... they've got no money, they don't want any help, they have got a sign up on the gate that nobody is permitted beyond this area...[Group interview participant 4]

And I suppose the other thing, as farms become bigger, is that the amount of time that the farmer is spending maintaining that production is that there's not that available time, that farmers in the past had available to go and maybe go to the footy or um associate with a lot of activities...[Group interview participant 9]

People's experiences of land use change are also affected by *how* the change occurs, not just *what* the change involves. The processes used to discuss and debate change will influence how it is experienced by people.

For example, towards the end of the project, researchers were invited to speak with members of the Gunditj Mirring Traditional Owners Aboriginal Corporation. Members of the corporation described many experiences of change similar to those described by others, but also raised new issues. Some members described experiences regarding loss or disturbance of cultural heritage sites. These negative experiences were associated with any land use that disturbed ground including bluegum plantations and grading of volcanic flow areas for development of cropping or pastures. Members of the corporation described their concerns regarding processes for management of land use change. Since very little Gunditj Marra country has been assessed for cultural heritage values, members stressed the importance of involving indigenous elders in assessing sites where land disturbance is proposed or occurring. Members described their efforts to identify where land use change was occurring, and to clarify responsibilities for informing local residents including traditional owners. They described a sense of frustration in what they considered to be a lack of process and regulation regarding land use change in the region.

The following sections describe key findings relating to individual land uses.

Blue gum plantations – summary of findings

How has this land use changed over 1991 to 2006?

There were almost no bluegum plantation in the region in 1991, but the area of plantations has grown rapidly, totalling 149,000ha by 2005 (Figure 12). This represented 20.1% of the total area of Australia’s hardwood plantations in 2005.

The largest areas of bluegum plantations have been established in the LGAs of Glenelg (46,827ha in 2005), Southern Grampians (20,954ha), Naracoorte and Lucindale (18,752ha), West Wimmera (18,045ha), and Moyne (16,021ha), and Wattle Range (13,430ha).

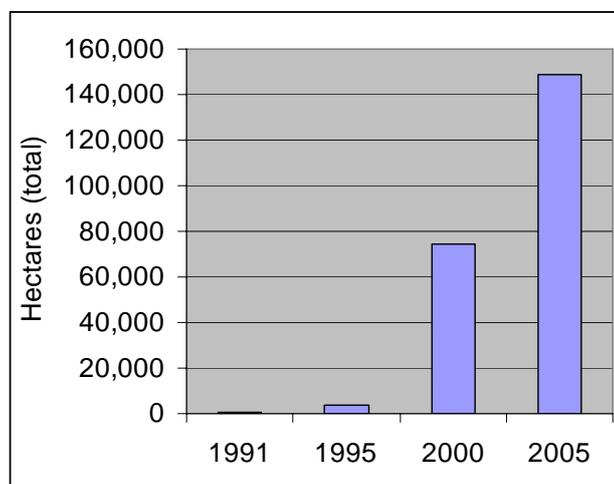


Figure 12: Total area of bluegum plantations in study region

By 2005, approximately 240 people were directly employed in the bluegum plantation industry. Harvesting of plantations is beginning in 2009, and this will change the employment generated by the industry. Based on experience in the Great Southern region of WA (where a similar bluegum plantation industry began harvesting in 2001), between 400-550 further jobs are likely to be generated in harvesting, transport and processing of bluegum plantation timber into woodchips within 4-5 years of harvesting beginning in the region.

How is this land use change perceived?

When asked about the impact of impact of increased plantations on a number of social and economic outcomes, beliefs of residents were very diverse (Figure 13). Many participants considered this change to provide benefits for the regional economy, but negative outcomes for population and community involvement.

Particular concerns were commonly expressed in group interviews about investment arrangements used to fund plantation expansion, with the use of managed investment schemes often viewed negatively.

What social and economic changes are associated with this land use change?

Plantation expansion in the study region has primarily occurred via purchase of agricultural land, and in fewer cases, lease of land from farmer, by plantation companies.

At the individual property scale, when a property is sold to a plantation company:

- In 44-52% of cases, there is no change to population as no-one was resident on the property for some years prior to the land use change
- In 75% of cases where someone does live on the property prior to the land use change, the original residents shift off the property, while in 25% they stay
- Where the original residents have shifted away, in between 50% to 80% of cases, new residents then shift onto the housing on the property, either through purchasing a subdivided house and small parcel of land excised from the plantation property, or through renting housing directly from a plantation company

- This population change results in a decrease of membership of community groups. Approx. 50% of the original residents living on properties maintain membership of local groups such as the rural fire brigade or sporting groups, 25% cease their membership altogether, and 25% shift their membership to a new location.
- The location of the employment generated by that property may change; workers on plantation properties often live some distance away or in regional centres, whereas many agricultural workers lived on rural land or more locally. However, this varies; in some cases farm workers also now manage properties spread over a wide distance

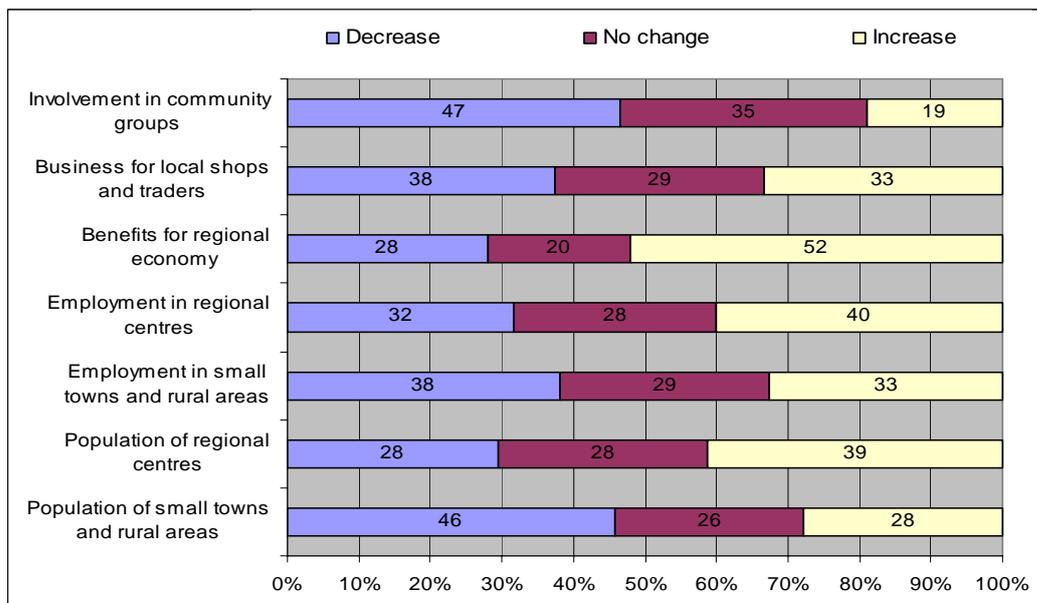


Figure 13: Percentage of respondents who considered increases in bluegum plantations would lead to increase, decrease or no change in social benefits.

