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Socio-economic impacts of plantation forestry in the South West Slopes of NSW

Socio-economic impacts of plantation forestry in the South West Slopes of NSW, 1991 to 2004

Report produced for FWPRDC Project PN04.4007

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Foreword

Plantation forestry has expanded considerably in recent years in Australia. Plantations are being established on agricultural land on an ongoing basis in several regions of the country, and provide a source of employment and income for many people.

Understanding the current and historical socio-economic impacts of plantation forestry is important, particularly to aid prediction of the impacts of future expansion of the sector.

BRS provides a range of scientific advice on Australia's forest resources and management. During the Regional Forest Agreement process, BRS provided guidance and leadership in areas including social impact assessment in the forest sector.

This study represents an important addition to the body of literature on socio-economic impact assessment of the plantation forestry sector. It goes beyond previous studies by, for the first time, using a range of data to examine socio-economic change over time in regions with plantation forestry, as well as examining employment and expenditure by the sector. This has allowed key questions about the socio-economic impact of plantations to be answered using independent data on socio-economic change.

The methods used have enabled the socio-economic impacts of the plantation sector to be thoroughly examined.

Executive Director
Bureau of Rural Sciences

Executive summary

Introduction

A large area of softwood plantation has been established in the South West Slopes (SWS) since the 1920s. Plantation timber has been processed on a large scale in the region since the 1950s. There has been ongoing expansion in the volume of wood harvested, and in the capacity of processing facilities in the region. This study examined the socio-economic impacts of the growing plantation sector over 1991 to 2004.

A range of socio-economic impacts may be examined as part of a study. In this study, the focus was on examining independent evidence related to a range of key perceptions expressed in previous studies about the socio-economic impacts of plantation forestry, particularly:

- Changes in key economic sectors in different local government areas (LGAs) of the SWS;
- Change in the total population living in rural areas and towns;
- Change in socio-demographic characteristics of the population, including age structure, educational attainment, rate and type of employment, rate of unemployment, number of new residents, and household income growth;
- Employment and investment by the plantation sector in the region;
- Changes in provision of key services in the region;
- Rental and housing availability; and
- Transportation networks used by the plantation sector.

It is often difficult to identify what has caused socio-economic change, as multiple types of land use, social and economic change may be occurring simultaneously in a region. Key socio-economic changes occurring in the region over 1991 to 2004 were examined in this study, in order to better identify the multiple factors likely to be influencing socio-economic change in the region.

Key results

Change in key economic sectors

The broad economic structure of different LGAs of the SWS has remained relatively steady over time. Within the SWS, several small LGAs are highly dependent on the agricultural sector, while others have a broader mix of manufacturing, agriculture, and secondary and tertiary sectors such as retailing and wholesaling.

LGAs highly dependent on agriculture include Culcairn, Gundagai, Holbrook and Tumbarumba. The plantation sector is most significant as a proportion of economic activity in the LGAs of Tumut, Tumbarumba, Holbrook and Hume, although the activity in Hume is effectively spread across Albury as well.

Although relatively large areas of plantation have been established in Holbrook and Gundagai, there is less economic activity related to plantations in these LGAs, as most of the employment in the sector is located in other LGAs.

Key changes in agricultural industries in the region have included:

- a shift to off-farm employment for many farming families;
- a shift from sheep grazing to either grain growing or cattle grazing since 1991;
- establishment of vineyards and some other new enterprises.

Plantation sector employment and spending

The total level of direct employment generated by plantations grown in the SWS, up to the point of processed products leaving the mill door, grew from an estimated 1,548 full-time equivalent employees in 1991-92, to 1,811 in 1996-97, then decreased slightly to 1,731 in 2001-02 and 1,682 in 2003-04. This occurred as volumes harvested and processed in the region more than doubled, reflecting rapid increases in efficiency occurring in the sector over recent decades.

The total level of direct employment in the plantation management sector fell from 393 to 236 people between 1991-92 and 2003-04, while employment in the harvesting and haulage to mill sector grew from an estimated 150 full-time equivalent employees in 1991-92, to 313 in 2003-04. The fall in plantation management employment reflects both a shift to contracting out of some work, with that contract employment not counted in these estimates, and increases in efficiency.

The total level of direct employment in the processing sector grew from an estimated 1,005 full-time equivalent employees in 1991-92 to 1,290 in 1996-97, then fell slightly to 1,180 in 2001-02 and 1,130 in 2003-04.

Of this direct employment, between 92% and 94% has been based in the SWS between 1991-92 and 2003-04. Most employment outside the SWS is located in north-east Victoria, where some timber from plantations in the SWS is processed. In 2003-04, the majority of direct employment – over 900 jobs – was located in the LGA of Tumut, with the next highest employment, of just over 200 jobs, in Tumbarumba, and a similar number of jobs located in Albury/Hume. This pattern has remained relatively similar over time, with the exception that some plantation managers were based in Tumbarumba and Batlow in previous years, and are now based in Tumut; and numbers of people employed in processing activities in Holbrook increased after construction of the Hyne & Son sawmill there in 1998.

The majority of direct employment was full-time, with the exception of seasonal labourers – primarily labourers employed by planting contractors.

The number of direct jobs generated per 100 hectares of plantation established in the SWS has fallen slightly over time, from 1.71 jobs per 100 ha in 1991-92 to 1.53 jobs per 100 ha in 2003-04, again reflecting increases in efficiency.

For every $1 million spent by the plantation sector, between 8.3 and 15.7 jobs are created in the South West Slopes, depending on which part of the plantation industry is being examined. This includes both direct employment by the plantation industry, and flow-on employment generated as a result of demand for goods and services from the plantation industry. In addition, further flow-on employment is created outside the region when goods and services are imported from other regions.

For every direct job in the plantation sector, this equates to flow-on employment equivalent to between 0.8 and 1.3 jobs within the South-West Slopes. For example, one job in the forestry and logging sector generated flow-on employment in the region equivalent to 0.8 of a full-

time job. One job in the pulp, paper and paperboard sector generated flow-on employment of 1.3 jobs, which includes some employment in the forestry and logging sector.

The total value of output of the plantation sector (including operating and capital expenditure) in the SWS grew from an estimated $401.4 million in 1993-94, to $574.5 million in 2002-03[1]. This represents growth of 43% over this period. This growth was spread across the plantation management, harvest and haulage and processing sector.

Considerable expenditure is captured by the SWS region. The majority of wages and salaries are paid to employees located within the region (approx. 93%), while inputs to plantation growing and management are similarly often sourced from within the SWS. The only major inputs which are not commonly sourced from within the SWS are inputs to processing such as chemicals, fuel and electricity, and even in this category an estimated 25% of inputs were sourced from within the SWS.

The value of output generated per hectare of plantation rose from $4,270 per hectare in 1993-94 to $5,334 per hectare in 2002-03[2], reflecting changes in the maturity of the plantation estate and in the utilisation of the plantation resource at harvest, with more integrated processing enabling more complete utilisation of harvested logs.

A total of $1.63 to $1.83 of output is generated in the SWS economy for every dollar invested by the plantation sector; and $0.31 to $0.49 income (eg wages and salaries paid to employees in the region). This represents the flow-on activity generated by the plantation sector in the regional economy, for example, through the purchase of supplies from regional businesses and plantation industry employees spending their income on good and services in the region. Further flow-on activity is also generated outside the SWS, for example when goods and services are imported into the SWS.

Population

In general, town populations in the SWS have followed trends seen across Australia – the populations of the regional cities of Albury and Wagga Wagga have risen, while the population of most small towns has fallen. There are some exceptions to this trend, however. Towns with large-scale plantation processing facilities in the SWS tended to experience population growth or a stable population over 1996 to 2001, while those with local economies more heavily dependent on agriculture tended to experience population decline. Having a strong manufacturing base is likely to have contributed to stabilisation and growth of the population of towns with plantation processing.

However, it is only in towns where the processing is on a scale that allows it to strongly underpin the local economy that this trend is seen. For example Holbrook, which has smaller scale plantation processing facilities than Tumut or Tumbarumba, experienced population decline, with its economy still largely dependent on agriculture despite the existence of plantation processing in the LGA.

Rural population (population living on rural properties or in localities with less than 200 population) has declined in LGAs of the SWS with economies highly dependent on traditional agriculture, and has tended to increase in LGAs located near regional centres, or in which local governments have allowed rural subdivision. Focus group participants suggested that rural populations have remained more stable in areas where off-farm income is more easily available, allowing farming families to remain on their properties while earning additional

[1] All figures are measured in $2002-03

income via off-farm employment. The plantation sector is one source of off-farm employment in the region, amongst others.

Socio-demographic characteristics of the population

In general the population of the study region has aged, with declines in child (age 0 to 14) and youth (age 15 to 24) population, and increases in working age (25 to 64) and retirement age (65+) population. This trend is consistent with the overall ageing of the Australian population.

SWS LGAs with high dependence on agriculture have tended to experience higher growth in retirement age population than working age population. In contrast, SWS LGAs with more diverse economies, including those with wood and paper manufacturing industries, have experienced greater increases in working age population, indicating they have better prospects for long term economic growth and population stability than LGAs with higher dependence on traditional agriculture.

The SWS population in general has become more highly qualified, with increases in the proportion of the population holding a certificate, bachelor degree or higher qualification. Again, this is consistent with trends across Australia. LGAs with smaller populations generally experienced a slower growth in the proportion of population holding qualifications beyond high school, although those with higher economic diversity tended to experience more rapid growth than those with high dependence on broadacre agriculture.

Most LGAs in the region experienced a decline in the proportion of new residents entering the LGA between 1996 and 2001, with the exception of the Shires of Tumut and Holbrook. In both these LGAs, changes in wood processing – particularly the establishment of the Visy Industries pulp and paper mill in Tumut – likely contributed to an increase in new residents in these Shires, with no other major changes identified by local residents that are likely to have been associated with the shift.

Unemployment fell in all LGAs in the region over 1991 to 2004, with most jobs growth coming from part-time employment. This was consistent with broader national trends. The exception is the Shire of Tumut, where both full-time and part-time jobs have been created, possibly reflecting the high proportion of full-time work available in the plantation sector.

Household income growth has generally been more reliable over time in LGAs with higher economic diversity. The plantation sector has been one of the sectors contributing to this economic diversity in LGAs where processing facilities have been established and plantation managers and employees are based. However, some LGAs with high areas of plantation have relatively few people living in the LGA who work in the sector – and so don't experience the benefits of more stable growth associated with having plantation sector employment located in the LGA.

Availability of key services

Limited data was available on changes occurring to service provision in the SWS, such as community groups, health services or retail services. While it was possible to identify general trends in service provision, achieving a detailed understanding of the magnitude of change was not generally possible.

Changes in the level of education, health, government, retail services and community groups were generally influenced by a range of factors. Probably the greatest of these was overall population change. Key trends in service provision included:

- Declining enrolments in schools in most areas. This reflects the decline in children as a proportion of the population, and relatively low population growth in the region. However, the Shire of Tumut experienced a lower rate of decline in school enrolments than other LGAs;

- Membership of community groups, and the number of community groups, was greater in areas experiencing higher population growth. However, in LGAs where many people are employed in manufacturing focus group attendees reported that it was sometimes difficult to maintain memberships in some community groups, particularly sporting groups, as shift workers employed in processing facilities can find it difficult to attend meetings or games on a regular basis. Additionally, in areas with ageing populations there is sometimes a trend of declining membership of sports groups such as football groups, while membership of other groups such as golf or bowling clubs is steady or rising; and

- Somewhat stronger growth in the retail sector in the Shire of Tumut compared to other 'small population' LGAs of the SWS. This is likely a result of both the strong plantation processing sector in Tumut, and the general trend in which the town of Tumut has been acting as a small regional centre for surrounding areas.

Overall, changes in the level of education, health, government, retail services and community groups were influenced by a range of factors. Probably the greatest of these was overall population change.

In focus groups, many participants reported that investment in fire fighting services by Forests NSW has provided important benefits in the region. Forests NSW invests in considerable fire fighting capabilities to protect the large plantation estate in the region. Other landholders in the region have benefited from rapid response to fire incidents by Forests NSW, which reduces fire damage on both plantation land and other land in the region.

Residential property markets

A wide range of factors affect rental prices, rental vacancy rates, house prices and housing availability. One of the most important factors is availability of land on which to build new housing. In Tumut, rental vacancy rates have been low since the 1980s. During the construction of the Visy Industries pulp and paper mill (from 1999 to 2001), it became extremely difficult to find housing to rent. Rental vacancies have remained low to date. In Tumbarumba, upgrading of the Hyne and Son mill over 2003 to 2004 resulted in a similar fall in rental vacancy rates. Some residents have had to rent or purchase housing in towns some distance away and commute to the towns of Tumbarumba and Tumut to work as a result of low availability of local accommodation.

In focus groups, a point emphasised by real estate sector employees was that low rental vacancies did not necessarily lead to rapid rises in rental prices – rents were, instead, directed by average incomes in the region. Despite this, rents did rise more rapidly in Tumut, Tumbarumba, Gundagai and Holbrook over 1991 to 2001 than the NSW average. Some real estate agents have observed rental prices increasing more rapidly in the town of Tumut in recent years, and believed this was at least partly a result of increasing numbers of high paid workers shifting into the region to work in the plantation sector.

Sales data show an overall trend of rising residential property prices in recent years. Local real estate agents believed the key factor causing these price rises has been increased demand from investors outside the region and rising residential property values nationwide. This trend has dominated overall price movements, generally masking other influences, such as any that may have resulted from expansion of the plantation sector.

Transportation infrastructure

Plantation sector transportation needs have the potential to place a significant burden on road networks in the region, some of which were originally designed and built to carry lower weights. The plantation industry and local and state governments have been working together on an ongoing basis to plan for funding required to maintain and upgrade roads in the region, and to prioritise transport infrastructure needs. This, together with ongoing discussion of alternate transportation options – such as a proposed re-opening of the Tumut to Cootamundra railway line – is essential to meeting the transport infrastructure needs of the expanding sector.

It is difficult to measure the impact – if any – of plantation sector traffic on road congestion and safety. In the two LGAs with the highest volumes of plantation sector traffic – Tumut and Tumbarumba – accident rates per capita have been well below the rates occurring in those LGAs that contain national transport corridors (eg major highways), and generally at or below the NSW average. In recent years Tumbarumba has experienced higher rates of accidents per capita than the NSW average. According to focus group participants, this pattern has largely been a result of accidents not involving plantation sector traffic. Other LGAs in the region which do not have national transport corridors within their boundaries have generally experienced lower accidents per capita than Tumut or Tumbarumba. Examining this trend further would require detailed data on traffic movements in the region, and the proportion and type of traffic represented by the plantation sector.

Key conclusions

Ongoing growth of the plantation sector in the region – particularly of the processing sector – has contributed to stabilisation of the population of towns with processing facilities, and to stable economic growth in LGAs such as Tumut.

Although increasing mechanisation has led to higher output per employee from the plantation sector, employment levels have remained relatively steady over time, as expansion of volumes harvested and processed has generally been rapid enough to match improvements in efficiency over time and keep employment needs steady.

The presence of integrated processing in the region has resulted in a high level of employment in the plantation sector, with 1.53 people directly employed per 100 hectares of plantation in 2003-04, over 90% of which were employed within the SWS.

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1.0 Introduction

1.1 Overview of the study

In recent years, Australia's plantation estate has expanded rapidly, as has the volume of plantation timber being harvested and processed from plantations. A wide range of claims have been made by different groups about the socio-economic impacts of this expansion on rural communities and regional economies. These include claims about the potential economic and employment benefits of plantations, as well as about potential social impacts of expanding plantation sector activity on rural populations, social structures, and levels of service provision.

Increasingly, there are calls for impact assessments to be undertaken to examine the benefits and costs of future expansion of the plantation estate and associated processing. Predicting future socio-economic impacts requires understanding how past expansion of the plantation sector has influenced rural communities and regional economies.

Previous socio-economic impact assessments have often focussed on recording perceptions of impacts of plantations, and using modelling approaches to predict potential future economic and social impacts of plantations. Recently, considerably more data has become available, allowing a better analysis of change in key socio-economic variables over time in areas experiencing rapid expansion of the plantation sector. This allows study of whether particular perceptions and predictions about the socio-economic impacts of plantations have in fact matched what has occurred.

The goals of this study were to explore the use of independent data to answer key questions commonly raised by rural communities about the socio-economic impacts of plantations. This involved identifying common questions asked about these types of impacts[2], and identifying the extent to which available data could answer these questions in two case study regions. The project was funded by the Forest and Wood Products Research and Development Corporation.

This report presents results of a case study examining the role of the plantation sector in socio-economic change in the South West Slopes region of NSW over 1991 to 2004. The role of the plantation sector was examined by comparing socio-economic and land use change occurring in areas with (a) high levels of plantation sector activity and (b) little or no plantation sector activity.

The study was designed so it can be followed up over time as further data from sources such as the Australian Bureau of Statistics *Census of Population and Housing* become available.

This report is one of six reports from the overall project. It is structured into several parts:

1. Overview of the South West Slopes and the plantation sector in the region;
2. Key questions examined in the study and methods used;
3. Results, including analysis of:

[2] These questions are presented and discussed in Section 3.

a. Different types of land use and industry change occurring in the SWS during the period studied. This was then used to inform interpretation of subsequent socio-economic changes observed in the region;

b. Change in plantation sector employment and value of output during the period studied;

c. Change in population of towns and rural areas;

d. Socio-demographic change including age, level of qualifications, labour force, employment and unemployment trends;

e. Changes in service provision in the region;

f. Changes in residential property markets; and

g. Roading and transportation related to the plantation sector.

Key conclusions and recommendations for further research are then given.

1.2 Defining socio-economic impact assessment

The term 'socio-economic impact assessment' (SEIA) is used throughout this report to refer to assessments of the impacts of a change on residents of a region or community. The terms 'social' and 'economic' are combined in SEIA in recognition of the inherently linked nature of social and economic impacts, and the difficulty of identifying clear boundaries between the two.

Many social impact assessments examine topics that would also be examined by an assessment of economic impact, and vice versa. For example, understanding the social impacts of the establishment of a new industry requires knowledge of the level of employment generated by this industry, and the regions where spending occurs as part of the industry. This, combined with understanding of the demographic structure of the regions identified, and of social and cultural issues relating to the 'liveability' of the regions, allows analysis of the likely impacts of the new industry on the population of these regions. Conversely, understanding the economic impacts of a change may require knowledge of the demographic characteristics of a community, which can allow prediction of whether new employment can be sourced from the local population or will need to be imported from elsewhere.

The term 'SEIA' is used throughout this report to emphasise the importance of and need for social and economic impact assessment. It highlights the need for appropriate techniques and expertise in assessing the broad spectrum of impacts that may be covered by an assessment of the impacts of a change on a particular region or community.

In this study, the impacts assessed fell mostly into the 'social' end of the socio-economic spectrum. The social impacts examined included impacts on regional and local population levels, socio-demographic characteristics, and provision of services. In addition, some impacts often considered to fall within both 'social' and 'economic' impacts were examined – primarily the level of employment generated by the plantation sector. Finally, some analysis of economic impacts occurred, with the level of direct and indirect expenditure and employment generated by the plantation sector calculated. The calculation of indirect impacts

was undertaken by National Economics[3], while all other analysis was undertaken by the Bureau of Rural Sciences, often utilising data already available from previous economic studies.

[3] National Economics is an Australian based economics consulting and research organisation. Amongst other reports, they produce the well-known *State of the Regions* report, and specialise in producing economic analysis of impacts at local and regional scales.

2.0 The South West Slopes of NSW

This section gives an overview of the case study region, and of the plantation sector operating in the region.

For the purposes of this study, the South West Slopes (SWS) was defined as the set of New South Wales local government areas (LGAs) shown in Figure 1. This area is a subset of that sometimes defined as the SWS. This more restricted definition of the SWS was used in order to be consistent with the recent URS study which examined the economic impact of the plantation sector in the region in 2002-03[4] (URS Forestry 2004).

Throughout this report, LGA boundaries current as at 2001 are used. In 2004 major changes occurred to some LGA boundaries in NSW – for example, the 'Greater Hume' Shire was formed, which includes the previous Shire of Hume and much of the Shire of Holbrook. These changes occurred after this project had been initiated. Concording data to the new boundaries was not possible without considerable expense. Therefore the previous LGA boundaries continued to be used.

In the eastern parts of the SWS (including Tumut, Tumbarumba, Holbrook and Gundagai), the primary agricultural activities are grazing and fruit growing (predominantly of apples); while in the western parts (including Cootamundra, Culcairn, Hume, and Wagga Wagga) both grazing and cropping take place.

A large area of softwood plantations has been established in the region since the 1920s. Most of the current plantation resource is located in the LGAs of Tumut, Tumbarumba, Holbrook and Gundagai, with less in Wagga Wagga. Associated softwood processing facilities are located in Tumut, Tumbarumba, Albury, Wagga Wagga, Holbrook and north-eastern Victoria and the ACT.

Four groups of SWS LGAs are described separately below. Albury and Wagga Wagga, the two large regional centres of the region, are discussed together as their high, relatively urbanised population means they have experienced different patterns of socio-economic change to other LGAs in the region. The other three groups of LGAs are similarly distinguished by having similar population and/or agricultural characteristics.

While there are differences between these four groups of LGAs, some changes have occurred in recent years which have affected the whole region. These are discussed below, followed by a description of each group of LGAs and their unique patterns of development and change.

[4] The URS study also included two Victorian LGAs in the SWS which have plantation estate and processing that is linked to the plantation estate and processing in the NSW SWS. While this study similarly recognised flows of wood between the Victorian and New South Wales areas, the socio-economic characteristics of the Victorian LGAs were not examined in depth.

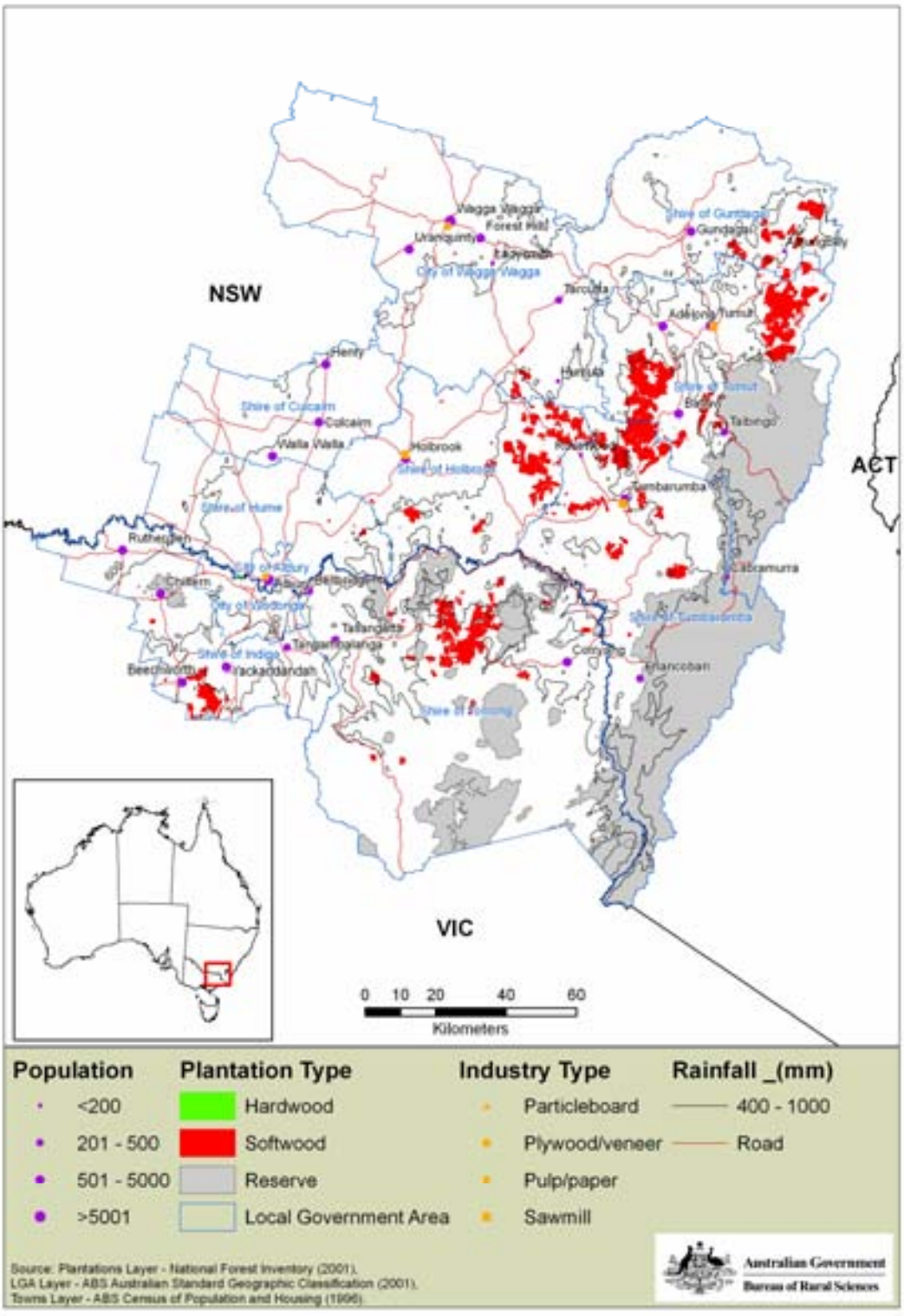


Figure 1: The South West Slopes

2.1 Key changes across the South West Slopes

The SWS as a whole has experienced significant changes to the agricultural industries that traditionally formed the basis of much of the region's economy. These changes have included:

- Increasing manufacturing activity in Albury, Wagga Wagga, Tumut and Tumbarumba. In Tumut and Tumbarumba, this is largely due to growth in processing of plantation timber;

- Increasing mechanisation and changes to agricultural prices, resulting in farmers needing to farm a larger area in order to stay viable. This has resulted in farmers purchasing additional properties, and a declining agricultural labour force. This trend has occurred for several decades, and is common across Australian rural areas;

- Young people leaving farms and rural areas to live in regional centres and cities, with relatively few choosing to return to farming. This has resulted in a rapidly ageing farming population;

- Shifts in agriculture, with a change in many areas from sheep grazing to cattle grazing or grain growing;

- Difficulty obtaining farm labour. This was reported as a key difficulty for farmers in all focus groups, and was explained as resulting from (a) the trend of young people leaving rural areas; (b) low wages paid to farm workers; and (c) declining availability of full-time farm employment resulting in people leaving the area or shifting into other jobs, reducing availability of skilled labour; and

- Declining provision of health, retail and government services in small rural towns, associated with declining population.

All of these changes are common to rural areas in many parts of Australia (Haberkorn *et al.* 2004, Productivity Commission 2005).

2.2 Albury and Wagga Wagga

The cities of Albury and Wagga Wagga share many similar characteristics. Albury is part of the regional city of Albury-Wodonga, crossing the NSW-Victoria border. Wagga Wagga is similarly a large regional city, acting as the regional centre for surrounding towns.

The Cities of Albury and Wagga Wagga have experienced slow population growth in recent years. Between 1996 and 2001, population of the urban centres of the two cities increased by 1%, to 41,613 people in Albury and 47,867 people in Wagga Wagga.

Plantation processing facilities are located in the cities of Albury and Wagga Wagga. The Norske Skog newsprint mill is located just outside Albury, in the Shire of Hume. In Wagga Wagga, the Ausply plywood mill produces veneer products[5].

The City of Albury is a separate LGA to the adjacent Shire of Hume, many of whose residents commute to Albury for their employment. The boundaries of the LGA of Wagga Wagga include both the city of Wagga Wagga and surrounding rural areas.

In the rural areas of Albury/Hume and Wagga Wagga, key changes in recent years have included:

- A shift out of sheep grazing into cattle grazing and cropping enterprises;

[5] These mills are described in more detail in later sections of this report

- In Hume, increasing rural residential development with associated increases in rural population;

- Falling rural population in Wagga Wagga, where rural residential development has not occurred on a large scale, as a result of policies in place restricting this type of development; and

- Withdrawal of retail and other services from rural areas into the cities of Albury and Wagga Wagga.

Very few plantations have been established in Albury, Hume and Wagga Wagga. By 2004, a total of 343 hectares of plantations were recorded in Hume, and 1,940 hectares in Wagga Wagga. The majority of plantation sector activity in these LGAs comes from employment in plantation processing facilities, as well as the Forests NSW office based in Albury.

2.3 Tumut

Tumut Shire, with a total population of 11,470 in 2001, is the centre for much of the plantation sector activity in the SWS. Located immediately east of the Shire of Wagga Wagga, Tumut Shire stretches east into the foothills the Snowy Mountains. A considerable proportion of the Shire's land area is part of the Kosciusko National Park.

