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

Living with land use change: different views and perspectives

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

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Executive Summary

Introduction

Land and its uses are essential to all human communities. Every person is shaped in a range of ways by the landscape in which they live, and the products and resources produced on the land. Land and its uses are particularly important 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 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 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.

These land use changes have the potential to lead to profound shifts in the region's communities and economy. They provoke ongoing debate and sometimes conflict amongst residents of the region, who are affected in different ways by land use change.

To better understand the impacts of land use change in the Green Triangle and Central Victoria over the past 15 years, a new study was developed and launched in August 2006. The *Socio-economic impacts of land use change in the Green Triangle and Central Victoria* (*Land Use Change)* study builds on and extends a study undertaken in 2000 by the University of Melbourne (Petheram *et al.* 2000).

The goal of the *Land Use Change* study is to provide a comprehensive understanding and quantification of land use, industry and socio-economic change across the region since 1991, and how different people experience these changes.

This report documents the perceptions of 57 residents of the region who took part in group interviews in September 2006. In the interviews they discussed the nature of land use change, and how it has affected their lives and the communities they live in.

This report is the first of seven detailing results of different parts of the study.

Aims and methods

Group interviews were undertaken at the start of the *Land Use Change* study to develop a better understanding of how people in the region are experiencing land use and socio-economic change, and the diversity of views about the nature and impacts of land use change. The eight group interviews were undertaken in September 2006, in Beaufort, Colac, Heywood, Horsham, Lucindale, Mortlake, Penola/Coonawarra and Warrnambool. The 57 participants included farmers and graziers from agricultural sectors including dairy, broadacre cropping and grazing and horticulture; plantation managers; members of local environmental, volunteer and community service groups; rural residents other than farmers; local business people; and local government staff and councillors. While a wide diversity of people participated in the interviews, some groups were better represented than others. The majority of participants had been or were currently involved in traditional farming activities in the region. Fewer participants were rural residents who did not farm, who farmed for new/alternative products, or were town residents, although most interviews had at least one or two participants who fell into these categories. None of the group interview participants identified themselves as indigenous. The views represented may therefore be more reflective of those held by people involved in traditional agriculture than of those held by town residents, rural residential residents, indigenous residents of the region, or those involved in newer land use industries.

During each group interview, participants were asked to identify and describe the different land use changes they had observed in the part of the study area they were familiar with, prioritise which land use changes were the most important or significant, and discuss the drivers and impacts of land use changes they ranked as highly important.

Results of the group interviews were used to inform subsequent stages of the *Land Use Change* study, and to better understand the different ways people experience and understand land use change.

The research reported in this document is qualitative and, as such, does not make claims about the validity of the different and often conflicting perceptions held by group interview participants, or attempt to quantify how many people hold the different views identified in the interviews. Subsequent reports forming part of the *Land Use Change* study will examine various aspects of land use change in the study region using quantitative data.

Results

Results of the group interviews are summarised below, focusing on identifying the diversity of sometimes conflicting perceptions reported about the nature and impacts of land use change in the region.

Defining different land uses

Participants were asked to discuss key land uses in the region. Key land uses identified included agroforestry, blue gum plantations, cropping (all types), dairy farming, grazing (sheep for prime lamb, sheep for wool, beef cattle), horticulture, pine plantations, rural residential expansion and viticulture. Each of these involved a group of activities which could be defined as a distinct 'land use', although often having links to other land uses.

What does land use change involve?

Group interview participants identified that land use change may involve some or all of the following:

- change in the area of land used for a particular purpose
- change in the number of people employed in different land use industries
- change in the way a land use is undertaken, including the technology used, efficiency of production and methods of production
- change in local and regional economic activity as a result of changing demand for goods and services, and
- change in volume and value of goods produced.

This range of types of change is important to recognise. A change in intensity or efficiency of land use can have socio-economic consequences as significant as those resulting from change in the total area of land being used for a particular purpose.

What land use changes have been occurring in the region?

The land use changes most commonly observed in the region over the last 10-15 years, and sometimes longer, by group interview participants were:

- increase in the area of **blue gum plantations**
- a trend to increasing **farm size and property amalgamation**, associated with increasing efficiency of production and changes in technology
- increases in the area of land used for **cropping**, diversity and type of crops established, location of cropping in the region, and changes to cropping practices
- changes to the **dairy** industry, varying substantially across the region. In some areas, dairy farming had decreased over time; in southern areas with reliable rainfall it had increased in area. Other changes included intensification of production and increasing dairy herd size.
- increased numbers of small **rural residential** properties (variously labelled as hobby farming, lifestyle properties, 'seachange')

- changes in **water availability, use and regulation**
- increased use of **on-farm conservation practices** aimed at improving sustainability
- decreased **grazing for wool production**
- increased **agroforestry**
- changes to **beef cattle grazing** — sometimes involving growth in the industry and sometimes decline
- increase in grazing for **prime lamb production**
- increase in land managed on behalf of investors via **Managed Investment Schemes**, and
- increased **intensity of agriculture**, often associated with introduction or increased use of irrigation.

Many other land use changes were also described, but not as often as those listed above. In some cases a land use change was identified in only one or two group interviews because it was relatively localised — for example, development of new mines.

Participants were asked to identify which land use changes were most important. Six land use changes were ranked as highly important in three or more interviews:

- increases in blue gum plantations (ranked as an important land use change in all eight interviews)
- increased cropping (five interviews)
- changes in water availability, use and regulation (five interviews)
- increased dairy farming (four interviews)
- farm amalgamation/increased farm size (ranked as important in three interviews), and
- rural residential expansion (three interviews).

Impacts of land use change

Participants were asked to discuss the impacts of different land use changes. These fell into the categories of impacts on local and regional economic activity; community interaction and cohesion; services and community groups; employment availability and types; other industries; population and demographics; environmental conditions; water use and availability; who manages land; land prices and markets; and infrastructure condition and use.

The impacts of the six land use changes commonly ranked as important by interview participants are described briefly below.

Blue gum plantations

The impacts of blue gum plantation expansion, while debated, were most commonly described as negative, with fewer positive than negative perceptions of impact discussed. Most participants believed expansion of blue gums impacted negatively on local economic activity (although some disagreed with this view). There were more mixed views about impacts on regional economic activity, with some believing blue gum expansion has positive impacts on regional activity and some believing it has neutral or negative impacts. Increase in the area of blue gums was commonly believed to lead to decreases in the population of rural communities, with flow on negative impacts on provision of services and community groups, and community interaction and cohesion. Some participants believed that blue gum expansion leads to availability of new types of employment, while others were concerned that the employment generated may not be comparable to that generated by alternative land uses. Several participants described concern that expansion of blue gums may make it difficult for other industries to maintain or expand production.

Views about environmental impacts were mixed, with some describing positive and others negative impacts. A key concern commonly raised was the question of whether plantation expansion affects water availability. Blue gum expansion was widely believed to have led to increased land prices, associated with positive benefits for landholders wishing to sell land, and with negative impacts for those wishing to purchase land. It was described as involving a shift to new people and corporations managing land. Some participants described blue gum expansion as resulting in loss of infrastructure from farms, and as leading to increased pressure on road infrastructure.

Cropping

Expansion of cropping, particularly where it involved amalgamation of farms, was described as having a range of differing impacts. Some participants believed it has led to increased local and regional economic activity; others that it has led to decreases in economic activity. There was more agreement about employment, with several participants describing cropping expansion as being associated with increased mechanisation and decreases in overall employment availability over time, as well as changes in the types of jobs available and their location. Some participants described cropping expansion as leading to loss of rural population, with flow-on negative impacts on provision of services and community groups, and community interaction and cohesion. When environmental impacts were discussed, cropping expansion was mostly perceived as having negative impacts due to use of chemicals and loss of biodiversity. It was also described as being associated with increased need for water drainage.

Water availability and use

The primary impacts of change in water availability and use were described as changes in the land uses that can be undertaken, and the viability of agricultural enterprises. Few other impacts were discussed.

Dairy farming

Dairy farming was generally considered to contribute positively to local and regional economic activity. Expansion of dairy farming was believed to create more jobs in local areas. Participants identified difficulty in obtaining enough labour for dairy farming, and several believed that people have become less willing to work in the industry over time, mostly because of the type and amount of work involved. Typically, participants believed that increases in dairy farming led to growth in local population, and decreases to a fall in population, with associated impacts on provision of services and community groups, and community interaction and cohesion. Some shifts in the management of dairy farms were noted, including an increase in the number of farmers migrating from other countries (particularly New Zealand) to manage farms.

Expansion of dairy farming was described by some as potentially having negative environmental impacts, while others believed that in recent years there has been a shift to more sustainable farming practices in dairy and other agricultural industries. Demand for land from dairy farmers was described as contributing to land price increases in recent years in some parts of the region, with similar impacts to those described above in the section on plantations. Expansion of dairy farming was also described as creating increased pressure on road infrastructure.

Farm amalgamation

While identified as a key type of land use change, the impacts of farm amalgamation were mostly discussed when particular land uses such as cropping were described. When its impacts were described outside the context of a particular land use, it was typically believed to have led to a shift of employment opportunities away from local areas into regional centres, to contractors working across larger regions, to a reduction in rural population and associated flow-on effects on community interaction and cohesion and community groups and services, and to more corporate management of farms.

Rural residential development

The impacts believed to result from rural residential expansion varied depending on the type of rural residential expansion being discussed. The expansion of rural residential ‘lifestyle’ blocks was sometimes believed to lead to decreased local and regional economic activity, particularly where the new residents are ‘weekenders’ who do not live permanently in the region. However, where new residents do move

permanently to a region, it was described as contributing to economic activity, and to increased employment in towns. Some participants were concerned that expansion of small rural residential properties reduced availability of land for traditional agriculture.

However, the most common impact discussed was the impact of rural residential expansion on the number and type of people living in rural areas, and on community interaction and cohesion. Rural residential expansion was generally believed to lead to population growth, with new residents shifting into communities. These new residents were sometimes viewed as a 'positive' and sometimes as a 'negative'. Many agreed that it can take some time for new residents to integrate into a rural community, and several described negative experiences of people who have moved onto rural residential blocks in their area. Expansion of rural residential properties was typically described as creating upward pressure on land prices.

The Land Use Change *study*

This report forms one of several reports from the *Land Use Change* study, and should be read in conjunction with other reports. The project reports are summarised in the following table.

Publication	Description	Publication date
Living with land use change: different views and perspectives	This report presents the results of the group interviews undertaken in the region in late 2006. It highlights the diversity of way people in the region have been impacted by land use change.	Mar 2008
Comparing industries: final framework	This methodology report documents the framework developed to compare different industries to equivalent points in the chain of production.	Mar 2008
Understanding resident views on land use change	Reports results of the 'resident views on land use change' survey.	May 2008
Impacts of land use change to farm forestry and plantation forestry: landholder survey results	Analyses the impact of changing land use to plantation forestry or farm forestry on rural populations and on those who decide to make the change.	June 2008
Employment and spending: comparing the activity generated by different primary industries	Quantifies how much employment and spending different industries generate in the community.	Sept 2008
Socio-economic impacts of land use change: what do the statistics tell us?	Analyses the changes in land use, and social and economic characteristics across the region over time.	Sept 2008
Socio-economic of land use change: Integration report & Summary report	Integration: Integrates findings across the whole project Summary: summarises the findings of the preceding publications.	Sept 2008

1 Introduction

1.1 Introduction

Land and its uses are essential to all human communities. Every person is shaped in a range of ways by the landscape in which they live, and the products and resources produced on the land. Land and its uses are particularly important 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 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.

These land use changes have the potential to lead to profound shifts in the region's communities and economy. They provoke ongoing debate and sometimes conflict amongst residents of the region, who are affected in different ways by land use change. Land use change may create positive change in one person's life — for example, by providing employment opportunities or the chance to develop new social networks. The same change, however, may have negative impacts on another person, who may lose a farming opportunity, or experience loss of social networks as friends or family shift out of their community. Change is commonly described as 'inevitable', but it is essential to understand its impacts, and how these impacts differ for different people in a community. This understanding is essential to help people better understand and plan for change, and to inform debate about the types of change that are desirable in rural regions.

This report documents the perceptions of 57 residents of the region about the nature of land use change and how it has affected their lives, and the communities they live in.

1.2 Background: the *Land Use Change* project

A range of land use and socio-economic changes have occurred across the Green Triangle and Central Victoria over the past 15 years. In 2000, a University of Melbourne research team examined the socio-economic impacts of land use change in

south west Victoria, and identified extensive land use change from grazing to cropping, dairying and blue gum plantations (Petheram *et al.* 2000). Land use changes have continued since 2000, with the area under plantations, cropping and dairying continuing to expand, and increasing use of rural land for residential and 'lifestyle farming' purposes.

To better understand the ongoing impacts of these changes, a new study was developed and launched in August 2006. The *Socio-economic impacts of land use change in the Green Triangle and Central Victoria* (*Land Use Change)* research project builds on and extends the 2000 study. The goal of the *Land Use Change* study is to provide a comprehensive understanding and quantification of land use, industry and socio-economic change across the region since 1991, and how different parts of the community experience these changes. A smaller component of the project examines the impacts of land use change to plantation and farm forestry on rural populations and on the landholders involved.

The *Land Use Change* study region is shown in Figure 1. It covers a larger area than the original study, extending from Colac-Otway, in central Victoria, to Robe in the lower south east of South Australia, and from West Wimmera south to the coast. It also examines changes occurring in the region in greater detail than was possible in the 2000 study.