Data source: Survey One - 899 residents of region, views of residents aged 18-35 are underrepresented

This means that expansion of plantations leads to change in who lives in rural communities, and a net decline in the population living on the properties involved of approximately 7-19%. The changeover of population from the farmers who often previously lived on the property to new residents can have profound social impacts. The nature of the impact depends on how well new residents integrate into the local community and join groups; if they do not integrate well, decline in community group membership and community spirit is likely; if they do integrate, the community will likely thrive, but with substantial change in the nature and ‘feel’ of that community.

At the community or local government area scale, the population and employment impacts are not ‘visible’ in statistics on rural population, employment etc. This is because the socio-economic changes occurring at individual property scale are mitigated by other factors, such as change in other agricultural land use, or expansion of rural residential living, and hence do not show visibly in figures on total change in population or employment at the larger scale. The only trends found at the community scale were, firstly, that the population living in regions which experienced rapid plantation expansion tended to have a higher median age and higher rural population decline than average in the years *before* plantation expansion occurred, indicating these regions were experiencing rural decline prior to plantation establishment. The same trends did not continue after plantation expansion occurred, however, possibly because in many plantation regions there has been an expansion of rural residential population living on small rural properties (including those subdivided from plantation properties).

Broad acre cropping – summary of findings

How has this land use changed over 1991 to 2006?

The area of broadacre cropping has increased substantially in the study region. The area of cereal and oilseed crops grown for grain rose from 281,000ha in 1991 to 571,000ha in 2006, while the area of pasture and hay crops grew more slowly, from 216,000ha to 285,000, over the same period (see Figure 14). During this period, many enterprises shifted from being a mixed cropping and grazing enterprise to pure cropping, as can be seen in Figure 14.

In 2006, the region had 14.6% of Australia’s total area of pasture/hay crops, and 17.7% of pasture/hay production; 2.6% of Australia’s cereal grain area and 8.0% of national cereal grain production, and 9.0% of Australia’s oilseed area and 9.8% of its production.

In 2006, the local government areas with the greatest dependence on cropping were Horsham, Northern Grampians, Southern Grampians, Ararat, Pyrenees, and West Wimmera, all of which had more than 15% of their agricultural land established to broadacre cereal and oilseed grain crops.

By 2006, approximately 855 people worked on enterprises on which broadacre cropping was the primary enterprise, while a further 1,860 worked on mixed grazing-cropping enterprises.

There were substantial changes in productivity of broadacre cropping over 1991 to 2006, with the average employment per 100 hectares falling, and the average tonnes produced per hectare increasing. Average tonnes of cereal grains produced per hectare rose from 2.01 tonnes in 1991 to 2.92 tonnes in 2006; average production of canola rose from 1.4 to 1.6 tonnes over the same period, and production of pasture/hay also rose, although this varies substantially based on weather conditions.

How is this land use change perceived?

When asked about the impact of impact of increased cropping on a number of social and economic outcomes, most survey respondents considered the impacts on population, employment and community involvement to be neutral (Figure 15). Many participants considered increased cropping to offer benefits to the regional economy and local traders.