The major town of the Shire is Tumut, with a population of 6,188 in 2001. Situated only approx. 20 kilometres from Tumut is the smaller town of Adelong, with a population of 809 in 2001. Adelong acts as a 'satellite' town of Tumut, particularly since establishment of the Visy pulp and paper mill approximately halfway between Tumut and Adelong. The population of both Tumut and Adelong increased between 1996 and 2001.

The other key town situated in Tumut Shire is the town of Batlow. Batlow's population fell from 1,069 people in 1996 to 973 people in 2001. According to focus group attendees, this was associated with declining employment at the local apple cannery, which closed in 2002, and general rural decline.

Talbingo, a small town situated in the eastern end of the Shire, had a steady population of 297 from 1996 to 2001.

Key land uses in Tumut Shire are cattle and sheep grazing, plantation growing and apple production. There is almost no cropping in the region. There has been some shift from sheep to cattle grazing over the past 15 years. Additionally, there has been an increase in rural residential population throughout the Shire, a result of planning policies which allow subdivision of blocks on existing rural properties. This has resulted in distribution of rural residential developments throughout the Shire.

By 2004, a total of 46,374 hectares of plantation had been established in the Shire, covering 12.3% of the total area of the Shire. In addition, considerable processing facilities have been established in the Shire, predominantly in and near the town of Tumut.

2.4 Tumbarumba, Holbrook and Gundagai

The Shires of Tumbarumba, Holbrook and Gundagai all have relatively small populations. Each has a single central town – Tumbarumba (population 1,501 in 2001), Holbrook (population of 1,272 in 2001) and Gundagai (population of 1,287 in 2001) respectively. Tumbarumba Shire has a second town, Khancoban, with a population of 308 in 2001. In each

Shire, almost half the total population lives in rural areas or in small localities with less than 200 population. Many of these small localities had higher populations in previous decades. The rural population of Tumbarumba Shire in 2001 was 1,736, of Holbrook Shire was 1,058 and of Gundagai Shire was 1,729 people.

The predominant agricultural land use in all three Shires is grazing, with almost no cropping in Tumbarumba, but some in Gundagai and Holbrook. There has been some shift out of sheep grazing into cattle grazing in all three Shires in recent decades. In Gundagai, honey production occurs on a relatively large scale, with 5,010 beehives recorded in the Shire in 1997.

In Tumbarumba, there have been some other land uses in addition to traditional sheep and cattle grazing. A number of vineyards have been established in the Shire, as well as a blueberry farm. The vineyards produce cool climate grapes, taking advantage of Tumbarumba's high altitude. In addition, a number of apple orchards have been established in Tumbarumba for some time, although in recent years the orchard industry has decreased in the Shire as smaller producers have tended to either sell to larger producers or, in some cases, remove trees. The total area of orchards in Tumbarumba is less than that established in Tumut.

Both Holbrook and Tumbarumba contain relatively high areas of plantation – by 2004, Holbrook had 22,468 hectares and Tumbarumba 29,559 hectares, most of which was established prior to 1991. Gundagai, on the other hand, had a smaller area of 9,208 hectares by 2004, two-thirds of which had been established since 1991.

While the agriculture sector is the largest employer in all three Shires, in Holbrook and Gundagai the retail sector is the second highest, while in Tumbarumba the manufacturing sector is the second highest employer. This manufacturing primarily derives from the Hyne & Son mill in Tumbarumba, which processes plantation timber, and the Laurel Hill sawmill in the small locality of Laurel Hill, which processes timber from native forests. Some native forest logging is undertaken in Tumbarumba Shire, although the level of activity is small in comparison with the plantation sector.

Holbrook and Gundagai are also distinguished by having a large national transport corridor – the Hume Highway – passing through them. The high volume of transport on the Hume Hwy brings some economic activity into these Shires, particularly the town of Holbrook where the highway passes through the main street of town (the highway bypasses the town of Gundagai rather than directly through the town).

2.5 Culcairn and Cootamundra

The Shire of Culcairn is of similar population size to Holbrook, Gundagai and Tumbarumba, with a total Shire population of 3,801 in 2001, with the majority living in the towns of Culcairn (1,019), Henty (856) and Walla Walla (601). The Shire of Cootamundra has a larger population, with a total population of 7,695 in 2001, most of whom (5,486) lived in the town of Cootamundra, while 242 lived in the village of Stockinbingal and less than 200 in Wallendbeen. These two Shires have both experienced declining population over the past decade, driven by changes to traditional agricultural industries. They share very similar land use characteristics, with a high reliance on traditional agriculture, and a shift away from sheep grazing and into wheat growing in the past decade. Neither Shire contains commercial plantation estate or associated processing activities.

The two Shires are different to the 'high plantation' Shires of Tumut, Tumbarumba and Holbrook in that there is considerable crop growing as well as sheep grazing, but less cattle

grazing than in the areas where most plantations are grown. They provide useful comparisons due to their geographic proximity to the plantation Shires of the SWS.

2.6 Plantation development in the South West Slopes

Extent of plantation development

By 2004, a total of 129,000 hectares of softwood plantations had been established in the SWS and adjoining areas of Victoria. Of this, 109,900 hectares was located in the SWS, predominantly in the LGAs of Tumut, Tumbarumba, Holbrook and Gundagai, with smaller areas in Wagga Wagga, Yass and Hume. Of the total estate in the SWS, just over 26% was privately owned in 2004. Figure 2 shows the total plantation estate by LGA at the start of 1991, 1996, 2001 and 2004, while Figure 3 shows the spatial distribution of plantations in the SWS at September 2000.

This pattern of plantation establishment has resulted from rainfall and soil variability, together with land availability in the region. Most plantations have been established in areas with over 700mm annual rainfall.

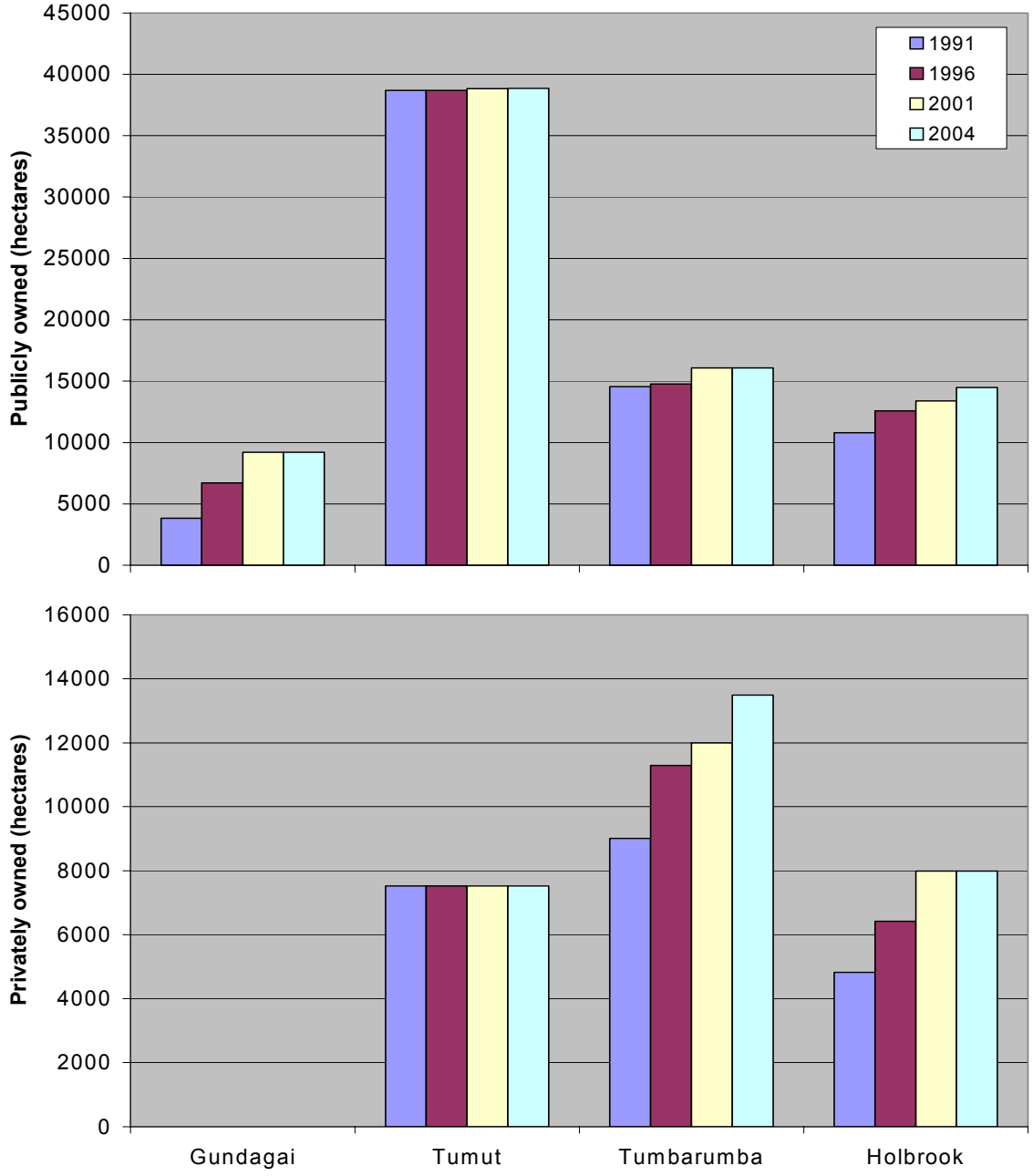
History of plantation sector development

Softwood plantation establishment began in the SWS from the 1920s, when the State[6] began planting three large areas of plantation in the region. Planting started in the Bago and Green Hills State Forest blocks, near Batlow, in 1922; while planting of Carabost State Forest near Tumbarumba began in 1927, and Buccleuch State Forest near Tumut in 1928. Subsequently three more adjacent areas were established adjoining Buccleuch.

Planting of all these large areas was largely completed by the late 1980s (Grant 1989: 162-163). The lowest rates of planting occurred during World War II, while the highest rates of plantation establishment occurred in the 1960s and 1970s when the Commonwealth government provided loans to the States to establish plantations under the *Softwood Forestry Agreements* Acts signed in 1967 and 1972 (Grant 1989; Dargavel 1995).

Since the 1990s, much slower expansion of State owned plantations has occurred, predominantly in Gundagai Shire as well as on a small number of properties in other parts of the SWS. Some of this recent planting has occurred via joint ventures between the State and private investors.

[6] Forests NSW is the government agency currently managing State owned plantations in the region. Prior to 2004 Forests NSW was called State Forests of NSW, and earlier it was named the Forestry Commission of NSW. The agency is referred to as Forests NSW throughout this report to avoid confusion.



Source: Bureau of Rural Sciences - National Forest Inventory

Figure 2: Area of plantation in SWS LGAs with > 5,000 hectares of plantation

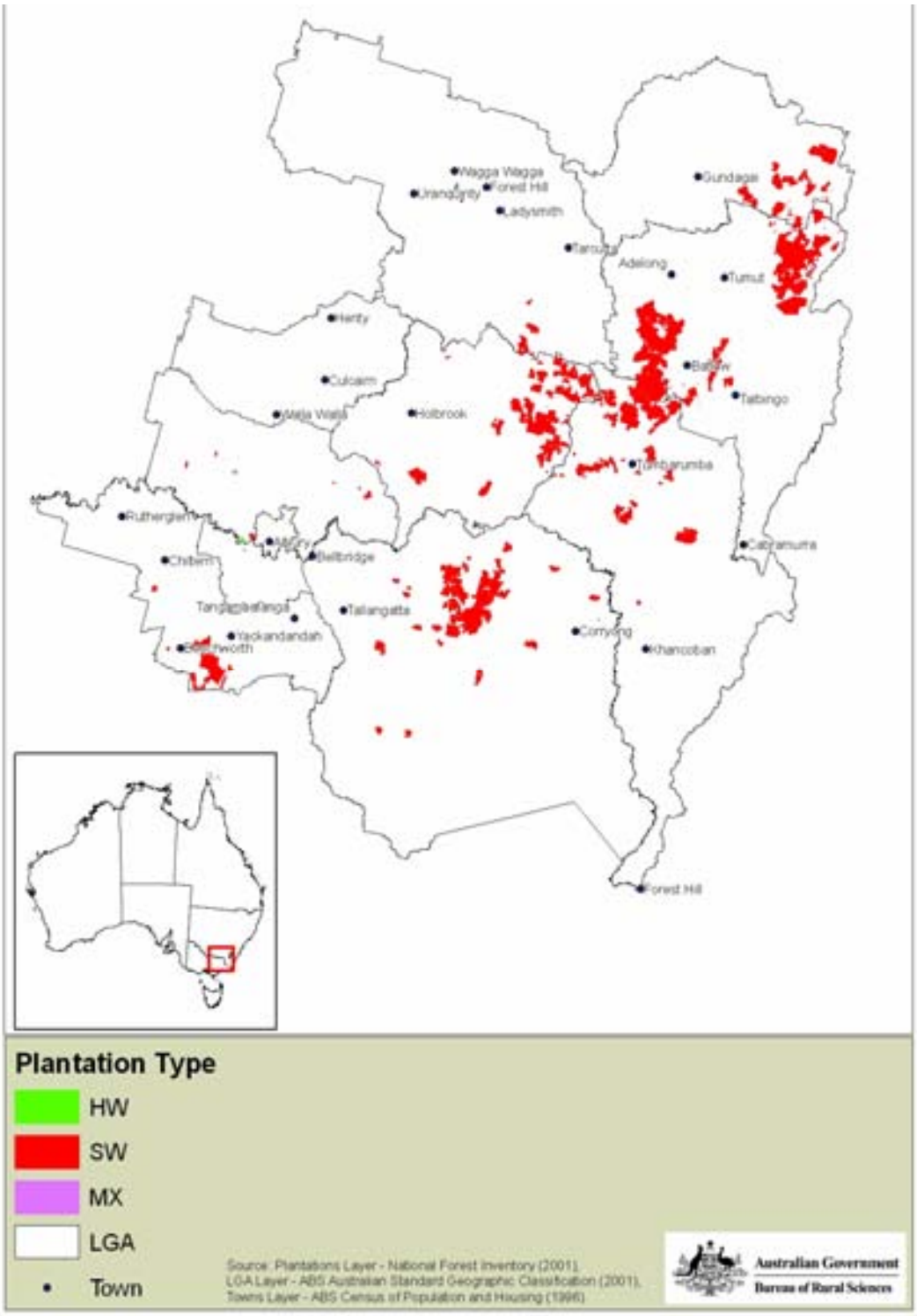


Figure 3: Spatial distribution of plantations in the South West Slopes as at September 2000

These large areas of State plantations were established in the area as a result of a 1935 review of existing plantations in NSW, as a result of which:

> Objectives in plantation establishment were revised to … focus on established of concentrated units [of plantations] in areas of optimal growth … As a consequence, plantation establishment was concentrated around Oberon, Lithgow and Orange in Bathurst Region and around Tumut, Batlow and Tumbarumba in Albury Region … (Drielsma *et al.* 1990: 108).

The focus in plantation expansion thereafter was on achieving a large plantation estate of 'a critical size and level of maturity [needed] before large competitive industries capable of using the full range of forest products are attracted to an area' (Drieslma *et al.* 1990: 110).

Two prison afforestation camps were established in the region, with prisoners who displayed good conduct sent to work in the camps. The Brookfield Afforestation Camp was established near Tumbarumba in 1930, and the Leslie Nott Afforestation Camp established north of Tumbarumba. Prisoners housed in these camps undertook considerable afforestation work. A small amount of weed control work has still been undertaken by prisoners for Forests NSW in recent years (Grant 1989; Hobson *pers comm.*).

Plantation establishment by Forests NSW occurred on both publicly owned land and on private land purchased by the government. By the late 1980s, around 60% of the total public plantation estate in the SWS had been established on land purchased from the private sector (Drielsma *et al.* 1990: 116). Most of the remainder had been established on publicly owned land which was cleared of native forest for the purpose of plantation establishment. Opposition to the clearing of native forest for plantation establishment led to a shift in the 1980s from clearing of native forest for plantation establishment to establishment on already cleared agricultural land (Drielsma *et al.* 1990; Dargavel 1995).

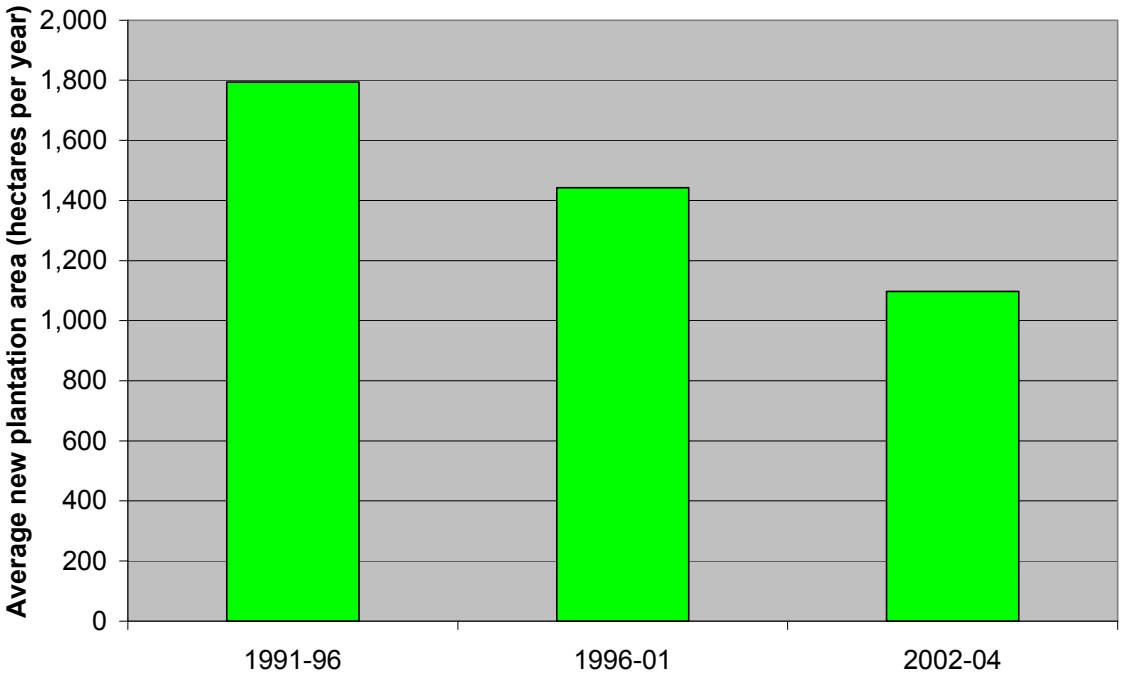
Private plantation development primarily occurred from the 1970s and 1980s onwards. A number of private companies and businesses established areas of plantation, often via investment schemes, in the region. Just under 25% of the total plantation estate in the region was privately owned as at 2004. Table 1 shows the distribution of plantation estate in 2002-03 by owner.

Table 1: Ownership of plantation estate in 2002-03

Owner/Manager	**Area**	**Percent of total area**
Forests NSW	85,078	73.14%
Norske Skog	6531	5.61%
Timberland	5994	5.15%
Ausforests	4797	4.12%
Abbeygate	2707	2.33%
Gerard Industries	2065	1.78%
Birnam Forests	2057	1.77%
Australian Stock Development	1103	0.95%
Veals	738	0.63%
Radiata Contractors Australia	388	0.33%
Pacific Forests	321	0.28%
Other (including farm forestry)	4614	3.97%
Total	**116,323**	**100%**
Source: URS Forestry (2004)		

Ownership of many private plantations changed hands in the region in early 2005, with Hume Forests purchasing several private plantation estates.

The majority of the region's current plantation estate – 85% - had been established by 1991, the start of the period examined for this study. The rate of expansion of plantations slowed over 1991 to 2004, as can be seen from Figure 4. In 2005, however, increased expansion of private plantation estate occurred, with Willmott Forests and Rosthchilds purchasing land for plantation establishment in the region.



Sources: (1) Bureau of Rural Sciences - National Forest Inventory
(2) Forests NSW

Figure 4: Average annual expansion of plantation estate in SWS

Harvesting of the region's plantations in began in the late 1940s. A number of processing facilities were subsequently established in the region, and processing capacity has steadily increased over several decades. Currently, there are several large processors located within the SWS as well as some smaller facilities. These facilities, described in Table 2, process pulplog, sawlog and residues into a range of products including paper and paperboards, sawntimber, poles and posts and composite wood products such as plywood and particleboard.

Many processing facilities, while originally established several decades ago, have undergone several changes of ownership and complete refurbishments, so that they often bear little resemblance to the original facility developed on the site.

Major changes are underway for several processors operating in the region. The biggest change in recent years has been the building of the Visy Industries pulp and paper mill, completed in 2002. Additionally, Hyne and Son have invested approx. $106 million in a major upgrade of their Tumbarumba mill to more than triple its production capacity; Norske Skog are upgrading their paper machine; and Weyerhaeuser have a program of ongoing investment to increase capacity (URS Forestry 2004).

Table 2: Plantation processing facilities in the region

Current owner	Type of processor	Location	Year operations began (if known)	Estimated required input, 2003-04 (Source: URS, 2004) (thousand tonnes/cubic metres)		
				Sawlog	Pulpwood/ chip	Residue
Weyerhaeuser	Sawmill	Tumut	1954	530	N/A	N/A
Weyerhaeuser	Sawmill	Gilmore (just outside Tumut)	1955			
Carter Holt Harvey	Particleboard	Tumut	1967; second line added 1981	N/A	160	N/A
Holbrook Timbers		Holbrook		10	N/A	N/A
Laminex	Medium Density Fibreboard	Wagga Wagga	1981	Closed in 1999		
Ausply	Plywood	Wagga Wagga	1964	30	N/A	N/A
Norske Skog	Pulp and paper – newsprint mill	Albury	1981	N/A	320	N/A
Visy Industries	Pulp and paper	Tumut	2002	N/A	795	N/A
Humula sawmill	Posts and poles	Humula	Est. 1949	4	N/A	N/A
Hyne & Son	Sawntimber	Tumbarumba	1974	290 (increasing in 2004-05 with upgrade)	N/A	N/A
Hyne & Son	Sawntimber	Holbrook	Established 1998 on site previously used for other timber processing	160	N/A	N/A
Additionally, plantation timber grown in the SWS is delivered to processing facilities located in Myrtleford, Victoria (Carter Holt Harvey), and in Canberra, ACT (Integrated Forest Products).						

Data sources: Grant (1989); URS Forestry (2004)

A number of ongoing changes have occurred to the overall structure and management of the plantation sector in the region over time. Key changes have included:

- Ongoing changes to technology allowing increasing mechanisation of some activities, and hence increasing efficiency of activities such as harvesting. Up to the 1970s, much harvesting was undertaken using hand falling of trees with chainsaws. Today almost all felling is undertaken using specialised harvesting machinery with sophisticated software allowing logs to be cut to specified lengths at the harvest site before being transported to processors;

- Increasing efficiency in the processing sector, with changing technology enabling rapidly increasing output per employee;

- Increasing levels of skill required of plantation sector employees. Higher levels of training are now needed to safely operate the complex machinery and software used in plantation management, harvesting and processing than were needed in previous decades.

Much training now occurs through the Forest Industry Training Centre in Tumut, which delivers a range of courses for the sector via a partnership between TAFE and the forest industry;

- A shift from direct employment to contract employment for key plantation management activities. In particular, Forests NSW has shifted away from using its own employees to undertake activities such as site preparation and planting, and instead engages contracting firms;

- Centralisation of plantation management. At the start of the study period (1991), Forests NSW employees were based in three offices in the region – Batlow, Tumbarumba and Tumut, together with a regional management office in Albury. The office in Batlow was closed in the early 1990s, and plantation sector staff shifted from the Tumbarumba office to the Tumut office in 2000; and

- Changes in contracting of harvest operators. Traditionally, harvesting was undertaken by contractors engaged either by the processing facilities receiving the wood, or the plantation owner. In recent years, Forests NSW has shifted to directly contracting most harvest operators, with fewer processors directly managing harvesting activities.

2.7 Plantation work cycles

This section provides an overview of the types of activities required to establish, manage and harvest a plantation. This provides a guide to the types of work undertaken, to underpin later results examining the level and type of direct employment and expenditure by the plantation sector.

Plantations require a number of types of activity during the establishment, management and harvesting phases. The hardwood and softwood plantations grown in Australia have generally similar establishment, silvicultural and maintenance requirements, although the length of time over which activities occur may vary. Hardwood plantations are generally harvested by 12 years of age. Softwood plantations such as those grown in the SWS are generally harvested at between 30 to 40 years of age, although there is variation between different species and different regions.

Once the land has been selected and plantation species chosen, a plantation development plan is prepared. The regulatory requirements concerning plantation development planning vary from State to State but typically require that trees not be planted within certain distances of streams and boundaries or on areas considered too steep. There are also operational and silvicultural restrictions and requirements, such as the need to avoid areas prone to waterlogging and to retain fire breaks. As a guide, these factors can lead to the net area planted being on average about 70% of the total property area.

Once the actual area to be planted has been determined, the land needs to be prepared for planting. The site is cleared of any large debris and then herbicide is usually applied to remove grass and weeds that would inhibit tree growth. Herbicide may be applied more than once depending on the nature of the grass and weeds to be controlled.

Depending on the soil type it may be necessary to rip and mound the soil to allow good root penetration. Ripping should be done in summer or autumn when the soil is dry. Mounding of the soil should occur prior to mid winter before the soil becomes saturated.

Planting of seedlings is usually done between May and August in the SWS.

Fertiliser is usually applied when the trees are planted and sometimes again as they grow.

It may be necessary to construct access roads and dams to provide water for fire protection when the plantation is established. Upgrading of roads to a standard suitable for heavy truck traffic is usually left to close to the time of harvest.

Annual management and maintenance work includes weed control within the planted area for the first year, inspections for pests and diseases and maintaining fences, firebreaks and roads. Tree growth is monitored as the trees mature to provide information to plan harvesting.

Softwood plantations in the SWS are generally managed for sawlog and veneer log production. They are thinned to remove inferior stems and concentrate growth on fewer stems so that larger diameter trees can be grown. Branches may be pruned from the lower part of the bole to improve sawlog and veneer log quality.

Methods and machinery used to harvest plantations have changed substantially over recent decades. While in the 1970s handfalling using chainsaws was common, today harvesting is generally undertaken using a feller-buncher or similar mechanical harvester, requiring considerable skill to operate.

3.0 Study goals and key questions

The goal of this study was to explore the use of independent data to answer key questions commonly asked about socio-economic impacts of plantations. Rather than examining only the types of data commonly examined in previous SEIA, the study aimed to examine questions commonly asked by communities about the socio-economic impacts of plantations.

The first step required was to identify these questions. As the goals of the project were to explore use of independent data to answer questions likely to be asked across a number of regions, rather than only those regions chosen as case studies for this project, key questions were identified from a review of literature examining perceptions of socio-economic impacts of plantations in a number of regions around Australia. Subsequently, participants in focus groups held in each case study region were asked if the questions identified covered the key questions raised about socio-economic impacts of plantations in their region.

Common questions about socio-economic impacts of plantations were identified from review of a diverse range of previous studies on the impacts of the establishment and management of plantations and associated industry in different parts of Australia (provided in Appendix 1). This review was used to identify (a) whether similar questions were asked about the socio-economic impacts of plantation across the different regions in which plantations have been established, and (b) to identify common topics discussed and formulate questions based on these topics which could be explored using independent data.

A high degree of similarity was found in the perceptions discussed in previous literature, despite a diversity of research methods being used to gather information about attitudes and perceptions to plantations (see Appendices 1 and 2). Similar questions tended to be raised about the socio-economic impacts of plantations in different regions, with one key difference: the type of questions asked varied depending on the maturity of the plantation industry. Some questions related specifically to the socio-economic impacts of expanding plantation estate, while others were related to the establishment of industry to process mature plantations.

Because of this difference, two case studies were undertaken for the project:

- The case study reported on here examined common questions related to expansion of *harvesting* and *processing* from a mature plantation estate, in the South West Slopes of NSW;

- The second case study, for which a separate report has been produced, examined common questions related to expansion of plantation *estate* in a region – the Great Southern.

The questions examined in this case study are provided in Box 1 below. The different questions listed in Box 1 cover a range of topics, and hence are not always directly related to each other, although some have clear relationships to other questions. They represent common questions related to management and harvesting of a mature plantation resource. They do not represent all the questions that might be asked about socio-economic impacts, but were chosen as (a) they were commonly raised in previous studies examining perceptions of socio-economic impacts and (b) contradicting perceptions about these types of impacts have been recorded, indicating a need for further examination of these topics.

Questions that can only be answered via perceptions studies were not included as the goal of the study was to explore data from sources other than perceptions studies. For example,

preferences for particular distributions of plantations in the landscape were not examined as this requires specialised examination of preferences and perceptions of different people.