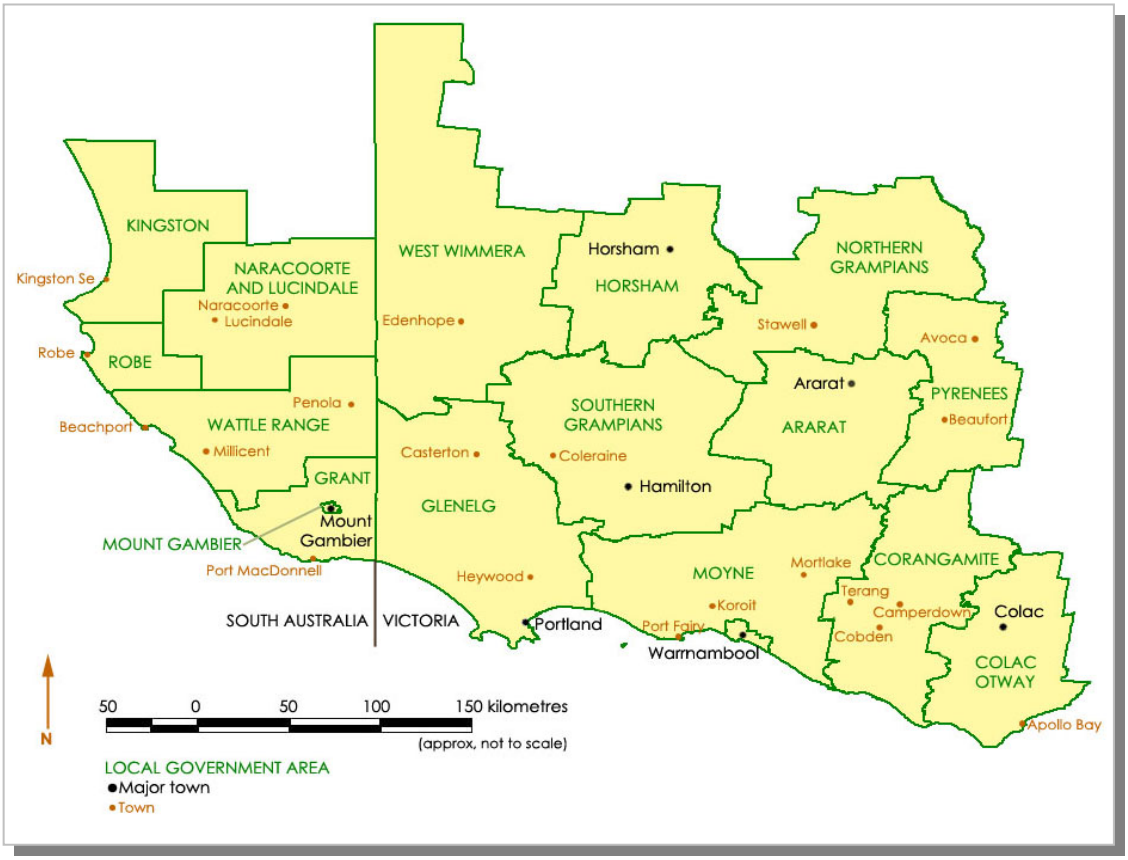

Figure 1. The *Land Use Change* study region.

Three organisations are undertaking the *Land Use Change* study research: the Australian National University, the University of Melbourne, and the Victorian Government Department of Primary Industries. The following organisations are contributing cash or in-kind funding to the project (in alphabetical order): Central Victorian Farm Plantations, Cooperative Research Centre for Forestry, Corangamite Catchment Management Authority, Forest and Wood Products Australia, Glenelg Hopkins Catchment Management Authority, Glenelg Shire Council, Green Triangle Regional Plantation Committee, Moyne Shire Council, Southern Grampians Shire Council, Victorian Government Department of Primary Industries, and Wattle Range Council.

Members of the community living in the project region have been involved in the study in a number of ways throughout its development and implementation. More information about community involvement in the project, project methods and governance, and project progress can be found on the project website at http://www.landusechange.net.au.

As part of the *Land Use Change* study, a series of eight group interviews was conducted in September 2006. This report summarises the results of these group interviews, describing why they were conducted, methods and participants, and results of the discussions held in the interviews.

1.3 Aims of the group interviews

Group interviews were undertaken at the start of the *Land Use Change* study to develop a better understanding of the diverse ways people in the region are experiencing land use and socio-economic change. While other parts of the *Land Use Change* project aim to quantify change and understand the impacts of change, the goal of the group interviews was to qualitatively describe the experience of these changes, focusing in particular on understanding the diversity of issues relating to land use change in the region, and how and why people experience change in different ways.

The specific aims of the group interviews were to:

- identify the range of types of land use change participants had observed in different parts of the study region over the last 15 – 20 years
- identify how group interview participants defined land use change and relationships between and within particular types of land uses
- prioritise which land use changes are considered to have been most significant by group interview participants, and
- identify the perceived impacts of different types of land use change and the processes by which these impacts are believed to occur.

Different people experience change in different ways, and therefore their perceptions of the nature and impacts of land use change also vary. Because of this, a range of perceptions of land use change are reported in this document, some of which are contradictory. This is a useful indication of the complexity of land use change and its impacts in the region.

Data from the group interviews was also used to inform subsequent development of the three subprojects undertaken in the *Land Use Change* study, ensuring they focused on the issues of most relevance to people living in the study region:

- *Subproject 1: Community attitudes and values toward land use change.* This subproject investigates community attitudes towards land use change in the study region. Results of the group interviews were utilised to help identify the range of topics to be included in a subsequent mail survey of residents living in the study region.
- *Subproject 2: Quantify and analyse land use, industry and socio-economic change in the region using independent data*. Subproject 2 uses statistical data to profile and analyse land use, industry and socio-economic change in the study region over time. The analysis seeks to identify likely relationships between observed socio-economic changes and changes in land use and industries. Results of the group interviews were used to help select the types of land use change and types of socio-economic change to be examined in this subproject.
- *Subproject 3: Understanding shifts in the landholder population*. Subproject 3 examines the direct impacts on landholders and rural population resulting from changing land use to farm forestry and plantation forestry. The group interviews were used to confirm which type of land use change this subproject should focus on.

2 Methods

2.1 Introduction

The following sections outline:

- dates and locations for group interviews and how these were chosen
- participant numbers, and how participants were recruited
- the interview topics and procedure, and
- data analysis.

2.2 Overall approach

The aim of the group interviews was to document the diversity of views about land use change in the study region. The most appropriate approach to do this was to use qualitative data collection and analysis. Qualitative interviews allow participants to provide an in-depth understanding of how they experience land use change and why they hold particular beliefs about its impacts. They enable identification of conflicting perceptions about the nature and impacts of land use change.

Group interviews were chosen as an appropriate method as they enable participants to discuss and debate their experiences of land use change with other participants, helping identify where conflicting views or different interpretations of change exist.

The nature of qualitative research means that it is highly effective for identifying the diversity of views and experiences of events and changes, and understanding subjective experiences of change. It cannot, however, provide an understanding of how widespread the different points of view identified are in a particular population, or make claims to objectively assess the validity or otherwise of the often conflicting points of view identified in the interviews.

2.3 Interview locations

The interviews were undertaken by two teams of researchers from 11–14 September 2006, at Colac, Warrnambool, Mortlake, Heywood, Lucindale, Coonawarra, Horsham and Beaufort. Interview locations were selected in consultation with the project's advisory group[1], seeking to maximise the range of groups with regard to geographical

[1] The advisory group for the *Land Use Change* study consists of 14 residents of the region, all of whom have in-depth knowledge of the region and particular land uses undertaken within it. To find out more about the advisory group members, go to http://www.landusechange.net.au and select "Governance" from the top menu bar.

location, land use, and town size. Availability of suitable meeting facilities was also considered.

Where possible, interviews were held in the evening, to enable participation of those who may be unable to attend during normal working hours. The exception was Warrnambool, where it was only possible to hold the meeting in the morning.

2.4 Participants

When inviting people to take part in the group interviews, the goal was to seek participants with a wide diversity of views about the consequences of different types of land use change in the study region. Two recruiting methods were used to ensure that those invited represented a broad range of groups in the community.

First, advisory group members were asked to nominate potential participants through their personal or professional connections. Second, the research team accessed local community directories to ask a range of community organisations such as sporting, service and interest (e.g. environment, historical) clubs to send a member of their group. In both cases it was stressed that participants need have no special knowledge of land us change, simply a willingness to talk about their experiences of living in the area and of land use change. It was also emphasised that participants were not being asked to represent a collective view of a particular group, but of their own experiences. Invitations were sent to a wide range of groups including farming groups, indigenous groups, local government, sporting clubs, service groups and environmental groups, amongst others.

A total of 57 people participated in the group interviews. Participants included:

- farmers and graziers from various agricultural sectors including dairy, broadacre cropping and grazing and horticulture
- members of local environmental, volunteer and community service groups
- rural residents other than farmers
- local business people, and
- local government staff and councillors.

While a wide diversity of people participated in the interviews, the majority of participants had been or were currently involved in farming activities in the region. Fewer participants were rural residents who did not farm, or town residents, although most interviews had at least one or two participants who fell into this category. None of the group interviews participants identified themselves as indigenous. Additionally, many of the participants were experienced in traditional agriculture, while few had direct experience with niche/alternative farming, hobby farming, or with plantation forestry. The views represented may therefore be more reflective of those held by people involved in traditional agriculture than of those held by town residents, rural

residential residents, indigenous residents of the region, or those involved in newer land use industries.

2.5 Interview procedure

The duration of each interview was around two hours. All interviews were audio-recorded, as well as notes being taken on butcher's paper to aid discussion amongst the group during the interview.

Each group interview followed the same procedure, in which participants were asked to:

1. Introduce themselves to the group.
2. Identify the different land use changes they had observed in the part of the study area they were familiar with, particularly over the last 10–15 years, but not restricted to this time frame. The researchers recorded these land uses on butcher's paper. A 'land use change' was identified as any change in how land was used in the region, where a land use is any commercial, non-commercial or other utilisation or experience of land. Participants were encouraged to consider land use change as including any change, whether they considered it positive or negative, or whether it involved change in what is produced on the land, how it is produced, or changes not related to production of goods from the land.
3. Prioritise which land use changes were the most important or significant. This was asked in a relatively open way. When clarification was requested it was suggested that this should be those land uses participants considered to have had the greatest or most important impacts on the part of the study region they were familiar with, which they were most keen to discuss, or which they felt should be investigated further in the *Land Use Change* study. Participants were given five stickers, and asked to prioritise significant land uses by placing their stars against those land uses they felt were most important. They could choose to put all five stickers against a single land use, to allocate their stickers to multiple land uses, or to use only some of their stickers.
4. Once all participants had indicated their priorities, land use changes were ranked. Those with the greatest number of stickers were considered to be the 'highest priority' land use changes, and those with the least the lowest priority. Following this ranking, the interview participants discussed the following topics for the highest priority land uses:
    - How widespread has the land use change been? (Where has it occurred? Over what time period?)
    - What factors have caused the land use change?

- What have been the consequences of the land use change? Participants were encouraged to think broadly about consequences and included consequences for individuals, communities and the region as a whole.

Time constraints meant it was not possible to discuss all land uses identified by participants, and typically the top two to four land use changes were discussed in the time available.

5. In the final section of the interview, participants were asked to provide more information on the relationships between different types of land use, particularly to identify whether the various terms used to refer to land uses had different meanings that were significant for the research. Researchers drew attention to groups of land uses they had recorded earlier, and asked participants to consider these groupings and identify ways in which concepts within each grouping and across groups were similar and different from each other.

2.6 Analysis

Each interview was audio recorded and transcribed in full for analysis. Data analysis focused on identifying (a) the type and nature of land use changes observed in the region, (b) which were considered important and why, and (c) the ways participants had experienced these changes — in other words, their impacts.

Analysis of types of land use change proceeded in the following way. Initially, three researchers read through the transcripts noting land uses and changes. Researchers then grouped these concepts into similar ideas or categories of land use change. Final groupings were resolved through discussion. Finally, interview transcripts were broadly coded to identify which land uses and impacts were used in each of the interviews.

Analysis of the significance of land use changed depended largely on participants' use of stars to indicate significant land uses. For each interview, the number of stars placed next to individual land uses were used to determine significance. Following the analysis of land use changes described above, these ratings were grouped to determine overall significance.

Analysis of the nature of land use change, and the language associated with this used a standard approach of identifying themes across interviews. Once major categories of land use change were identified, researchers identified sections of the transcripts in which participants were asked to describe similarities and differences between land use types. Key points of differentiation were noted, and key quotes selected to illustrate the ways that participants characterised the land uses.

Analysis of the impacts of land use change was undertaken initially by three researchers independently. They each read through the transcripts and noted statements that described different impacts of change. One researcher then noted

common themes and developed a smaller number of categories of impacts, which were refined through discussion among researchers.

3 Results

The results of the group interviews are presented in two sections:

- defining and describing the nature of land use changes in the region, and
- impacts of land use change experienced or observed by group interview participants.

3.1 Identifying land uses and how they have changed

When analysing the impacts of land use change it is important to understand the different land uses being undertaken in the study region, and the variety of ways in which they have been changing in recent years. Land use change is not a simple matter of a shift in the area of land used for a particular commodity; it may involve a range of changes including change in what is produced on the land, how it is produced, and the intensity of production, amongst others.

Understanding land use change requires carefully defining what is considered to be a 'land use', so that changes in these land uses can be examined. Defining a land use can be challenging — what activities should be considered to form part of a single 'land use' when every land use can be undertaken in many ways? While some sectors and interest groups may adopt formal definitions of particular land uses, in this study land uses were defined based on the ways participants defined them in everyday language.

This section:

- explores the ways participants defined key land uses in the region and how these were related to each other, and
- describes the ways participants had observed these land uses changing over the past 15 years.

3.1.1 Defining different land uses

As described above, understanding land use changes and its impacts requires first understanding and defining different land uses. Participants discussed a wide range of land uses in the group interviews, and often used multiple terms to refer to a particular land use. It was not always clear where the boundaries of one type of land use ended and another land use began. Participants were therefore asked to discuss the similarities and differences between different land uses, to assist in defining what should be considered a single land use, and where an activity may need to be split into more than one type of land use.

The following key categories of land use are discussed in turn below. For each, the various ways the land use was defined, and the way it has been defined for this report based on the discussion held in the interviews, is described:

- plantation forestry
- trees on farms
- rural residential, lifestyle farming, hobby farming, urban growth
- cropping
- dairy farming
- grazing enterprises
- farm amalgamation, and
- water availability and water use.

Plantation forestry

Participants commonly used the following terms when discussing plantation forestry: *blue gum plantations, blue gums, eucalypt plantations, forestry, gum trees, hardwood, monoculture, pine plantation, pine trees, pines, plantation, property going into trees, pulp production, plantation forestry, softwood, timber, timber production,* and *trees.*

Another distinct form of tree planting for commercial purposes — farm forestry or agroforestry — was often discussed, but was considered a separate category to plantation forestry and is discussed in the next section.

Some participants believed all types of plantation forestry were similar enough to think about as a single type of land use:

> I am happy to lump timber into one.[2]
>
> Well it is all plantations and it is all forestry.
>
> We are talking about land use change for good or evil aren't we so that whole segment of plantation forestry takes in all those different uses.

However, many participants believed **pine** and **blue gum**[3] plantations should be considered separate land uses, largely because each was believed to have different impacts. Blue gum plantations in particular were distinguished as being different to other forms of forestry discussed — including farm forestry, pine plantations, and harvesting of native forests. When discussing different types of plantation, pine

[2] Indented text in this style are verbatim quotations from group interview transcripts. In cases where a quote includes a speaker following on from another, the follow-on is preceded by a dash (—).