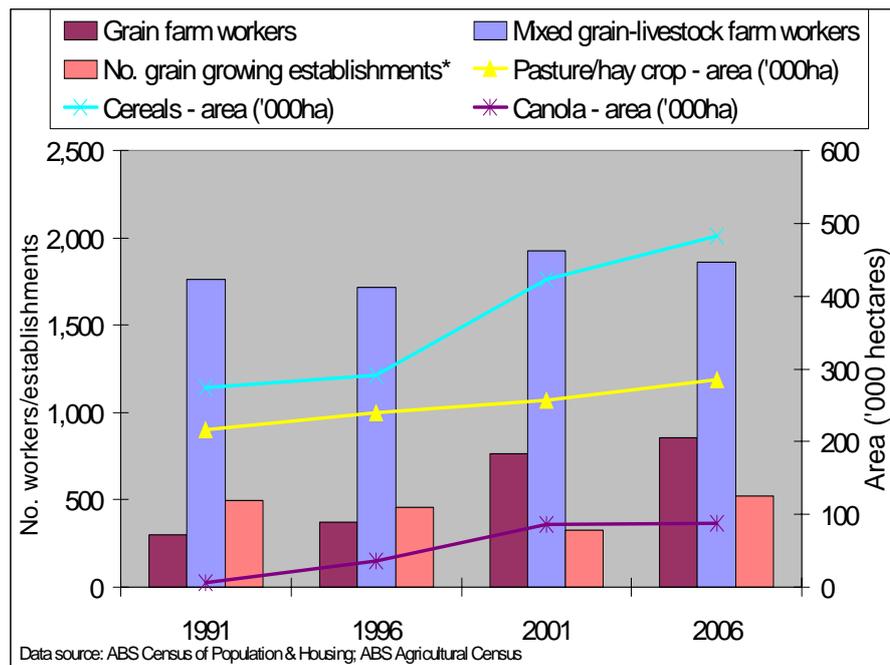


Figure 14: Changes in broadacre cropping in the study region, 1991-2006

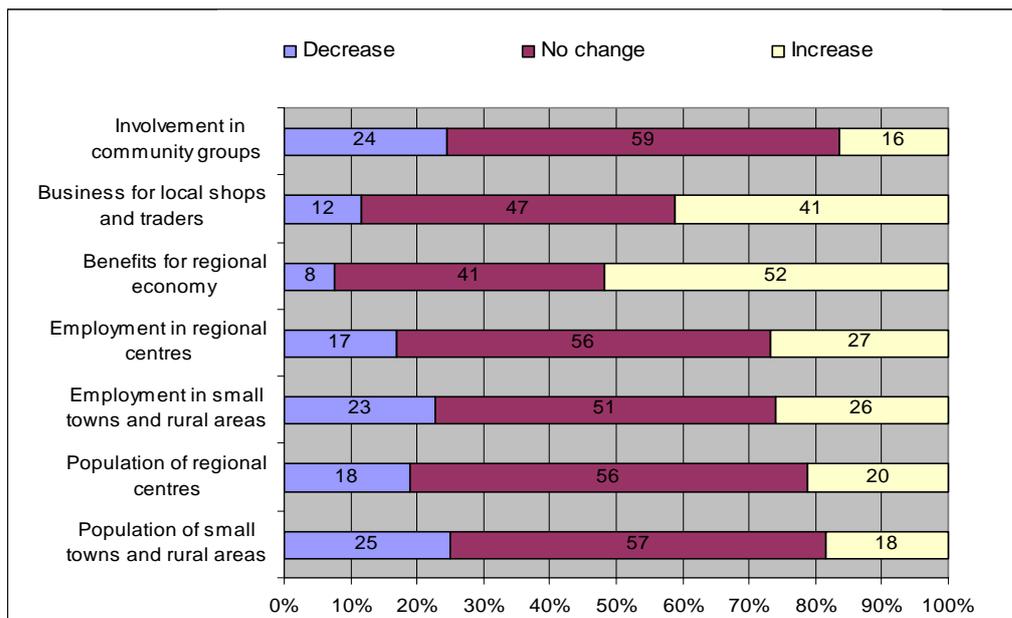


Figure 15: Percentage of respondents who considered increases in cropping would lead to increase, decrease or no change in social benefits

(Data source: Survey One - 899 residents of region, views of residents aged 18-35 are underrepresented)

What social and economic changes are associated with this land use change?

The expansion of broadacre cropping has principally occurred on land previously used for sheep grazing, and sometimes land previously used for beef grazing.

Based on the amount of employment required per hectare for cropping versus sheep or beef grazing, and the trends of increased labour and production efficiency documented over time, at the individual property level it is expected that a shift from sheep grazing to cropping would be associated with a decline in rural employment and population. Fewer people are required to manage a broadacre cropping enterprise compared to a sheep grazing enterprise; and over time, increasing efficiency has meant fewer people are needed to crop the same area of land.

This analysis was borne out when population trends at the community scale were analysed. Areas experienced rapid growth in the area of broadacre cropping experienced:

- greater rural population decline and total population decline than the study region average, although it should be noted that some areas experiencing decline in sheep grazing but no expansion of cropping experienced similar decline
- a slightly higher unemployment rate compared to non-cropping rural areas
- a range of changes likely associated with decline in sheep grazing, including having a higher median age and rate of ageing than average, and lower than average median household income. These were considered to be factors related to changes in sheep grazing which may be driving a shift to cropping, rather than factors caused by the shift to cropping, in these regions.

This means that expansion of cropping is associated with some decline in rural population and employment. As there is an ongoing transition from sheep grazing to cropping, it is difficult to identify whether some of the social changes observed related to stresses related to decline in grazing industries, or resulted from the increase in area cropped; it is most likely, based on observations of local farmers, that trends such as the high rate of population ageing are related more to decline in grazing than increase in cropping.

Dairy farming – summary of findings

How has this land use changed over 1991 to 2006?

Overall, the extent of dairy farming increased in the study region over 1991 to 2006, although it did decline in some parts of the study region. The number of dairy cows increased from 293,000 in 1991 to 449,000 in 2001, and subsequently declined slightly to 416,000 in 2006 (see Figure 16).

In 2006, the region had 14.9% of Australia's total dairy herd. The local government areas in the study region with more than 20% of agricultural holdings utilised for dairy farming are the southern half of

Corangamite Shire (85%), the southern part of Moyne Shire (70%), Warrnambool (60%), Colac-Otway (approx. 30%), and Grant (20%).

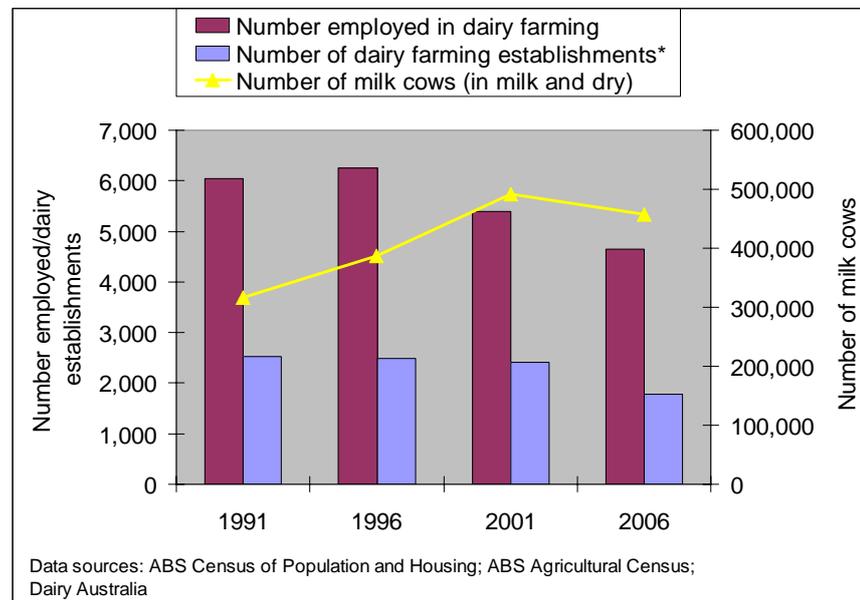


Figure 16: Changes in dairy farming in the study region, 1991-2006

By 2006, approximately 4,160 people worked in dairy farming (down from just over 6,000 in 1991) and a further 1,340 in dairy manufacturing in the study region (up from 743 in 1991, but having declined from a high of 1,670 in 2001). Total employment in the industry grew over 1991 to 1996, but has subsequently fallen, largely due to rapid increases in productivity of dairy farming, with the number of people employed per 100 milk cows falling from 1.91 in 1991 to 1.02 in 2006.

How is this land use change perceived?

When asked about the impact of impact of increased dairying on a number of social and economic outcomes, most survey respondents considered the impacts to be neutral or positive (Figure 17). The regional and local economic outcomes were often considered positive.

What social and economic changes are associated with this land use change?

Based on the amount of employment required per hectare for dairy farming versus other land uses, at the individual property level it is expected that a shift from grazing to dairy farming would be associated with an increase in rural employment and population, as dairy farming employs a higher number of people per hectare than most other agricultural land uses in the region (with the exception of viticulture). However, the rapid increase in labour efficiency means that dairy farming expansion in some regions is likely to be associated with some decline in labour over time. This means areas experiencing expansion in numbers of dairy cows may experience an increase in rural population (where dairy farming is replacing grazing enterprises), or a decrease (where the change involves intensification on existing dairy farms).