Topics related specifically to expansion of plantation estate were not examined as part of this case study, as there was relatively little expansion of the plantation estate in the region during the time period studied. Some expansion has been occurring in the past two years and may continue. It may therefore be useful to examine socio-economic impacts of expansion of plantations, as well as socio-economic impacts of management and harvesting activities associated with existing plantations, in future studies of the SWS.

Box 1: Key questions about socio-economic impacts of plantation processing and harvesting activities:

Question 1: How much employment is provided by the plantation sector and where is this employment located in relation to the plantation estate and processing and harvesting activities?

Question 2: What type of employment is provided by the plantation sector?

Question 3: How much spending occurs from the plantation sector and where, and what is the value of output of the plantation sector?

Question 4: Does plantation processing and harvesting expansion have a demonstrable impact on regional and local populations?

Question 5: Does the plantation sector have a demonstrable impact on socio-demographics of the population within a region, eg through an influx of new residents into a community?

Question 6: Does the plantation sector have a demonstrable impact on provision of different services in local regions?

Question 7: Is change in the level of processing and harvesting demonstrably associated with changes in housing availability in processing towns?

Question 8: Do harvesting and processing activities lead to transportation challenges?

In focus groups held in the region, participants were asked if the questions in Box 1 covered key issues raised about socio-economic impacts of plantations in the South West Slopes, and what other questions may be relevant. All participants agreed that the questions were representative of common questions asked about plantations in the region. Of the additional questions suggested by participants, most could only be answered through perceptions studies, or related to the impacts of the further expansion of plantation estate beginning to occur in the region from 2004 – a change that was occurring so recently its impacts could not be examined as part of this study.

However, one topic within the scope of the study was raised by participants in focus groups, but was not able to be explored in this study: how does the employment generated per hectare by plantations compare to other land uses? This question could not be answered due to a lack of current, comparable data on employment generated by alternative land uses. This topic should be explored in subsequent studies.

4.0 Methods

This section describes the methods used in this project. A more detailed discussion of approaches to socio-economic impact assessment in the plantation sector is provided in a separate publication from this study, *Recommended approaches for assessing the impacts of plantation forestry*.

Socio-economic impact assessment (SEIA) includes a wide range of methods and approaches. Some SEIAs attempt to predict the impacts of planned future changes, while others assess the impact past changes have had. Some examine impacts at a particular point in time, while others examine changes in impacts over time.

This study examined the socio-economic impacts historical changes in the plantation sector have had over time, in order to answer key questions raised in previous perceptions studies about these impacts.

SEIA may examine perceptions of impact, or other data on socio-economic changes over time. As previously outlined, this study focussed on gathering independent data to answer key questions about socio-economic impacts raised in previous perceptions studies.

While it is relatively simple to identify the broad expenditure and employment generated by the plantation sector, going beyond this to identify the geographic location of impacts, and whether this employment and expenditure has had an observable impact on overall population and employment in a region, particularly when plantations have been established on land previously used for other purposes, is much more challenging. Key issues include:

- Identifying appropriate sources of data which can be used to examine socio-economic impacts;
- The need to identify geographic linkages between the plantation resource and its socio-economic impacts, when those impacts may not be located in the same area as the resource; and
- The difficulty of isolating the impacts of plantation sector expansion when multiple types of social, economic and land use change are generally occurring in a region at any given time.

The sections below detail the types of data collected, methods used to identify geographic linkages, and methods used to identify potential links between socio-economic change and the plantation sector.

4.1 Data accessed

A range of data on (a) socio-economic change, (b) change in key industries, and (c) change in the plantation sector was accessed for the study.

While considerably detailed data was collected for this study, there were limitations to the data used. A key limitation was the scale at which data was available.

The data examined was generally at the scale of the local government area[7]. Areas of a smaller scale could not generally be examined with the data available. As a result, it is possible that some within-LGA variations have occurred that relate specifically to plantation establishment or other changes, but were not identified in this study. In some cases, LGA-scale data was not available and so trends could only be analysed at a larger scale. In others, data for specific towns within LGAs was examined.

The timeframe examined in the study was 1991 to 2004. This timeframe was chosen for two reasons:

- It encompassed the period during which volumes of plantation timber harvested annually in the region more than doubled, due to increasing proportions of the region's plantation estate reaching maturity. This allowed examination of changes occurring over time as harvesting and processing activities expanded; and

- Data were generally available for some or all of the timeframe studied.

Where possible, data was accessed for 1986 to 2004, in order to identify the changes occurring prior to the start of the period studied (1991) up to the most recent time possible. In most cases, data was available only for shorter periods within this time period, generally 1991 to 2001 or 1996 to 2001. This was due to a range of factors, including the timing of data collection, changes in boundaries on which data has been collected, and changes in definitions of the socio-economic characteristics for which data were collected.

Data on socio-economic change in the region

Data on socio-economic change was accessed as far as possible at the local government area scale, to enable comparison of areas with different levels of plantation sector activity. Where possible, data was accessed for 1986 to 2004, in order to identify the changes occurring prior to the start of the period studied (1991 to 2004) and examine changes occurring up to the most recent time possible. In most cases, data was available only for shorter periods within this time period, generally 1991 to 2001 or 1996 to 2001. This was due to a range of factors, including the timing of data collection, and changes in boundaries on which data has been collected or in definitions of socio-economic characteristics on which data was collected.

Data was drawn primarily from the 1991, 1996 and 2001 Australian Bureau of Statistics *Census of Population and Housing* (ABS *Census*) and from the National Economics *YourPlace* database. The latter utilises data drawn from the ABS *Census* and a range of other sources to produce indicators of socio-economic change for Australian LGAs. Additional data was sourced from the NSW Department of Housing and the NSW Roads and Traffic Authority.

Data accessed included:

- Total population in 1991, 1996 and 2001 (Census and YourPlace);

- Town and rural populations in 1996 and 2001 (Census);

- Age structure of the population in 1991, 1996 and 2001 (Census);

[7] Note that for the SWS, the boundaries of most LGAs are identical to the relevant ABS Statistical Local Area (SLA) boundaries. The exceptions are Wagga Wagga and Albury, where the LGA is split into two SLAs.

- Proportion of residents who did and did not usually reside in the area 5 years previously, 1996 and 2001 (Census);

- Level of qualifications attained, 1991, 1996 and 2001 (Census);

- Level of participation in the labour force, and proportion of the labour force employed part-time, employed full-time, and unemployed in 1991, 1996 and 2001 (Census and the Department of Employment and Workplace Relations *Small Area Labour Market* report);

- Rate of change in average household income, 1991, 1996 and 2001 (YourPlace);

- Change in average rent paid, 1991, 1996 and 2001 (Census and NSW Department of Housing);

- Change in residential dwelling values (different years available for different regions within the SWS) (NSW Department of Housing); and

- Numbers and types of road accidents (1997 to 2003) (NSW Roads and Traffic Authority).

Changes in key industries

Data on employment and expenditure by key industries in different LGAs was primarily drawn from the *YourPlace* database and the ABS *Agricultural Census*. Similar limitations applied to the timespan for which consistent data was available to those described above.

Agricultural Census data used included:

- Number of agricultural establishments and their primary agricultural enterprises in 1994, 1996 and 2001 (definitions of agricultural establishments changed from 1994 onwards so previous data was not comparable);

- Area established to different agricultural crops in 1991, 1996 and 2001; and

- Number of grazing stock and kilograms of wood produced in 1991, 1996 and 2001.

In addition, the number of people identifying themselves as farmers/farm managers in 1996 and 2001 was used as a proxy to measure change in the agricultural sector over time.

YourPlace data used included data on change in estimated value of a number of key industries and services at the LGA level.

Plantation sector data

Data on direct employment, expenditure and value of output

Data on direct plantation sector employment, expenditure and value of output was sourced from:

- The *Forest Industry Census*, an annual survey undertaken by Forests NSW until 1999 which asked for details of employment by plantation growers, harvest and haulage businesses and processors in different regions in NSW. This data was useful but occasionally collected in an inconsistent manner over time, so comparisons with records of companies and businesses were used to validate data where possible;

- Direct survey of all plantation sector growers, harvest and haulage businesses and processors who grow, harvest, transport and process plantation timber grown in the SWS; and

- Two previous studies which gathered employment and output data from the plantation sector using methods consistent with those used in the survey for this study (Margules Groome Poyry Pty Ltd [1995] and URS Forestry [2004]).

The survey of the plantation sector undertaken for this study asked plantation sector businesses to provide the following details about their business:

- Number of employees, type of employment (full-time or part-time/casual), and where employees were located, over 1991 to 2004;

- Amount spent on different types of contracting businesses, and where those contractors were located over time; and

- Operating expenses and capital expenditure over time, including where expenditure occurred.

The extent to which it was possible to obtain data for earlier periods, particularly prior to 2000, was limited. Many plantation sector companies had difficulty accessing archived records from earlier years for this data, or did not have access to records that had belonged to a previous owner of the business. Key limitations of the data are detailed in the results as appropriate.

As it was not possible to obtain data from all plantation growers and processors (although the majority provided data), the total impact of SWS plantations was estimated by:

- Identifying the percent of activity for which data had been provided. For plantation managers, this involved identifying the proportion of the plantation estate for which data had been sourced. For plantation processors it involved identifying the proportion of wood entering processing for which data on subsequent employment and spending had been identified; and

- Adjusting data to estimate the missing proportion of activity. For example, if data for 10% of the plantation estate was missing, the employment and spending generated by the 10% was estimated using the average employment/spending per hectare for the other 90%.

The data obtained via the survey provided details for all or part of the study period for:

- Growers representing 85% of the total plantation estate in the region;

- Processors representing approx. 70% of the volume harvested in the region currently. Some independent data was available for processors who did not complete surveys, and used to assist in estimation of the missing 30% of data; and

- Approximately 10% of the harvest and haulage sector. Despite the low survey return from the harvest and haulage sector, data on harvest and haulage employment was able to be estimated based on data supplied by growers and processors who contract harvest and haulage businesses in the region.

Data on plantation sector training provision was obtained from the Forest Industry Training Centre.

Additional data on plantation sector transportation needs was obtained from Peece Consulting (2005).

Indirect employment and output data

Indirect employment and value of output data were generated for the project using regional input-output models constructed by National Economics. These models identify the 'multiplier' effect of the plantation sector within a defined region. While input-output analysis has limitations – in particular, it calculates impacts based on an assumption that an economy stays stable apart from the change imposed as part of the input-output modelling – it is a useful tool for identifying the likely quantum of indirect impacts of a sector.

For this project, that region was the LGAs of the SWS. Multiplier effects *outside* the SWS were not included in the model, which therefore only reflects the level of flow-on benefits of the sector that are 'captured' in the SWS.

An input-output model was constructed for the SWS only, rather than for a larger region, in order to identify the extent to which benefits of the plantation sector are captured within the region. This decision was taken as one of the key questions often asked about expansion of the plantation sector is whether benefits are captured by the region in which plantations are grown and processed, or in other regions. That said, it is important to recognise that the flow-on employment and expenditure reported is only that which is located in the SWS, and that other flow-on benefits occur outside the SWS that have not been examined here.

The input-output models constructed identified the indirect employment and expenditure occurring at two points:

- Indirect and induced employment and expenditure generated by the forestry and logging sector, defined as the activities occurred up to the point where harvested wood is delivered to processors; and

- Indirect and induced employment and expenditure generated by three different segments of the wood and paper manufacturing sector, defined as the activities occurred up to the point where processed products are transported to market.

The input-output modelling included modelling of 'first round' or initial effects, and subsequent effects resulting from further rounds of flow-on economic activity generated as a result of the first round of impacts. This allows estimation of the full chain of impacts generated as a result of activity in the plantation sector[8].

4.2 Geographic links between SWS plantations and their socio-economic impacts

For this study, direct employment and expenditure generated by the plantation sector was defined as *the employment and expenditure generated both within and outside the SWS by the plantation estate grown within the SWS, up to the point of processed products leaving the 'mill door'.* In other words, the goal was to identify how much employment and expenditure was generated by those plantations grown in the SWS through to the point where processed products are ready for transport to market. This 'end point' was chosen as it is possible to then calculate flow-on effects beyond this point using the input-output analysis described above.

[8] See Appendices 3 and 4 for details of the *YourPlace I-O* model used to model indirect impacts.

This definition was used to ensure that it would be possible to identify the flows of employment and expenditure arising from a particular plantation estate, including activity within and outside the SWS. This would enable a true identification of the level of benefit in terms of employment and expenditure arising from a defined area of plantation. This is more complex than at first apparent, as:

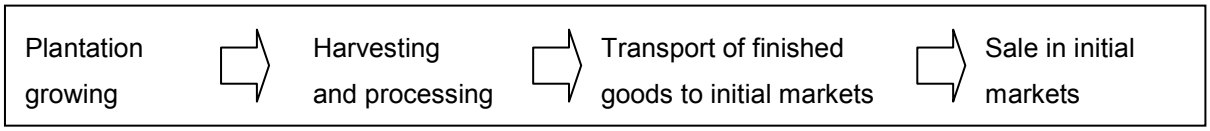
- Wood from plantations in the SWS is processed both within and outside the SWS, and products are sometimes processed in two locations before being sent to market;
- Processors located in the SWS process wood from plantations located outside the SWS as well as those within it; and
- The plantations in the region support activities of employees located at offices outside the SWS.

The first issue, of defining the point to which impacts would be calculated in the chain of flow-on activities resulting from plantation growing, was defined based on the points in the activity chain at which multiplier data showing indirect employment and expenditure could be calculated. Figure 5 shows four key points in the activities generated by plantation growing, in a simplified form (eg, in reality processing may go through more than one stage and there may be more than one market for processed products).

It is possible to construct multiplier tables generating estimates of the employment and expenditure generated as a result of (a) forestry and logging activities, equating to all activities after 'plantation growing' in Figure 5 below; or (b) harvesting and processing activities as shown in Figure 5 below.

Therefore, for this study data was collected enabling identification of expenditure and employment up to two points: plantation growing; and the point at which finished goods leave a processing facility.

Figure 5: Chain of activities generated by plantation growing



The other challenge of identifying the employment and expenditure generated by plantation grown in the SWS is that of identifying the activity generated within and outside the SWS from plantations grown in the SWS while excluding the activity generated by plantations grown in other locations.

Figure 6 models the key flows of plantation sector activity within and outside the SWS related to plantations grown within and outside the SWS. To ensure that activity generated by plantations grown in the SWS was distinguished from that generated by plantations outside the SWS:

- Processors were asked to identify the proportion of their wood/fibre input sourced from SWS plantations over time. This enabled the proportion of processing activity dependent on SWS plantations to be identified;
- Growers were asked to identify the proportion of sales of wood occurring within and outside the SWS; and

- Both processors and growers were asked to identify all employees located within and outside SWS whose employment was dependent on plantations grown in the SWS. For example, Forests NSW identified the proportion of staff in its head office whose employment was dependent on the plantations grown in the SWS.

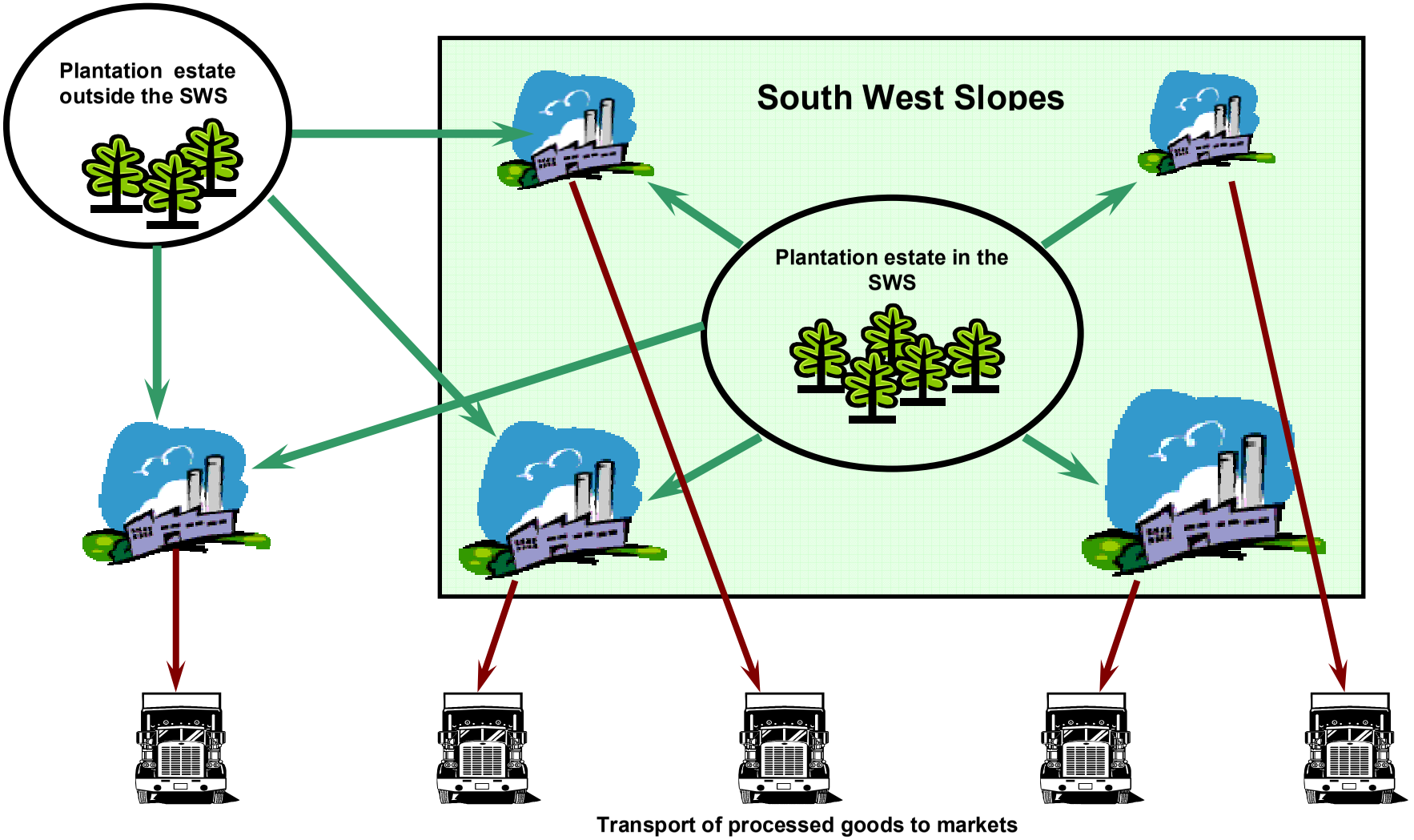


Figure 6: Plantation sector activities flowing inside and outside the SWS

4.3 Links between socio-economic change and plantation sector activity

Several methods were used to examine whether socio-economic changes observed in the region were likely to be linked to change in the plantation sector. The key approaches used were qualitative comparisons of socio-economic change in:

- Plantation and non-plantation LGAs within the SWS;
- Plantation LGAs within the SWS compared to broader regional, State and national averages;
- Plantation LGAs within the SWS and similar LGAs outside the SWS without plantation sector activity; and
- Specific changes within individual LGAs that may have contributed to socio-economic trends observed. These changes were identified both through available data on changes in key industries in the region, and via focus groups held in the region.

While it would be ideal to undertake statistical analysis of socio-economic trends in different regions, to identify whether areas experiencing plantation sector expansion have experienced different trends to areas without plantations, this was not possible in this study for a number of reasons. Firstly, there are a limited number of comparison regions. For the 2001 Census, there were 1353 Statistical Local Areas (SLAs) in all of Australia, of which a large number are located in urban areas with little or no comparative value for understanding changes related to plantation expansion in rural areas. Rural SLAs vary widely in their characteristics, including in geographic area, population, town sizes, and the mix of economic sectors operating in the LGA. As multiple factors may cause change in socio-economic characteristics of a region, undertaking a statistically significant analysis would require using sophisticated statistical analysis techniques to try to determine if change in the plantation sector is associated with different socio-economic trends to other changes. This type of analysis was not feasible for the types of data examined in this study due to difficulties (a) created by boundary changes over time in many SLAs, (b) in identifying the many factors potentially causing socio-economic change in different areas, and (c) the limited number of SLAs and limited availability of data on a range of socio-economic characteristics. However, as improved data becomes available, and a wider range of questions are examined, this type of analysis may be more feasible in future.

In reality, this type of analysis is not feasible due to difficulties (a) created by boundary changes over time in many SLAs, (b) in identifying the many factors potentially causing socio-economic change in different areas, and (c) the limited number of SLAs.

The different types of qualitative comparative analysis undertaken are described below.

Comparison of different SWS LGAs to each other and to regional, State and national averages

Rates of socio-economic change over time in each plantation LGA were compared with rates of change occurring in neighbouring LGAs which did not experience plantation expansion, and with regional, State and/or national averages where available and appropriate.

Comparison of different types of plantation LGAs to non-plantation LGAs within the SWS was important to identify whether areas with different types of plantation sector activity (eg

LGAs with large areas of plantation estate and/or high levels of plantation processing activity occurring within their boundaries) experienced different socio-economic trends to other LGAs. Any differences found were then further explored by examining whether factors other than the plantation sector might be associated with the observed differences. By doing this, explanations involving multiple sets of factors could be identified, rather than assuming differences were necessarily a result of change in the plantation sector.

Comparison to regional and State averages allowed examination of whether the SWS as a whole exhibited different types of socio-economic change to the average, or whether particular LGAs within the SWS did. Again, this pointed to differences which could then be further explored using other data sets and information provided in focus groups.

Comparing SWS LGAs

When comparing SWS LGAs, a meaningful comparison system needed to be identified in which LGAs with 'high' levels of plantation sector activity could be compared to those with 'low' or 'no' plantation sector activity. In addition, it was important to identify other key characteristics which may affect socio-economic change in different SWS LGAs over time.

Table 3 provides a comparison of SWS LGAs based on whether they have 'low/no', 'medium' or 'high' levels of (a) plantation estate, (b) dependence on plantation processing, (c) dependence on manufacturing activity in general, including wood and paper and all other types of manufacturing, and (d) dependence on broadacre agriculture. These rankings are used when interpreting data in the report. Where LGAs with particular rankings in terms of these four variables – for example, those with a high proportion of economic output from manufacturing activities – experienced unique patterns of socio-economic change, this is discussed in the results.

Table 3: Dependence of different SWS on plantation, manufacturing and agricultural activities

LGA	Plantation estate (2004)*	Wood and paper manufacturing (2001)**	Total manufacturing (2001)**	Broadacre agriculture (2001)**
	Low < 5,000ha Med 5000-19999ha High ≥ 20000ha	Low = No activity Medium < 10% High > 10%	Low < 15% Med 15-25% High > 25%	Low < 10% Medium 10-30% High > 30%
Albury	Low	Med (2.5%)	Med (22%)	Low (0%)
Cootamundra	Low	Low (0%)	Med (16.7%)	Med (17.6%)
Culcairn	Low	Low (0%)	Low (14.5%)	High (40.7%)
Gundagai	Med	Low (0%)	Med (16%)	High (30.7%)
Holbrook	High	High (14.2%)	Low (14.7%)	High (41.1%)
Hume	Low	High (17.6%)	High (38.3%)	High (30.1%)
Tumbarumba	High	High (11.3%)	Med (15.2%)	Med (27.8%)
Tumut	High	High (23.3%)	High (28.2%)	Low (9.5%)
Wagga Wagga	Low	Med (0.8%)	Med (18.3%)	Low (4.9%)
* Source: National Forest Inventory. **Measured based on proportion of economic output from this sector in 2001, as calculated by National Economics.				

Presentation of averages

Due to the different data sources accessed, and the different types of data examined, it was not always possible or appropriate to present the same averages.

Averages are given where rates of change or proportions of the population experiencing particular phenomena are being compared. They are not provided where the average would be a misleading comparison, for example in some cases the only averages available included large metropolitan areas that would not be expected to be experiencing changes similar to regional areas, and so have not been used. In other cases, for the type of data being examined comparison to an average that includes metropolitan trends is appropriate.

The following types of averages are used in the results:

- *Regional average:* The average across a Statistical Division or Statistical Subdivision (as defined by the Australian Bureau of Statistics) in which one or more of the SWS LGAs examined is located. Used where noticeably different trends occurred in different LGAs of relevance to distinguishing plantation-related impacts. The area covered by a regional average is explained when this type of average is used in the results;

- *New South Wales* or *Australian average:* The average across the State of New South Wales, or all of Australia. Used where the trends in major cities, eg Sydney do not mask trends in regional areas – for example, metropolitan trends do not tend to skew the change in farmer and farm manager numbers across NSW; and

- *Non-metropolitan Australia average:* The average for non-metropolitan Australia, ie trends for the Australian population living outside major cities. This is used where an average including metropolitan areas would give an average highly influenced by metropolitan trends.

Comparisons between 'plantation' LGAs and similarly structured 'non-plantation' LGAs outside the SWS

While comparing to nearby regions is useful, it has the potential to be misleading. Often there are considerable biophysical, social and economic differences between neighbouring regions, which may reduce the usefulness of comparisons.

For example, Wagga Wagga LGA contains a regional city, while neighbouring LGAs have considerably smaller populations. Different types of socio-economic changes may be expected to occur in areas which have an urbanised population compared to those with a predominantly rural population. Therefore, it was important to compare Wagga Wagga to similarly sized and structured LGAs in other regions, as well as to neighbouring regions in the SWS which had different socio-economic structures.

For this reason, comparison LGAs were chosen from around Australia for each of the 'plantation' LGAs of the SWS.

These comparison LGAs were chosen using the following criteria:

- At 1991, the comparator LGAs had a similar total population and town/rural structure to the comparison plantation LGA. For example, a Wagga Wagga comparator region would contain a city of similar size to Wagga Wagga;

- At 1991, the comparator LGA had a similar industry structure to the SWS LGA(s) it was being compared to. In particular, comparison regions for rural LGAs were chosen on the basis of the proportion of cropping, grazing and irrigated agriculture undertaken, which acted as a very broad proxy for rainfall, climatic and soil comparability. The presence of different industries in the comparator region and the SWS region, such as large mining enterprises, would reduce the level of ability to compare whether the presence of a

plantation sector was likely to explain the presence of noticeably different socio-economic trends;

- At 1991, the comparator LGAs for rural LGAs of the SWS had an area of agricultural land of more than 10,000 hectares for the whole LGA. This was to ensure that similarly rural LGAs were being compared, and ensured that LGAs close to major cities, eg Sydney and Melbourne were generally excluded;

- The comparator LGA had very little or no plantation-sector related activity, to ensure 'high plantation' LGAs of the SWS were being compared to areas without a significant plantation sector; and

- The YourPlace database, which has an in-built 'cluster' function that identifies how similar different LGAs are to each other in terms of their socio-economic characteristics, was used to identify LGAs with similar socio-economic structure.

While every effort was made to compare similar LGAs, it must be recognised that the high level of variability between LGAs makes it impossible to find 'ideal' comparisons. In addition, variability in climate between regions may lead to different changes in LGAs with a high dependence on agriculture. For example, it would be expected that comparison regions might perform differently to SWS LGAs in years where a comparison region experienced high rainfall while the SWS experienced drought.

The final comparison regions selected are listed in Table 4. The comparison regions are listed under two categories – those that had very similar socio-economic characteristics to the relevant SWS LGA, while having somewhat different types of cropping/grazing agricultural land use mixes in 1991 (although still broadly similar), and those that had very similar mixes of cropping, grazing and irrigation activities but were ranked as less similar on socio-economic structure to the comparison SWS LGA.

As some LGAs within the SWS had similar population size and socio-economic structure, and differed primarily in their level and type of plantation sector activity, comparison LGAs were selected for groups of LGAs rather than for each individual LGA. For example, Tumbarumba, Holbrook and Gundagai had relatively similar population sizes and structure of agriculture and so the same comparison regions were examined for all three LGAs.

The number of comparison LGAs differs in some cases. This is a result of difficulty finding a high number of suitable comparison LGAs.

Table 4: List of comparison regions

SWS plantation LGAs	Comparison LGAs sharing similar socio-economic characteristics	Comparison LGAs sharing similar agricultural characteristics
Albury /Hume and Wagga Wagga	Delatite	As these LGAs economies were driven largely by their urban areas, comparison regions matched more closely for agricultural characteristics were not chosen
	Dubbo	
	Lismore	
	Rockhampton	
	Tamworth	
Tumut	Berri and Barmera	As Tumut's economy is not highly dependent on the agricultural sector, comparison regions matched more closely for agricultural characteristics were not chosen
	Central Goldfields	
	Deniliquin	
	Leeton	
Tumbarumba, Holbrook and Gundagai	Chinchilla	Blackall
	Murrumbidgee	Paroo

Additionally, geographically close LGAs of Culcairn and Cootamundra were compared to the plantation LGAs where possible. These did not have agricultural and population characteristics of high similarity, but did experience the same climatic variations as the plantation LGAs over the period studied.