[3] Participants referred to blue gum plantations variously as *blue gum plantations, timber production, property going into trees, plantation, pulp production, plantation forestry, forestry, eucalypt plantations,* and *gum trees*. The term 'blue gum plantations' was the most commonly used, and hence is used in this report.

plantations were commonly described as being an established industry which was known to provide employment, particularly where processing facilities existed, while many believed blue gums were not yet a fully developed industry. Participants also typically separated blue gum plantations from pine plantations when discussing their beliefs about impacts on land prices and markets, population and demographics, community interaction and cohesion, employment and economic activity, and potential profitability of plantations:

> I wouldn't like to put *Pinus radiata* and blue gum in the same bucket.
>
> …we've lived with the pine industry reasonably comfortably for many years and we've accepted it because it's provided jobs and it's provided … good products at the end.
>
> …people are more likely to react against blue gums whereas they might not react against pine plantations because the blue gums haven't got a sort of I suppose you would call it a tertiary use other than wood chips and no further. The attitude might change to blue gums when you have a pulp mill.

Participants also discussed whether it was important to distinguish between different types of blue gum plantations. Some suggested that blue gum plantations have different impacts if they are established through leasing of land from farmers, versus direct purchase of land, while others believed there was little difference between the two:

> … if you were leasing there would be a slightly different, I imagine a slightly different effect on the demographic where because it's only being leased from the farmer … [the farmer] is more likely to remain on the land, whereas when the timber company purchases it and subdivides it usually that's the farmers kick in the butt to actually move on…
> – But when they lease it's 25 years, it's a whole generation gone. So…
> – It's the same but on a lesser scale.

Blue gum plantations were clearly distinguished from tree planting in general:

> We've got to start talking about plantation blue gums. Because if we keep talking about trees… the community thinks trees are terrific.
>
> Well you definitely don't want to put trees and plantations together. Trees are more over with your revegetation on farms and that sort of stuff. I mean there is nothing wrong with planting any trees at all. Plantations is your pulp industry, is your, is your plantation timber.

Occasionally participants used similar terms to mean different things; with some confusion over what type of plantation was 'hardwood' and similar issues. However, in general there was considerable similarity in the terms used to refer to plantations and the meanings attached to them, with clear distinctions made between 'pine' and 'blue gum' plantations, and to a lesser extent between blue gums established on leased land and on purchased land.

For this reason, 'blue gum plantations' and 'pine plantations' are discussed as different land uses in this report. Blue gum plantations are further differentiated into 'leased land' and 'purchased land' where these differences were perceived to be associated with different types of impacts.

Farm forestry/agroforestry

Participants used the following terms when discussing farm forestry/agroforestry: *agroforestry, farm forestry, firewood, sugar gums, tree planting, sawlogs, sawlogs for salinity, shelterbelts,* and *woodlots*. The concept was often linked to terms describing non-commercial tree plantings such as *environmental works, landcare, revegetation, shelter trees,* and *tree planting.*

Farm forestry and **agroforestry** were clearly distinguished from plantation forestry. The major differences were that, while generally involving growing trees for commercial return, they were viewed as a land use that is complementary to traditional farming, rather than replacing it, occurred on a small scale, and were believed to have different impacts on the environment and rural communities than plantation forestry:

> I would certainly differentiate between agroforestry and large scale industrial monocultural type blue gums forestry.
>
> There are also farms that are totally devoted to plantations… and then there were farmers who used plantations as an adjunct, as just another string to their bow as primary producers.
> – Agroforestry.

Agroforestry and farm forestry were described by most participants as being related to environmental tree plantings, revegetation and landcare, and by some as being related to larger-scale commercial forestry. Some people emphasised the differences between agroforestry/woodlots/farm forestry and environmental/landcare works, however, usually emphasising that the former aim to generate income from the trees established and the latter do not. Some further distinguished between woodlots/farm forestry and agroforestry, believing these involved different practices, although many used the terms interchangeably

Landcare and other environmental works were also often discussed separately to tree planting activities. They were commonly considered to be related to a growing sustainability ethic amongst land managers and the broader community:

> The landcare, it's been a change of attitude almost, you know, an ethic…
> – and not doing it individually, but as a community and as a catchment.
> – Farmers have that landcare ethic and unless you've got healthy land you are not going to produce healthy livestock or whatever and… be productive.
> – We talk about sustainability now. Landcare has led that sustainability to make sure we keep farms healthy to pass on to the next generation.

Overall, agroforestry and farm forestry were seen as different to plantation forestry, and related to — but not the same as — landcare, revegetation and environmental works. The term 'farm forestry' is used in this report to refer to tree planting for commercial purposes which is undertaken by landholders on part of their farm enterprise independently of a plantation company. Tree planting for non-commercial purposes is referred to as 'revegetation'.

Rural residential development

Participants used the following terms when discussing rural residential land use: *alternative farming, farmlets, hobby block/farm/farmer/property, lifestyle block/farm/farmer/property, niche farming, rural residential, seachange, semi-rural, subdivision, suburban farmers, town farmers, tree change, urban expansion, urban sprawl,* and *weekenders*.

The terms listed above were often used in different ways, and participants both within and across group interviews had differing and often inconsistent definitions of the terms.

For some participants, the terms **hobby farming** and **lifestyle farming** were synonymous in actual land use, but conveyed different connotations regarding the value of this land use:

> Lifestyle is just a nice way of saying hobby.

However others defined the terms 'hobby farms/hobby farmers' and 'lifestyle farmers/blocks/living/land' differently, believing hobby farms were more agriculturally focussed, involving earning some income off the land to supplement a primary income elsewhere; and that hobby farmers had more land management experience than 'lifestyle' farmers, for example having a greater awareness of land management responsibilities such as controlling weeds.

There was no consistent agreement on the similarities or differences between the 'hobby' and 'lifestyle' labels overall.

> Lifestyle farmers like trees, rivers, rainfall and when you look down the foothills in the Otways they have got all that and they are close to the coast.
>
> It is just little people their bloody couple of goats and a horse and a bloody fire hazard.

Another participant conceptualised these related land uses as involving different distances from a town centre:

> Urban sprawl on the outskirts, you go lifestyle and then hobby farmers further out.

A few participants used the term **rural residential**, and again they put forward their own understanding of this term, which did not necessarily include hobby farming:

> Under the rural residential development, I'd sort of have that as lifestyle farming in some places.
> – yes
> – that's a bit different too… because some of that rural residential is only five acres blocks too isn't it, rather than your 30, 40, 50 acre real hobby farm isn't it?

Subdivision was described as involving both subdivision of land for urban growth and for lifestyle/hobby/rural residential properties. In both cases subdivision activities were often associated with loss of agricultural land:

> The real problem with that rural residential, encroaching on wonderful farmland.
>
> The danger is when you start cutting up, you know these bigger farms.

Subdivision sometimes took the form of a property being divided into many small blocks. In other cases, it involved a single house and small surrounding block being subdivided from a larger property that was being established to blue gums or amalgamated with another farm.

A shift from traditional agriculture to lifestyle/hobby/rural residential living did not necessarily involve subdivision of land. In some cases, participants described a hobby farm taking up a whole previous holding such as an orchard or dairy:

> …those people who were traditionally the dairy farmers and the orchardists, some of their land has been subdivided or bought by hobby farmers.

In other cases, no subdivision was needed as land had originally been divided into small titles:

> They mightn't be subdividing they might be getting back onto those old titles.
>
> Most of the small blocks, they are already subdivided…

Hobby/lifestyle/rural residential living was sometimes discussed in association with the idea of **'town' or 'suburban' farmers**. Two kinds of suburban farmers were identified. The first were farmers (sometimes retired) who live on small farming properties near town. These were also described as 'secondary income farmers', who still maintain some income from farming while having a different primary source of income. The second type of suburban farmer was described as weekenders from Melbourne, living on small rural blocks.

> There are also a lot of smaller holdings there that are used by what you call 'suburban farmers', retired farmers ... who like to have a paddock still and that type of thing.

Sometimes the idea of hobby farming was associated with the terms **niche** or **alternative** farming. Although these specific terms were used only occasionally, land use change involving a shift to growing niche or alternative products was raised in half of the group discussions. Enterprises highlighted included grapes, olives, goats, alpacas, wildflowers, lavender, rosemary, deer, emus and race horses. This type of diversification was often – although not always - linked back to hobby- or lifestyle farming:

> Actually half of those niche products would be people from…with money back-up, say other income maybe and it is a hobby.
>
> …with grapes and viticulture, that circle could nearly take in the lifestyle farming and subdivision and hobby farmers, and all that area too…

Overall, it was difficult to identify how to refer to this group, given that it is quite diverse. Throughout this report the following terms are used:

- 'Rural residential' is used to refer to small rural properties managed for lifestyle or 'hobby farming' purposes, generally by people who are not from a traditional farming background. The term 'rural residential' is used in this report as some participants used the terms 'hobby' or 'lifestyle' as derogatory terms whereas 'rural residential' was a more neutral term.

- ‘Urban expansion’ is used to refer to the expansion of urban developments on the edge of cities, where these are in the form of typical suburb-style developments rather than larger semi-rural or rural ‘hobby’ or ‘lifestyle’ blocks.

Cropping and horticulture

Participants used the following terms when discussing cropping: *broadacre cropping, continual cropping, cropping, fodder crops, GM crops, grains, hay, oilseed production,* and *raised bed cropping*. Various specific types of crop were discussed e.g. oats, wheat, canola, legumes.

Cropping was typically described as the production of cereals, oilseeds and pulses:

> When I was farming there was only wheat and barley. Whereas now, there’s all legumes, canola and beans, and peas and ah umpteen other things.

However, there was a cross-over for some participants with horticultural terminology:

> …now there is a probably a couple of hundred acres that’s under potatoes each year… So that’s sort of change, it comes into cropping I suppose, it depends how you are classing your cropping.

Most participants clearly separated horticultural crops from ‘cropping’ which was mostly agreed to involve cereals, oilseeds and pulses. Within this, participants described cropping as involving a wide range of activities, but were largely comfortable with describing all of these as ‘cropping’:

> If this meeting had’ve been held 20 years ago, we wouldn’t have had any idea of what crops are being grown at the present time, well 20 years ago you were growing barley, wheat, oats … and hadn’t heard of red wheat.
> – Linseed, peas, chickpeas, the legumes have only just been introduced.
> – …if you’re talking about change in the crop type that’s where, the biggest change has taken place, the different varieties that you’re planting.

It was relatively easy to define the term ‘cropping’ as relating to growing cereals, oilseeds and pulses. While many participants specifically discussed raised bed cropping, none suggested that it was a different type of land use to cropping in general.

In some cases cropping for fodder was differentiated from growing crops for other products; however fodder cropping was also often included as being part of cropping overall. The term ‘cropping’ is used in this report to refer to growing cereals, oilseeds and pulses for fodder or grain. Where different crops were believed to have different impacts, the different types are specified. The term ‘horticulture’ is used to describe growing vegetable crops such as potatoes, usually for human consumption.

Dairy farming

Participants primarily used the terms ‘dairies’, ‘dairy’, ‘dairy industry’ ‘dairying’ and ‘dairy farming’ when discussing the dairy industry in the region. Occasionally more specific terms such as ‘dryland dairy’ and ‘intensive dairy’ were used. While linkages were identified between dairy enterprises and other farming enterprises such as those

supplying fodder, there were no suggestions that these should be grouped together as a single type of land use.

> …there was a lot of conversion farms from sheep to dairy or beef to dairy in this area particularly…
>
> I suppose the increase in dairying from all the Kiwis coming over here and turning dryland farms into dairy farms, some irrigating and some not…

In general, the terminology and conceptualisation of dairy farming was the same across different group interviews, with a well accepted definition of dairy farming as involving specialist enterprises that focus on producing milk and/or breeding dairy cattle. Therefore the term 'dairy farming' is used to refer to this land use in the region.

Grazing enterprises

Participants used the following terms when discussing grazing enterprises: *beef, cattle, cell grazing, fat lambs, grazing, mixed farming, prime lamb, rotational grazing, sheep, wool,* and *wool production.*

The types of grazing enterprises discussed included prime lamb, wool and beef cattle enterprises. While participants commonly talked separately about different types of grazing enterprises, they also often discussed all types of grazing as a single type of land use, and sometimes included mixed grazing-cropping enterprises in this group.

As with the hobby/lifestyle discussion, participants were mindful of the terminology they used:

> Massive increase in fat lambs in some areas as well.
> – Prime lambs, thanks...

While grazing enterprises were sometimes discussed as a single group, participants commonly separated sheep grazing enterprises from beef cattle enterprises in their discussions.

> So traditionally, um this would have been traditional sheep and cattle properties are now into grain, due to low rainfall.
>
> Basically I've stayed in our area right from day one as wool, fat lambs and beef, changed to less wool more... fat lambs dairy and beef...

When sheep grazing was discussed, participants often distinguished between prime lamb and wool growing, but also referred to sheep grazing as a whole:

> One of the ones that has not been mentioned is probably the change from Merino wool production... to first cross ewes and prime lambs.
>
> Wool was such a big commodity in this area and now wool as a, as a featured product of the local area is almost non existent…

For this reason, sheep grazing and beef grazing are discussed separately as appropriate in this document, as are prime lamb and wool growing where participants discussed them separately. However, where comments were made about grazing enterprises in general, the term 'grazing' is used, while the term 'mixed enterprise' is used to refer to a farm on which grazing and cropping or other combinations of traditional agriculture are undertaken.

Farm amalgamation

Participants used the following terms when discussing farm amalgamation: *amalgamation, farm size,* and *bigger farms*.

Farm amalgamation is a term used to refer to a specific type of land use *change*, rather than being a land use. It is discussed only briefly here to clarify terminology, as the change it describes is discussed in detail in Section 3.1.2.

When discussing amalgamation of farms, participants often described the process involved rather than giving it a particular label:

> I suppose if you go back far enough it think there was 400 dairy farms around Mt Gambier … now it's changed to probably being less than 100 dairy farms but the biggest ones are now milking 1,500 cows and the smaller ones are milking 400.
>
> Some of your stock operations with sheep and that, some have got larger, and left empty house[s], where you've got one family where there used to be three or four.

Others specifically used terms such as 'farm size increase' or 'amalgamation':

> Yeah, well farm size increasing and manpower reducing for those farm sizes.
>
> There is certainly an amalgamation of farms, not necessarily corporate though.

The term 'farm amalgamation' is used in this report to refer to the land use change in which farms have become larger, usually through purchase of additional properties.