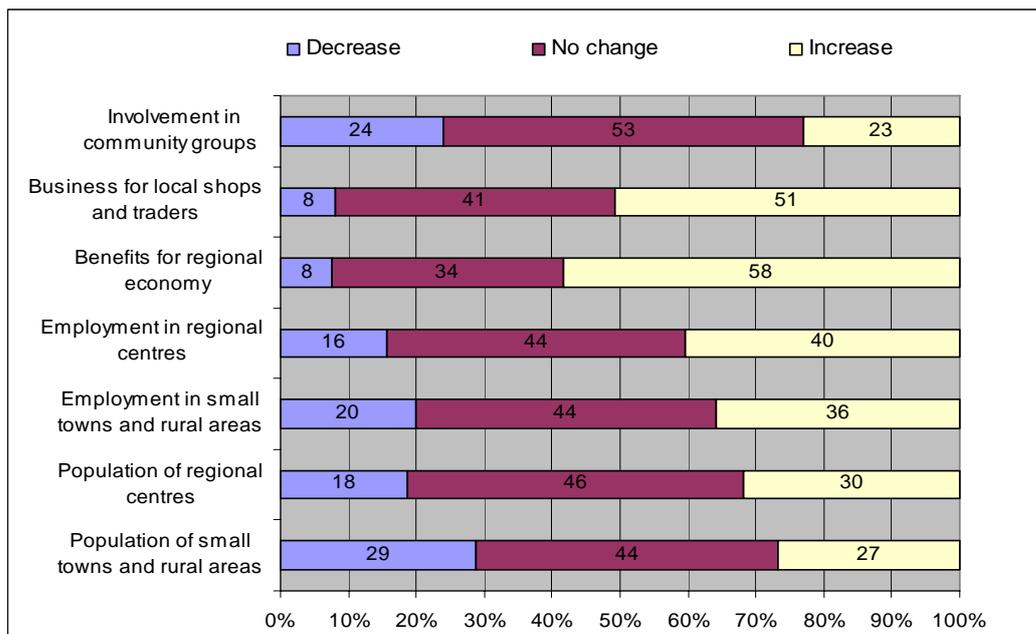


Figure 17: Percentage of respondents who considered increases in dairying would lead to increase, decrease or no change in social benefits

Data source: Survey One - 899 residents of region, views of residents aged 18-35 are underrepresented

This analysis was borne out when population trends at the community scale were analysed. It was possible to analyse social and economic changes in local areas within the study region which had experienced expansion or decline in dairy farming, to identify whether the expansion and decline were associated with particular types of change.

Over 1991 to 2006, areas experiencing rapid growth in dairy farming experienced:

- slightly slower decline in agricultural employment than average
- less rural population decline than average, and in some cases rural population growth. However, over 1991-96, dairying regions experienced greater rural population decline than average, while over 1996-2006, they experienced less decline than average
- a lower drop in full-time employment than average
- slower ageing of the population than average
- slightly higher numbers of new residents compared to average

Many dairy regions also experienced expansion of rural residential population during this period, particularly from 1996-2006, and some of the changes in rural population are likely to be partly due to expansion of rural residential living than changes in dairy farming.

However, areas experiencing *decline* in dairy farming over 1991-2006 experienced higher than average decline in agricultural employment, slightly higher than average loss of rural population, a higher drop in full-time employment than average, and more rapid ageing of the population than average. This suggests that expansion of dairy farming has been a key contributor to the maintenance of agricultural employment and rural population, full-time employment, and involves younger farmers, than other types of rural land use.

This means that expansion of dairy farming is associated with less rural population decline, high rates of full-time employment, and a reduced rate of ageing in the rural population, compared to the other land uses examined in this study.

Beef and sheep grazing – summary of findings

How has this land use changed over 1991 to 2006?

Beef and sheep grazing constitute the largest land use in the study region in terms of the area of land used. In 2006, an estimated 42% of agricultural land in the study region was utilised for sheep grazing, and 25% for beef cattle grazing.

In 2006, the study region has 13.9% of Australia's total flock of sheep and lambs, and

5.9% of Australia's beef cattle herd, while only representing 1.1% of total agricultural land in Australia.

Beef and sheep grazing have experienced different types of changes in the study region over 1991 to 2006. The number of sheep and lambs declined by 30% over this period, from 17.7 million in 1991 to 12.4 million in 2006. Over the same period, the number of beef cattle increased from 1.0 million to 1.5 million (Figure 18).

In the sheep grazing industry, there has been a substantial shift from wool to prime lamb production, with an increase in cross-bred lambs produced for meat and decrease in merino flock.

Similarly, employment in sheep farming declined while employment in beef farming grew (Figure 19). Employment in mixed sheep-beef grazing fell over time.

The local regions which in 2006 had more than 50% of agricultural land used for sheep grazing were Southern Grampians (estimated 66%), West Wimmera (60%), Pyrenees (58%), Northern Grampians (54%), and Ararat (53%). The only local government regions with less than 20% of agricultural land used for sheep grazing were Colac Otway, Corangamite, the southern part of Moyné Shire, Grant and the southern parts of Glenelg Shire.