The same types of socio-economic data examined for the SWS region were examined for comparison regions where possible. However, there were several types of socio-economic data for which this was not possible, as data was available only at a regional or State level and not for all comparison regions.

Use of focus groups

Focus groups were held in the case study region to identify potential explanations for changes observed in socio-economic characteristics of different SWS LGAs over time.

Participants were selected based on their knowledge of the region. The majority had lived in the SWS for at least a decade, and were employed in areas which allowed them to develop broad knowledge of changes in the region. Participants included:

- Real estate agents;
- Local government council and staff members;
- Employees of regional development, employment and planning agencies;
- Landcare representatives and Department of Agriculture employees;
- Representatives of farming and community groups; and
- Local business owners.

In each focus group, participants were asked to:

- Describe key social, economic and land use changes they had observed in the region since the early 1990s;
- Examine data on socio-economic change over time and discuss why they believed particular trends had occurred; and
- Describe changes in provision of different services in local areas over time.

Where a key informant could not attend a focus group meeting but was available to be interviewed individually, interviews were undertaken either face to face or by phone. This occurred for five key informants in the case study region who were unable to attend a focus group.

The data provided in focus groups was used to help interpret and explain results of the secondary data on socio-economic and land use change, and particularly to identify different changes occurring in particular LGAs that may have led to socio-economic change.

In most cases, focus group participants agreed on likely explanations for socio-economic trends. Where this was the case, focus group results are presented in the results without defining the proportion or type of focus group participants who held particular views, as there was no differentiation within the focus groups. Where there were differences of views, or only one particular group were able to offer likely explanations of particular changes, this is identified in the results.

5.0 Results

Results of the study are presented in several sections. The following topics are presented separately:

1. Different types of *land use and industry change* occurring in the SWS over 1991 to 2004. The changes identified are used to inform interpretation of socio-economic changes analysed in subsequent sections of the results;

2. Change in *plantation sector employment, value of output and expenditure* during the period studied. Similar to the analysis of land use and industry change, these changes are used to inform analysis of socio-economic changes in subsequent sections of the results (related to Questions 1 through 3 in Box 1);

3. Analysis of changes in *population* of towns and rural areas over time (related to Question 4 in Box 1);

4. Analysis of *socio-demographic changes* over time including changes in age, level of qualifications, labour force, employment and unemployment trends in the SWS population (related to Question 5 in Box 1);

5. Analysis of changes in *service provision* in the region over time (Question 6 in Box 1);

6. Analysis of changes in *residential property markets* over time (Question 7); and

7. Analysis of *roading and transportation* planning and safety in relation to the plantation sector (Question 8).

6.0 Land use and industry change in the SWS

A number of changes have occurred in the economies of the different LGAs of the SWS since the late 1980s. Key findings on changes in major industries are detailed in Box 2. It is important to analyse these changes so they can be drawn on to assist in interpreting factors associated with socio-economic changes in different parts of the region.

Box 2: Changes in local economies

Key changes in local economies of the SWS have included shifts to increasing reliance on agriculture in some small LGAs, while the economies of others have experienced an increased reliance on manufacturing over time. LGAs highly dependent on agriculture include Culcairn, Gundagai, Holbrook and Tumbarumba. The plantation sector is most significant as a proportion of economic activity in the LGAs of Tumut, Tumbarumba, Holbrook and Hume, although the activity in Hume is effectively spread across Albury as well. Wood and paper manufacturing making up the majority of the economic activity generated by the plantation sector.

Agricultural industries have followed different patterns of change in different areas of the South West Slopes. In Tumbarumba, a broader range of agricultural activities have developed over the last two decades, with increasing viticulture but declining orchard growing. In the Shires which are not suitable for cropping – Tumut, Tumbarumba, Holbrook, and Gundagai – there has been some shift from sheep grazing to cattle grazing. In Shires suitable for cropping, there has been an increase in some types of cropping, particularly wheat growing and a reduction in sheep grazing. Some have also experienced an increase in cattle grazing. The orchard industry has struggled at times in Tumut Shire as well as in Tumbarumba, with producers having to expand to stay viable.

The number of farmers and farm managers remained relatively steady in some parts of the region over 1996 to 2001. In focus groups, participants suggested this may have been due to farmers being able to obtain off-farm employment in local towns, and thereby retain their farm while earning additional income to remain financially viable.

6.1 Changes in key economic sectors

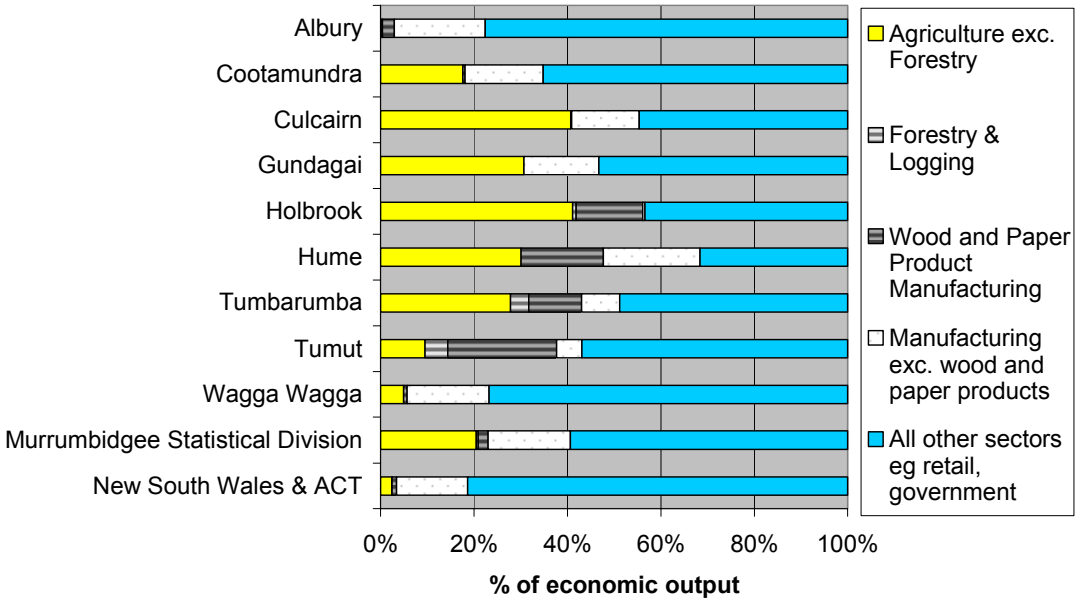
In general, the different LGAs show quite different levels of economic diversity in the primary and manufacturing sectors, with different mixes of reliance on the agricultural sector, manufacturing and, within the manufacturing sector, wood and paper product manufacturing.

Change in key economic sectors was compared for the key LGAs of the SWS. Figure 7 compares the overall structure of each LGA's economy in 2001. Figures 8 through 12 show changes in key economic sectors in individual LGAs since 1991[9].

It should be noted that Hume, although reported as a separate LGA to Albury, is situated adjacent to Albury and is effectively integrated into Albury's economy. While the Norske

[9] These figures all provide figures for the Murrumbidgee Statistical Division (SD) as a comparison. The Murrumbidgee SD includes the LGAs of Carathool, Coolamon, Cootamundra, Griffith, Gundagai, Hay, Junee, Leeton, Lockhart, Murrumbidgee, Narrandera, Temora, Tumut and Wagga Wagga.

Skog pulp and paper processing facility is located in Hume LGA, the majority of employees live in Albury, the centre of which lies only a few minutes drive from the mill. Throughout this report, Hume and Albury are reported on separately except where trends in both are identical.



Source: National Economics *YourPlace* database

Figure 7: Key economic sectors in different SWS LGAs

From Figure 7, it can be seen that in 2001, the economies of the Shires of Tumbarumba, Hume, Holbrook, Gundagai and Culcairn were highly dependent on the agricultural sector, while other LGAs were less dependent on agriculture.

Forestry and logging activities made up a relatively small proportion of the total economy in Tumut, Tumbarumba and Holbrook.

Manufacturing makes up a larger proportion of economic activity in Tumut, Hume and Tumbarumba than other LGAs. In all three LGAs, wood and paper product manufacturing is a large proportion of the manufacturing sector. In Holbrook, while manufacturing industries make up a smaller overall proportion of the economy than in Tumut, Hume and Tumbarumba almost 100% of the manufacturing in the Shire is in the wood and paper sector and based on plantation processing.

When trends in key sectors (agriculture, forestry, manufacturing, wood and paper manufacturing and other non-primary sectors) were compared over time in Figures 8 to 12, key trends observed included:

- Agriculture increased as a proportion of the economy of Culcairn, Holbrook, Hume and Tumbarumba, while decreasing as a proportion of the Tumut economy;

- Forestry and logging activity declined as a proportion of the Tumbarumba economy – most likely a result of the shifting of many Forests NSW plantation sector employees from Tumbarumba to Tumut in 2000;

- Forestry and logging activity remained relatively stable in Tumut, with a slight drop between 1996 and 2001. This reflects increasing productivity in this sector, with fewer

employees required to manage the same resource, balanced with influx of activity that was previously based in Tumbarumba;

- Manufacturing activities other than wood and paper manufacturing declined as a proportion of the economy in most small LGAs, with the exception of Tumbarumba and Gundagai;

- During 1991 to 2001, wood and paper manufacturing increased significantly in Holbrook as a result of establishment of a new sawmill facility in 1998. Wood and paper manufacturing also increased in Tumbarumba and Tumut, and declined slightly in Hume as a proportion of economic activity; and

- The proportion of economic output from other sectors has remained relatively stable since 1991 in most LGAs.

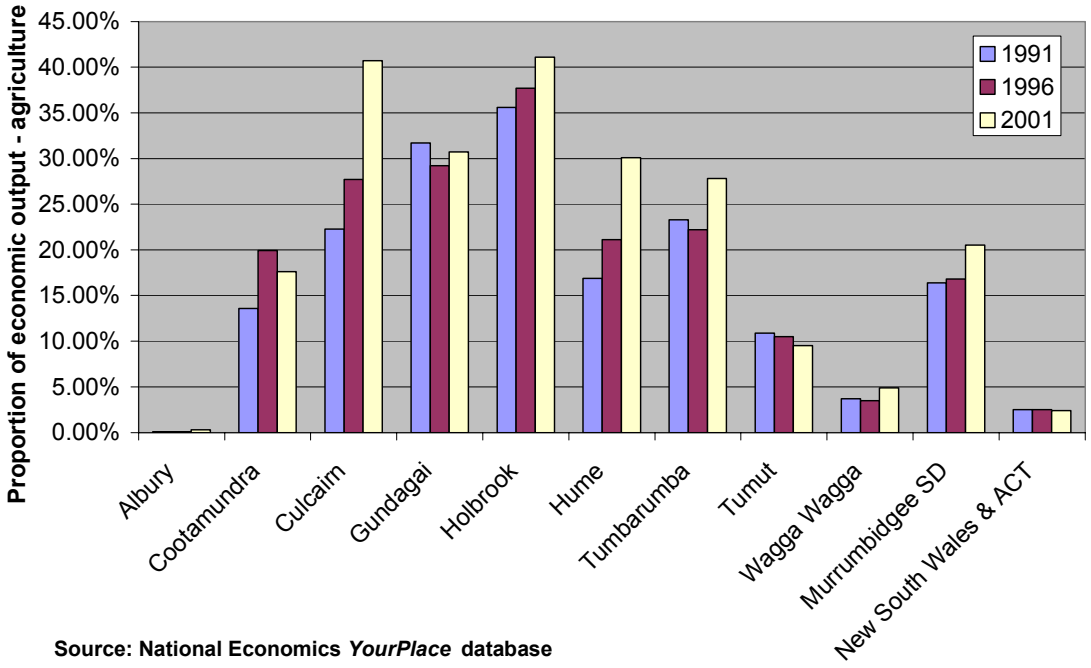


Figure 8: Proportion of economic output from the agricultural sector by LGA, 1991, 1996 and 2001

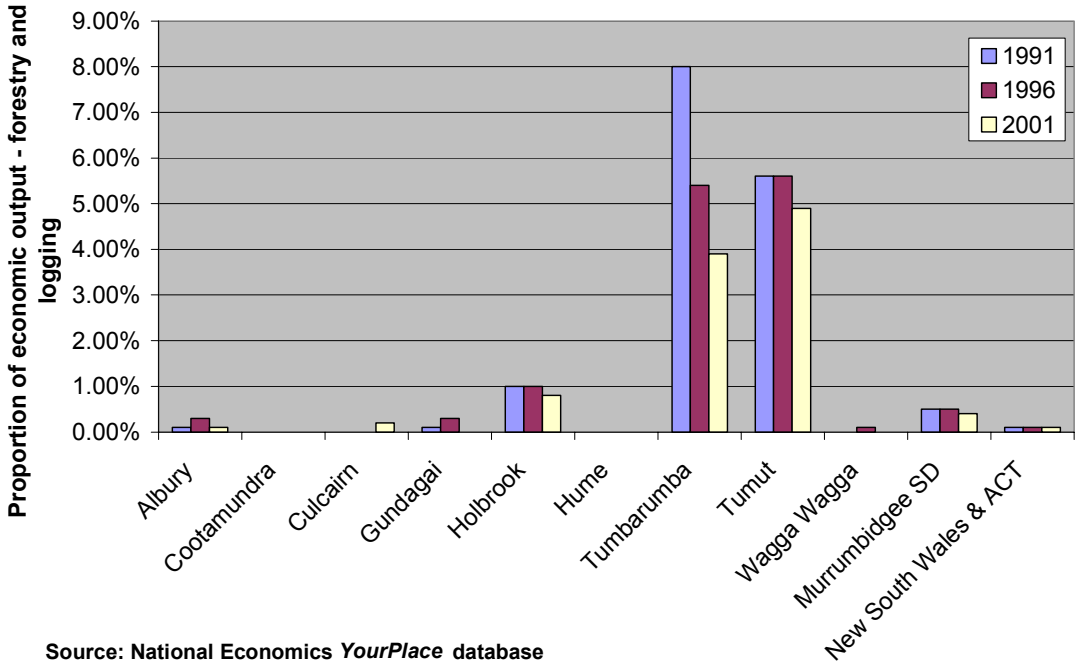


Figure 9: Proportion of economic output from the forestry and logging sector by LGA, 1991, 1996 and 2001

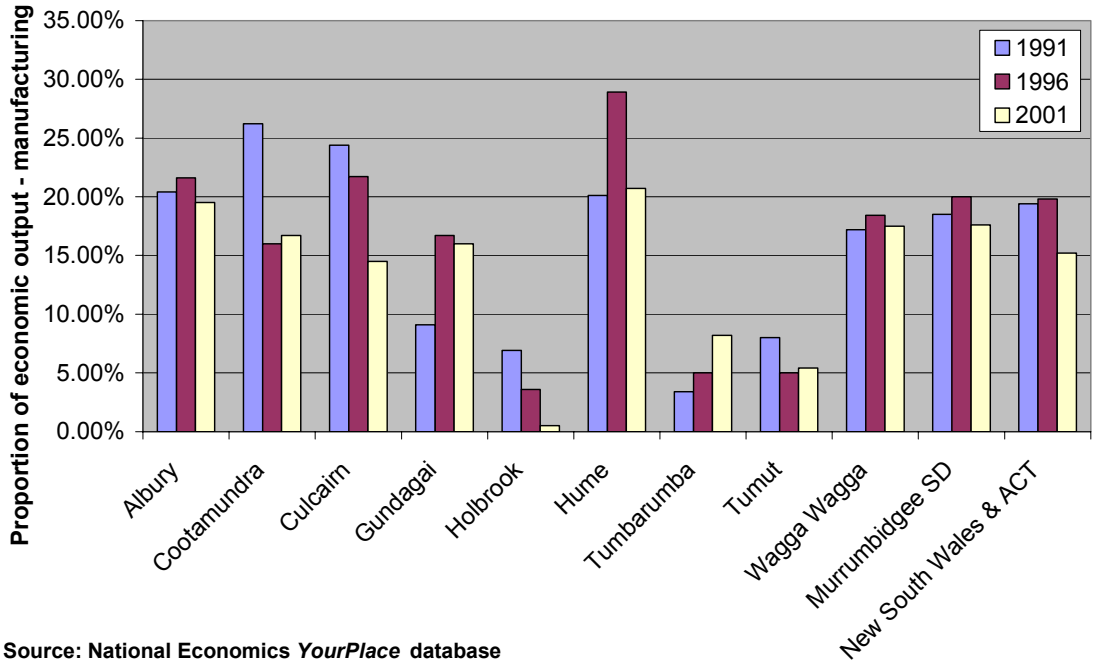


Figure 10: Proportion of economic output from manufacturing activities other than wood and paper manufacturing by LGA, 1991, 1996 and 2001

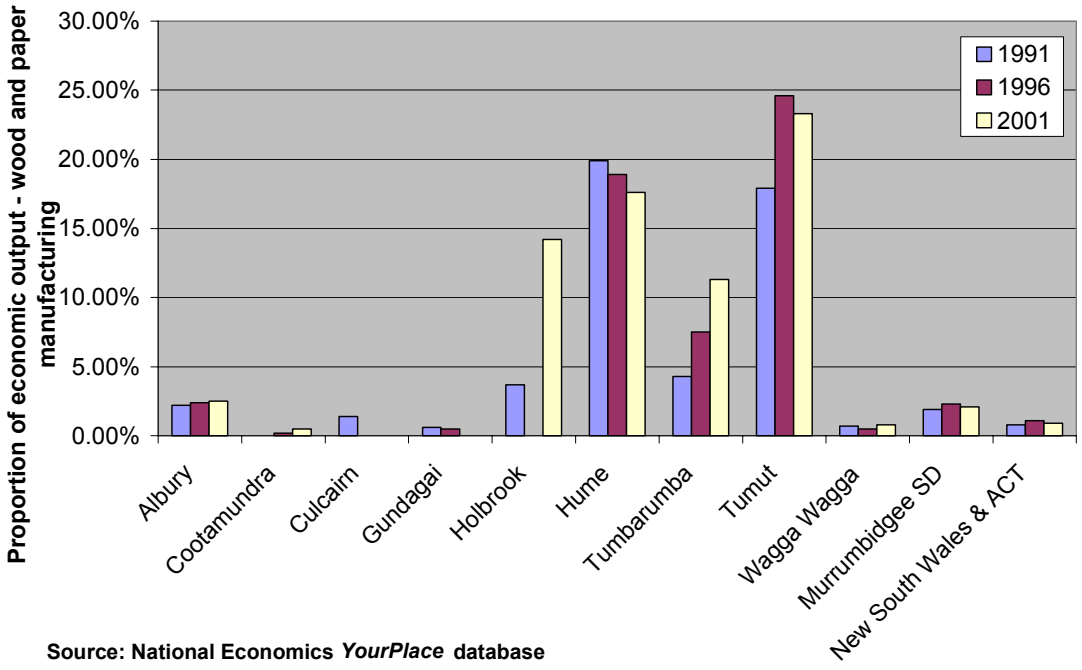


Figure 11: Proportion of economic output from wood and paper manufacturing by LGA, 1991, 1996 and 2001

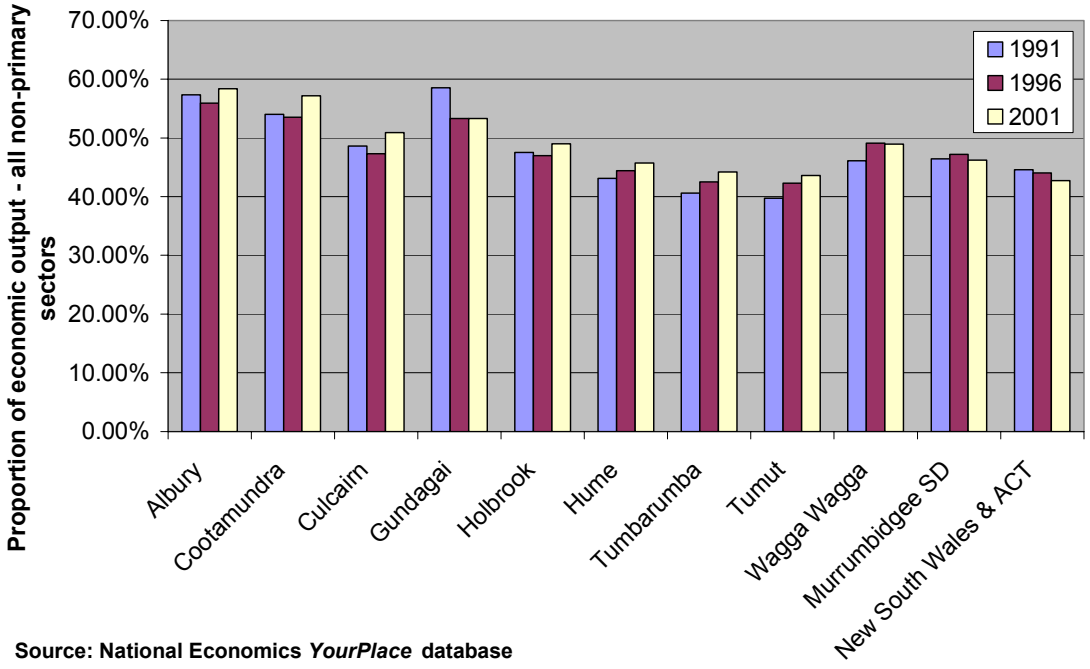


Figure 12: Change in proportion of economic output from other sectors, 1991 to 2001

6.2 Broadacre agriculture

Changes to broadacre agriculture have followed different patterns in LGAs with land suitable for cropping, and those more reliant on grazing and fruit growing.

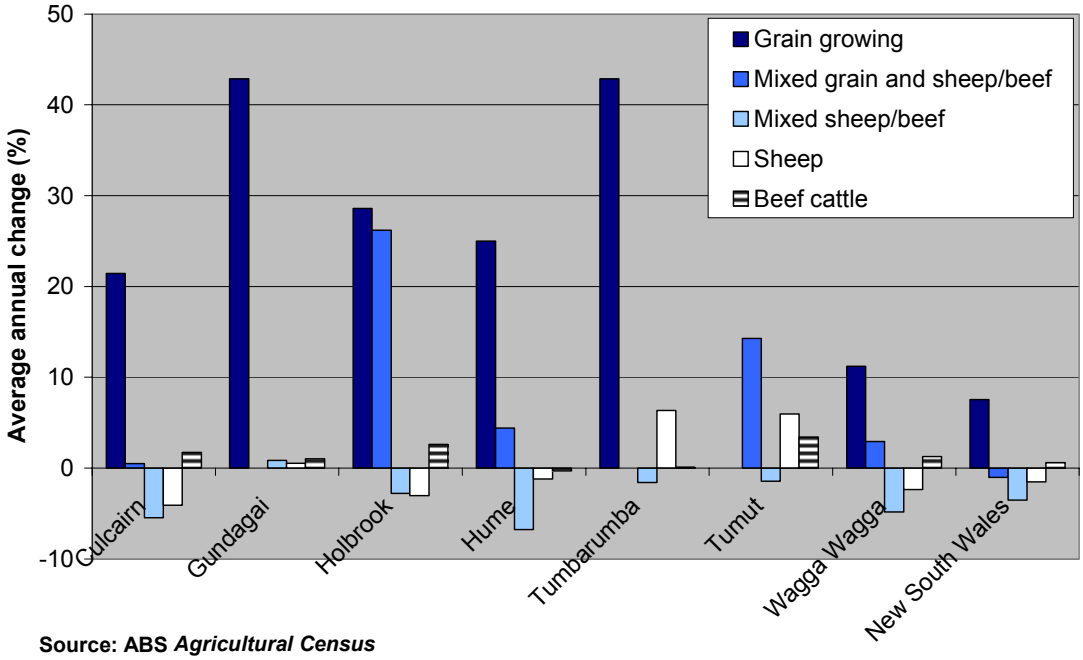
Key changes in broadacre agriculture reported by focus group participants included increasing input prices, often without similar increases in prices received for livestock and crops, and increasing mechanisation and efficiency of agricultural production. Whereas 20 years ago many farmers employed a full-time farm worker, this is now uncommon, and farmers often manage considerably larger areas of land using less labour than they did two decades ago.

In general there has been some shift out of sheep grazing into cattle grazing or grain growing, and shifts to growing different types of grain crops, as described in the overview of the SWS region. In focus groups, participants from the farming sector described the shift away from sheep grazing as being driven by a fall in wool prices and also by some ageing farmers choosing to shift into a less labour intensive form of farming.

This shift can be seen in Figure 13, which shows the average annual change between 1994 and 2000 in the number of establishments reporting different types of broadacre agriculture as their *primary* agricultural activity. The shift away from enterprises undertaking sheep grazing alone toward more cattle, mixed and grain growing enterprises can be seen. Only two LGAs have shown a different trend, with the reported number of sheep grazing enterprises growing slightly in Tumbarumba and Tumut compared to most other LGAs.

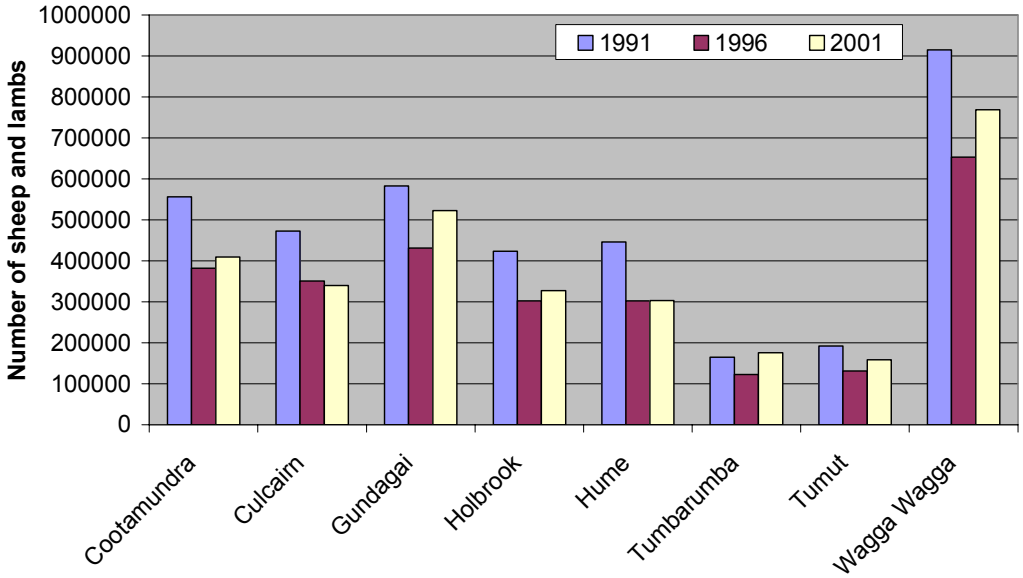
Figures 14 through 19 provide data on trends in key grazing and cropping enterprises, with the areas established to wheat and barley, numbers of sheep and lambs, and numbers of beef cattle and calves over time compared. While some changes in individual years may reflect seasonal variability, the general trends towards falling numbers of sheep and lambs, and increasing grain growing or cattle growing can be seen.

In general, the trends in broadacre agriculture in the SWS mirror those occurring across Australia, with a shift away from sheep grazing and an increase in cattle grazing and grain growing occurring in many areas. Farm amalgamation and decreasing labour requirements per unit of output have been common trends across Australia (Productivity Commission 2005).