Water availability and water use

Participants used the following terms when discussing water availability and use: *bore, drainage, irrigation, pivot irrigation, water* and *watertable.*

In most groups, water was described by one or more participants as a land use. In all groups it was clear that water-related issues were highly salient for all participants and a range of water-related land use issues were discussed, including drainage of wet land, irrigation of dry land, and the impacts of drought on land use, amongst others:

> I can remember where there was a bore put down and you'd turn a tap and water would gush out — this is the other side of Moonambel — and it was terribly salty, it was damn near seawater. And now I've heard the water table is about 30 feet down.
>
> Irresponsible drainage is another thing that's having an impact on farming and that's not even there.
> - [Researcher]: So would change in drainage be another land use change?
> - Well drainage, rural drainage.
> - Just the lower amount of water we all have now.

While not often considered a land use per se, it was clear why many participants described water management as a land use. Changes in water availability — such as expansion of irrigation — constitute a different way of using the land to dryland farming. In South Australia in particular, farmer participants described water holding as a land use, with land held or seen as valuable for the sake of the water license rather than the land itself, so that the water becomes the primary use. This was particularly the case for farmers using irrigation.

However, in most cases, discussion concerning water suggested that it could more readily be understood as a driver (availability, cost, regulation) of land use and land use change, or as a consequence (availability) of land use change. In the remainder of this report, water availability will be considered as a driver or impact rather than as a land use.

Where water related issues are discussed in this report, specific terms are used as appropriate to refer to the particular type of water management being discussed. These terms include water availability, irrigation, and drainage.

3.1.2 Land use changes observed in the region

Based on a clearer understanding of the activities that could be defined as separate land uses, it was possible to describe the types of land use change participants reported as occurring in the study area.

Group interview participants were asked to:

- describe the land use changes they had observed in their region, focusing particularly on the last 15 years
- rank which of these land use changes were the most important, and
- describe the drivers and characteristics of the land use changes ranked as important.

This section describes the types of land use change observed, while Section 3.2 describes the impacts believed to result from different land use changes.

What does land use change involve?

Interview participants were provided with a deliberately broad definition of land use change. Land use change was identified as any shift in how land was used in the region, and could involve any commercial, non-commercial or other utilisation or experience of land considered relevant by interview participants. This broad definition was used to ensure participants themselves defined land use change, rather than pre-determining the types of things that might be considered ‘land use change’.

Land use change is commonly thought of as involving a change in the amount of land used for a particular purpose. In reality, it is more complex. Group interview participants identified that land use change may involve some or all of the following:

- change in the area of land used for a particular purpose
- change in the number of people employed in different land use industries
- changes in the way a land use is undertaken, including the technology used, efficiency of production and methods of production

- change in local and regional economic activity dependent on different land uses, e.g. changes in the types of businesses needed to supply goods and services, and
- change in volume and value of goods produced.

This range of types of change is important to recognise. A change in intensity or efficiency of land use can have socio-economic impacts that are as significant as those resulting from a change in the total area of land used for a particular purpose. For example, intensification of a particular land use such as cropping can result in higher employment per hectare, and a greater local economic activity due to more inputs being used and greater volume of outputs being produced per hectare. This may have impacts as significant as those resulting from a change in the total area of land used for cropping.

Land use changes observed

Interview participants were first asked to list *all* the land use changes they had observed in recent decades, focusing particularly on the last 15 years. Table 1 lists the land use changes identified, including:

- which group interviews they were identified in, and
- which land use changes were ranked as important by interview participants (indicated by shaded table cells).

Table 2 lists additional land use changes identified in only one group interview. Both Tables 1 and 2 report land use changes as they were identified by group interview participants, without attempting to alter them beyond grouping them into categories.

A wide range of land use changes were identified, many of which are inter-related. Many of the changes identified in Tables 1 and 2 below are influenced by multiple factors, and were often described as part of a chain of interrelated land use changes. For example, a decrease in wool price and production was commonly identified as being one of the triggers of land use changes including a shift to increased cropping, and a shift to prime lamb production. Increases in cropping and prime lamb production in turn led to further changes.

Many of the land use changes identified can thus be considered to be both a land use change in and of themselves, but also a trigger of other land use change, or the result (or impact) of other land use change.

Table 1. Land use changes identified in group interviews.

Land use that has changed (and key changes identified)	Type of change ↑Increase or ↓decrease observed	Group interviews in which change was discussed (✓) and/or ranked as one of the five more important changes (shaded):							
		Beaufort	Colac	Heywood	Horsham	Lucindale	Mortlake	Penola /Coonawarra	Warrnambool
Blue gum plantations (increase in area)	↑	✓	✓	✓	✓	✓	✓	✓	✓
Farm amalgamation (associated with increases in farm efficiency and farm size)	↑	✓	✓	✓	✓	✓	✓	✓	✓
Cropping (increase in area and types of crops, intensification, changing technology. Note: raised bed cropping discussed separately in some group interviews)	↑	✓	✓	✓	✓	✓	✓	✓	×
Dairy farming (intensification, larger property size, decrease and increase in area)	↑ & ↓	×	✓	✓	✓	✓	✓	✓	✓
Rural residential (increase)	↑	✓	✓	✓	✓	✓	×	✓	✓
Water (increased water use, decreased water availability)	↑ & ↓	✓	×	✓	✓	✓	✓	✓	×
Farm conservation practices (increase in area)	↑	✓	✓	✓	✓	✓	✓	×	✓
Grazing for **wool production** (decrease in area)	↓	✓	✓	✓	✓	×	✓	✓	✓
Agroforestry/farm forestry (increase in area)	↑	✓	✓	×	✓	✓	✓	✓	✓
Beef cattle grazing (increase and decrease in area)	↑ & ↓	×	✓	✓	✓	×	✓	✓	✓
Prime lamb grazing (increase in area and numbers)	↑	✓	✓	✓	×	✓	✓	✓	✓
Managed Investment Schemes (increase, usually in reference to blue gum plantations)	↑	✓	×	✓	✓	✓	✓	✓	✓
Niche/alternative farming (e.g. emus; goats; increase in area and diversity)	↑	✓	×	×	✓	✓	×	✓	✓
Intensive agriculture and irrigation (particularly pivot irrigation, feedlotting; increase in use of intensive techniques)	↑	✓	×	✓	✓	✓	×	✓	✓
Small farms (decrease in number)	↓	×	✓	✓	×	✓	✓	×	✓
Pulp mills (increase)	↑	×	✓	✓	×	✓	×	✓	✓

Land use that has changed (and key changes identified)	Type of change ↑Increase or ↓decrease observed	Group interviews in which change was discussed (✓) and/or ranked as one of the five more important changes (shaded):							
		Beaufort	Colac	Heywood	Horsham	Lucindale	Mortlake	Penola /Coonawarra	Warrnambool
Water regulation (increase)	↑	✓	×	✓	×	✓	✓	✓	×
Biofuel (discussed as potential future increase only just beginning)	↑	✓	✓	×	✓	×	×	✓	×
Ownership of farms by outsiders (increase, e.g. people from overseas, investors)	↑	✓	✓	×	×	×	✓	×	✓
Raised bed cropping (related to cropping; increase)	↑	✓	✓	×	✓[4]	✓[5]	✓	×	✓
Pine plantations (increase, although often over several decades' time span with little expansion in recent years)	↑	×	✓	✓	×	✓	×	✓	×
Mining/gasworks (increase in some localities)	↑	✓	✓	×	✓	×	✓	×	✓
Increase in **age of farmers** and population, fewer younger farmers and people	↑	✓	✓	×	×	✓	×	×	×
Drainage of land (increase)	↑	✓	×	×	×	✓	×	✓	×
Feedlot (cattle, other; increase in number)	↑	✓	✓	×	×	×	×	✓	×
Horticulture (various trends in different localities)	↑ & ↓	×	×	×	×	✓	✓	✓	×
Land clearance (increase or continuation)	↑	×	×	✓	×	✓	✓	×	×
Urban growth (increase)	↑	×	×	×	✓	×	✓	×	✓
Viticulture (increase)	↑	×	×	×	✓	✓	×	✓	×
Wind farms (increase)	↑	✓	×	×	×	×	✓	×	✓
Conservation areas, values (increase)	↑	×	×	×	×	×	×	✓	✓
Pressure on recreational space (increase)	↑	✓	×	×	×	×	×	×	✓[6]
Tourism (increase)	↑	×	×	×	✓	×	×	✓	✓

[4] Raised bed cropping mentioned, but described as occurring further south.

[5] 'Raised bed farming' mentioned, but possibly in relation to horticulture.

[6] Intensive use of beach and coastal space.

Land use that has changed (and key changes identified)	Type of change ↑Increase or ↓decrease observed	Group interviews in which change was discussed (✓) and/or ranked as one of the five more important changes (shaded):							
		Beaufort	Colac	Heywood	Horsham	Lucindale	Mortlake	Penola /Coonawarra	Warrnambool
Lake-based recreation and tourism (decrease)	↓	✓	×	×	✓	×	×	×	×
Town-based farmers (increase)	↑	×	✓	×	✓	✓	×	×	×
Corporatisation of farming (increase)	↑	×	×	×	✓	✓	×	×	×
Rock crushing (increase)	↑	×	✓	×	×	×	×	×	✓
Drought/dry conditions[7] (increase)	↑	✓	✓	✓[8]	✓	×	×	×	×
Climate change (usually described as causing reduced rainfall; increase)	↑	×	×	×	✓	×	✓	✓	×
Changed management of **Crown land** (increase)	↑	✓	×	×	×	×	×	×	×
Native forestry (decrease)	↓	×	✓	×	×	×	×	×	×
Fires (increased or recent occurrence)	↑	✓	×	×	×	×	×	×	×
Soldier settler farming (1900s)		×	×	×	×	✓	×	×	×
Difficulties entering farming (due to increased land prices; increase)	↑	×	×	✓	×	×	✓	×	×
Rotational/cell grazing (increase)	↑	×	×	×	×	✓	×	✓	×
Road/highway expansion (increase)	↑	✓	×	×	×	✓	×	×	×
Note: As stated previously, many of the land use changes observed can be variously interpreted as impacts or drivers of other changes. These tables represent changes as reported by interview participants without attempting to reclassify beyond grouping into similar categories									

[7] Drought/dry conditions tended to be described as a driver of or influence on land use change, rather than being a land use change in their own right. They were described as an independent and often triggering cause of land use change, and were thus defined by some as land use change. As such, they have been included here.

[8] Dry conditions further north of the group interview location were described as leading to changes further south.

Table 2. Other land use changes identified in only one group interview.

Location	Other land use changes
Warrnambool	Decreased farmland resulting from increase in conservation areas, increased awareness of cultural sites, decrease in recreational space
Colac	Increasing use of out paddocks (including purchase of properties in high rainfall areas), increase in number of suburban-based/retired farmers, shifting lake beds, changes to piggeries, changed access to fertiliser supplies
Heywood	Increase in reliance on off-farm income, more people shifting into city and towns, illicit crops (mentioned only briefly, not clear if has increased), increased regulation, increase in carbon credit plantations (Kangaroo Island), rural decline (driven by economics, social change, technological change and changing preferences of young people for what they wanted to do in life), Portland and Hamilton stopped having a show
Mortlake	Squatter to soldier settler, introduction of superphosphate, improved pasture, increase in grazing with reduction in potato farming and vice versus as a regular change in land use (i.e. on a relatively regular cycle), decrease in native grasslands and native wetlands, increased fertiliser use
Lucindale	Increase in improved pasture, increase in delving/claying (rip clay), increase in duck shooting, vermin, increased town population in Lucindale, change in 13 month tax rule, increased land prices, increased salinity, changes in communication technologies and how that impacts farming e.g. computer controlled irrigation
Penola	Increased potato processing, increased value adding, decreased value adding industries with frozen food vegetable factories going in the 1980s, increase illicit crops, increase fertiliser
Horsham	Increase in rock climbing lifestylers, larger town businesses, shift of saleyards out of town, decrease in show entries, increased diversity of cropping, continual cropping, debate over whether diversification of land enterprises has increased or decreased
Beaufort	Railway expansion, damming on farms, increased rubbish dumping, changes in drainage practices on farms, reduced diversity of enterprises on farms (e.g. Some farmers moving to 100 per cent cropping)

Note: As stated previously, many of the land use changes observed can be variously interpreted as impacts or drivers of other changes. These tables represent changes as reported by interview participants without attempting to reclassify beyond grouping into similar categories

Only two land use changes were discussed in all eight group interviews: increase in blue gum plantations, and increase in farm amalgamation. Changes to cropping, dairy farming and rural residential development were each discussed in seven of the eight group interviews, while change in water availability was discussed in six interviews.

Relative importance of different types of land use change

After listing the land use changes they had observed, participants were asked to prioritise which were the most important or significant. This was asked in a relatively open way, and when clarification was requested it was suggested that this should be those land uses which participants considered to have had the greatest or most important impacts (not necessarily either positive or negative) on the part of the study region they were familiar with, which they were most keen to discuss, or which they felt should be investigated further in the *Land Use Change* study.

Participants were given five stickers, and asked to prioritise significant land uses by placing their stars against those land uses they felt were most important. They could choose to put all five stickers against a single land use, to allocate their stickers to multiple land uses, or to use only some of their stickers. Once all participants had indicated their priorities, land use changes were ranked from highest importance (those with the greatest number of stickers) to least (those with few or no stickers).

As can be seen from Table 1, the land use changes identified as being 'important' by participants in three or more group interviews were:

- increase in area of blue gum plantations
- increase in the area of land used for cropping, and a range of changes in how cropping is undertaken
- changes in the dairy industry, which varied but included increase in the area used for dairy farming in some parts of the region, decreases in other parts, intensification and increasing herd size
- farm amalgamation (across all types of agriculture), associated with increased farm size, and increased efficiency enabling a farmer to manage larger areas
- increase in rural residential development, and
- changes in water availability and water use.

Other land use changes were either ranked as important in only one or two group interviews, or in none. In some cases, a land use change was relatively localised and so was ranked as highly important in the part of the study region in which it has occurred, but not in group interviews held in other parts of the region. For example, urban growth was ranked as an important land use change in the Horsham and Warrnambool group interviews, which had the largest number of participants who lived in urban areas that have experienced expansion in recent years.

Some land use changes were identified in six or more interviews, but were not usually ranked as an 'important' land use change by participants. The following changes were ranked as important changes in two or less interviews, despite being identified as a land use change in six or more interviews:

- farm conservation practices (with increased and changing conservation practices reported)
- the wool industry (generally reported as decreasing)
- agroforestry, farm forestry and other small-scale tree plantings (usually reported to have increased)
- beef cattle grazing (a range of changes were reported)
- prime lamb production (usually reported as increasing)

- Managed Investment Schemes (reported as increasing and often discussed as involving blue gum plantations, which were ranked as an important land use change)
- intensive agriculture and irrigation use (reported as increasing across several industries, including dairy farming and cropping, which were ranked as important), and
- raised bed cropping (reported as increasing, and forming part of the changes to cropping that were ranked as an important land use change in several interviews).