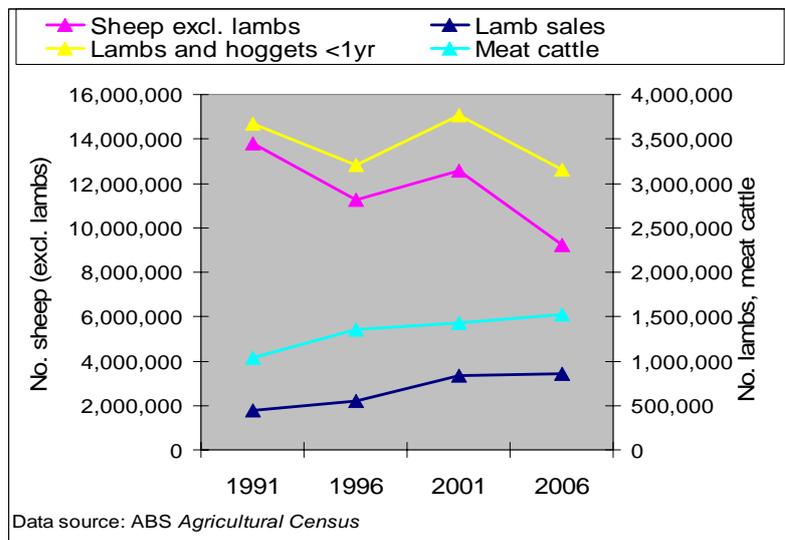


Figure 18: Change in sheep and cattle numbers in study region, 1991-2006

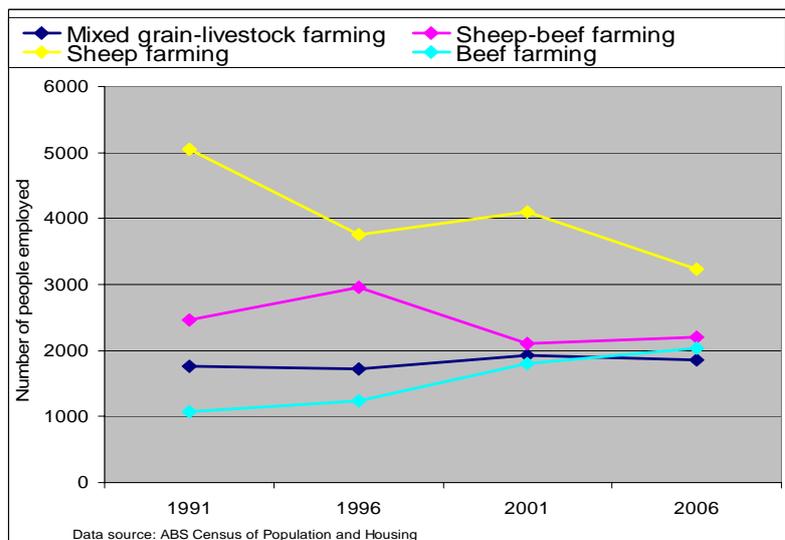


Figure 19: Change in sheep and beef grazing employment in study region, 1991-2006

The local regions which in 2006 had more than 40% of agricultural land utilised for beef cattle grazing were Kingston (56%), Glenelg (52%), Grant (52%), Wattle Range (48%), Robe (49%), and the north-west part of Moyne Shire (40%).

Production efficiency has grown in the sheep and beef grazing industries, although more slowly than for the cropping and dairy industries, with average stocking rates increasing from around 12 dry sheep equivalent (DSE) per hectare in 1991 to above 15 in 2006. While this is affected by seasonal conditions, these figures reflect long term trends.

How is this land use change perceived?

The survey of resident's views on land use change did not ask about changes to sheep and beef grazing³. In group interviews undertaken at the start of the project, many participants noted the decrease in sheep grazing was a significant land use change, but there was little discussion of the impacts of this change. Participants more generally discussed this change in terms of impacts of increasing land uses (such as bluegum plantations) rather than impacts of land uses that has decreased. A number of participants also noted the importance of increased beef grazing, however there was equally little discussion of this land use.

What social and economic changes are associated with this land use change?

Changes to sheep grazing and beef grazing were associated with different social and economic changes in the study region.

Over 1991-2006, compared to areas with low/no sheep grazing, areas experiencing decline in *sheep and lamb farming* had:

- Higher than average decline in rural and total population (the few where sheep farming grew experienced rural population growth)
- Greater than average decline in agricultural employment; although this decline was slower in areas where lamb numbers grew, indicating that the shift to prime lamb slowed decline in some regions
- Older population and faster rate of ageing, except in areas in which a strong shift to prime lamb production occurred
- Lower median household size
- Lower than average household income & slower growth in income
- Higher than average decline in labour force participation
- Slower growth in population with post high-school qualifications

Over 1991-2006, compared to areas with low/no beef cattle, areas experiencing growth in *beef cattle farming* had:

- Similar change in agricultural employment to study region average (not higher or lower)
- Slightly slower growth in median age, and a similar median age to study region average
- Higher median household income & higher growth rate in income than average
- Higher than average growth in labour force participation
- Higher than average rate of full time employment, and
- Household sizes similar to the study region average.

The decline in sheep grazing has been associated with a range of indicators of socio-economic decline, while growth in beef grazing appears associated with neutral or positive outcomes.

³ It was not possible to ask questions about all types of land use change on the resident's views survey as the survey had to be kept to a length which respondents could complete in a reasonable time.

Rural residential development – summary of findings

How has this land use changed over 1991 to 2006?

A key land use change often discussed in the study region is change to ‘lifestyle’ or ‘rural residential’ use of rural land. A number of types of ‘rural residential’ development occur in the region, each with different characteristics:

- Peri-urban expansion: increases in the number of people living on small rural blocks around the perimeter of towns and cities. Peri-urban residents often live permanently on their small block and commute into the adjacent town/city to work. They are often believed to have high incomes, enabling them to afford to purchase and maintain the small rural block
- Sea- and tree-changers: People who shift to rural areas from large cities for a ‘seachange’, changing their life. They may shift into rural towns or onto small rural properties. This may involve building new homes or utilising existing housing. When it involves rural land, it may involve the subdivision of a rural property into several small rural residential blocks, or may involve existing small agricultural properties being purchased as a whole block by the new resident. Some move into peri-urban areas.
- Weekenders: People who purchase a property which they live in on weekends or during holidays, but not as their permanent home. This may be a home within a town or on rural land, in peri-urban or rural areas.

It is difficult to track rural residential expansion as not all people who move to live in a rural area can be considered sea- or tree-changers – for example, some new residents are farmers who have purchased a new property, where sea/treechangers are defined as those who use rural land for lifestyle purposes rather than primarily for traditional production.

Based on group interviews and focus groups held in the region, the regions which have experienced considerable rural residential expansion are shown in Table 2 below.

Rural residential expansion was identified as having occurred in every local government area (LGA) within the study region, although in fewer locations in West Wimmera and Horsham Rural City than other LGAs. This meant that when analysing rural residential change, it was important to use a smaller scale than the LGA, as it was difficult to compare change when so many LGAs had experienced rural residential expansion.

How is this land use change perceived?

When asked about the impact of impact of increased rural residential development on a number of social and economic outcomes, most survey respondents considered all impacts to be positive (Figure 20).

However, in group interviews a more mixed view was presented, with participants describing a range of both positive and negative outcomes of rural residential expansion. The impacts depended on how well the sea/treechangers integrated into the rural communities they had come to live in, particularly whether they managed their land well, joined local community and service groups, and were permanent residents or ‘weekenders’.