Source: ABS *Agricultural Census*

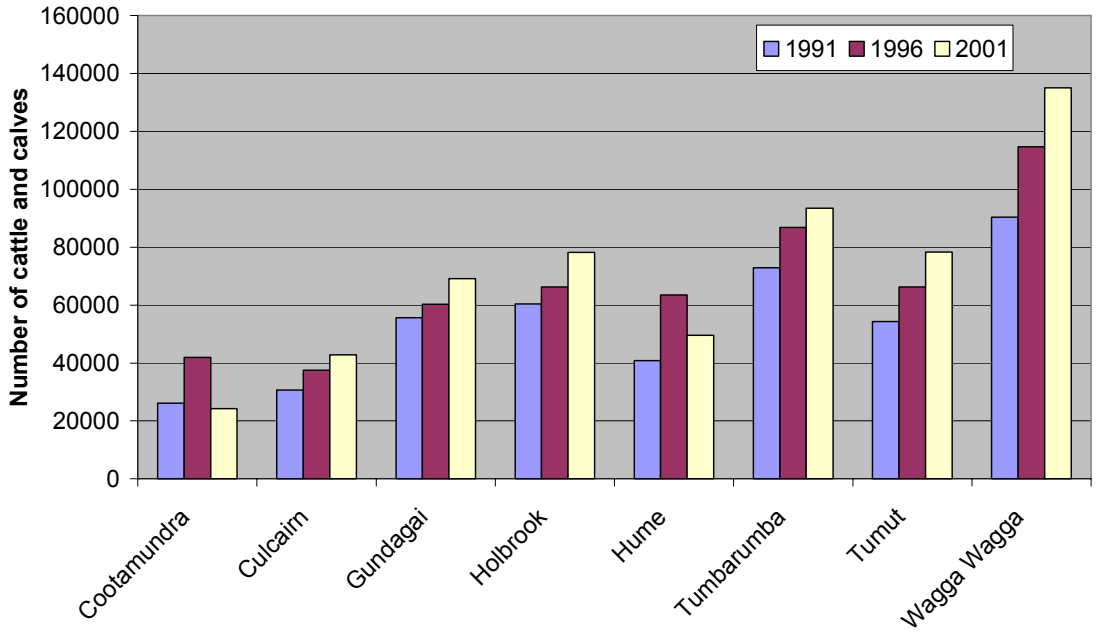
Figure 13: Average annual change in primary agricultural activity by LGA, 1994-2001[10]



Source: ABS *Agricultural Census*

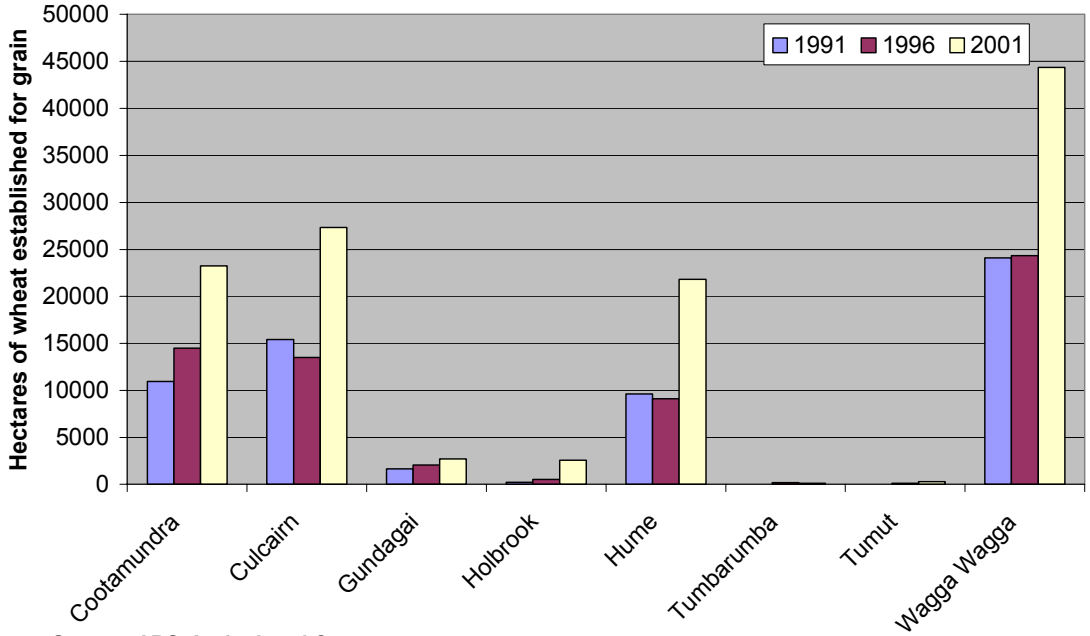
Figure 14: Number of sheep and lambs by LGA, 1991, 1996 and 2001

[10] Note: (1) In this and following figures, Albury is not included as it is a predominantly urban LGAS with very little agricultural activity; (2) Cootamundra is not included in Figure 13 as focus group participants identified inaccuracies in data for that LGA; (3) Where there are only a small number of a particular type of enterprise in an LGA, small changes may appear as large percentage shifts. For example, the total number of grain growing establishments in Tumbarumba is very small, and so a change of 1 or 2 enterprises shows as a large percentage change in the number of enterprises.



Source: ABS *Agricultural Census*

Figure 15: Number of cattle and calves by LGA, 1991, 1996 and 2001



Source: ABS *Agricultural Census*

Figure 16: Area of wheat established for grain by LGA, 1991, 1996 and 2001

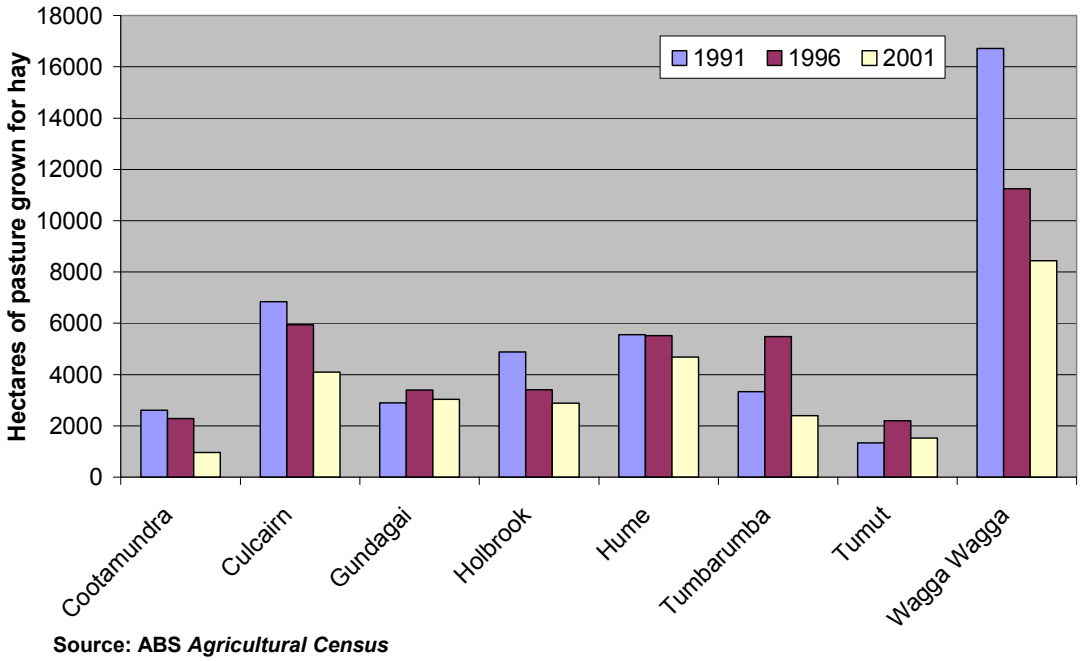


Figure 17: Area of pasture grown for hay by LGA, 1991, 1996 and 2001

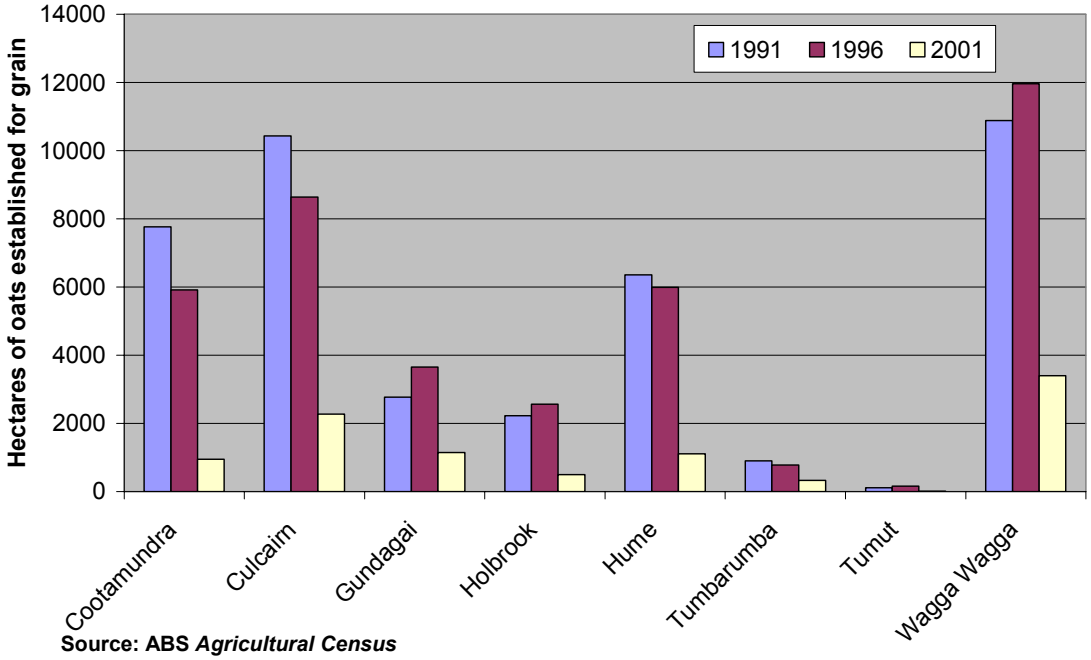


Figure 18: Area of oats established for grain by LGA, 1991, 1996 and 2001

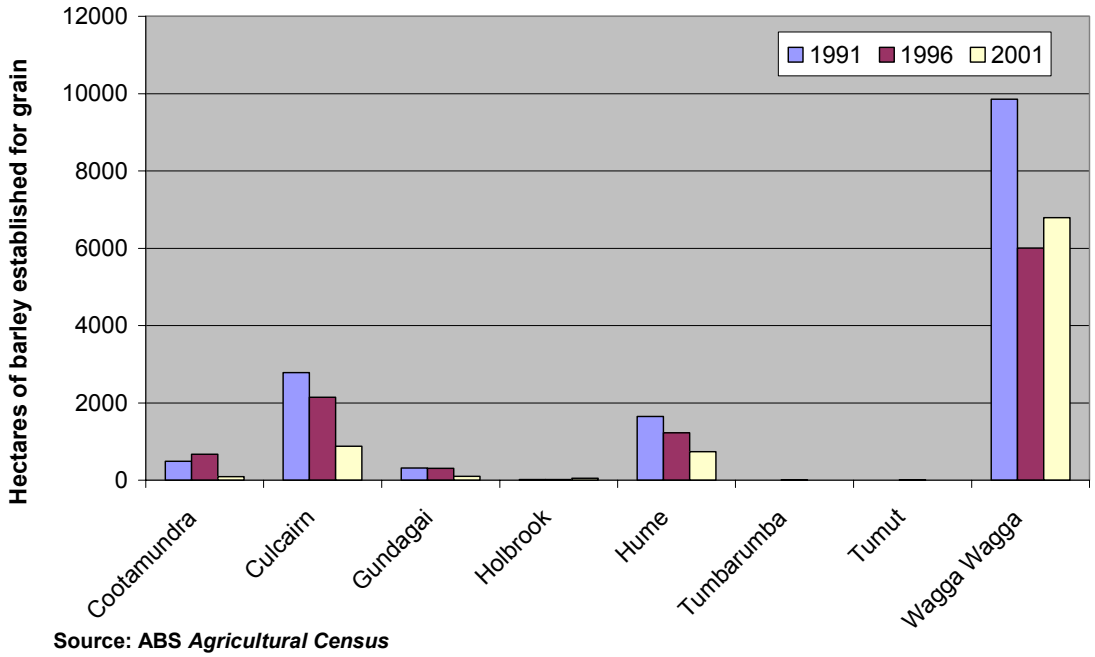


Figure 19: Area of barley established for grain by LGA, 1991, 1996 and 2001

Orchard and fruit growing industries

Fruit growing – particularly apple growing – has been an established industry in the Shires of Tumut and Tumbarumba for some decades. Over 1991 to 2004, industry participants experienced pressure to expand the scale of individual operations to stay economically viable. In general, the trend has been for some smaller apple growers to exit the industry, while those remaining have tended to expand operations, by establishing new tree stock or expanding their orchard area.

A fruit cannery processing apples in Batlow gradually decreased its operations before closing in 2002, with loss of the 30 jobs that remained at the cannery at that time.

In Tumbarumba, some new industries have established. Grape growing expanded from the early 1990s. Many vineyards are part of mixed enterprises, and have been established by existing farmers in the region; around six of the grape growers in the region are new residents. The majority of vineyards are relatively small boutique enterprises under 20 acres in size, while others are have up to 300 acres of vines established. Vineyard expansion has also occurred to a lesser extent, and more recently than in Tumbarumba, around Gundagai. A blueberry growing enterprise has also been established in Tumbarumba, creating employment in the area through packaging and delivery of blueberries to domestic and international markets.

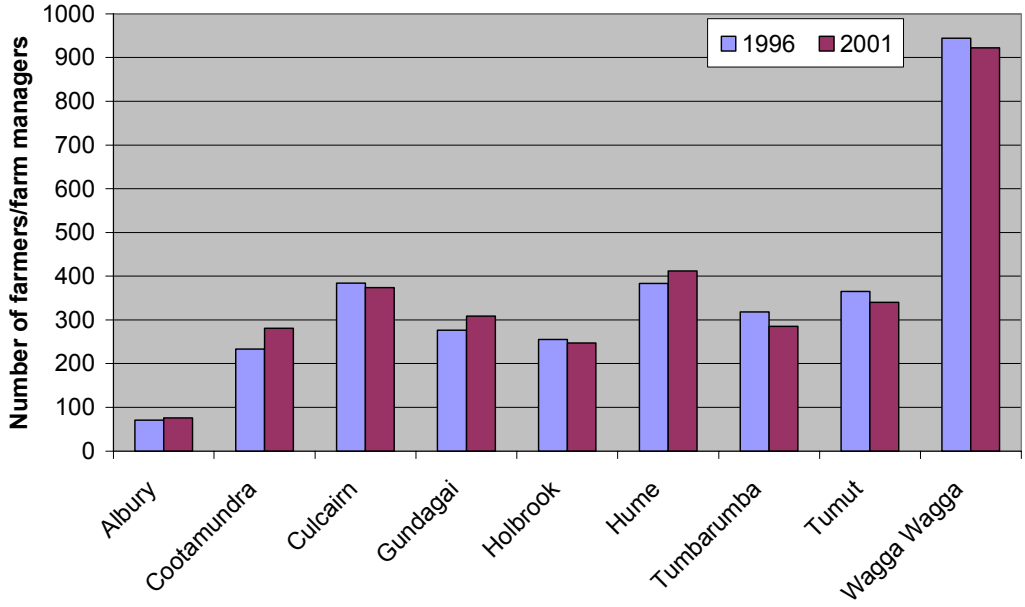
Number of farm managers

Change in the numbers of farmers/farm managers in different LGAs was examined. Plantation managers are not included in the definition of farmers/farm managers used by the ABS (they are defined as forest sector workers). Figure 20 shows the number of farmers and farm managers in 1996 and 2001 in different SWS LGAs, while Figure 21 shows the rate of change in the number of farm managers over 1996 to 2001, compared to the New South Wales average.

Wagga Wagga has a considerably higher number of farmers/farm managers than other LGAs, primarily a result of the comparatively larger area of agricultural land in this LGA compared

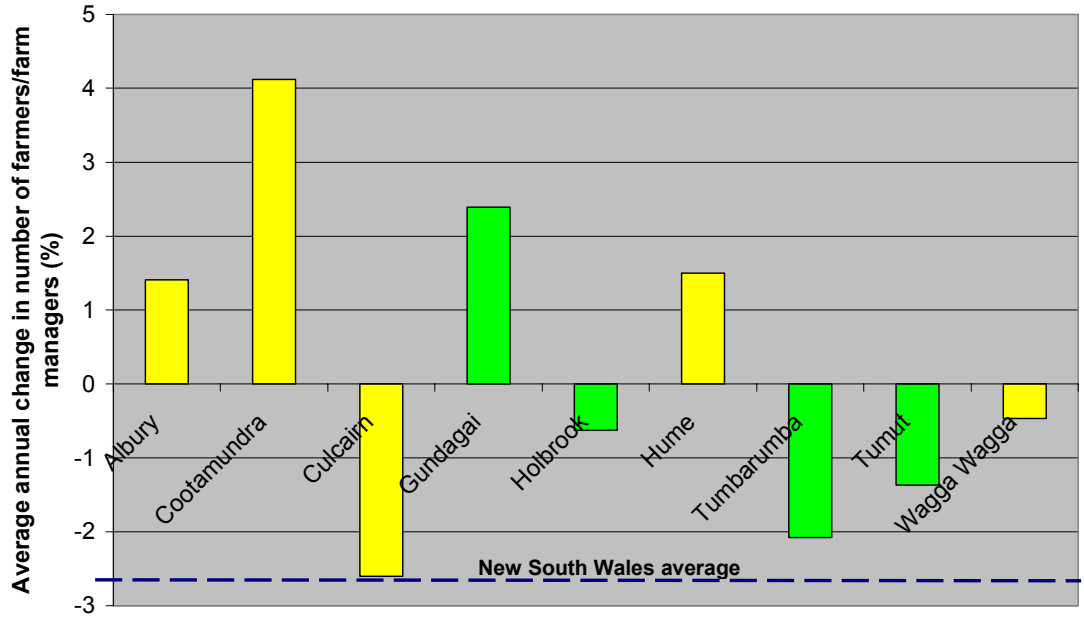
to the others. Albury, Cootamundra, Gundagai and Hume all experienced an increase in the number of farm managers between 1996 and 2001, while the other LGAs experienced declines. However, only Culcairn experienced a decline close to the NSW average for the period. In general, the SWS retained more of its farming population, or experienced a higher influx of new farm managers compared to loss of existing farm managers, than was usual across the State. Part of this may be due to establishment of intensive enterprises such as vineyards in some regions, with these requiring more managers for smaller areas of land. It is also possible that managers of some small rural lifestyle blocks in the area defined themselves as farmers as they managed small numbers of stock in addition to having employment elsewhere.

In focus groups, participants suggested that the number of farmers has remained relatively steady in the region due to farmers being able to obtain off-farm employment in local towns. This has allowed farmers to retain their farm while earning additional income to remain financially viable.



Source: ABS *Census of Population and Housing*

Figure 20: Number of farmers and farm managers in different SWS LGAs, 1996 to 2001



Source: ABS *Census of Population and Housing*

Figure 21: Average annual change in number of farm managers by LGA, 1996 to 2001[11]

[11] In Figure 21, light green columns (dark grey if viewed in black and white) indicate LGAs of the SWS with high areas of plantation estate, while yellow columns (light grey) indicate LGAs of the SWS with little or no plantation estate.

7.0 Plantation sector employment, value of output, expenditure and training

Key findings on plantation sector employment, value of output and expenditure are detailed in Box 3.

Box 3: Plantation sector employment, value of output, expenditure and training

The total level of direct employment generated by plantations grown in the SWS, up to the point of processed products leaving the mill door, grew from an estimated 1,548 full-time equivalent employees in 1991-92, to 1,682 in 2003-04. This occurred as volumes harvested and processed in the region more than doubled, reflecting rapid increases in efficiency occurring in the sector over recent decades.

Direct employment in plantation management fell from 393 to 236 people between 1991-92 and 2003-04, while employment in harvesting and haulage grew rapidly over the same period. The fall in plantation management jobs reflects both a shift to contracting out work, and increases in efficiency. The total level of direct employment in the processing sector grew from an estimated 1,005 full-time equivalent employees in 1991-92 to 1,290 in 1996-97, then fell slightly to 1,180 in 2001-02 and 1,130 in 2003-04.

Of this direct employment, between 92% and 94% has been based in the SWS between 1991-92 and 2003-04. Most employment outside the SWS is located in north-east Victoria, where some timber from plantations in the SWS is processed. In 2003-04, most direct employment – over 900 jobs – was located in the LGA of Tumut, while over 200 jobs were located in Tumbarumba, and just over 200 in Albury/Hume. The number of direct jobs generated per 100 hectares of plantation has fallen slightly over time, from 1.71 jobs per 100 ha in 1991-92 to 1.53 jobs per 100 ha in 2003-04, again reflecting increases in efficiency.

For every $1 million spent by the plantation sector, between 8.3 and 15.7 jobs are created in the South West Slopes, depending on which part of the plantation industry is being examined. This includes both direct employment by the plantation industry, and flow-on employment generated as a result of demand for goods and services from the plantation industry. In addition, further flow-on employment is created outside the region when goods and services are imported from other regions. For every direct job in the plantation sector, this equates to flow-on employment equivalent to between 0.8 and 1.3 jobs within the South-West Slopes.

The total value of output of the plantation sector (including operating and capital expenditure) in the SWS grew from an estimated $401.4 million in 1993-94, to $574.5 million in 2002-03[1]. This represents growth of 43% over this period. This growth was spread across the plantation management, harvest and haulage and processing sector.

The majority of wages and salaries are paid to employees located within the region (approx. 93%), while inputs to plantation growing and management are similarly often sourced from within the SWS. The only major inputs which are not commonly sourced from within the SWS are inputs to processing such as chemicals, fuel and electricity.

The value of output generated per hectare of plantation rose from $4,270 per hectare in 1993-94 to $5,334 per hectare in 2002-03[2], reflecting changes in the maturity of the plantation estate and in the utilisation of the plantation resource at harvest, with more integrated processing enabling more complete utilisation of harvested logs. A total of $1.63 to $1.83 of output is generated in the SWS economy for every dollar of expenditure by the plantation sector, as well as further flow-on expenditure outside the SWS.

7.1 Employment

Direct employment

Table 5 provides details of direct employment generated by plantations grown in the SWS up to the point of producing processed timber – ie, up to the 'mill door exit' prior to transport of goods to market. It does not include flow-on employment resulting from factors such as spending of income by those employed in the sector. Figure 22 shows the change in levels of direct employment across the whole sector over time.

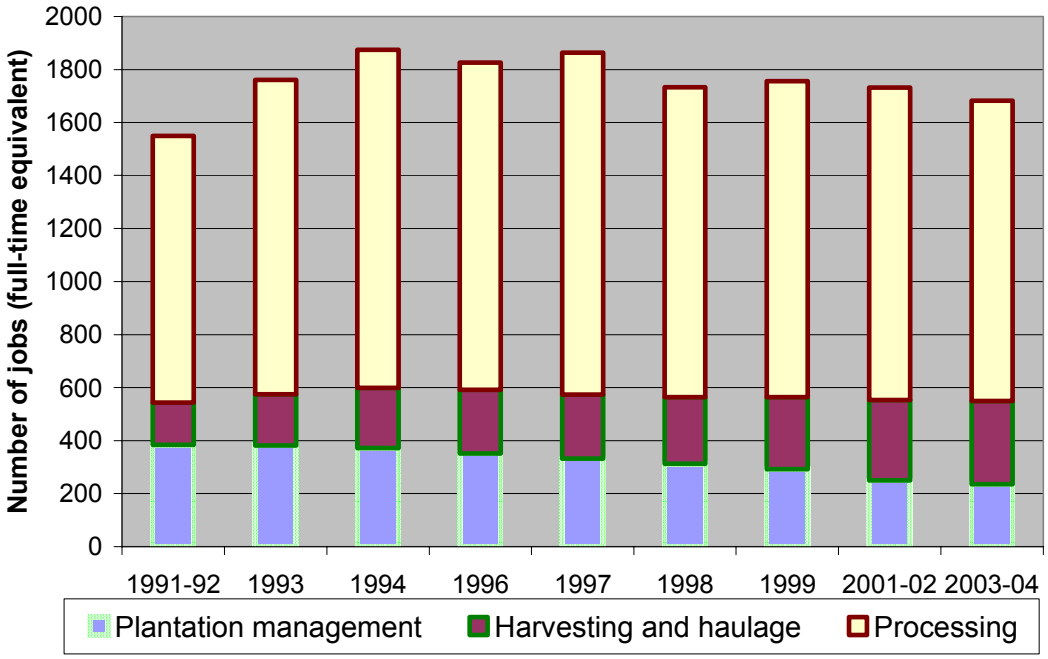
Table 5: Direct employment generated by SWS plantations over time

	1991-92	1996-97	2001-02	2003-04
Plantation establishment and management*	393	352	250	236
Harvesting and transport to processors**	150	225	303	313
Processing	1005	1234	1178	1133
Total	1548	1811	1731	1682
Average number of employees per 100 hectares of plantation	1.7	1.8	1.6	1.5

* Figures include some estimation of numbers of private sector plantation managers, as it was not possible to obtain exact data over time. Estimates should be considered accurate to within +/- 5%

** Figures include some estimates used when exact data could not be obtained; in particular it was not always possible to identify extent of employment in haulage sector. Estimates should be considered accurate to within +/- 10%.

Note that figures exclude transport of processed products from mills to market, but include some transport of residues and processed products between mills for further processing.



Data source: Surveys of SWS plantation sector

Figure 22: Direct employment in the plantation sector over time

It can be seen from Table 5 and Figure 22 that direct employment grew from an estimated 1,548 full-time equivalent employees in 1991-92, a peak of 1,864 employees in 1997, and subsequently fell to 1,682 by 2003-04. This overall trend was made up of several changes including:

- An overall rise in employment in the harvest and haulage sector;
- An overall decline in employment in the plantation management sector; and
- A rise and then slight overall fall in employment in processing.

These changes occurred during a period in which volumes harvested and transported to mills in the region more than doubled. Clearly, processing has become considerably more efficient over 1991 to 2004, with only a slightly higher number of employees required in 2004 than in 1991 to process more than twice the volume as was processed in 1991. The number of processing employees has remained relatively steady over time, reflecting the ongoing operation of several large mills in the region, the opening of new facilities, and the expansion of capacity of existing facilities. These increases have counteracted the impact of increasing efficiency of operations, and of the closure of the Laminex processing facility in Wagga Wagga in 1999.

Increasing efficiency has also occurred in the plantation management and the harvesting and haulage sectors. In the plantation management sector, the fall in employment over time partly reflects a shift to contracting out some activities to firms whose employees have not been subsequently counted in the employment estimates, as well as increases in efficiency. In the harvest and haulage sector, a considerable increase in employment has been required to transport the increasing volumes harvested in the region, despite increased efficiency of harvesting and transport activities.

In general, there has been less than a 5% fluctuation in the number of people employed in the plantation sector in most years since the mid-1990s. This contrasts with the agricultural sector, where fluctuations in climatic conditions can result in rapid changes to employment. For example, across Australia the 2002-03 drought led to an estimated 15% drop in agricultural employment (Productivity Commission 2005).

While there were considerable fluctuations in markets for wood products during the period studied, these did not translate into large changes in numbers employed. Discussions with members of the plantation sector indicated that this was a result of (a) policies put in place to maintain processing volumes through periods of lower demand, eg through stockpiling processed products, and (b) the increasing substitution of softwood for hardwood products in the construction sector, which meant there was growing demand for softwood products even during periods of lower demand for wood products overall.

Figure 23 shows the employment generated per 100 hectares of plantation grown in the SWS over time. The majority of employment per hectare is generated in the processing sector, although considerable employment also occurs in the 'growing, harvesting and haulage to mill' category, which is the sum of the plantation management and harvesting and haulage categories shown in Figure 22.

Employment per 100 hectares rose to the mid 1990s, with a peak of 1.84 jobs per 100 hectares in 1996-97, and has since fallen to 1.53 jobs per 100 hectares in 2003-04, reflecting increased efficiency that is common in many primary industries. Two-thirds of jobs are generated by the processing sector.

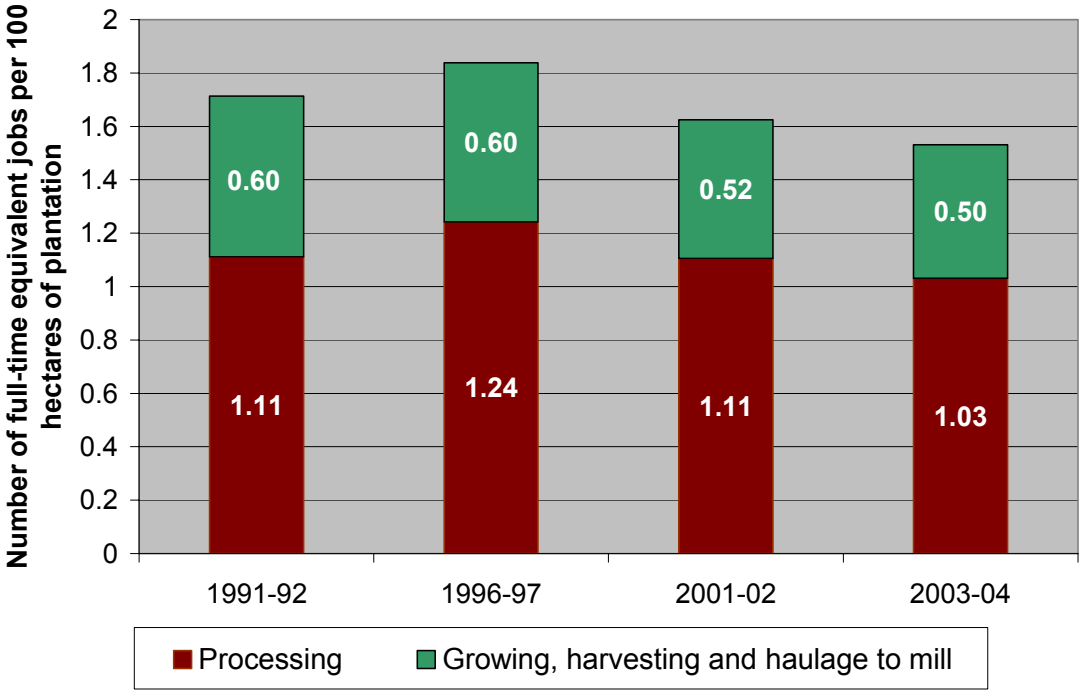


Figure 23: Employment per 100 hectares of plantation grown in the SWS

Types of direct employment

The plantation sector provides a range of types of employment. These include full-time, part-time and casual/seasonal employment. Plantation growers and processors were asked to

identify whether the type of employment being provided was full-time or part-time/casual when providing data on employment.