Participants were not asked to specifically discuss why they did not rank particular land use changes as being important. Analysis of the discussion that took place when participants discussed ranking the importance of land use changes suggests that important considerations when deciding whether a land use change was important or not included:

- whether the change was considered to have had an impact, most commonly negative, on people or businesses in the region (this appeared to be the most common criterion used)
- whether the change was considered to have been 'large scale', i.e. occurred often, over a large area, or in a way that affected many people rather than a few
- whether participants believed the change needed to be further examined as part of the *Land Use Change* study, and
- whether the land use change was the change 'from', or out of a land use, or the change 'to' — the new land use. In general, participants ranked the new land use as highly important, but were unlikely to rank the previous land use as important. For example, in most group interviews participants identified that sheep grazing for wool had decreased. However, none ranked this as an important land use change; instead it was common for new land uses, which may have replaced grazing for wool — such as plantation forestry and cropping — to be ranked as important land use changes.

This may be partly a result of the guidance given to participants about what should be considered 'important'. Nevertheless, it indicates that the land use changes which were mentioned often but not ranked as important were not necessarily considered to have a significant negative impact, in some cases were not considered to have affected a large number of people, or had been replaced by a new land use that was considered the more important change to study.

Characteristics and drivers of different types of land use change

This section provides a brief description of the characteristics of each type of land use change ranked as important in three or more group interviews:

- blue gum plantations
- cropping
- dairy farming
- farm amalgamation, and
- rural residential development.

It also provides a description of the changes observed in grazing enterprises, particularly the wool and prime lamb industries. While these were not ranked as important land use changes, they were often linked to the land use changes listed above.

Water availability, while identified as an important land use change by many participants, is not dealt with here and is instead considered as a driver and/or impact of other changes. This is because when participants described changes in water availability, they always linked it to other types of land use change (with changes in water availability described either as a driver or an outcome of these land use changes). It is therefore discussed in relation to each type of land use change, rather than as a separate category.

The nature and drivers of each land use change are briefly described below. It is important to recognise that some drivers were described as triggering a wide range of land use changes. For example, decline in wool prices was described as triggering a shift out of wool production into a range of different enterprises including prime lamb, plantations and cropping. Conversely, participants also often described situations in which multiple drivers combined to produce a particular outcome, rather than a single trigger creating change. One participant summarised this when describing the range of events she had observed driving change in her local area:

> ...the market pressures that are the supply, demand and the price... The lack of water, which is the wet winters and less surface water as stock water. The increase in knowledge and technology enabling you to farm smarter. Social pressures, community expectations of clean air and water and the ecosystem service type thing. Animal rights, lifestyle farming, the urban sprawl and recreational demands encroaching on to country land I suppose, and personal attitude change towards sustainable farming and landcare ethic making a nicer, healthier workplace and wanting to hand on the land in a better condition and all sort[s] of those things.

Land use change always occurs in a context where multiple drivers may be combining at a single time to influence what type of change occurs.

Blue gum plantations

Land use change to blue gum plantations was described as involving an increase in the area of land used to grow blue gums. No other type of change in the way blue

gums were established, managed, or utilised was discussed when participants described what this type of land use change involves. Instead, participants focussed primarily on discussing the impacts of this change.

The drivers of land use change to plantations were generally described as including:

- emergence of Managed Investment Schemes (MIS) which provide a vehicle for investing money in plantations. MIS schemes were typically perceived as driven by investors who wish to claim a tax deduction
- 'dollars', referring to availability of investment money via MIS, and
- availability of land due to ageing farmers wanting to retire, or struggling to maintain viability of their enterprise.

> Well the drivers are obvious. It's the Managed Investment Schemes… I mean you have only got to look at what the federal government put in place when its reaches its 2020 Vision with all these plantations… and you have got a tax haven for people to invest nearly a billion dollars in the last financial year, into an industry that... you know it really is made an un-level playing field for the rest of the farming community in general...
> – [Researcher]: Has there been any other drivers of that shift to plantations?
> – There are always farmers selling properties... retiring farmers wanting to sell farms.
> – [Researcher]: So that's been another driver?
> – And you can't blame them for selling too... you don't blame anyone for selling if they can get a good price for it.

Overall, blue gum plantations were described as involving fairly simple types of change (an increase in area) and drivers (MIS, availability of land). This differed to the descriptions of some other land use changes, where the changes described, and their drivers, were more complex.

Land use change to plantations may have been described relatively simply because:

- it is a relatively new land use compared to many of the others described, and so participants have not had the opportunity to observe major changes in how plantations are managed, and/or
- the group interviews had few participants who had been directly employed in the plantation industry, whereas there were many participants with direct experience of changes to land uses such as cropping and sheep grazing which were often described in more detail.

Cropping

Multiple types of changes were observed in cropping enterprises, including:

- an increase in the area of land cropped over time in the region
- changes in type of crops grown, with a shift over time to growing new crops such as oilseeds, chickpeas and red wheat
- overall increase in the diversity of crops grown

- changes in where crops were grown, with many participants reporting a shift to cropping further south than had occurred in the past
- a shift to more farms undertaking continuous cropping and focusing solely on cropping rather than running a mixed enterprise
- changes in ownership of cropping enterprises, with more corporate and overseas investment, and
- changes in how crops were grown; in particular a shift to new practices such as direct drilling and raised bed cropping.

> In our area we've got an increase in cropping area, and we've got some farms which are 100 per cent cropped and they are actually ones owned by a superannuation fund, another one's owned by an Egyptian investor.
>
> Traditionally you fallow a paddock once in every five years leave it out of production, and that's not happening.

The increase in cropping area and change in location of cropping were described as resulting from a number of drivers including:

- change in the area considered suitable for cropping, resulting from drier conditions, changed cropping practices and technology such as raised bed cropping, and changed drainage
- the need to have larger cropping enterprises to make a return, and
- changes in other industries (particularly the wool industry).

> ...cropping and sheep used to be a partnership, but then the bottom fell out of sheep, so they went to cropping.
>
> The raised bed cropping is probably the biggest thing that sort of changed our area for the moment, brought about by the decline of the wool market I think.
>
> ...traditional sheep and cattle properties are now into grain, due to low rainfall.
>
> An area that used to be known as salt flat or something like that I think it was and they drained that now and they turned it into arable country, when I first came down it was far too wet, you couldn't crop it.

Another driver of increased cropping was the preferences of young farmers, who were described by some participants as preferring cropping to other agricultural enterprises:

> The next generation have got diesel in their veins, good luck to them.
>
> ...I think the farmers' sons prefer the grain to the old traditional livestock enterprise.
> – ...[My son] loves anything to do with the tractor. He will do anything out there for you in the paddock but, 'I'm not milking those cows'.

Change in the type and variety of crops grown was described as being primarily driven by market shifts. For example, increased demand for fodder crops from the expanding prime lamb industry and the dairy industry was described as driving development of specialised fodder growing enterprises.

Dairy farming

Different types of change to dairy farming had been observed in different parts of the study region. The changes identified were:

- increase in area of dairy farming in some parts of the region and decrease in others
- intensification and increasing productivity over time
- changes in who owns dairy farms, and
- increasing farm size over time.

Land use changes involving dairy farming were discussed more often in group interviews where participants had observed land use change away from dairy farming, or where they believed expansion of the dairy industry had been slowed by competition for land, than where dairy farming had been expanding.

Several participants believed competition for land with blue gum plantations had slowed or stopped expansion of dairy farming. Some participants, however, believed dairy farming had been declining well before emergence of blue gum plantations:

> ...we were steaming along hugely... there was a lot of conversion farms from sheep to dairy or beef to dairy in this area particularly and then the blue gums coming in put a halt on that to some degree.
>
> I think the viability of dairy farmers is affected by scale of enterprise these days and the ability of farmers to compete with the prices that are being paid. It seems to be creating a lot of angst... [about] whether they can compete with timber companies.
>
> ...there was a decline in the dairy industry where people were finding it difficult to maintain their viability, and the normal farmer didn't have the finances to be able to buy out the next door neighbour or whatever, and it was just fortunate that the plantation owners could offer them better money...
>
> ...say with the expansion of dairying [a farmer] might want to purchase some land and if land values have gone much higher they might find that impossible to do, in order to expand the amount of land they need for a dairy farm.
> – farmers next door have had their opportunities, I have seen this happen but they have sat back and they have sat back and they have waited and they have waited to get their land even cheaper, and once the blue gums come and the price of land went up the dairy farmers now are whinging.

Change in ownership of dairy farms was commonly described. New owners of dairy farms were described as coming from other parts of Victoria, from New Zealand and occasionally from other countries.

The final change described was increasing size and intensity of dairy production:

> ...if you go back far enough I think there was 400 dairy farms around Mount Gambier... now it's changed to probably being less than 100 dairy farms but the biggest ones are now milking 1,500 cows and the smaller ones are milking 400.
>
> Well I think with dairying, the ones that are there are getting bigger and they are pushing the envelope as regards production. High inputs — I don't know how sustainable that is but — the ones that are doing well are doing very well. It is probably linked to economy of scale...

Participants sometimes described dairy farming as shifting geographically over time. This was sometimes described as a shift 'south', although the location of the shift differed depending on the part of the region the group interview was held in.

A range of factors were described as driving the different changes in the dairy industry, including:

- changes in the area and type of land considered suitable for dairy farming
- changing economies of scale, driven by market pressures, with farmers needing to intensify and/or expand to maintain a viable enterprise
- deregulation of the dairy industry
- improved breeding
- intergenerational change with the younger generation less likely to return to the farm, and
- lifestyle choices relating to workload.

> ...dairying is increasing in the south west because it's … under natural rainfall, with good, fairly reliable rainfall compared with the likes of the Goulburn Valley where they are dependent on irrigation and it's becoming... attractive to New Zealand money and companies for that reason.
>
> I know a few dairy farmers whose kids like farming and don't like milking cows too.
>
> Yeah, less farmers due to properties being sold for plantations or due to the fact that the family have moved on to university or other jobs or whatever so the labour force isn't there and the people are actually turning from dairy to beef for easier lifestyle if they can afford to do so.
>
> I will say the other things driving the dairy industry to bigger things is the genetic improvement is probably greater than in the dairying industry than any other.

Farm amalgamation

Farm amalgamation was generally described as involving an increase in the size of farm enterprises, typically occurring via farmers buying additional properties to manage as part of their farm enterprise. It was sometimes associated with other changes such as intensification of production, increasing efficiency, increased mechanisation of farm management, and farmers shifting to towns as a base from which to manage multiple properties:

> Everyone is growing bigger and bigger these days and unless you have got a great big farm... dairy farm or sheep farm or whatever, the bigger ones seem to be surviving and the smaller ones are being taken over.

Only three groups (Heywood, Horsham and Lucindale) ranked this type of land use change as one of the most important in their area in its own right, but it was also often described as forming part of many of the other land use changes discussed.

Farm amalgamation was primarily described as being driven by:

- changing market pressures which lead to a need to improve efficiency and productivity on the farm (this included deregulation in some cases), and
- changing technology enabling farmers to manage larger areas of land.

> The number of farms we lived on or amalgamation of farms probably relates a little bit to also your change of management style and returns and all those sorts of things are probably really relating there.
>
> Farm size is, farms are getting bigger because of the small farms being swallowed up.
> – And they're getting to be one man works [a] bigger unit.
> – Yep, see they have all this bigger machinery.

Rural residential development

Rural residential properties were described as increasing in number across the study region over time. Land use change to rural residential properties was not described as involving other characteristics. While participants debated which types of properties should be defined as rural residential (or lifestyle or hobby properties), when describing the nature of change all described it as involving an increase in the area of land and number of properties used for these purposes.

Drivers of rural residential growth were described as including:

- availability of income off-farm, enabling small blocks to be managed as a 'hobby'
- availability of land for subdivision
- farm amalgamation and expansion of blue gums leading to subdivision of small blocks (usually containing the farm house and a small area of land) from properties purchased to expand a farm enterprise/establish blue gums, and
- increasing affluence, enabling people to pay high prices for small parcels of land.

> ...those people who were traditionally the dairy farmers and the orchardists, some of their land has been subdivided or bought by hobby farmers, who have a job in [nearby town]...
>
> ...maybe in the grazing areas where they can't do anything else, and... they can't make the financial return, that may happen that the farm is eventually sold, and maybe that when it's then split up, you know subdivided, and becomes more of a hobby farm.
>
> ...the last thing you want is another house to maintain if you just basically want the country... you buy 1,500 acres next door you try and cut the house off and flog it, do you know what I mean, because you don't want to maintain another one.

Grazing enterprises

Grazing enterprises were described as experiencing the following types of change:

- decline in area, particularly for wool growing enterprises
- increase in area, primarily for prime lamb and, sometimes, beef enterprises
- intensification of production through use of improved pastures and, more recently, increased use of feed and irrigation
- changes in outputs, particularly a shift from wool to meat production, and

- changes in grazing and feeding practices, such as a shift to cell or rotational grazing, to buying in feed (often a necessity in drought conditions rather than a choice, but sometimes an active management choice), and to feedlotting.

> ...intensification of the grazing... they are now using... improved pastures they're using irrigation and lot feeding to maximise their return on their area.

Change in land use away from grazing was often mentioned only briefly as part of describing new land uses in the area:

> ...the raised bed cropping is probably the biggest thing that sort of changed our area for the moment, brought about by the decline of the wool market I think.

A number of participants noted an increase in use of fodder cropping and feedlotting:

> There is one land use change perhaps that is emerging that we haven't discussed at all and that is the growth in feedlotting of cattle and now lambs and also pigs.

> A lot of the cattle now that were sold as grass fed prime young cattle are now being sold to feeders. There are not so many of them in this region I don't think, they tend to go north, but they are not going to slaughter from here, they are going into a feedlot. And that trend is becoming... it have very much accelerated in the last 12 months with lamb as well.

Drivers of changes to grazing enterprises included:

- decrease in the wool price after the removal of the price floor, and overall changes in markets for various agricultural products over time, leading to switches in enterprise mixes
- growth in markets and prices for particular meat products in some years
- new technology and production techniques enabling different enterprises to be undertaken on land which could previously only be utilised for grazing
- lifestyle changes, with some farmers shifting to or from grazing to improve or change the nature of their workload
- new buyers on the markets offering to purchase land at good prices, and
- decreased rainfall.

> ...that shift out of grazing to cropping is just economics, and changing technology letting people do that.