Table 2: Localities experiencing rural residential expansion, by local government area

Local government area	Towns/locations
Ararat	Ararat, Willaura, Moyston
Colac Otway	Whole Shire, Otways, Birregurra
Corangamite	Camperdown, Derrinallum, Noorat, Port Campbell, Terang, Timboon, southern part of Shire, all parts of Shire according to some
Glenelg Shire	Heywood, Portland, Bridgewater, Casterton, Narrawong, Nelson
Grant	Whole District Council
Horsham	Natimuk, Quantong
Kingston	Kingston
Moyne Shire	Yambuck, Koroit, all of southern Moyne, Port Fairy
Mt Gambier	Mt Gambier
Naracoorte & Lucindale	Naracoorte, Lucindale
Northern Grampians	Grampians region, Halls Gap
Pyrenees	Snake Valley, Waterloo, Warrenmang, whole of Shire according to some
Robe	Whole Council described as experiencing rural residential expansion, particularly on coast
Southern Grampians	Dunkeld, Grampians region
Warrnambool	Warrnambool
Wattle Range	Penola, Coonawarra, to a lesser extent parts of the western part of the District Council
West Wimmera	Edenhope

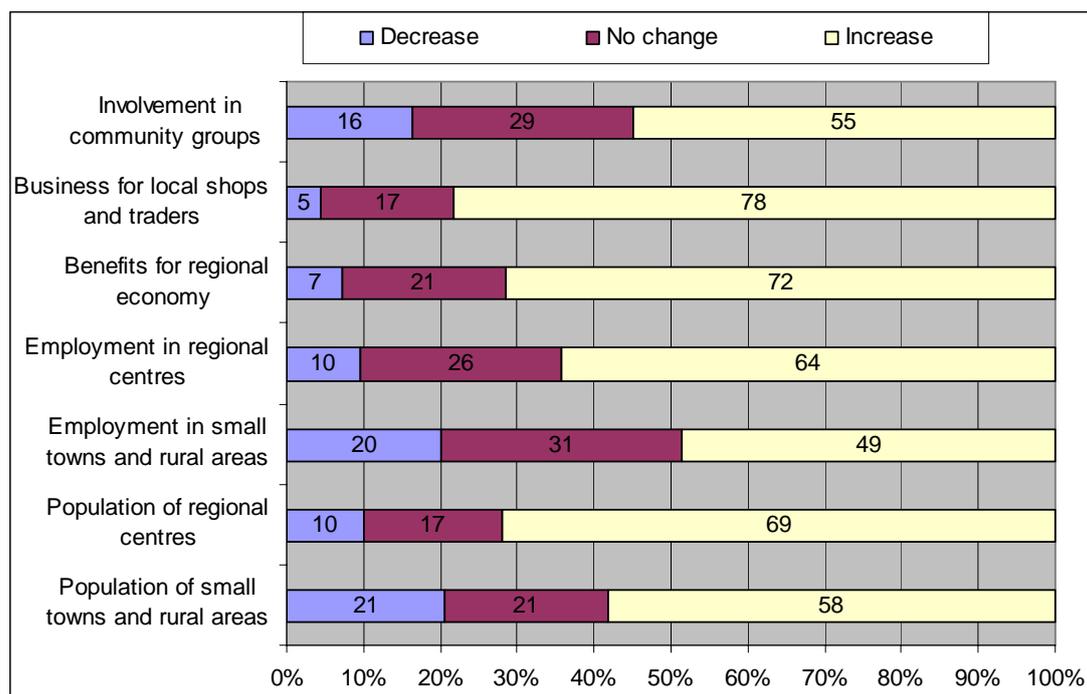


Figure 20: Percentage of respondents who considered increases in rural residential development would lead to increase, decrease or no change in social benefits

Data source: Survey One - 899 residents of region, views of residents aged 18-35 are underrepresented

What social and economic changes are associated with this land use change?

The areas identified as experiencing rural residential expansion differed from others in some key ways. In particular:

- Median household income was higher than average in most (although not all) rural residential regions
- The population living in both rural areas and in towns and urban centres typically grew in areas experiencing rural residential expansion, or declined more slowly than average
- There were no consistent results on age of the population. While many people believe rural residential expansion may be associated with an ageing population, this was not always the case in the study region, with some rural residential expansion areas having a lower median age and slower rate of ageing than regions highly dependent on traditional agriculture.

Viticulture – summary of findings

How has this land use changed over 1991 to 2006?

The extent of grape growing and associated wine making increased in the study region over 1991 to 2006, although over 2001 to 2006 the employment generated did decline slightly in some regions.

The area of grapes grown increased from 3,300ha in 1991 to 11,700ha in 2006, with the largest increase occurring between 1996 and 2001 (Figure 21).

Grape growing differs to some other industries in that manufacturing facilities are typically established very

close to vineyards, with as much employment generated in manufacturing as in grape growing (as seen in Figure 21), and this manufacturing employment largely located in rural areas.

Employment and wine production grew rapidly from 1991 to 2001, followed by some decrease. However, 2006 was a poor year for production in the region, so may not accurately reflect longer term trends. The local government area in the study region with the greatest proportion of agricultural holdings utilised for grape growing was the eastern part of Wattle Range, where 5.6% of land was used for grape growing in 2006, followed by Robe (0.9%), Naracoorte and Lucindale (0.9%) and the northern part of Pyrenees Shire (0.6%).

How is this land use change perceived?

The survey of resident's views on land use change did not ask about changes to grape growing⁴. In group interviews undertaken at the start of the project, many participants noted increases in viticulture as a significant land use change, and generally viewed it as a positive change associated with increasing population and employment.

What social and economic changes are associated with this land use change?

The expansion of grape growing has principally occurred on land previously used for grazing or cropping.

Based on the amount of employment required per hectare for grape growing versus grazing or cropping, it is expected that a shift from grazing or cropping to grape growing would be associated with growth in rural employment and population. More people are required to manage a grape growing enterprise per hectare compared to these other land uses, and grape

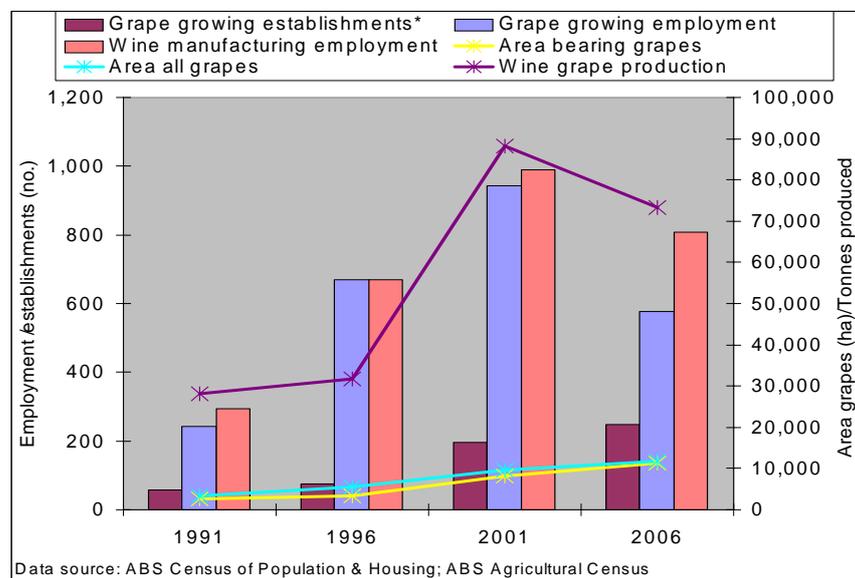


Figure 21: Changes in grape growing and wine production in the study region, 1991-2006

⁴ It was not possible to ask questions about all types of land use change on the resident's views survey as the survey had to be kept to a length which respondents could complete in a reasonable time.

growing is also often associated with influx of population related to tourism ventures that depend on the grape growing.