The large majority of employment is full-time, with over 95% of employees in plantation growing, harvesting, and processing working full-time. This was consistently the case over 1991 to 2004.

Part-time and casual employment tend to be confined to seasonal work, particularly planting work, as well as some summer work manning fire towers and undertaking other seasonal fire fighting-related work.

Location of direct employment

The large majority of direct employment in the plantation sector is located within the SWS region, as can be seen in Figure 24. Between 1991 and 2004, an estimated 92% to 94% of direct employment generated by the plantations grown in the SWS has been located within the SWS region. The majority of other direct employment generated has been in north-east Victoria (Myrtleford and Benalla), with a smaller amount in Sydney and Canberra.

Figure 25 shows the location of direct employment dependent on SWS plantations in 2003-04. The location refers to the location of the offices in which employees were based, not their residential address. The category 'jobs from plantations grown outside SWS' indicates the level of employment generated within the SWS by plantations grown outside the region, a figure not presented in any of the data on direct employment generated by plantations grown in the SWS. This figure refers to employment generated as a result of plantation logs grown outside the SWS being transported to mills in the SWS to be processed, or when plantation industry contractors based in the SWS travel outside the region to work on plantations in other areas. The majority of this employment is generated by the plantation estate grown in the 'Shelley' region of north-east Victoria.

In general, employees of processing facilities were located either in the same town as the processing facility, or within relatively short driving distance of the facility. Those employed in managing and harvesting plantations, however, were often based some distance from the plantation estate they worked in. For example, Tumut is currently the base for most Forests NSW employees managing plantations in the SWS. These employees manage plantations grown across several Shires including Tumut, Tumbarumba, Gundagai and Holbrook. Many harvesting contractors working on plantations in a number of SWS Shires are also based in Tumut.

The majority of employment was located in Tumut, reflecting the large proportion of plantation managers, harvest contractors, and processors located in the LGA. The next highest number of jobs was located in Tumbarumba which, as a much smaller population LGA than Tumut, is highly dependent on the plantation sector despite having a small number of plantation sector employees overall than Tumut.

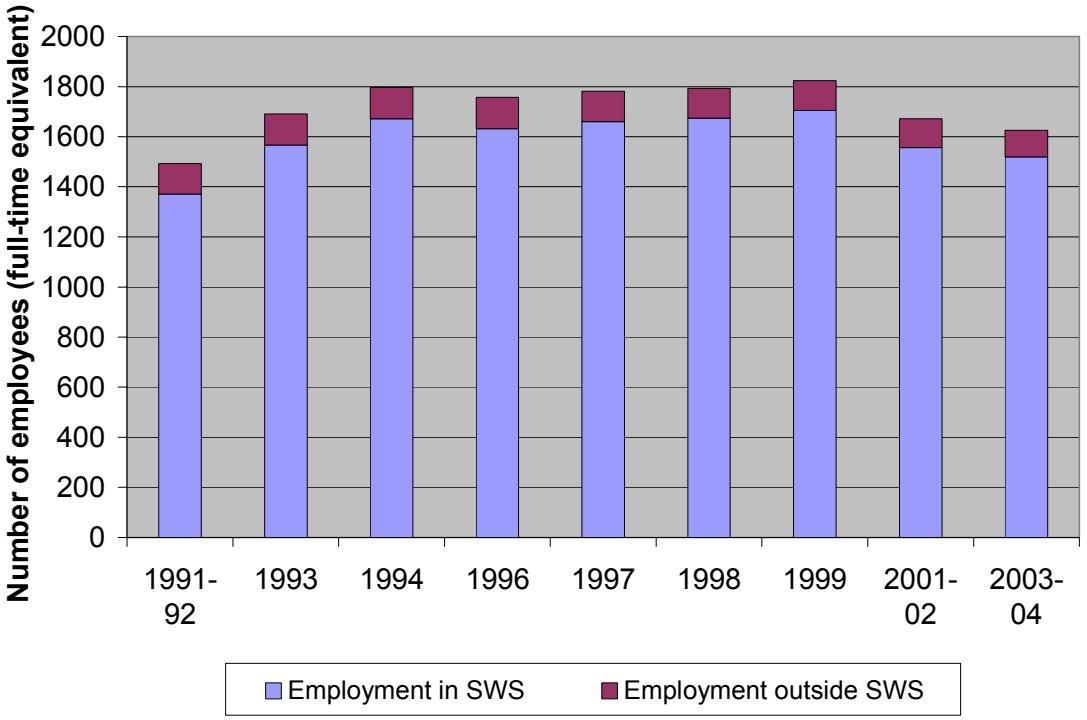


Figure 24: Proportion of direct employment located within and outside the SWS

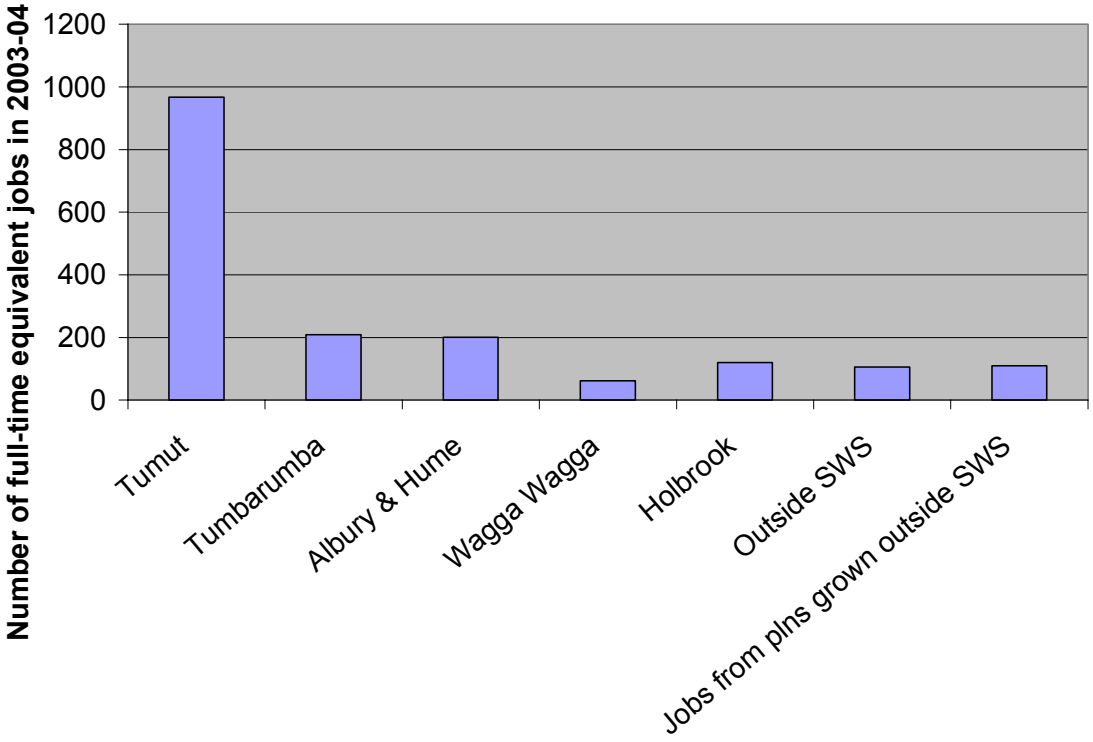


Figure 25: Proportion of direct employment based in different SWS LGAs and outside the SWS

Note: Haulage sector employees have been spread across several LGAs due to difficulty identifying base locations for employees of this sector in many cases

Indirect employment

A considerable amount of indirect employment is generated in the SWS as a result of plantation sector activities. For every $1 million spent by the plantation sector in 2002-03, between 8.3 and 15.7 jobs were created in the South West Slopes, depending on which part of the plantation industry – in other words, which part of the project chain - was being examined[12]. This includes both direct employment by the plantation industry, and flow-on employment generated as a result of demand for goods and services from the plantation industry. In addition, further flow-on employment is created outside the region when goods and services are imported from other regions.

For every direct job in the plantation sector, this equates to flow-on employment equivalent to between 0.8 and 1.3 jobs within the South-West Slopes. In 2002-03, the following number of indirect jobs were generated per direct employee in different parts of the plantation sector:

- 0.79 in plantation management and harvesting[13];
- 0.87 in sawmilling[13];
- 1.3 in pulp, paper and paperboard production[13]; and
- 1.06 in other wood processing[13].

7.2 Value of output and location of expenditure

Table 6 provides details of the value of output – broadly corresponding to gross value of sales - from growing, harvesting and processing plantations in the SWS in 1993-94 and 2002-03. All figures have been adjusted for inflation and are in $2002-03.

The figure for 'total value of output' excludes transfers between the three sectors such as payments for roundwood from processors to plantation managers. It reflects the true value of output without 'double counting' output from one stage which becomes input to the next stage of production of processed wood products.

The total value of the output generated by plantations in the SWS, measured in $2002-03, increased by just over 43% between 1993-94 and 2002-03, from $401.4 million to $574.5 million.

The value of output generated per hectare of plantation rose from $4,270 per hectare in 1993-94 to $5,334 per hectare in 2002-03. This increase reflected changes in the maturity of the plantation estate and in the utilisation of the plantation resource at harvest, with more integrated processing enabling more complete utilisation of harvested logs.

[12] These figures are employment multipliers, and refer to the direct and indirect, or 'flow-on' employment generated by a one million dollar investment by the plantation sector. See Appendices 3 and 4 for details of the *YourPlace I-O* model used to model indirect impacts.

[13] This includes some employment generated in other parts of the plantation sector.

Table 6: Value of output from plantation grown in the SWS in 1993-04 and 2002-03

	1993-94 ($ million)	2002-03 ($ million)
Plantation management	28.3	45.7
Harvesting and haulage	21.6	32.1
Softwood processing	361.4	549.8
Total value of output (net)	401.4	574.5

Data sources:
- Margules Groome Poyry Pty Ltd (1995) – used for 1993-94 data (direct and indirect)
- URS Forestry (2004) – used for 2002-03 data
- Direct survey of plantation sector – used for both periods as appropriate to adjust data

A total of $1.63 to $1.83 of output[14] is generated in the SWS economy for every dollar invested by the plantation sector; and $0.31 to $0.49 income[15] (eg wages and salaries paid to employees in the region). This represents the flow-on activity generated by the plantation sector in the regional economy, for example, through the purchase of supplies from regional businesses and plantation industry employees spending their income on good and services in the region. Further flow-on activity is also generated outside the SWS, for example when goods and services are imported into the SWS.

Location of expenditure

Plantation growers and processors were asked to provide details on the location of their expenditure. Table 7 summarises the average proportion of different categories of expenditure purchased within and outside the SWS since 2001-02, as well as indicating where expenditure is not easily linked to a spending location. The data in Table 7 is an average for the period of 2001-02 to 2003-04. It is based on the knowledge of current employees on where supplies have been purchased and where contractors have been based in recent years. More detailed estimation over a longer time period was not possible, as many records of expenditure do not include specific locational data.

Generally most expenditure occurs within the SWS, largely because a significant supply industry has developed to service the plantation sector. Wages and salaries are largely paid to employees based in the SWS. Building and plant maintenance is generally undertaken by contractors based within the SWS, although specialists are also brought in from other areas when needed to undertake specialist work on processing lines.

The key exception to this pattern is for some types of inputs to the processing sector. Inputs such as electricity and gas are bought from suppliers operating at a state level, and so it is not possible to define the expenditure as occurring 'within' or 'outside' the SWS. Inputs such as chemicals are commonly purchased in bulk from suppliers outside the SWS.

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[14] This figure is the total output multiplier (equivalent to a Type 2A multiplier), and includes both production and consumption induced effects. The total multiplier measures the direct, indirect and consumption induced effects on output from an initial stimulus (in this case, one million dollars). See Appendices 3 and 4 for details of the *YourPlace I-O* model used to model indirect impacts.

[15] This figure is the income multiplier, which measures the compensation (in other words, wages and salaries) paid to employees to produce the additional output generated by an increase in activity. In this case, it is the compensation paid to generate the output that is produced as a result of an initial one million dollar investment in the plantation sector. See Appendices 3 and 4 for details of the *YourPlace I-O* model used to model indirect impacts.

Table 7: Location of expenditure on key operating costs for the plantation sector

Expenditure category	% spent within SWS	% spent outside SWS	Purchased from supplier/business with multiple locations, making identification of location of purchase difficult (eg electricity)
Wages/salaries (direct)	93%	7%	N/A
Building & plant maintenance	80%	20%	N/A
Inputs to processing other than wood and fibre, eg chemicals, fuel, electricity	25%	40%	35%
Training	90%	10%	N/A
Inputs to plantation growing and management eg seedlings, payments to contractors	80%	20%	N/A
Road maintenance and construction	90%	10%	N/A
Note: Data is based on a sample of growers and processors in region, and considerable variability exists in the pattern of purchases of different types of supplies by different plantation sector businesses			

7.3 Plantation sector training

As the plantation sector has matured, resources have been developed in the region to support the training needs of employees. The Forest Industry Training Centre, a partnership between the TAFE NSW Riverina Institute and the forest industry, has been established to deliver accredited training courses providing appropriate skills for a range of plantation sector employees. Much of this training is delivered via the Tumut campus of the TAFE NSW Riverina Institute.

Figure 26 shows the increase in student contact hours over time at the Forest Industry Training Centre, and the cost of delivering this training. Since 1996, annual numbers of students enrolled in forestry training courses at the Centre have increased from 148 to 1,164, with many students from outside the SWS attending courses at the Centre.

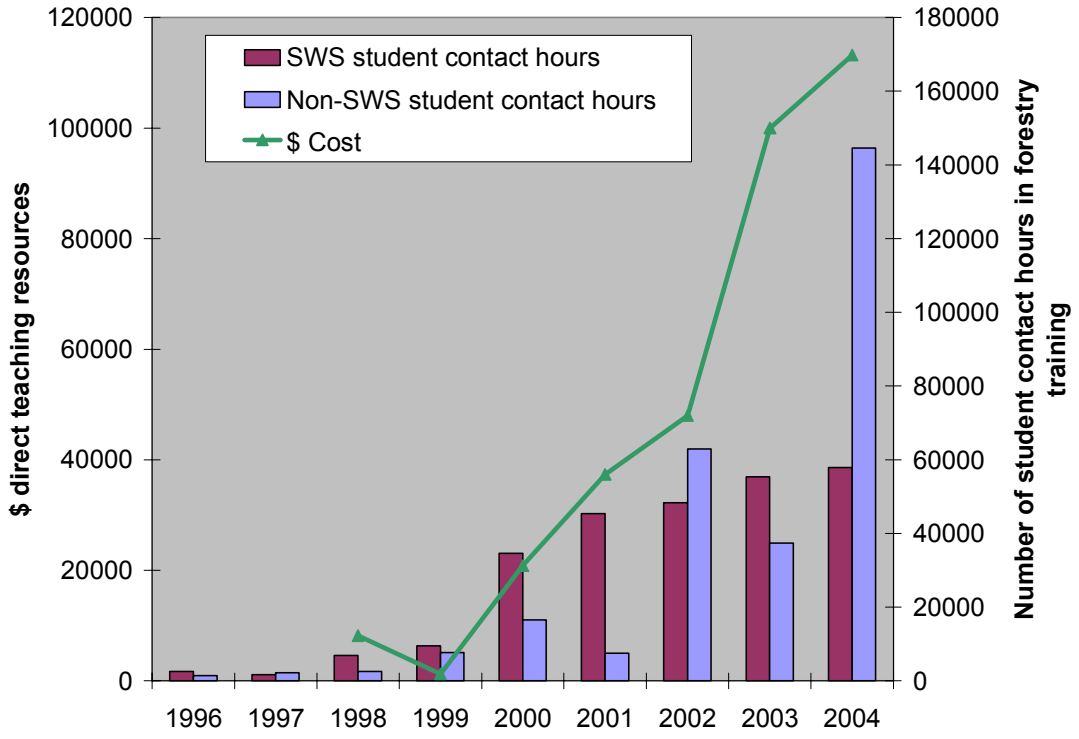


Figure 26: Increase in training delivered through the Forest Industry Training Centre

8.0 Population

Change in the population living in different SWS LGAs, and in rural areas and key towns within each LGA, was examined over time. Changes in LGAs with high areas of plantation sector activity were then compared with changes in other LGAs in the SWS, and with comparison regions outside the SWS. Participants in focus groups were asked to discuss key factors they had observed over time that had influenced changing population levels in their local area. This was used to assist in searching for likely explanations of observed trends in total population. Box 4 summarises key findings.

Box 4: Key findings on population change

In general, town populations in the SWS have followed trends seen across Australia – the populations of the regional cities of Albury and Wagga Wagga have risen, while the population of most small towns has fallen. There are some exceptions to this trend, however. Towns in the SWS with large-scale plantation processing facilities tended to experience population growth or a stable population, while those with local economies more heavily dependent on agriculture tended to experience population decline. Having a strong manufacturing base is likely to have contributed to stabilisation and growth of the population of towns with plantation processing.

However, it is only in towns where the processing is on a scale that allows it to strongly underpin the local economy that this trend is seen. For example Holbrook, which has smaller scale plantation processing facilities than Tumut or Tumbarumba, experienced population decline, with its economy still largely dependent on agriculture despite the existence of plantation processing in the LGA.

Rural population (population living on rural properties or in localities with less than 200 population) has declined in LGAs of the SWS with economies highly dependent on traditional agriculture, and has tended to increase in LGAs located near regional centres, or in which local governments have allowed rural subdivision. Focus group participants suggested that rural populations have remained more stable in areas where off-farm income is more easily available, allowing farming families to remain on their properties while earning additional income via off-farm employment. The plantation sector is one source of off-farm employment in the region, amongst others.

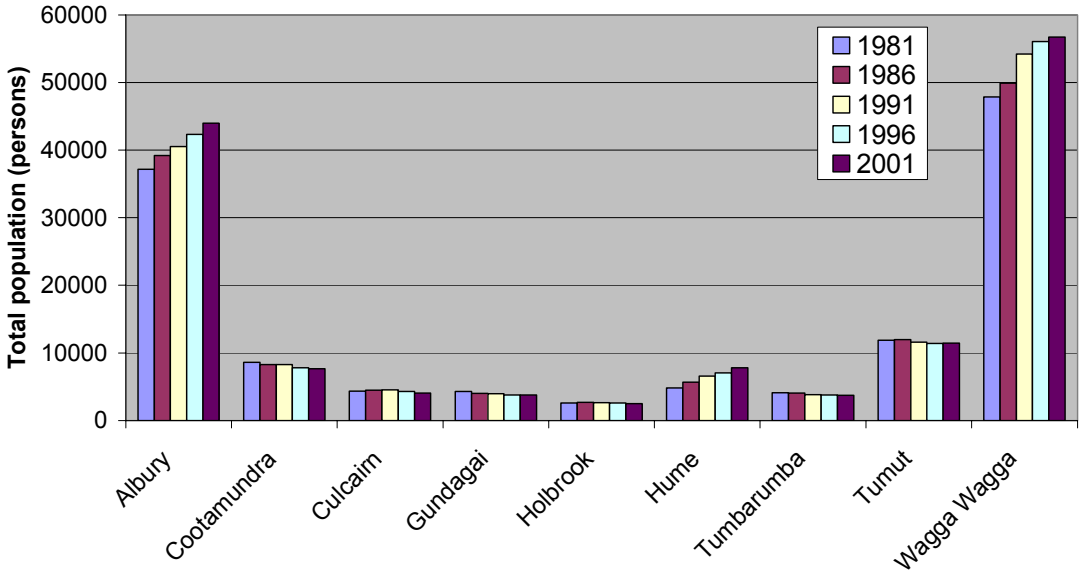
All figures presented in the following sections are based on the *estimated resident population* of LGAs and towns – defined as the population residing in the area, and excluding temporary workers and visitors.

Figure 27 shows the total population in each of the key SWS LGAs over 1981 to 2001, while Figure 28 shows the average annual rate of population change over 1981-2001.

A key pattern that can be seen is that LGAs with higher total population, particularly the regional cities of Albury and Wagga Wagga, experienced ongoing population growth, as did Hume, the LGA within commuting distance of the large regional centre of Albury.

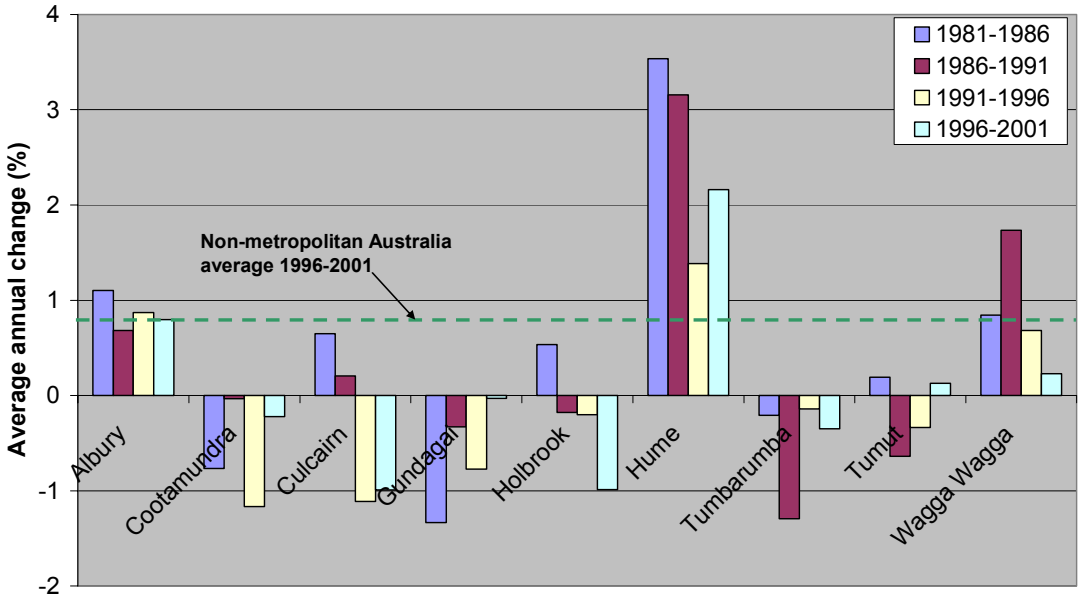
LGAs with smaller populations tended to experience population decline, with all but Holbrook, Tumut and Culcairn experiencing consistent population decline over 1986-2001. Of the three exceptions, only the LGA of Tumut experienced population growth in the most recent period. Tumut also experienced generally lower rates of population decline than the other ‘small’ population LGAs of the South West Slopes in other periods. Tumbarumba

experienced a lower rate of decline between 1991 and 2001 than other 'small' population LGAs, although it experienced high decline between 1986 and 1991.



Source: National Economics *Your Place* database

Figure 27: Total population by LGA, 1981 to 2001



Source: National Economics *Your Place* database

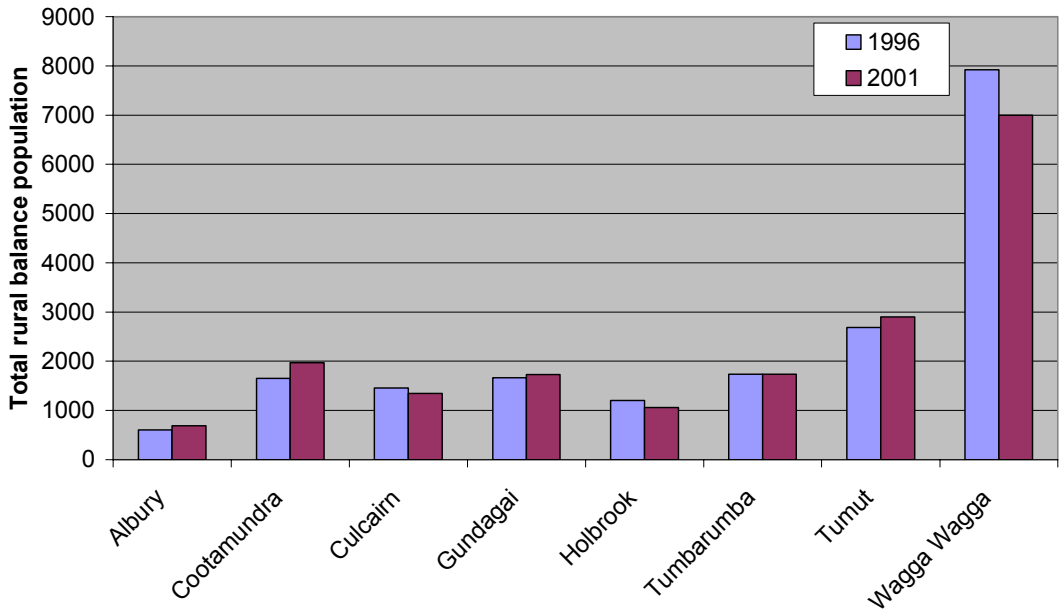
Figure 28: Average annual change in population of different SWS LGAs, 1981 to 2001

In focus groups, population growth in the region was generally reported to have occurred in and around the regional cities, a perception supported by the data. Population decline in the smaller LGAs was generally believed to have resulted from declining employment in the agricultural sector, associated with declining retail sectors in some LGAs.

Factors believed to have contributed to population stabilisation and/or growth in Tumut, Tumbarumba and, in 1996-2001, Gundagai, were:

- Increase in population living on 'rural residential' blocks (in all three);
- Increase in population working in the plantation sector and associated expansion of the retail sector to support this population (in Tumut and Tumbarumba);
- Some increase in tourism related businesses, particularly the retail sector, in Tumbarumba, although much of this growth has probably occurred post-2001;
- Increase in vineyards and blueberry production in Tumbarumba; and
- In Tumut, the expansion of the retail sector as the town of Tumut has become a 'sub-regional centre' for LGAs to the east and south, particularly Tumbarumba.

For the Census years of 1996 and 2001, data was obtained showing the population of rural areas[16] within each SWS LGA, and of individual towns[17]. Figure 29 and Figure 30 show the total rural population, and rate of change in rural population, over 1996 to 2001.