> ...when the pine trees first started coming into the area... it was providing an outlet for a lot of farmers who were sick of banging their heads against a gate post trying to make a living out of wool that wasn't very viable and so the foresters came in and bought up a lot of land.

> ...the decreased rainfall over the last four years has had a significant change on land use in the change from much more grazing based to a lot more cropping in the area.

3.2 Impacts of land use change

Interview participants were asked to discuss the impacts, or changes, associated with land use change.

As time was limited, participants only discussed the impacts of land use changes they had ranked as being important.

A diverse range of views were expressed about the impacts of different land use changes, and interview participants did not always agree about the type of impact arising from a change. A large range of impacts were identified, with over 100 individual types of impact described by participants.

As with the process of analysing land use and land use changes, the first stage of analysis of impacts involved grouping similar impacts into categories. While there were important differences in the impacts described as resulting from different types of land use change, the individual impacts described could be grouped into the categories of impacts on:

- local and regional economic activity: spending and flows of goods and services at the local and regional level
- population and demographics: numbers of residents in region and in local areas, as well as diversity of these populations with regard to age, length of residence, income and other salient characteristics
- community interaction and cohesion: the extent to which members of a community interact, and levels of consensus and conflict in communities
- services and community groups: levels of involvement in community groups such as the Country Fire Authority, service and sporting clubs
- employment availability and types: the type and quantity of jobs available in different industries
- other industries: competition between industries for land and other resources
- environmental conditions: condition of soil, streams, and native vegetation in region
- water use and availability: amount of water available for domestic and industrial uses
- land prices and markets: change in the price of land suitable for particular land uses, and
- infrastructure condition and use: change in the provision and condition of infrastructure such as roads, housing, power supplies, fencing and water distribution facilities.

This section summarises interview participants' perceptions about the impacts of the following land use changes ranked as important in three or more interviews:

- blue gum plantations
- cropping
- dairy
- farm amalgamation, and
- rural residential development.

The impacts have been categorised into the groupings listed above. It should be noted that when discussing impacts, some participants argued impacts resulted from many factors, only one of which was a particular land use change. Others debated whether land use change was a major cause of socio-economic change at all:

> I can't say that the decline in our football team and our lack of sports competition is because of land use because I don't believe it is. I think it is just a normal trend of living these days and like with the dairy industry, you can't blame the blue gums for the fact that you had to put in stainless steel vats that forced a lot of those people out of the industry many years ago.

This indicates that study of impacts of land use change should identify the multiple factors that may be influencing socio-economic change, which may or may not be linked to particular land use changes. When impacts are discussed below, the land use change being discussed should generally be considered as one of the factors potentially contributing to the occurrence of the impact, rather than the sole factor.

3.2.1 Expansion of blue gum plantations

The impacts of expansion of blue gum plantations were most commonly perceived as negative, although there were mixed perceptions about some issues, and participants had sometimes conflicting perceptions about the positive and negative impacts of plantation expansion.

Local and regional economic activity

Expansion of blue gum plantations was most commonly described as impacting negatively on local economic activity, although a small number of participants believed local employment and economic activity are generated by blue gum plantation expansion. When discussing regional economic activity, participants had more mixed views, with some believing expansion of blue gums impacts negatively and others that it impacts positively. Some believed that the changes have led to a shift of employment from local to regional centres:

> ...if you put enough blue gums into a given region, it will cause economic dislocation.

> ...places sometimes have... earned some extra money from contracting to the blue gum companies, there'd be local contractors like the spraying contractors and some of the people who grow the seedlings for them so it's probably generated a bit of industry.

> Seems to me that a big operation like mining or blue gums run centralized operations, like, the workers come from the major regional centres, and work out in the trees or out in the mines. Any

> operation like that takes away from the rural community and adds to the big community, I'm not saying it's a positive or it's a negative, but it's a trade-off. That's what happens, and that's what's happened in our area.

Population and demographics

Expansion of blue gums was commonly believed to be associated with loss of population, and/or with a change in the type of people living in local communities:

> 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.

> 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...'

Community interaction and cohesion

Expansion of blue gums was typically described as having a negative impact on community interaction and cohesion. This was a flow-on effect of the population and community group changes often believed to be caused by expansion of plantations:

> ...blue gums have really knocked them [a small rural community] about both population wise, young people leaving and football clubs closing down. When you take a football or netball team out of the community, any community... it's somewhere where people go at a weekend and towns like [names two small nearby towns] the only time they met was on Saturday when the girls played netball, the boys played football and met each other and it kept a few communities together.

> We lost eight or nine farming families, big farms, they all went to blue gums, which was a good thing at the time because they had no family to take on the farms so they got good money and they retired to town. But it has meant that we have got a lot of... two houses were subdivided and new young families with their buses running and that's good to see a lot of children around again. But both mum and dad work through the day, or are shift workers so that one parent is home with the children, and that means there is no one around our area through the day to be on the fire brigade, more or less the fire brigade has suffered badly. Our hall committees, we may have a meeting at night but you will only get one or two that turn up because the rest have got to get up to work the next day. So it has made a huge impact that way.

Services and community groups

Expansion of blue gums was usually described as having a negative impact on service provision and community groups:

> Like blue gums, less farmers, so you lose people in your CFA and landcare and your local church and school.

> Well, yes, because I teach down near [town], we've just had one family, are in the process of selling out to, we say selling out to the blue gums, and it is probable that the high school next year will be missing a year 11 student, a year seven student, and the primary school will be missing I think, two students. Now, when you've got a school of about 77... then, maybe one class is very short of kids so a couple more move, send their kids to um a private school, or to [larger towns] for their schooling and then you lose another teacher...

Employment availability and types

Some believed that blue gum expansion led to increased employment, while others were concerned that more jobs may be lost than are created. Some believed that

plantation expansion changes the seasonality of jobs and provides relatively little ongoing employment:

> Obviously... well as far as I am concerned it is going to be great for the area. I mean you are getting mills coming here, you have employment coming in.
>
> ...like the labour, there's no labour or group of labour, you plant them, the contractors come plant, it's all over within a couple of months, those are people who don't live in the community, so that then that area is not serviced by anyone who lives locally, and then they come back, harvest in another 10 years, or 15 whatever, so basically, removes all the population.
>
> Blue gums is basically zero labour or local feedback.

Other industries

Expansion of blue gums was described as having many impacts on other industries. These were believed to occur at both the small scale, with concerns about potential impacts on neighbouring landholders undertaking traditional agriculture; and at the regional scale with concerns about whether enough agricultural land remained available to maintain viability of traditional agricultural land uses:

> ...there are some farmers that I know of who actually have blue gums on three sides of them, they're just about surrounded which then raises problems of fire, as well as, as pests.
>
> It is a totally different land use for a start off because blue gums are eating up our prime grazing land.

Environmental conditions

Expansion of plantations was perceived as having a range of positive and negative environmental impacts. Positive perceptions included beliefs that plantation expansion may have salinity and/or biodiversity benefits. Negative perceptions included beliefs that plantation expansion may result in increased chemical use, reduced biodiversity, and general unspecified concerns about sustainability:

> They plant this plantation above your pumping station that pumps the water for you guys to drink, and then they spray it all out with all these different things like simazine and these other chemicals, Eucmix and all this sort of stuff... and they're now washing downstream and going into our water system that is feeding people.
>
> It's a question we're all asking I think at the moment I think in terms of blue gums: are they sustainable?
>
> The only positive thing I could say... in our area it [expansion of blue gum plantations] has helped because it's dropping the water table...

Water use and availability

Plantations were often described as potentially lowering water tables and/or reducing stream flow, although the extent of impact was debated in some interviews:

> Like I mean, these trees are actually little pumps. They pump a hell of a lot of water... Now as a farmer we have to get a water licence to be able to pump water onto our crops and things like that...
>
> With blue gums... well around home it was small water courses and stuff that in living memory... they have never stopped... Now those little water courses are starting to stop running, even sort of late spring, early summer. There are no springs running into those creeks and those springs have all been used up... the water has been used up by the blue gums I think...
> – And in the drought did the springs stop then? Like that's the argument that people would bring.
> – No.

- We are coming off eight dryish years in ten though in farming. I mean that is going to be the obvious one to be thrown back.
- Yeah, but there is dry time, but there are springs that never stop running. They are stopped, and what's above them? Blue gums. They are just sucking water out of the system.
- Yeah well irrigation too could be taking a lot of water.

Land prices and markets

Expansion of blue gums was commonly perceived as leading to increases in land prices. This was described as creating difficulties for farmers wishing to purchase properties (either to establish or to expand a farm enterprise), while also providing benefits for farmers who wished to sell their properties:

> A sort of a side effect that we've touched on with blue gums is that land prices have now become so high that to buy land, that's farming land, you're behind the eight ball because you are never going to get, you may never get your money back on what you've paid for it, if you buy it at the prices equivalent to what the blue gums are prepared to pay.
>
> ...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...
>
> 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.

The only exception to this common perception came from one participant, who described his belief that properties neighbouring blue gum plantations may be devalued.

Infrastructure condition and use

Blue gum expansion was typically believed to be associated with a decrease in infrastructure such as housing on properties, although participants also identified that houses were often rented out or subdivided; and with increased pressure on road infrastructure:

> I've noticed out here where there's blue gums planted that some of the power lines have been removed so one day if ever the that area goes back to another land use... the power infrastructure won't be there.
>
> There are two proposed pulp mills, one at Heywood and one at Penola... it is all going to be trucked in and the pulp is going to be trucked out. They said they were going to freight it out of Portland but there are no container facilities there so they are going to have to go back into Adelaide... So there are going to be major impacts with trucks and transport...

Other perceptions about impacts

Participants qualified or contextualised their views on blue gum plantations in a number of ways. Some participants emphasised that their concerns were not about blue gums per se, but about how much area was established to plantation:

> And my worry is that the effects of the blue gums, if you allow too much land to be taken up, it's not a matter of should we have blue gums or shouldn't we have it, it's how much goes in.

A strong perception existed that it may be difficult to return land from growing blue gums into traditional agricultural production, although some participants pointed to recent experience in New Zealand where this has occurred as evidence that it is feasible:

> And I think the other thing is if this whole blue gum thing falls over economically, the cost of actually bringing that land back into production, whether it be for cropping or grazing is going to be enormous.

A concern raised by several participants was that the profitability of blue gums was unknown, or was doubted:

> My biggest concern about blue gum is that it's a massive change of... land use to something that's not going to be profitable.

3.2.2 Cropping

Changes to cropping were described as having a range of impacts. These included changes to employment availability, and to population — the latter largely related to farm amalgamation, a key change identified as occurring in the cropping industry.

Local and regional economic activity

Changes to cropping were described as impacting on the workforce in rural areas, but not on local and regional economic activity. The exception was when the flow-on effects of changes to population were described, with one participant believing that loss of population led to a chain of effects which included reduced local spending:

> ...it's reduced the number of people... so who suffers from that, is that community numbers drop, fire brigade numbers drop... and as well as that is the dollar value of the wages and the income that are then not being spent in that community.

Others, however, believed that cropping is beneficial as it involves local spending:

> ...and you know, he'll be buying fertilizer for next year, and he'll be buying, fuel to run his tractor for his crop, he'll be buying spray for his crop, so there's much more money going around in that community from that farmer.
> – And he'll be employing people to come and service his machinery and that sort of thing, and buying fuel locally...

Population and demographics

Expansion of cropping area, and particularly the increasing size and efficiency of cropping enterprises, was described as leading to loss of population. This can be seen in the quotes in the 'services and community groups' section. Some believed this loss was not as high as for other land use changes such as expansion of blue gums:

> Your population loss is nowhere near as great as it would be for blue gums.
> – No it's not.
> – No.
> – But there is population lost.

Community interaction and cohesion

The potential for impacts on social interaction was implicit in some comments regarding cropping changes that were associated with different types of people or corporations managing land. For example:

> ...I've got two neighbours, one neighbour is a superannuation fund, which is 100 per cent cropping, they don't have any livestock at all, and on the other side I've got an... investor who is... 100 per cent cropping too.

However, the nature of any impacts on community interaction and cohesion was not discussed further.

Services and community groups

Changes to cropping were described as having potentially negative impacts on service provision and community group membership, largely due to the believed impacts of increased size of cropping enterprises on overall numbers of farmers:

> I guess one of the other effects of the cropping and the increase in farm [size], is the fact that it's reduced the number of people, Many farmers now are working farms that might be aggregate[d], depends on which part you're in, aggregation of you know five or six or even more farms which means that there's now you know one family there you know four members maybe? Where in the past there were probably 25 other people there, so they've generally left the community because there's generally not a great deal of work for them if they go and reside in the local town, so they've lost their, so who suffers from that, is that community numbers drop, fire brigade numbers drop, ah, people available to play sport both senior and junior drop and the numbers to keep [the] school open drops as well...

Employment availability and types

Changes in cropping were described as impacting on the nature of employment available. Key changes noted were a reduction in total employment opportunities over time, associated with increased mechanisation and efficiency, and changes in the types of employment available. This was also described for most other agricultural land uses (except perhaps dairy):

> With the cropping there'd be an overall loss in seasonal workers I would imagine. Like shearers and crutchers and mulesers. Although you may have some that contract to cropping.
>
> Well, I mean you've got farmer who lives there who'll employ a bloke, who'll employ a truck driver to drive, take his crop into town, every year, yeah, he lives there and he'll employ people, just to a lesser degree than what we used to...
>
> ...all the big farmers have got a couple of guys working and the seasonal work is on the seeder or the harvest time and they're employed locally.

Other industries

Changes to cropping were described as impacting other industries only in that cropping often expanded on land previously used for grazing;

> Up our way it's mostly been grazing the land historically up around our place and there's some properties have gone into cropping that there's probably never been a crop on that property before.

Environmental conditions

Changes to cropping were described as being associated with increases in use of chemicals, and decrease in biodiversity:

> With blue gum and cropping, would you say that there would be an increase in chemical use with those two enterprises [compared to] livestock?
> – Guaranteed.
>
> A problem, a bit like the blue gums, with intensive cropping is a lowering of the overall biodiversity on the farm.
> – Cropping don't like trees because they get in the way of the big machinery.
> – The GPS can't find them...

Water use and availability

Increases in the area of land cropped were described as impacting on water management, with increased water use and increased drainage of land resulting from the shift to cropping:

> ...with cropping, you're using a lot of water there too, so that's another water issue.
>
> Because we are cropping we have to have our paddocks drier so therefore there is more drainage...

Land prices and markets

No specific impacts of changes to cropping on land prices and markets were identified in any of the group interviews.