These property-scale trends were confirmed when social changes were examined at the community scale. The expansion of viticulture is often associated with social change, which results not just from the activity of growing and processing grapes, but from the tourism industry often associated with grape growing and establishment of retail ventures such as cellar doors, restaurants and boutique accommodation in grape growing regions. Expansion of grape growing and these associated activities was associated with:

- Rural population growth (compared to decline in most regions)
- Higher than average growth in agricultural employment (or, in some periods, less decline than average)
- Younger population – these regions had a lower median age than the study region average
- Higher median household income in all periods except 2006
- Slightly lower than average household size
- A higher proportion of full-time jobs (slower decline in full-time jobs) than average, and
- Stronger growth in than average in the proportion of the population aged over 15 who hold qualifications beyond high school.

Integrating findings

The previous parts of this report have identified a range of results relating to how people perceive land use change, analysis of the social changes observed to accompany land use change, and the diversity of ways people experience land use change.

This section focuses on exploring why people's experiences vary so much, and how combining an understanding of people's values and attitudes with understanding of the independent evidence on social changes can assist in understanding the social impacts of land use change.

When comparing perceptions of socio-economic change with evidence of change from independent statistical data, the independent data does not provide an understanding of which perceptions are 'correct', but points to a need to understand why some people experience change in different ways to the 'average' social change identified in statistical data.

The results of our study of people's perceptions and analysis of statistics are compared below to further analyse the impacts of land use change on population, employment, and community groups. These aspects of land use change were explored in both the survey of residents' views in the region and in analysis of statistical data⁵. In each, reasons for variations in perceptions are explored using results from the analysis of statistical data, and comparison is made of the results from independent data and perceptions data.

Population

Analysis of independent statistical data indicated that land use change from sheep grazing to broadacre cropping, increases in production efficiency in the cropping, dairy and grazing industries, and land use change to plantation forestry have all led to some decline in rural population. Change from grazing to dairy farming, expansion of viticulture, and rural residential development were all associated with growth in rural population.

When perceptions were studied, the overall patterns of beliefs about change in population were consistent with the results of the analysis of independent data, with one exception: a majority of survey respondents believed that an increase in cropping led to no change in population, while analysis of independent data suggested that land use change to cropping was associated with some decline in population.

While analysis of independent data suggests change to cropping and change to bluegum plantations would have similar effects on rural population, only 25% of survey respondents believed there would be a population loss from an increase cropping, while 46% believed there would be a loss from an increase in blue gum plantation. This raises a key question: why are people's perceptions so different to the results suggested by the independent data?

It is possible these results are more consistent than they at first appear. A survey of landholders who changed land use to plantation forestry suggested that in 75% of cases when land is sold to a plantation company, previous residents shift away. This does represent a loss of population from the region, and may explain the high proportion of people who believe expansion of plantations leads to loss of population. However, in the majority of cases, new residents do shift onto plantation properties after the plantation is established. It is possible these new residents do not integrate into the same social networks the previous residents had in the community, meaning that the change is experienced as a decline in social interaction in the community.

⁵ Beliefs about impacts on roads, water, soil, fire, and native vegetation were also explored in the survey of resident's perceptions, but analysis of the environmental and infrastructure impacts of land use change using independent statistical data was beyond the scope of this project.

Population decline related to cropping, meanwhile, occurs as a slower, less visible change, involving loss of one or two people working on a property, or amalgamation of farming properties on retirement of a farming family.

When residents were asked if they believed an increase in dairying would lead to an increase, decrease or no change in population, their beliefs were diverse, but generally more positive than for increases in cropping and blue gum plantations, with most people anticipating no change. Based on the analysis of statistical data, over time increases in dairy farming have led to decline in population within the industry due to increasing efficiency of production, but where land use has changed from grazing to dairy farming, have led to an increase in population, as dairy farming employs more people than most other agricultural land uses. This supports the diversity of views expressed by residents, as in some cases the net effect on rural population would be neutral, in others positive, and in others negative.

In both the perceptions survey and independent data, expansion of rural residential properties was associated with increases in rural population. Interestingly, around 20% of people believed expansion of rural residential development may lead to a decrease in population. In group interviews, some people suggested that rural residential development may bring new people into the region, but may also decrease the employment generated from land, potentially explaining why some people hold this point of view.

Employment and economy

The impacts of land use change on employment are complex, and people's perceptions of impacts are as a result quite diverse. Analysis of independent data suggested multiple factors influencing how land use change influenced employment. For example, while a land use changes from grazing to dairy farming would increase employment, as the latter employs more people per hectare, over time increases in production efficiency have reduced overall employment in the dairy industry.

When asked their views, a similarly high number of people (around 38%) believed an increase in blue gum plantations would lead to more employment and less employment (with under 30% believing there would be no change). This diversity of views may be related to the way employment changes when land use changes to plantation forestry. Plantation workers are typically located in larger towns and regional centres rather than being based in small towns or on rural land. Even where there is no net employment change, this means the location of employment is likely to shift; as a result, some areas will experience a decrease in employment and some an increase, depending on where they are located.

Different perceptions were reported about dairy farming, with less than 20% of people believing an increase in dairy farming would lead to a decrease in employment, 35-40% believing it would result in an increase, and the remainder (around 44%) believe it would lead to no change. This again may be explained by the varying ways dairy expansion impacts on employment – depending on how the increase occurs, it may result in any of these outcomes.

When asked about cropping, over 50% of respondents believed an increase in this land use would have create no change to employment, while slightly more people believed it would lead to growth in employment than believed it would lead to a fall in employment. However, analysis of statistical data suggests cropping expansion has been accompanied by decreasing employment requirements over time. This change may be less visible in rural areas than some others, as it does not involve a wholesale shift in who undertakes work on rural properties, but rather often involves a gradual change to more cropping on a property and a similarly gradual shift in employment.