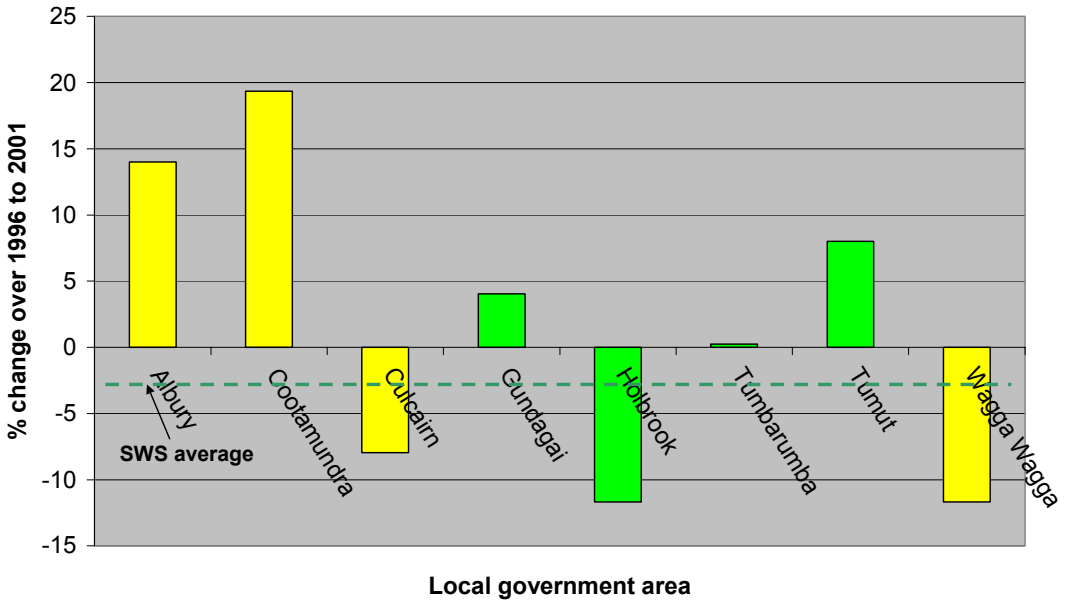


Source: ABS *Census of Population and Housing*

Figure 29: Total population living in rural areas by LGA, 1996 and 2001

[16] Defined as the population living on rural properties or in localities with less than 200 population living within gazetted town boundaries

[17] Defined as towns/localities with higher than 200 population living within their gazetted town boundaries



Source: ABS *Census of Population and Housing*

Figure 30: Percent change in rural population by LGA, 1996 to 2001[18]

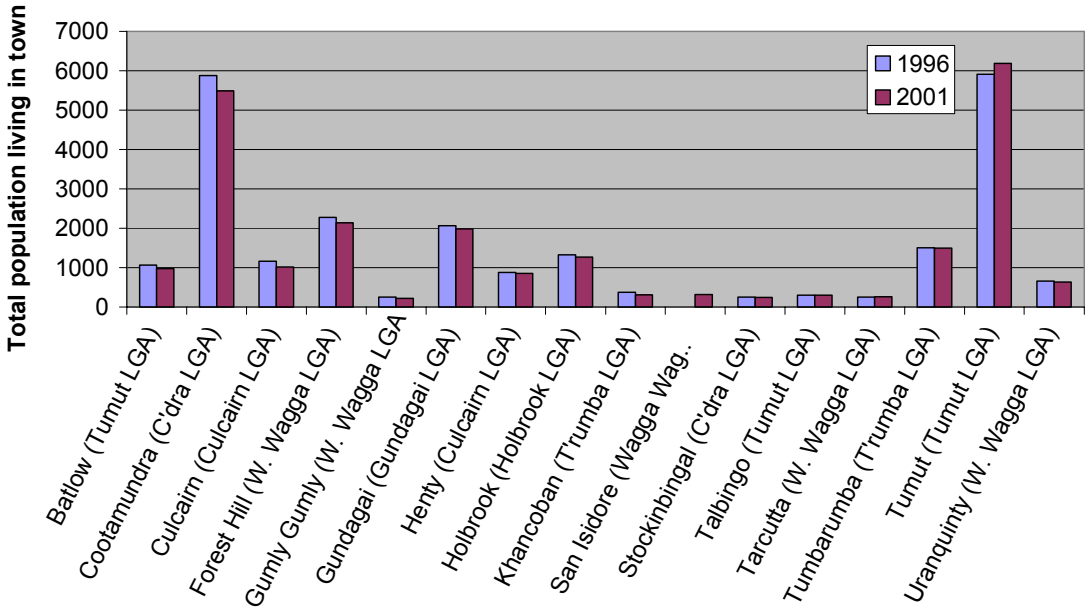
The rural population includes many people living in rural subdivisions, particularly in Tumut Shire. It also includes people living in localities with a population of less than 200, such as Humula and Rosewood (shown on Figure 1). Rural population growth primarily occurred in LGAs which had growth of population living in rural subdivisions – Albury, Gundagai, Tumbarumba and Tumut. In many cases, this growth involved town residents shifting to rural subdivisions outside gazetted town boundaries, so represented a shift of population within an LGA. In more recent years, focus groups attendees reported that increasing numbers of new residents had shifted to the region from outside the SWS to live on rural residential blocks.

Rural populations declined in Wagga Wagga, Culcairn and Holbrook. The decline in Culcairn and Holbrook is likely related to high dependence on broadacre agriculture combined with lack of proximity to a large regional centre. Decline in Wagga Wagga was reported by focus group participants to be most likely due to a combination of decline in numbers of farming families, and local government policies in the LGA restricting subdivision of rural properties.

Figures 31 and 32 show the total population in all towns in the region with more than 200 population in 1996 and 2001[19], and the rate of change in town populations over this time.

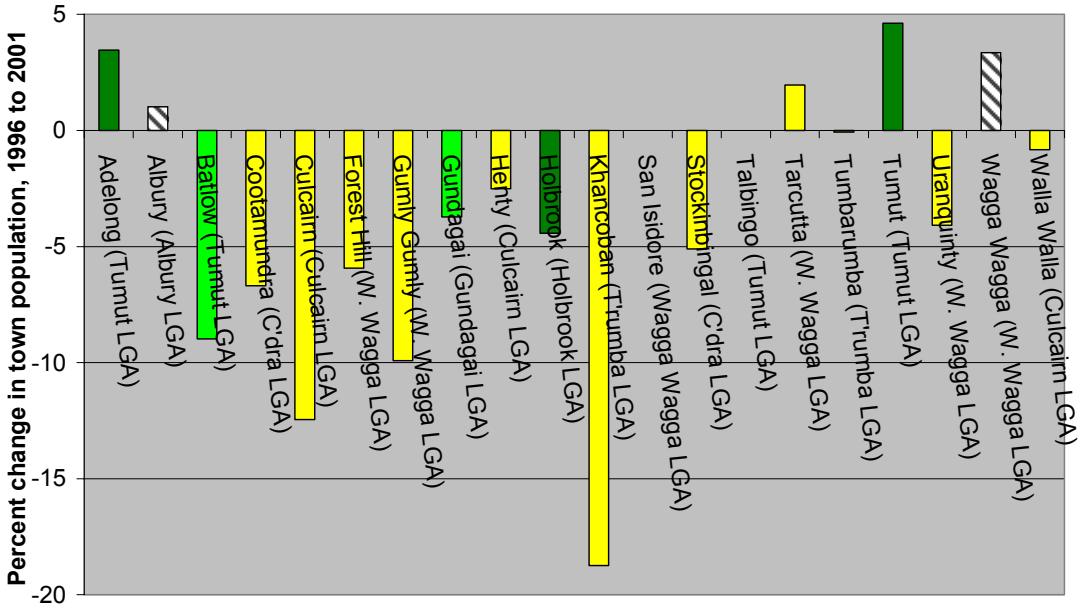
[18] In Figure 30, light green columns (dark grey if viewed in black and white) indicate LGAs of the SWS with high areas of plantation estate, while yellow columns (light grey) indicate LGAs of the SWS with little or no plantation estate.

[19] The total population of Albury and Wagga Wagga are not shown as the population of these towns is considerably higher than that of the other towns in the region, making it difficult to view population trends in the smaller towns. The large majority of the population shown in Figure 28 for the LGAs of Albury and Wagga Wagga live in the cities of Albury and Wagga Wagga.



Source: ABS *Census of Population and Housing*

Figure 31: Total population living in towns by town, 1996 and 2001



Source: ABS *Census of Population and Housing*

Figure 32: Percent change in town population by town, 1996 to 2001[20]

The population of larger towns tended to increase, while population of smaller towns generally fell. Exceptions to this trend were:

[20] In Figure 32, towns are classified into four categories: yellow (light grey if viewing a black and white printed copy of this report) are towns not located near large areas of plantation and without plantation processing facilities; light green (medium grey) are towns located near large areas of plantation but without plantation process facilities; dark green (dark grey) are towns located near large areas of plantations and with plantation processing facilities, and striped brown (striped) towns are regional cities with plantation processing facilities.

- Tumut, the largest of the 'small' towns in the region, and Adelong. Growth in the population living in these two towns was largely attributed by focus group attendees to employment in plantation processing facilities in and near the town of Tumut. The town of Cootamundra, of a similar size to Tumut in 1996, experienced population decline over the same period;

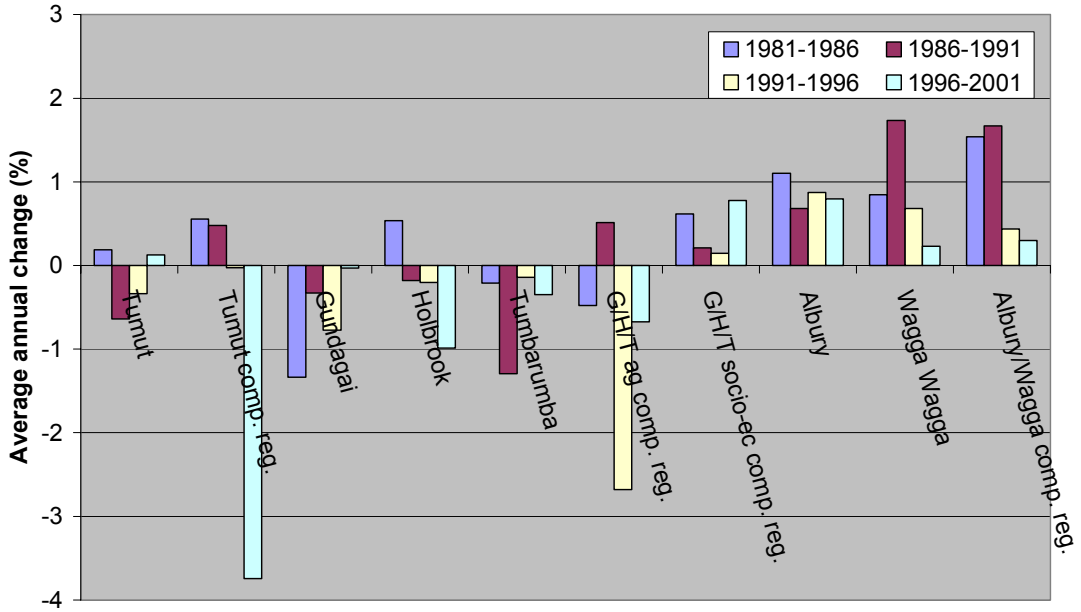
- Tumbarumba, which experienced stable population over 1996 to 2001 while other towns with similarly sized populations mostly experienced population decline. The main explanation provided by focus group attendees for this trend was that employment in plantation processing at the Hyne & Son mill, expansion of vineyards, expansion of blueberry production, and a slowly growing tourism industry had all acted to help stabilise the population of the town; and

- Cabramurra and Talbingo, which experienced unchanged population between 1996 and 2001. These two small towns are located within National Park areas, and their population is made up of employees of the Snowy Hydro, who work in the large hydro-electric plants located near the towns, as well as some 'lifestyle' residents who commute to Tumut or Tumbarumba for employment, and some residents with holiday homes. This small population is not affected by changes to agricultural industries, as there is very little agricultural activity in areas surrounding the two towns.

Overall, it appears that towns/regional cities with either (a) a large population at the start of the period studied (over 30,000) or (b) large-scale plantation processing facilities or otherwise strong manufacturing sectors, tended to experience population growth or a stable population. In contrast, those with local economies more heavily dependent on broadacre agriculture and less manufacturing activity were more likely to experience population decline.

Having a strong manufacturing base is likely to have contributed to stabilisation and growth of those town populations that experienced growth. However, it is only in towns where the processing is on a scale that allows it to strongly underpin the local economy that this trend is seen. Holbrook, which has smaller scale plantation processing facilities than Tumut or Tumbarumba, experienced population decline, with its economy still largely dependent on agriculture despite the presence of plantation processing in the town of Holbrook.

Figure 33 compares average annual population change over 1981-1991 and 1991-2001 in LGAs of the SWS with plantation sector activity and comparison LGAs outside the SWS.



Source: National Economics YourPlace database

Figure 33: Average annual change in population of SWS LGAs and comparison regions

The Shire of Tumut experienced somewhat different trends to similar regions, experiencing population decline in the late 1980s and early 1990s when the comparison regions grew, while the comparison regions experienced a high rate of population decline over 1996 to 2001.

When a larger sample of 20 similarly sized inland regions, not matched for industry structure, were compared to Tumut, a wide range of outcomes could be seen. Some experienced population growth considerably higher than that in the Shire of Tumut; others population decline. In general, most LGAs which had between 7,000 and 13,000 population in 1991 experienced average annual population growth of between -1% and +1% between 1991 and 2001, a range in which Tumut falls at the upper end.

However, within the Shire of Tumut it is important to note that the towns of Tumut and Adelong have experienced population growth while the town of Batlow experienced population decline. The key factors explaining this within-LGA difference relate to the strength of the ongoing plantation processing-based manufacturing industry in Tumut and near Adelong, compared to the closing of the fruit cannery in Batlow which had until 2002 been the major manufacturing facility in the town.

Gundagai, Holbrook and Tumbarumba experienced a mix of patterns of population change. Different factors appear to have influenced the population of these LGAs and their comparison regions at different points in time. It is important to note that relatively small numbers of people entering or exiting these LGAs can have a large impact on the overall population due to the small total populations of the LGAs.

Albury and Wagga Wagga experienced similar overall trends to comparison regions outside the SWS, but Albury experienced more consistent and stable population growth than either Wagga Wagga or the comparison LGAs.

These findings indicate that the SWS LGAs experienced population trends relatively similar to LGAs which had similar size and structure in 1991. In the small population LGAs (all except Albury, Wagga Wagga and, to a lesser extent, Tumut), it is difficult to identify what is

a ‘typical’ trend, with small numbers of people entering and exiting these LGAs showing as relatively large percentage changes in population.

Perhaps the only exception was Tumut, which experienced higher population growth in recent years than comparison LGAs. Although Tumut Shire’s overall population trends were at the upper end of a typical range, the growth of the towns of Tumut and Adelong was above average compared to similarly sized towns. It is likely that the reason Tumut experienced population growth in recent years is related to expansion of the processing sector in the region, and to Tumut increasingly acting as a small regional centre, with services withdrawing from surrounding smaller towns whose residents commonly shift to accessing these services in the town of Tumut.

During the period studied, the plantation sector appears likely to have contributed to stable or growing town populations in small and mid-sized towns where large-scale processing facilities have been established – primarily the towns of Tumut and Tumbarumba. Particularly since 1991, these LGAs have experienced more stable populations and, in the case of Tumut, population growth, than other LGAs with small populations in the SWS with economies more reliant on broadacre agriculture. By providing a source of local employment, the plantation sector may also have indirectly contributed to maintenance of some rural population, as farming families could stay on farms while earning off-farm income in the local region.

While other factors have undoubtedly contributed to the overall higher population growth/lower population decline in LGAs with plantation processing, the influence of having a large proportion of the local economy dependent on the manufacturing sector as well as lower dependence on broadacre agriculture is likely to be a major factor contributing to this trend. This is supported by the town population data, which show higher population growth in the towns with large-scale processing facilities, while other towns within the same LGAs experienced population decline.

9.0 Socio-demographic change in the population

Socio-demographic change – change in the characteristics of the population - was examined over time for the LGAs of the SWS. Key findings are provided in Box 5.

Box 5: Key findings on socio-demographic change

In general, the population of the study region has aged with declines in child (age 0 to 14) and youth (age 15 to 24) population, and increases in working age (25 to 64) and retirement age (65+) population. This trend is consistent with the overall ageing of the Australian population.

LGAs with high dependence on agriculture have tended to experience higher growth in retirement age population than working age population. In contrast, LGAs with more diverse economies, including those with wood and paper manufacturing industries, have experienced greater increases in working age population, indicating they have better prospects for long term economic growth and population stability than LGAs with higher dependence on traditional agriculture.

The SWS population in general has become more highly qualified, with increases in the proportion of the population holding a certificate, bachelor degree or higher qualification. Again, this is consistent with trends across Australia. LGAs with smaller populations generally experienced a slower growth in the proportion of population holding qualifications beyond high school, although those with higher economic diversity tended to experience more rapid growth than those with high dependence on broadacre agriculture.

Most LGAs in the region experienced a decline in the proportion of new residents entering the LGA between 1996 and 2001, with the exception of the Shires of Tumut and Holbrook. In both these LGAs, changes in wood processing – particularly the establishment of the Visy Industries pulp and paper mill in Tumut – likely contributed to this change. No other changes were identified that might have contributed to an increase in the proportion of new residents in these populations.

Unemployment fell in all LGAs in the region over 1991 to 2004, with most jobs growth coming from part-time employment. This was consistent with broader national trends. The exception is the Shire of Tumut, where both full-time and part-time jobs have been created, possibly reflecting the high proportion of full-time work available in the plantation sector.

Household income growth has generally been more reliable over time in LGAs with higher economic diversity. The plantation sector has been one of the sectors contributing to this economic diversity in LGAs where processing facilities have been established and plantation managers and employees are based. However, some LGAs with high areas of plantation have relatively few people living in the LGA who work in the sector – and so don't experience the benefits of more stable growth associated with having plantation sector employment located in the LGA.

A wide range of socio-demographic characteristics may be examined for any population. For this study, the following were examined:

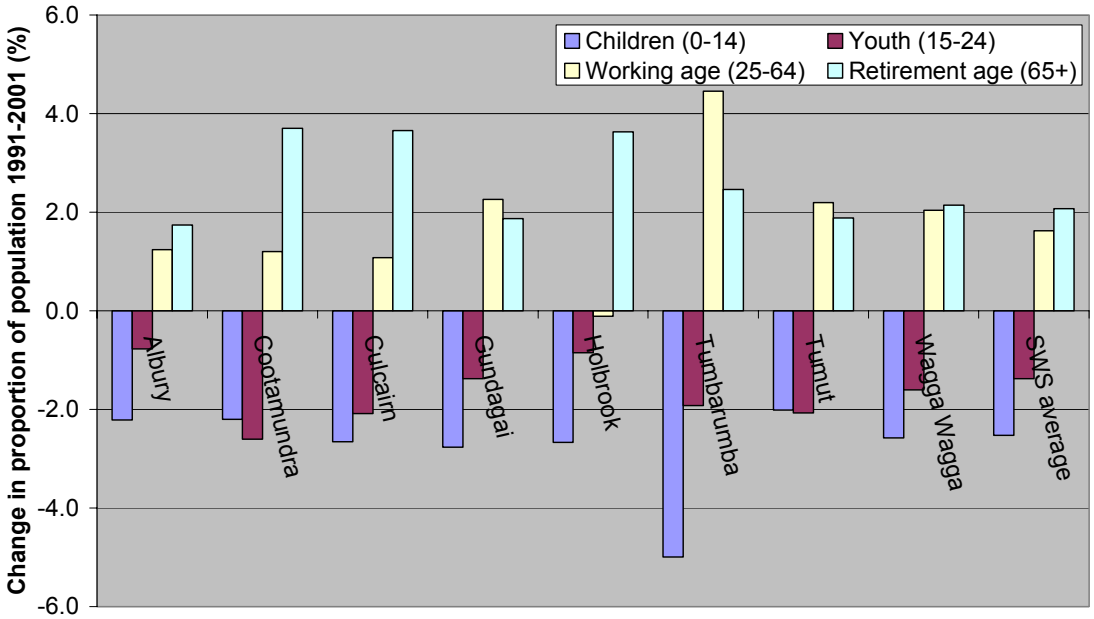
- Age structure;
- Educational attainment;
- Number of new residents;

- Part-time and full-time employment;
- Unemployment; and
- Household income.

These socio-demographic characteristics were selected as they represent key areas which may change when the economy of an area changes, eg as a result of introduction of new industries or decline of existing industries. Each characteristic is examined separately below.

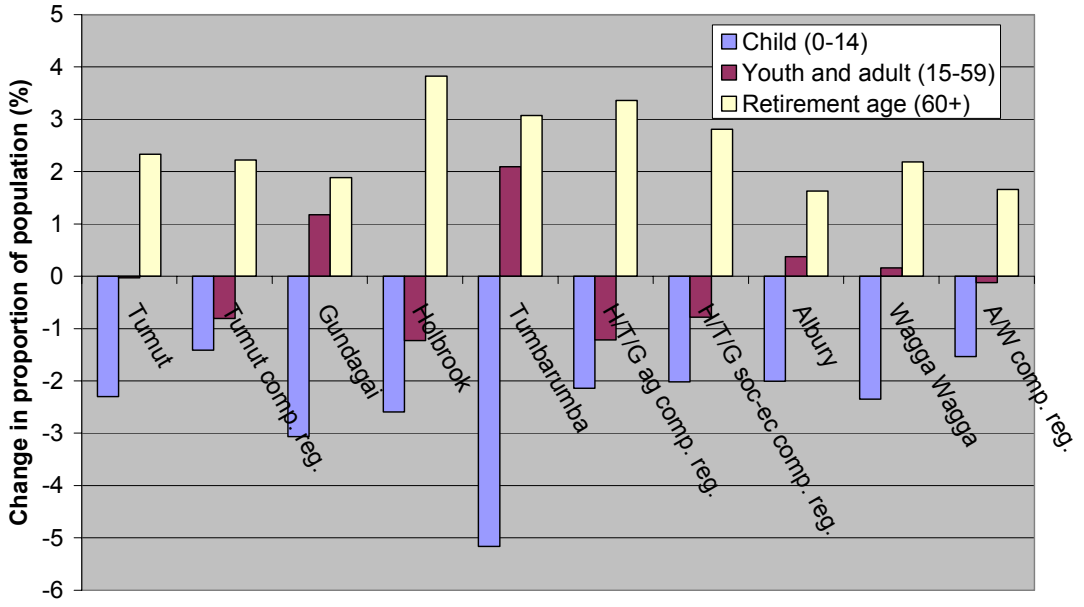
9.1 Age structure

Figure 34 shows the change in proportion of the population made up of four age groups over the period 1991 to 2001 in different SWS LGAs. During this period, there was a general trend across the SWS of declining child (0 to 14) and youth (15 to 24) age populations, and increasing working age (25 to 64) and retirement (65+) age population. This trend reflects the trend of ageing population across Australia generally – between 1991 and 2001, the median age of the Australian population rose from 32.4 years to 35.4 years of age (ABS 2002). When shifts in age structure in comparison regions were examined, shown in Figure 35, the SWS LGAs showed similar patterns to their comparison LGAs with the exception of Tumut, Tumbarumba and Gundagai, all of which experienced a smaller fall in youth and adult aged population than their comparison LGAs.



Source: ABS *Census of Population and Housing*

Figure 34: Change in proportion of population of different ages 1991-2001, by LGA



Source: National Economics *YourPlace* database

Figure 35: Change in population age structure of high plantation LGAs and comparison regions, 1991 to 2001[21]

While the overall trend was similar across the region, some different trends occurred in individual LGAs:

- Tumbarumba experienced a particularly high decline in child-aged population. In focus groups, this trend could not be easily explained, although attendees reported increasing enrolments in child care and early school years over the last two to three years, indicating that there may have been a shift to a higher proportion of child-age population since 2001;

- Culcairn and Holbrook – the two LGAs most highly dependent on traditional agriculture as a proportion of their economy – experienced the highest increases in population aged over 65 as a proportion of their population, and the lowest increases in working age population. These LGAs may experience declining economic growth as the working age population falls, unless new population is attracted to the area;

- Tumbarumba, Tumut, Gundagai and Wagga Wagga experienced the highest rates of increase in working age population, with all except Wagga Wagga experiencing stronger growth than occurred in comparison regions. This indicates a strong potential for ongoing economic growth, due to the large proportion of the population in the most economically productive age group.

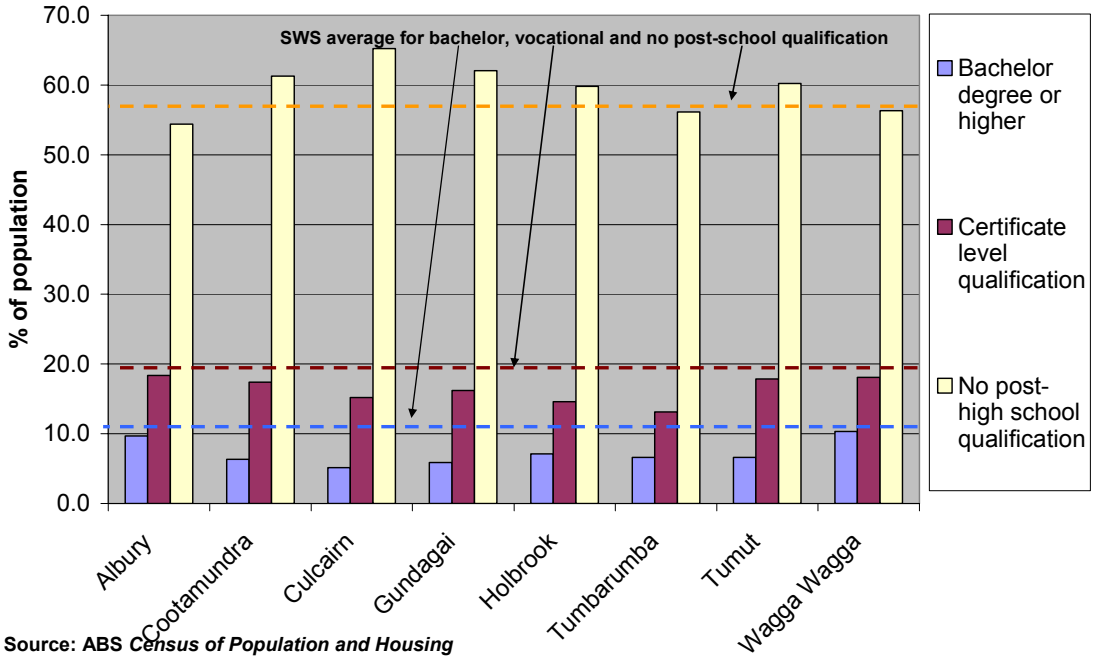
In general, LGAs with a more diversified economy including a strong manufacturing sector experienced stronger growth in working age population than those with high economic reliance on broadacre agriculture.

[21] Data for comparison regions in Figure 35 was drawn from the National Economics database which has time series data concorded to 2001 regional boundaries. This database provides information for three age groups that are slightly different to those shown in Figure 34. It was used as it was possible to obtain data for all comparison regions using National Economics data, although not as many age groups could be examined separately as for the data drawn directly from the Census.

The plantation sector has underpinned the diversification of the economy of Tumut and Tumbarumba Shires, while other industries have also contributed to a lesser extent. Other industries have underpinned growth in Wagga Wagga. In Gundagai, the growth may be due both to growth in manufacturing in Gundagai Shire and to employment opportunities in the town of Tumut, which is only 20 minutes drive from the town of Gundagai, including jobs in the plantation sector.

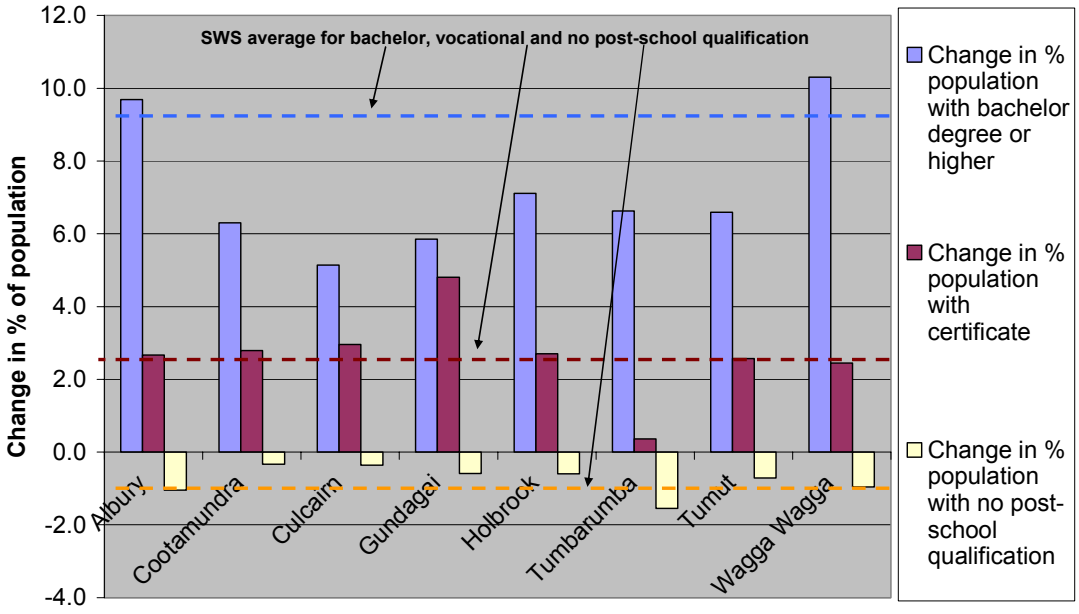
9.2 Educational attainment

Figure 36 shows the highest level of formal qualification attained by people over the age of 16 in 2001, while Figure 37 shows the rate of change in the proportion of the population that had attained different qualifications over 1991 to 2001.



Source: ABS *Census of Population and Housing*

Figure 36: Highest qualification achieved by LGA, 2001



Source: ABS *Census of Population and Housing*

Figure 37: Change in proportion of population with different qualification levels by LGA, 1991 to 2001

In general, there has a been a trend across the region towards increasing levels of formal qualification, with an increase in the proportion of the population who have a high school certificate or a qualification beyond high school.

Similarly to age structure of the population, while the overall changes were similar across the region, there were some differences:

- While the proportion of the population of regional centres (Albury and Wagga Wagga) holding bachelor degrees or certificate level qualifications was close to the NSW average, a lower proportion of the population of LGAs with smaller populations held post-school qualifications;

- The proportion of population holding certificate level qualifications in Tumut in 2001 was slightly above the NSW average and considerably higher in Gundagai, whereas for other low population LGAs it was generally below the State average;

- Growth in the proportion of population holding bachelor degree or higher qualifications has been above the State average in the regional cities of Albury and Wagga Wagga, and lower than the average in other LGAs of the region; and

- Growth in the proportion of population holding bachelor degree or higher qualifications has been higher in Tumut, Tumbarumba and Holbrook than other small LGAs.