Infrastructure condition and use

While changes to cropping were not typically described as having impacts on infrastructure, in one group interview it was suggested that expansion of cropping may require improved infrastructure planning:

> One thing I'd look at for cropping too is the... look at the railways... you've got to look at infrastructure road and railway. Trucks are going to be on the road and we've got to do something about it. You've got to have a system to move their grain, but you've got to look at that.

3.2.3 Dairy farming

While considerable concern was expressed in some group interviews about whether the dairy industry would be able to continue expanding, impacts of changes to the dairy industry were rarely discussed in depth in the group interviews. This was largely because participants focussed on describing their concerns about impacts of new land uses believed to be competing with the dairy industry for land — in particular, blue gum plantations.

That said, interview participants had strongly held views about the impacts of dairy farming, particularly relating to the employment and economic activity generated by the industry.

Local and regional economic activity

Dairy farming was generally considered to contribute positively to local and regional economic activity. This was often evident in the way in which participants described

the impact of land use changes that involved a reduction in dairy farming, with the new levels of economic activity often described as being lower than if dairy farming had remained:

> ...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. You had the [town] cheese factory close, that's three people out of work, you had businesses which relied on farming, they were affected, so the effect on the community economy was considerable.

> ...on this property that I have just itemised... [the farmer] was milking a cow to the acre on that property and producing 240 kilograms of butter fat per cow… at eight dollars a kilogram and the 250 cows he was milking on that property brought in 60,000 kilograms of fat which amounted to 480 thousand dollars a year. And that property is now in trees. And the whole of that 480 thousand dollars was spent in the local area. It was the local fertiliser companies and all these people in the area lived off that.

> ...the fact that they [dairy farmers] are... feeding heavily to increase their production... they are using a lot of the extra grain that is being produced and quite locally...

> ...I think too you can see that in even just hay purchases. A lot of the [dairy] properties now they have got to a point where they are fully stocked so where they once used to do their own harvest they now bring it all in.

Population and demographics

Typically participants described increases in dairy farming as maintaining or increasing rural population levels, while shifts away from dairy farming were commonly described as leading to a decline in local population levels. This was primarily related to the number of people needed to work on dairy farms and supply farms with services.

Community interaction and cohesion

Changes to community interaction and cohesion were described primarily when reduction in dairy farming was discussed. Change in land use from dairy farming to other land uses such as rural residential development or blue gum plantations was typically believed to lead to change in the type of people living in an area (rural residential) or decrease in population (blue gums). These changes were described as leading to changes in community interaction and cohesion, with concerns that there was less interaction and cohesion as a result of changes to the number and type of people living in an area.

Services and community groups

Typically, loss of dairy farms was believed to result in declines in local population with flow on effects on services and community groups:

> ...suburban farmers... come in and purchase those [dairy properties] and then the local school is affected because the children are declining and there is no service club because you have no longer got farming communities who need services to service their farms.

While not directly discussed, sometimes the converse was implied: that expansion of dairy farming is associated with maintenance of population and hence of service provision and community groups. Some participants described demographic changes affecting the dairy industry, such as fewer young people wanting to enter the industry,

which may have flow-on effects on membership of community groups, although these were not directly discussed in interviews.

Employment availability and types

When discussing employment availability, two impacts were discussed. Firstly, expansion of dairy farming was described as creating more jobs in local areas, which were sometimes hard to fill in a tight labour market. Secondly, changes were described in the willingness of people to put in the long hours required in dairy farming, with both young people and ageing farmers described as being reluctant to enter/continue dairy farming due to the type and amount of work involved. The two trends may be related, although participants typically discussed them separately:

> There is a neighbour of mine... used to have prime lambs. And his farm was probably one, maybe one and a half full time equivalents, possibly two... [now] there is four, four or five full time equivalents from going from prime lambs to now a fairly intensive dairy operation.
>
> ...down home people are starting to say 'I don't want to milk cows any more I'll do steers'... or whatever
>
> You get all these other younger people they just... they are flat out trying to milk 300 or 400 cows and they are working 14 or 15 hours a day and up in the middle of the night calving cows down and you know.
> – It's unsustainable for a lot of people.
> – And they burn out. They get sick of it, and that's what happened.
>
> ...looking at dairy farming in particular... it is intense hours you know and long days... You are constantly seeing at the moment people advertising for labourers and they are just too difficult to get. They either don't want to do that job or the young people, not just necessarily young people or anybody in particular, move away because there are no actual secure jobs for them.

Other industries

In some areas, dairy farming had expanded in recent decades, typically by expanding onto land previously used for grazing:

> One important one is just conversion... conversion of grazing land to dairy land...
>
> You've got grazing to cropping, and have grazing to dairying.

This expansion was not generally described as having either positive or negative impacts on other industries or the communities living in the area where dairy farming was expanding, although some believed dairy expansion has positive impacts overall. Most participants focused on describing the impacts of other land use changes on dairy farming, rather than the impacts of changes to dairy on other industries.

Environmental conditions

Expansion of dairy farming was sometimes described as having negative environmental impacts, particularly related to intensification of fertiliser use. However some interview participants had also observed a shift to more sustainable farming practices in the industry in recent years or decades:

> There is a change in our area... from basically a sheep based agriculture to a dairy based agricultural movement, and that has had quite significant ramifications for the environment as far as we are concerned.
>
> We are finding that dairy farmers are more and more aware of their responsibility to land.

Water use and availability

Expansion of dairy farming was believed by some to be associated with increased water use, particularly where it involves conversion of dryland properties to irrigation:

> There may have been some growth in the use of water for dairying.
>
> Well I suppose the increase in dairying from all the Kiwis coming over here and turning dryland farms into dairy farms, some irrigating and some not.

Land prices and markets

Demand for land from dairy farmers was described as contributing to land price increases in recent years. As described earlier, several participants also expressed concern that dairy farm expansion may be constrained as a result of land price increases in the region:

> I think [when] dairy came in that certainly put some pressure on... land prices because we were getting dairymen from [another region] in Victoria plus New Zealand and... they were selling out for higher prices.
>
> ...the trees came in... and... they paid more money than what dairy farmers could... they outbid the dairy farmers for the land.

Infrastructure condition and use

Two types of impacts on infrastructure were described as resulting from changes to dairy. Reduction in number of dairy farms was described as reducing infrastructure on the farm, and also potentially affecting processing infrastructure. Expansion of dairy farming was described as creating high demands on road infrastructure:

> To see those dairies down there now, the dairy [recently sold to a plantation company]... [was] just renovated 12 months ago, the infrastructure, the sheds. And when you go around now it's like a vulture picking the bones. Someone comes in and buys the shed or they take the roof off the dairy... there is just a derelict heap of buildings left and it's terrible.
>
> For me, in the water area, plantation forestry has reduced the conversion of grazing land into dairying. That is a significant consequence. We went through a period of high growth and there was a significant amount of dairy farmers' money invested in infrastructure in dairy factories as [another participant] mentioned before... this high growth... almost immediately stopped once the plantation forestry started buying the land.
>
> When you are getting back to that dairy industry again, with the larger dairies, larger inputs, larger milk wagons, a lot of bought in fodder, we have again got potential pressure on rural roading...
> – ...because a lot of them have got bigger and their milk productions have risen, a lot of the factories are going to B doubles too now, so you haven't got your normal tanker coming in your drive you've got B doubles going up all kinds of roads.

Other perceptions about impacts

In addition to the impacts discussed above, some participants expressed a strong belief that dairy farmers may struggle to expand due to increasing competition for suitable land. This competition was primarily described as coming from blue gum plantations and from rural residential expansion:

> Well and the other thing that's now done is that they've actually created a shortage of available land for dairy or horticulture so taken so much of it up that now it squeezes onto the available land that's left from say the dairy industry, they they've got to find [a] decent farm that's got the water on it.

> If the gum trees hadn't come there is a pretty good chance, we can't tell you but dairying had just started and the gum trees nipped it.

3.2.4 Farm amalgamation

The impacts of farm amalgamation were typically described when participants were identifying the impacts of changes to particular land uses, such as cropping. Farm amalgamation was not generally viewed positively, but its perceived negative impacts were described as being unavoidable given the economic pressures driving the change:

> A lot of people knew that [you]... couldn't keep dividing them [farms] up and supporting the family members, and that's... the issue of getting bigger and not necessarily better with time.

Local and regional economic activity

Farm amalgamation was not directly described as changing local and regional economic activity. Perhaps the only area in which some comment was made was that contractors and managers who work on large farms may not be based locally:

> It'll be corporational buyers, bigger farms, and they'll put a manager on, they'll have contract labour and so forth, they probably won't contribute anything in the way of um, support to the community because none of their people are living there.

Population and demographics

Two types of population and demographic changes were described as resulting from farm amalgamation. The first was that amalgamation was believed to result in a decrease in overall population. The only time this was debated was when expansion of dairy farming was discussed, with some participants arguing that amalgamation in this industry led to increased, rather than decreased, population. The second was that it was described as resulting in 'empty houses' on properties, which were sometimes rented out to new residents:

> I think it's more farm size increase, and you've got this housing left over which is then filled as well, with people not wanting to move into town, cheaper housing.

> Some of your stock operations with sheep and that, some have got larger, and left empty house, where you've got one family where there used to be three or four. Same thing within all facets of farming.

> [Researcher]: When you started talking... about consequences you said there could be some of the same population impacts we were talking about before when you get farm consolidation...
> - It can go both ways.
> - Probably down your way, but up here the bigger properties don't really mean increased numbers when you are talking cropping and beef cattle. Not really hugely increased. It often means less numbers in fact.
> - Actually that raises an interesting point. The different regions have different outcomes in that. Where we are in the dairying area it can go both ways. But [it] generally seems to be going one way in the grazing area.

> ...whether it be farmers getting bigger and gobbling up small farms or blue gums coming in or pine plantations buying land, is the decrease in population and services. And I mean that will happen anyway.

Community interaction and cohesion

Farm amalgamation was generally seen as having a negative impact on community interaction and cohesion. This related to the decreases in local population believed to result from farm amalgamation. Some also described farm amalgamation as being associated with increased working hours and hence less time for community activities:

> 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...

Services and community groups

Similar to community interaction and cohesion, farm amalgamation was sometimes described as leading to reductions in service provision and membership of community groups. This was only described as occurring in association with a shift to corporate management of large farms:

> They [referring to large properties managed by corporations] probably won't contribute anything in the way of um, support to the community because none of their people are living there, um they'll be one of our liabilities as a fire brigade, and they'll probably be a liability on the other members of the farms there who actually make up the fire brigade in the community.

Employment availability and types

Farm amalgamation was described as impacting on availability of employment, largely because it was driven by increasing mechanisation and efficiency of production, and the resulting ability to manage larger areas of land with less labour. The shift to farm amalgamation was also described as putting increasing pressure on those who do work on the larger properties:

> Yeah, well farm size increasing and manpower reducing for those farm sizes.

> Farm size is, farms are getting bigger because of the small farms being swallowed up.
> – And they're getting to be one man works bigger unit.
> – Yep, see they have all this bigger machinery.

> ...the bigger they go the quicker they get out and there's a lot of the farmers have burnt out and got out. Because of the pressure that is put on and really, you know, when I go back to our early days down there, and when we milked 140–150 cows. It was a family farm that run it and all of a sudden we got bigger and bigger...

Other industries

No impacts of farm amalgamation on other industries were described; it was typically described as involving the amalgamation of several properties which may have previously been used for the same purpose as the amalgamated enterprise.

Environmental conditions

Farm amalgamation was not described as leading to either positive or negative environmental impacts.

Water use and availability

Farm amalgamation was not described as leading to changes in water use and availability, although changes in water use were associated with many of the land uses in which farm amalgamation occurred (e.g. dairy, cropping).

Land prices and markets

Farm amalgamation was not described as directly impacting on land prices. Amalgamation was, however, described as being facilitated in some cases by increase in land prices:

> ...As I said before, the increase in the price of land [described by participant prior to this statement as driven by expansion of blue gums] has allowed farmers to increase in size because [when] they sell off their own land they will be able to go and buy a bigger place, so that is probably one area that we don't look at, that sometimes it is farmers buying some of that land too.

Infrastructure condition and use

Farm amalgamation was not described as leading to changes in infrastructure condition or use.

3.2.5 Rural residential development

Increased rural residential development was described as having varying impacts depending on what type of rural residential development was involved and what type of people it attracted, as the following discussion highlights:

> Well as long as they [residents of rural residential blocks] don't take the kids with them to wherever they're working and drop them off at school there, it can be quite beneficial to smaller school populations, and if they shop locally instead of in the big places, you know, that can be beneficial that way. Um, 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...
> - Fire control, wandering dogs...
> - Yes all of that sort of stuff.
> - We get, some of them are retirees where they like seachange and they get involved in some of the committees around town, the committees... Then they'll offer a new perspective a new enthusiasm, a new driver for an organisation...
> - Around home, though, we've been attracting, mid-range, middle age type person already towards retirement, you know. Whether there's cheaper housing with blocks and stuff like that I don't know, but not the families because our school has closed down, which is a hell of a loss that...
> - [Researcher]: Yes, so there is a lot of social change there is it?
> - Oh yes, compared to the old days. Say, go back and you knew everybody, you know all the locals and you know... now it's amazing. The people that come up, most of them are pretty good, it's just you might get the odd criminal. But they do get involved, although they are coming from, you know, the major cities and they tend, they are a bit reluctant initially.
> - They have [a] little bit of a romantic view...
> - Yes, yes that's it you've got it.
> - ...of living in the country.

This discussion highlights that an increase in rural residents is associated with a range of changes to community interaction and cohesion, and to services and community groups, as well as population and demographics, but that these vary.

Local and regional economic activity

Rural residential development was believed to be associated with decreased economic activity in some cases — particularly where the new residents were 'weekenders':

> 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. You had the [town] cheese factory close, that's three people out of work, you

> had businesses which relied on farming, they were affected, so the effect on the community economy was considerable. Now you wouldn't have thought rural residential development would have had such a massive adverse effect on a community like [town], but it did.'

In other cases it was described as bringing new people into the community who contributed to the economy, as indicated in the quote above.

Population and demographics

The population impacts of rural residential development were described as varying depending on the type of rural residential change. Perceived changes described by participants included an overall drop in population if lifestyle farmers were 'weekenders' or 'absentee owners' not present full time; and an increase in population if the rural residential owners/renters were living full time on their small block. Varied demographic changes were believed to result from expansion of rural residential development, with some rural residential property areas attracting retirees from cities, and others attracting young families looking for a 'seachange'.

> 'a lot of them are absentee owners which means we have fewer families in [town], and hence this affects the pre-school and the numbers at our local primary school have plummeted...'

> 'a lot of the lifestyle farmers only come at weekends, or they live at the coast and they come up and look at their paddock when it suits them.'