Robust data on changes to employment from rural residential development is not available for comparison to people's views about this land use. Most people tended to hold positive beliefs about employment opportunities from this land use, particularly in regional centres. Group interviews suggested that people saw this as being related to an increase in retail sector employment resulting from the influx of new rural residents.

Involvement in community groups

Accurate independent data on the change in involvement in community groups is not readily available. However, group interview data uniformly suggested that involvement in community groups is dropping generally, and that possible explanations for this are related to changes in agriculture which are making it difficult for people to participate in community activities. The survey of landholders who had changed land use to plantation forestry suggested that when residents sold their properties to plantation companies, in 50% of cases membership of community groups did not change, while in 25% people stopped their membership, and in 25% of cases they changed the location of their membership. This suggests that a decline in involvement in community groups could occur where an expansion of blue gum plantations leads to people shifting off a property, but it depends on whether the new residents who subsequently shift onto that property join local community groups.

Survey results suggest the majority of people believe that rural residential development leads to increased involvement in groups. However, group interviews suggest that this will depend on whether the person lives permanently in the region, and whether they are the type of person to become involved.

Conclusion

Land use has changed significantly and rapidly in the Green Triangle and Central Victoria over the past 15 years. The impacts of this change have clearly been complex, and the ways that residents perceive and experience these change are equally diverse. There is therefore no clear and simple answer to the questions regarding the impacts these changes have on the region.

The region supports a wide diversity of land uses, more than many others, which helps underpin diversity in the communities who live in the region. It is a major producer of many of Australia's agricultural and forestry products. This diversity provides considerable economic and social strength for the region, and is likely to enable improved adaptation to changing circumstances.

When land use change occurs, it may lead to either (or both) positive and negative impacts, depending on the values and goals of those affected by change, and their individual circumstances. This finding points to the importance of assisting residents to adapt to land use change – in other words, to help residents maintain the characteristics of the region and their communities they value while adapting to change. Given the concerns raised regarding population change in many parts of the region, strategies to assist communities to welcome new residents and to assist new residents to integrate with communities may be particularly valuable. Similarly, it is important to support communities and individuals to adapt to employment requirements of new industries.

Both positive and negative socio-economic impacts were identified for most types of land use change, with a differing mix for each. Decline in sheep grazing, expansion of cropping, change from dairy farming to other land uses and, to a lesser extent, expansion of bluegum plantations, were associated with decline in rural population. Expansion of rural residential properties and bluegum plantations was associated with high population turnover. These changes lead to ongoing social change in rural communities. It is important to note however, that these changes often have benefits at the individual enterprise or household scale, while leading to other changes at the community scale. For example, when a farming family expands its cropping activities, it often does so to adapt to economic pressures and create opportunities for family members. The finding therefore acts primarily as a signal for industry and government, highlighting regions where there may be need for particular attention to reduce any negative impacts of land use change for rural communities.

It is hoped that this report, along with other outputs of the *Land Use Change* project, provide a useful basis for continued public debate regarding land use change. The survey of resident perceptions indicates considerable diversity of views. Mutual appreciation of the different ways people have experienced land use change can assist communities in moving away from a simplistic polarised characterisation of particular land uses as being 'good' or 'bad'. Similarly, it is hoped a more sophisticated understanding of the socio-economic impacts of land use change will lead to creative thinking regarding how to best to help rural communities to harness the benefits of change while minimising its negative outcomes.

Appendix 1: How was the study conducted?

The project was conducted over a two and half year period and involved diverse methods to explore socio-economic impacts of land use change. A detailed description of the methods for each component of the project, and the limitations of these, can be found in the technical reports for each part of the project, which can be accessed at www.landusechange.net.au. This section describes the major elements.

Project governance

A project steering committee, comprising representatives of funding agencies, oversaw the progress of the project. Advice on project directions was provided by a more broadly based project advisory group. Group members were recruited for their expertise in a range of agricultural industries and their knowledge of diverse localities within the region.

Group interviews

Interviews were conducted with 57 residents of the region, recruiting participants through community groups around Beaufort Colac, Heywood, Horsham, Lucindale, Mortlake, Penola/Coonawarra and Warrnambool. Analysis of interviews were used to identify major land uses changes and impacts of these changes. This information was used to inform and test the analysis of socio-economic impacts, to inform the design of surveys, and to provide deeper insight to experiences of land use change.

Surveys of resident views

A postal survey of 899 residents of the region examined beliefs about overall and specific impacts of four land use changes: increased cropping, dairying, blue gum plantations and rural residential development. Respondents to this survey tended to be older, more often male, and more often resident in regional centres than was typical of the population as a whole. A second smaller survey was conducted involving interviews with 414 residents in the main streets towns across the region. The surveys provided a relatively consistent picture of land use perceptions.

Employment survey

A postal survey of landholders and businesses engaged in beef grazing, sheep grazing, cropping, viticulture and bluegum plantation growing was undertaken in late 2008. The survey was small, aiming to achieve a high enough response rate to compare data to other sources on employment. Surveys were sent to members of viticulture associations; sheep, beef and cropping farmer discussion groups; and to plantation managers and landholders who had undertaken their own farm forestry. Responses were received from 81 businesses in total. This information was used to better identify how much employment is generated to the farm gate by different land uses.

Analysis of social and economic change from independent data

Statistical data from sources such as the Australian Bureau of Statistics, Bureau of Rural Sciences and state government agencies was analysed to identify (a) the key socio-economic and land use changes occurring in different parts of the study region, and (b) whether different land use change were associated with different types of socio-economic change.

Focus groups

As part of the analysis of social and economic change based on independent data, a series of focus groups were held in which residents with in-depth knowledge of their local region reviewed statistics on land use and socio-economic change, identifying (a) any problems with the data, and (b) their interpretations of how and why different changes had occurred, and the

consequences of those changes. The focus group data were then used as the basis for further analysis of the data. Over 60 people participated in the focus groups.

Survey of landholders selling, leasing or establishing plantations & plantation companies

A postal survey was distributed to landholders who had sold or leased land to a plantation company, or established their own farm forestry. A total of 158 landholders responded to the survey (a 60.3% response rate). The purpose of the survey was to better understand the social changes that result from land use change to plantation or farm forestry. Data were also collected directly from plantation companies, who provided information about numbers of people living on properties before and after the land use change to plantations, for an estimated 78% of properties leased or sold to plantation companies in the study region during 1995-2007.