Community interaction and cohesion

The most commonly discussed impact of rural residential expansion was its effects on community interaction and cohesion. Again, the natures of the impacts described vary, and include both positive and negative experiences:

> 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.

> It is just the negatives that come, people that don't actually know the environment or don't even know what happens in the community, they think they do but they don't... it is nice to have fresh blood come in but we want positive blood not negative blood.

> They come along... and they are not involved in anything and don't really know what is going on in their own community.
> - Some do get involved in things but...
> - Not that many though. They are not there long enough.
> - It definitely is the minority.
> - ...they are the first people who go crook about you going and spraying your pines. And me getting out of bed at 3.30am to milk the cows and get stuck and causing a noise... They are the first person to go crook. And the do-gooders, who do they look after — that lifestyle farmer.

Services and community groups

As the quotes above indicate, interview participants had varied views about the impact of 'lifestyle' residents on community interaction. Similar views were held about the impact of these residents on community group membership. In some cases, concern was expressed about the need to provide more services for rural residential dwellers, while in others their presence was viewed as providing of the population needed to maintain service provision.

Employment availability and types

Rural residential expansion was seen as creating some employment, particularly in shops in towns on weekends when 'weekender' residents visited their properties, but there was some debate about the extent to which 'lifestyle farmers' purchased goods and services from nearby areas. Rural residential property owners were also described as typically having a job off the land; sometimes these jobs were described as being in a city some distance away while others were described as working in nearby towns.

> Admittedly you have got to work on weekends but it does generate jobs over weekends for younger people with part time jobs.
>
> ...hobby farming is a lifestyle associated with another form of employment...

Other industries

One area where participants had more agreement was about the impacts of expansion of rural residential properties on other industries. Many believed there was a negative impact, with concern that 'prime farming land' would be lost to traditional agriculture:

> What you're talking about is loss of prime farming land and lack of population.
>
> Like you look at it around [town] and all that beautiful lovely land there that has been cut to bits to lifestyle farming.

Environmental conditions

No impacts of rural residential expansion on the environment were discussed in the group interviews.

Water use and availability

No impacts of rural residential expansion on water use and availability were discussed in the group interviews.

Land prices and markets

Expansion of rural residential properties was described as creating upward pressure on land prices in areas desirable for 'lifestylers', and hence creating difficulties for farmers wanted to purchase agricultural land:

> Lifestyle farmers like trees, rivers, rainfall and when you look down the foothills in the Otways they have got all that and they are close to the coast. That then drives the true farmers from that area either into cheaper country or we will stay where we are and watch our asset grow but we have got to get land further away. I have got a neighbour who bought land near me and his main farm is... near an area experiencing substantial rural residential expansion and he regarded what he bought near me as very cheap compared to the prices they would have to pay down there.
>
> It will be interesting to see with the pressure on land price from forestry and lifestyle farmers and all these other things whether some of the dairy companies and some of the other corporate and cultural processes start buying land as well. I think that is probably the next step, just to make sure they have got supply.

Infrastructure condition and use

No impacts of rural residential expansion on infrastructure condition and use were discussed in the group interviews.

4 Discussion

4.1 Introduction

The results of the group interviews suggest that it is important to carefully consider:

- how different people experience impacts of land use change
- the linkages and relationships between different impacts of land use change
- how the way a land use is carried out may affect the types of impacts it has, and
- how perceptions have changed over time.

4.2 How do people experience the impacts of land use change?

Slootweg *et al.* (2001: 25) argue that when examining the social impacts of changes such as new government policies, development or land use change, it is essential to understand that different people will experience change in different ways. Because different people will be impacted by change in different ways, they argue that it is necessary to examine both the social changes that are caused by land use change, and the impacts of those social changes:

> In the context of our approach, human impacts should be seen in the broadest sense. This means that they refer to quantifiable variables such as economic or demographic issues, as well as to changes in people's norms, values, beliefs and perceptions about the society in which they live … we argue that a distinction between social change processes and human impacts should be identified in the social setting. … An increase in population, or the presence of strangers, is not the experienced impact, the experienced impact is likely to be changed perception about the nature of the community ('communityness', community cohesion), changed perception about personal attachment to the community, and possibly annoyance and upset as a result of the project. The ways in which the social change processes are perceived, given meaning, or valued, depends on the social context in which various societal groups act.

It is important to understand both the social changes that may result from land use change (for example, changes in demographic characteristics of the population, or in the nature and availability of employment), and how people experience these changes. The results presented in this report therefore document participant perceptions of both social changes that result from different types of land use change, and how these changes have affected their lives and the lives of others in their communities.

The outcomes of the group interviews support the idea that impacts are different to social change. In many cases, participants described the same types of social change, but debated or differed in how they described the impacts of that change. For example, participants who discussed blue gum plantations and land prices agreed on the nature of the change caused by plantation expansion — upward pressure on land prices. There were different views about the extent to which plantation expansion had

contributed to land price pressure, with some believing plantation expansion has been one among many factors influencing change, and others believing that it was the most significant cause of land price increase, but there was general agreement on the overall nature of the change — an upward pressure resulting from demand by the plantation sector. However, the impacts of upward pressure on land prices differed substantially for different people. In particular, those who wished to start or expand an agricultural enterprise were described as often disadvantaged by the change, as land had become more expensive. Even this was not always the case, however, with some examples given in which landholders had sold a property in a 'high land price' area, and used the additional money to purchase a larger and more viable enterprise in an area where land prices were not as high. Meanwhile, those who wished to sell properties were described as benefiting from both increased land prices and the overall increase in demand for land, which meant they found buyers for their land and received good money for it.

The separation of changes from their impacts suggests that it is entirely likely that people may hold different perceptions about the impacts of the social changes caused by land use change, without this necessarily being a conflict or contradiction of views that needs to be resolved. A given change may have positive impacts on one person, and negative impacts on another.

It also suggests that the experience of impacts depends on how a person perceives that change. This is commonly accepted in the field of social impact assessment, where:

> In contrast to biophysical impacts, human impacts can occur as soon as there are changes in social conditions, even from the time when a project is anticipated. People do not simply experience social changes, they react to them and are able to anticipate them. This makes prediction of social changes and human impacts difficult and situation specific. (Slootweg *et al.* 2001: 25)

In other words, the experience of impact is dependent on how people perceive a change. If a person believes that plantation expansion will lead to increased land prices in the future, they may decide it will have a negative impact, and act independently to mitigate that predicted impact by investing in a new property before prices rise. If many people do this, prices may rise independent of any effects of plantation expansion, simply because there is a strong belief that this change will or might occur.

Similarly, the experience of impact is influenced by the beliefs and values of those experiencing change. A person may encounter many changes, but not all of these changes will be viewed as significant (Stern 2000). Across a rural landscape, different people will value different outcomes of land use (Williams 2003). For example, some may give value to environmental good while others may be more concerned about individual profit or social diversity. A person primarily concerned about economic prosperity may express little concern regarding a land use that changes social or environmental outcomes. A person most concerned about environmental good may pay little attention to consequences of land uses for social cohesion or economic

prosperity. In this way, the impacts of land use will differ across different social groups and interest groups as values differ within society. At the same time it should be noted that impacts may affect people even if they are not aware of their presence. For example, a person may be unaware that land prices have increased in their region, yet may still experience financial stress if rates rise due to rising valuation of their property.

Slootweg *et al.* (2001)'s argument for the separation of 'change' and 'impact' allows the complexity of impacts to be better understood, as has been discussed above. Impacts are contested and experienced differently by different people. The data from the group interviews, suggests that it is not only perceptions about nature and types of impacts that may be contested: the nature of the social changes that result from land use change are also contested. For example:

- There was debate about whether plantation expansion was the major contributor, one of many contributors, or not a contributor at all, to decline in rural population
- There were varying views about the impacts of a range of land use changes on the nature and availability of employment. Some described the same land use changes as leading to increased local employment while others firmly believed they led to decreased local employment.
- The social changes resulting from rural residential expansion were described as varying greatly. While this was often because the nature of rural residential expansion varied across the region (and hence the social changes it leads to would be expected to differ), it also pointed to differing perceptions of social change arising from this land use change.

What does all this mean for the understanding of the socio-economic impacts of land use change in the Green Triangle and Central Victoria?

First, there is no simple answer to the question 'what are the impacts of a particular land use change'. Land use change in the Green Triangle and Central Victoria has had profound impacts on the lives of residents in the region. These have been both positive and negative; the socio-economic changes in the region have resulted in deep divisions in some parts of the community and in increased pressures for many people, as well as in new opportunities. The nature of the social changes caused by land use change is often debated; so is the nature of the impacts. Perhaps most importantly, interview participants emphasised the complex and interlinked nature of land use change, socio-economic change, and the impacts of that socio-economic change on their lives. It is important not to artificially oversimplify these changes and impacts, and just as important to clearly identify the range of ways people are experiencing and understanding land use change.

Second, the results of the group interviews suggest a clear need to undertake research which better explores the nature of social changes and whether and how land use change influences social change. The results also confirm the importance of understanding how social change impacts different people and groups — simply documenting the nature of social changes does not provide an understanding of what it means for the lives of those living and working in the region.

4.3 Linkages and relationships between different impacts of land use change

In the results, land use change was identified as having many types of impacts, such as impacts on local and regional economic activity, community interaction and cohesion, services and community groups. Interview participants commonly described the impacts as forming part of a chain of interrelated impacts, rather than as occurring in isolation. A typical chain of impacts is evident in the quote below:

> I guess one of the other effects of the cropping and the increase in farm [size], is the fact that it's reduced the number of people. Many farmers now are working farms that might be aggregate[ed], depends on which part you're in, aggregation of you know five or six or even more farms which means that there's now you know one family there you know four members maybe? Where in the past there were probably 25 other people there, so they've generally left the community because there's generally not a great deal of work for them if they go and reside in the local town, so they've lost their, so who suffers from that, is that community numbers drop, fire brigade numbers drop, ah, people available to play sport both senior and junior drop and the numbers to keep school open drops as well...

In this case, the participant describes how they have observed a land use change (farm amalgamation) lead to decreased employment. This in turn is believed to have led to population and demographic change (less farm families) and so to impacts on community groups (numbers in fire brigade, sport clubs).

The wide range of inter-relationships between different types of impacts mean that land use change results in not one or two isolated changes, but rather comprehensive change in multiple dimensions which affects many aspects of people's lives. The impacts may involve a constellation of changes to a person's social life, family life, work life, and business opportunities. One land use change may also trigger a range of changes which leads to further, and different types of, land use change.

Therefore the impacts of land use change cannot be fully understood by simply looking at each group of impacts in isolation. Any analysis of social change and impacts of that change must examine the chain of events that may be triggered by a land use change.

This is made more complicated by the issue of multiple factors influencing change. Population and demographic characteristics of a town or rural community may be influenced by a land use change and at the same time by multiple other factors. Isolating the impacts of the land use change from other influences is difficult; it is even more difficult to attempt to trace the 'chain of impacts' of land use change when

every type of social and economic change occurring in a community may have multiple causative factors.

4.4 Land use characteristics and their influence on impacts of land use change

The previous sections highlighted that the impacts of land use change are inter-related and that understanding impacts requires understanding both the socio-economic changes resulting from land use change, and the ways those changes impact on people's lives. Understanding the impacts of land use change becomes even more complex when the differences in how a land use change may occur are considered.

Interview participants emphasised that the impacts of a land use change may depend on the way the land use is carried out. For example, in one interview, some participants argued that expansion of plantations has different impacts depending on the way land was accessed for plantation expansion. Some (but not all) argued that if land was leased for plantation expansion it may have fewer negative impacts than if land was purchased by the plantation company:

> ...if you were leasing there would be a slightly different, I imagine a slightly different effect on the demographic where, because it's only being leased, the farmer still, or at least is more likely to, remain on the land, whereas when the timber company purchases it and subdivides it usually that's the farmers kick in the butt to actually move on whether it's into town or, you know... up to Melbourne and that kind of thing.

Similarly, impacts may differ depending on how a particular type of land use change occurs. For example, while many different types of change to cropping were described, negative impacts such as declining population were primarily associated with one type of change to cropping: the amalgamation of properties to form larger enterprises. Other changes — such as intensification of cropping, and change in the type of crops produced — were not associated with the same types of impacts.

While only a small number of examples were given in the interviews, examination of the impacts of land use change should carefully specify how a land use change occurs. A land use change, such as a shift to plantations, should also be split into multiple categories where appropriate, based on the differences in how that change occurs.

4.5 Have perceptions changed over time?

The *Land Use Change* study is, in part, following up an earlier study undertaken by the University of Melbourne in 2000. The earlier work (Petheram *et al.* 2000) also reported on a series of group interviews in which residents of the region were asked their views on land use change. The 2000 study examined views in a much smaller area and methods used in group interviews differed somewhat from the current study. However, there was considerable similarity in the topics discussed, and it is possible to compare the results of the group interviews in the two studies.

The following similarities and differences were noted by researchers:

- A wider range of land use changes were noted by participants in the 2006 interviews.
- The emphasis given to water as a land use, driver and impact of change was much greater in the 2006 interviews.
- Rural residential development arose as a significant land use change in 2006 but was not mentioned in the 2000 study.
- Blue gum plantations were highlighted as a significant land use change in both 2000 and 2006. Once again, participants described many negative impacts of blue gum plantations. Many of these impacts were also identified in the 2000 study, and there appeared to be little change in acceptance of this land use change. The emphasis given to water availability impacts of blue gum plantations appeared greater in 2006 than in 2000.
- Greater attention was given to changes associated with cropping in 2006. Participants described a greater range of changes within cropping and appeared more aware of impacts of these changes.
- Views on dairying appeared very similar to those expressed in 2000. Participants in both studies appeared generally positive about the impacts of increased dairying on their areas.
- There appeared to be greater sophistication in participants' descriptions of the interrelationships between drivers and impacts of land use change in 2006, with greater acknowledgment of the difficulty of attributing any impact to a single land use change.

5 Conclusions

In the Green Triangle and Central Victoria land use has changed significantly over the past 15 to 20 years. Many different changes have been noted with the most significant including increased area of blue gum plantations, cropping, rural residential development, and both increased and decreased dairying in different parts of the region. Changes in how cropping and dairying are undertaken, increased farm amalgamation and changes in water availability and use were also noted as very significant.

There were some general trends in the ways different changes were characterised and experienced. For example, participants were generally more positive about the impacts of increased dairying than about the impacts of increased blue gum plantations. However, exploration of views on these land uses suggests significant variation in the ways people describe and experience these land use changes. The findings indicate it is important to explore:

- both the observable and perceived impacts of land use change
- how both perceived and observable impacts differ across different types of residents of the region, and
- the reasons views may differ across groups.

6 References

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