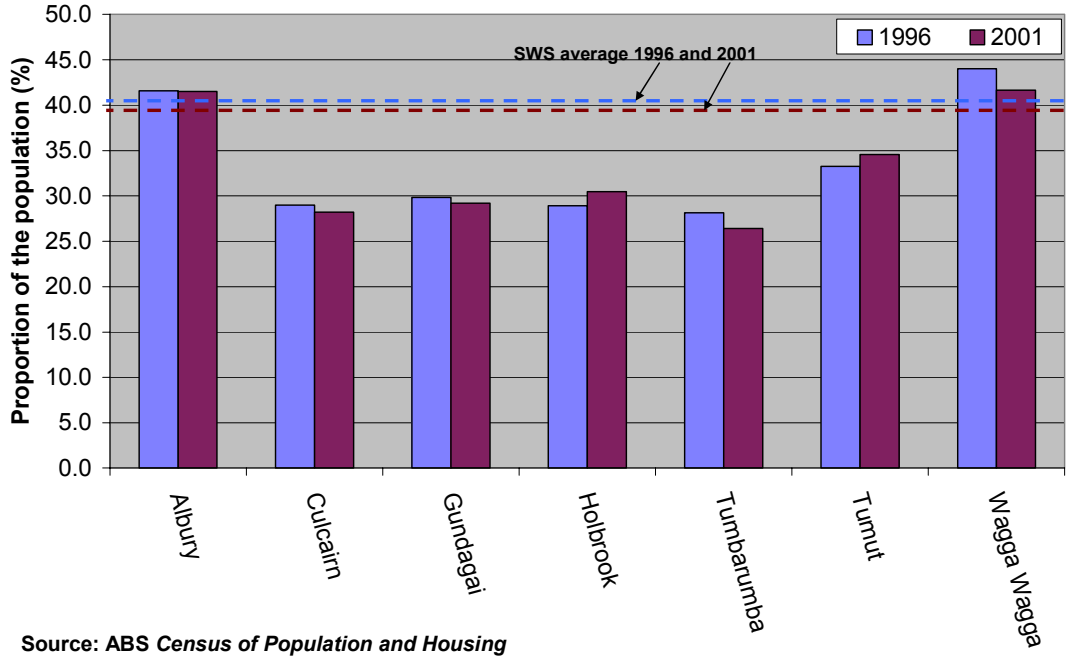
Overall, people living in small population LGAs were less likely to hold qualifications beyond high school than those living in large population LGAs. However, within the smaller rural LGAs, those with a more diversified economy tended to have a more highly educated population, including those in which there was considerable plantation sector employment.

When changes in proportions of the population holding different types of qualification in the SWS were compared with changes in comparison LGAs outside the SWS, no clear differences in rates of change were observed.

9.3 Number of new residents

The ABS *Census of Population and Housing* asks residents whether they have been usually resident at their current address for the past five years, and for their previous address if they have shifted residence. From this, a data series has been developed showing the proportion of population usually resident in the same LGA five years previously.

Figure 38 shows the proportion of the population who reported they did *not* usually reside at the same address five years previously in 1996 and 2001.



Source: ABS *Census of Population and Housing*

Figure 38: Proportion of population not usually resident in the LGA five years previously, 1996 and 2001[22]

In most LGAs of the SWS, the proportion of the population who did not usually reside there five years previously – 'new residents' – fell slightly. However, an increased proportion of new residents lived in Tumut and Holbrook in 2001 compared to 1996.

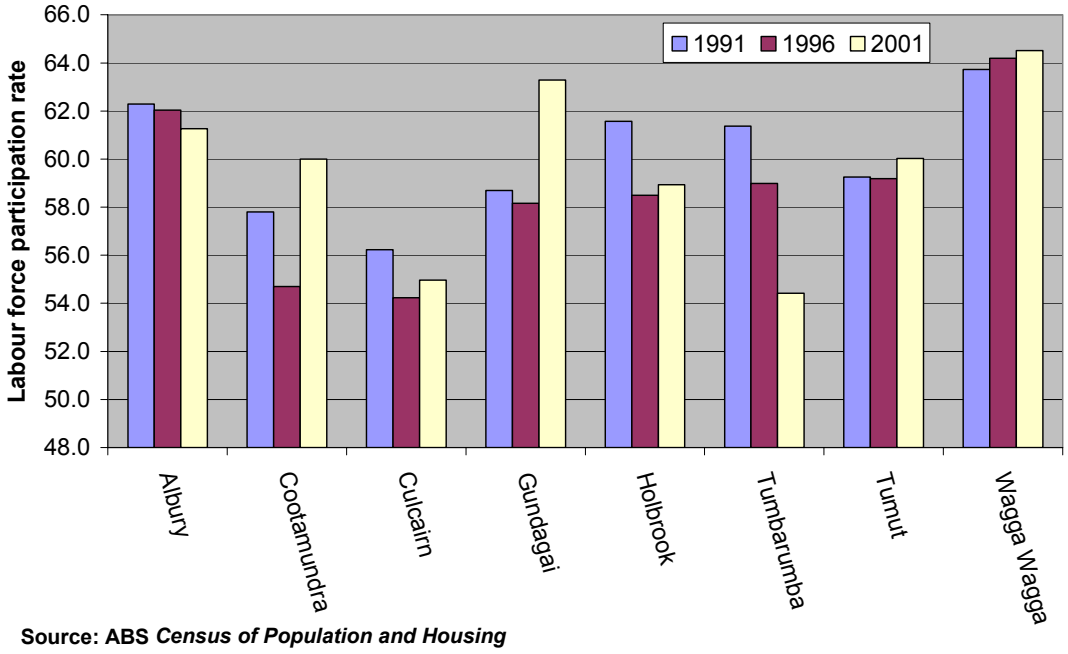
In focus groups, respondents suggested that the change in Tumut was likely a result of an influx of new residents in Tumut as a result of establishment of the Visy mill and ongoing expansion of plantation sector activities. In Holbrook the construction of the Hyne and Son sawmill, opened in 1998, similarly brought new workers into the region. No other potential explanations for this pattern were suggested by either focus group participants, or the data on changes in key economic sectors in each LGA over this period. It therefore seems plausible that changes in the plantation sector are likely to have led to a shift to increased numbers of new residents in Tumut and Holbrook over 1996 to 2001.

[22] Note: Data have not been included for the LGA of Cootamundra due to problems identified with the 1996 data for that LGA

9.4 Labour force, employment and unemployment

Figure 39 shows the rate of change in participation in the labour force in different LGAs of the SWS over 1991-1996 and 1996-2001. There was high variability in labour force participation rates, with the lowest labour force participation generally occurring in LGAs with lower population, but considerable variation both over time and between LGAs.

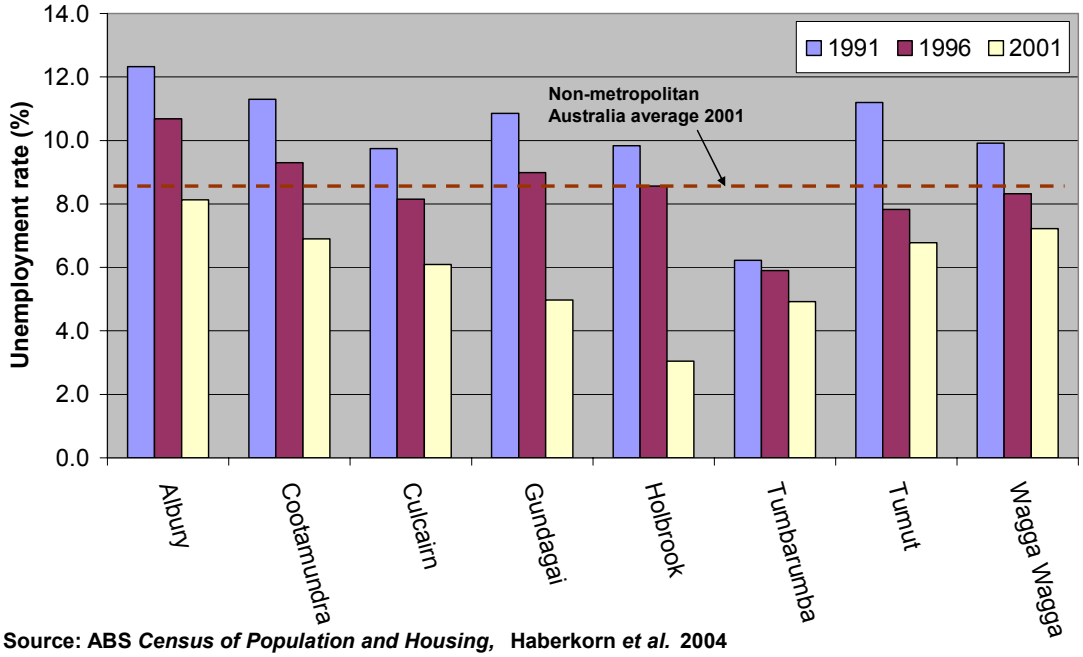
While different trends are apparent over time in some LGAs, participants in focus groups were able to offer few explanations for these changes based on their knowledge of different LGAs.



Source: ABS *Census of Population and Housing*

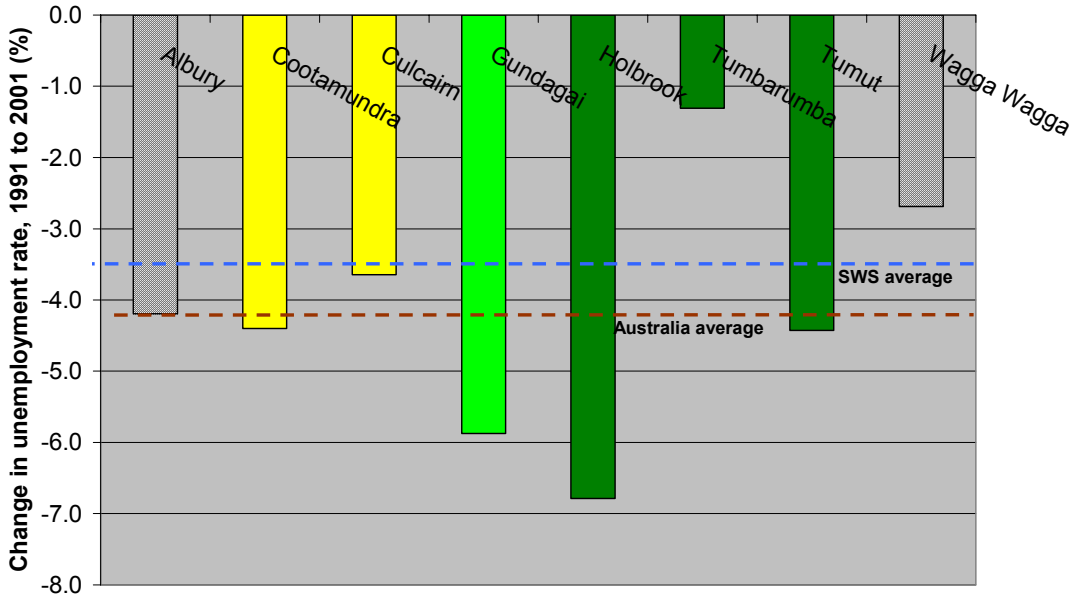
Figure 39: Labour force participation rate by LGA

Figure 40 shows the rate of unemployment over time in different LGAs, while Figure 41 shows the total decrease in unemployment over 1991-2001. Rates of unemployment fell in all LGAs of the SWS, and in NSW generally, over 1991 to 2001. However, the extent of the change varied in different LGAs.



Source: ABS *Census of Population and Housing,* Haberkorn *et al.* 2004

Figure 40: Unemployment rate by LGA, 1991, 1996 and 2001



Source: ABS *Census of Population and Housing*

Figure 41: Change in unemployment rate by LGA, 1991 to 2001

Focus group attendees generally found it difficult to provide explanations for the different rates of change in unemployment rates over time.

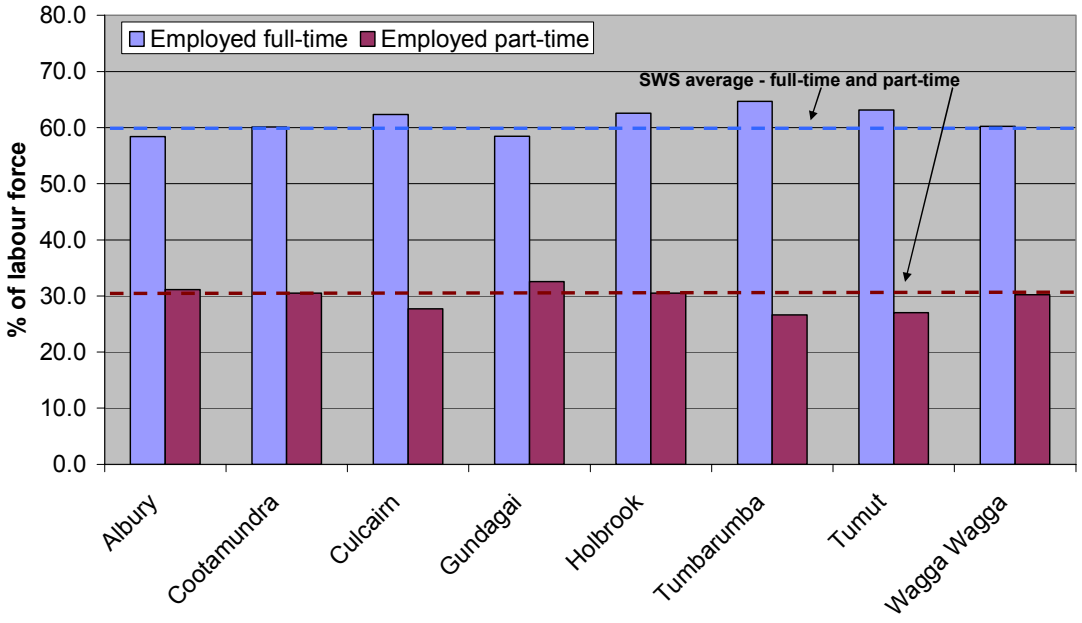
In Holbrook, the establishment of the Hyne and Son mill, which has been the single largest employer in Holbrook since it opened in 1998, was believed to have been a major contributor to reduction in unemployment in the LGA. This appears to be a likely explanation as the total number of unemployed in Holbrook is relatively small, and therefore the rate of unemployment could easily have been influenced by employment opportunities at the mill.

Some also suggested that reduction in unemployment in Gundagai was influenced by trends in the Tumut labour market as well as in Gundagai, with the towns of Gundagai and Tumut only a short distance apart.

Figure 42 shows the proportion of the labour force employed full-time and part-time in 2001, while Figure 43 shows the change in the proportion of the labour force employed full-time and part-time over 1991 to 2001.

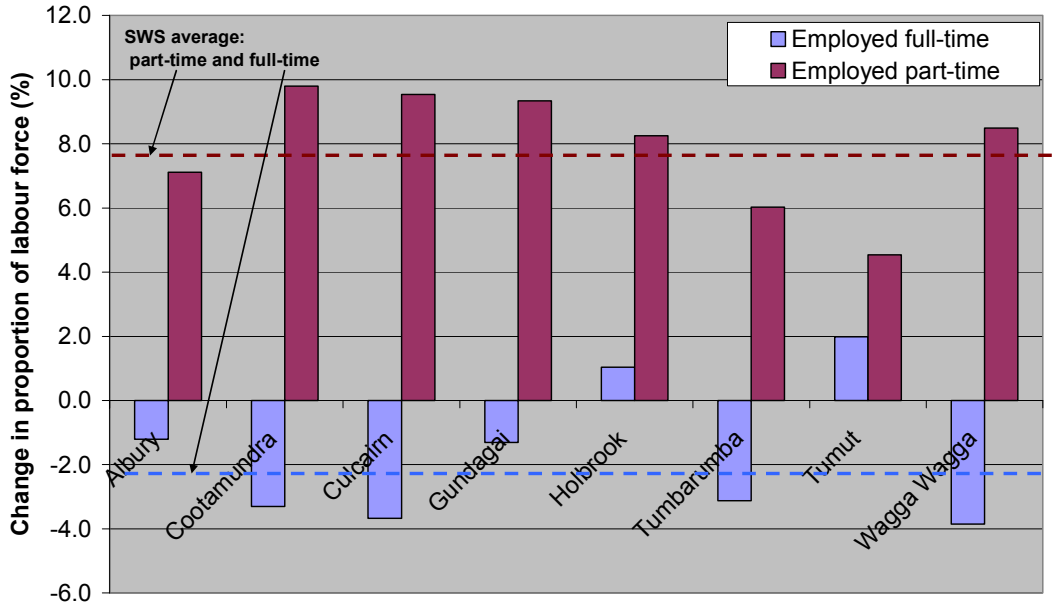
The proportion of the labour force employed part-time increased in all LGAs, while the proportion employed full-time fell in most LGAs. The exceptions to this trend were Tumut and Holbrook, where both full-time and part-time employment increased. The fall in unemployment in these LGAs resulted from creation of both full-time and part-time employment, while in other LGAs the fall in unemployment mostly resulted from an increase in part-time employment.

When asked what may have contributed to this different outcome in Tumut and Holbrook, focus group attendees generally believed that the high levels of full-time employment in the plantation sector contributed to the increase in full-time employment in both LGAs, particularly with expansion of plantation processing activities in Holbrook.



Source: ABS *Census of Population and Housing*

Figure 42: Proportion of labour force employed full-time and part-time in 2001 by LGA



Source: ABS *Census of Population and Housing*

Figure 43: Change in proportion of labour force employed full-time and part-time by LGA, 1991 to 2001

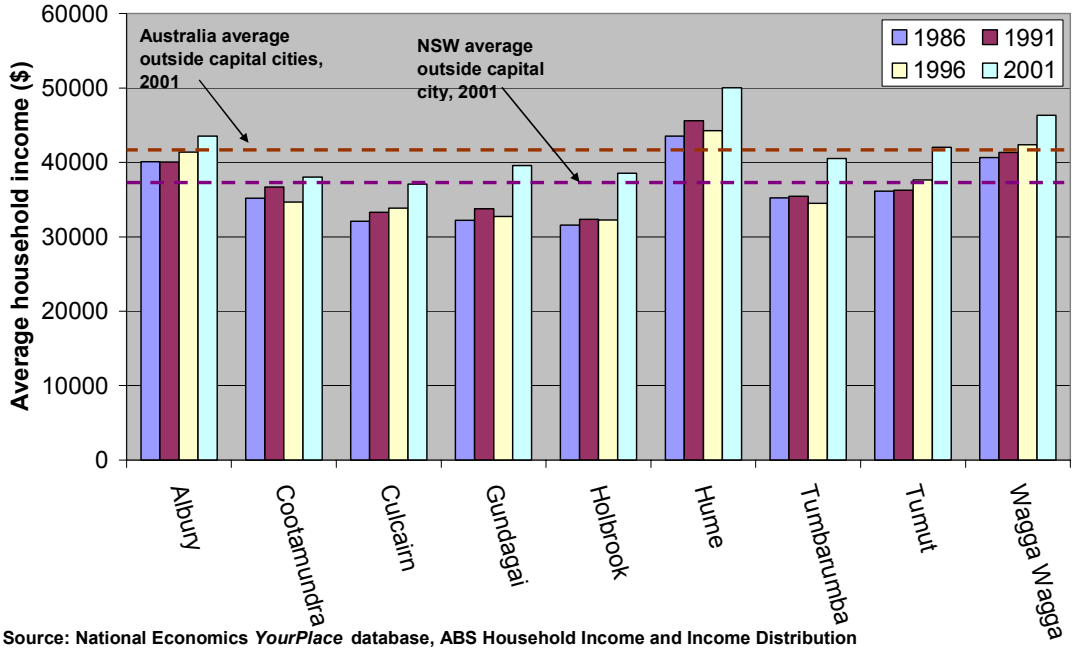
9.5 Household income

Figure 44 shows average household income for different LGAs of the SWS in 1986, 1991, 1996 and 2001. The lowest average household incomes were consistently in the LGAs of Cootamundra, Culcairn and Holbrook, while the highest incomes occurred in the regional cities of Albury and Wagga Wagga, and in the Shire of Hume. Of the low population LGAs, Tumut and Tumbarumba consistently had the highest average household incomes over the four periods examined.

In focus groups, participants explained these trends as resulting from:

- A high concentration of professional, high income jobs in regional centres;
- A high number of rural residential properties in Hume, in which high income residents working in Albury live;
- Incomes from the plantation sector in Tumut and Tumbarumba contributing to a more stable growth in household income; and
- Increases in income resulting from establishment of the Hyne and Son sawmill in Holbrook in the late 1990s and increased manufacturing employment in Gundagai contributing to increased household income in the same period.

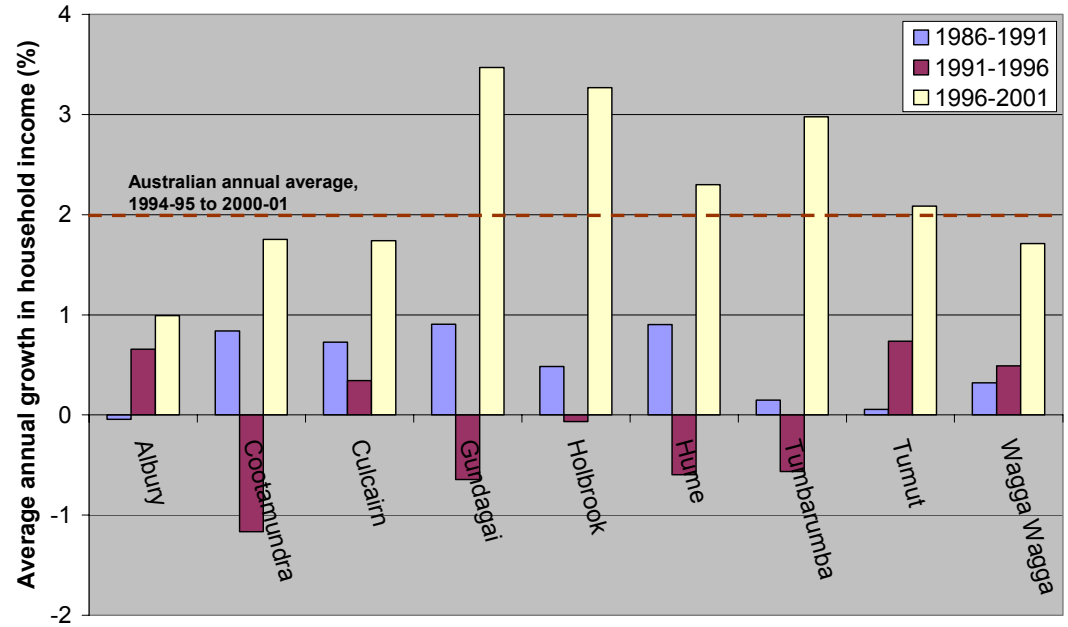
The perceptions of focus group participants clearly pointed to the plantation sector playing a role in higher household incomes. Unfortunately, exact data on wages and salaries for all parts of the plantation sector and other industries operating in the SWS could not be obtained for the years shown in Figure 44, and so it was not possible to test whether wages/salaries paid in the plantation sector tended to be higher on average than wages/salaries paid in other industries operating in the small LGAs at the same time.



Source: National Economics *YourPlace* database, ABS Household Income and Income Distribution

Figure 44: Average household income by LGA, 1986 to 2001

Figure 45 shows average annual growth in household income (in $2001 dollars) in the five years to 1991, 1996 and 2001.

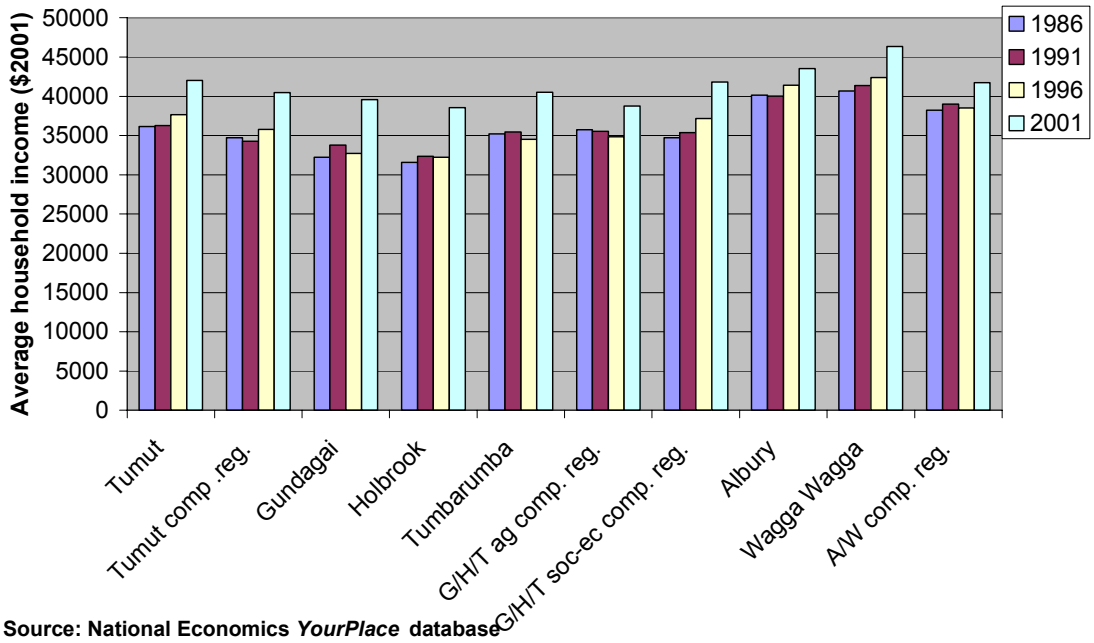


Source: National Economics *YourPlace* database, ABS Household Income and Income Distribution

Figure 45: Average annual growth in household income by LGA, 1986 to 2001

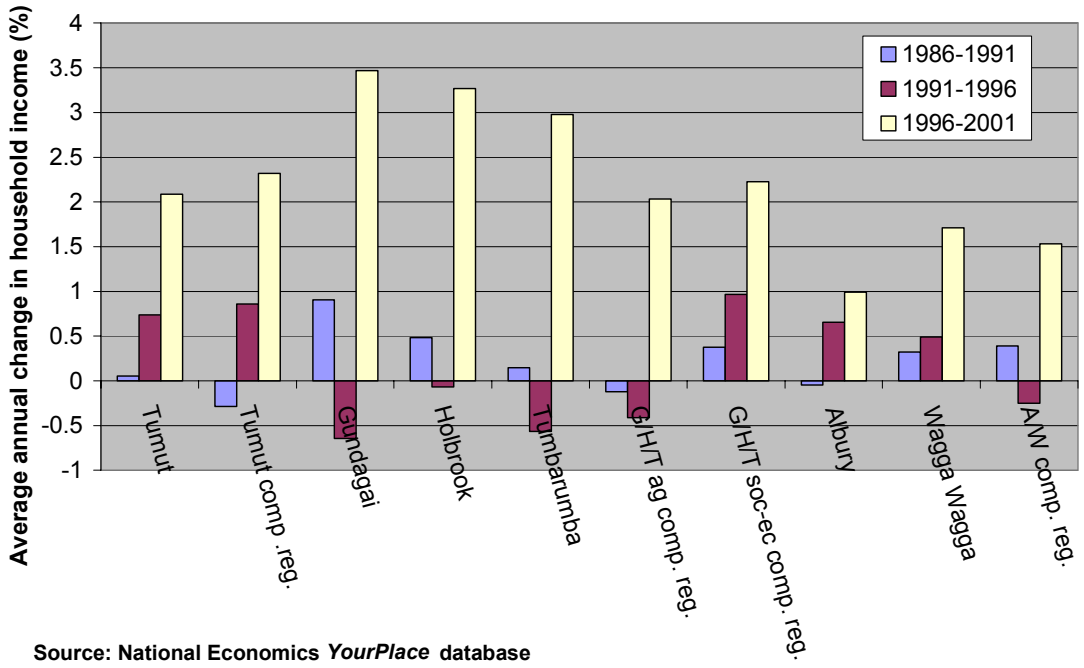
The pattern that can be seen in Figure 45 is one in which those LGAs which have the highest diversity of industries – the large regional centres and Tumut - show a more stable pattern of income growth, while those that are heavily reliant on a single sector (in this case, usually broadacre agriculture) have experienced fluctuations in household income growth. Tumbarumba, despite having plantation processing, remains relatively highly reliant on agriculture, and shows this pattern of fluctuations in the real value of household income.

When total income and change in income in comparison regions was examined (shown in Figures 46 and 47), a mix of patterns can be seen. This indicates that a range of factors affect average household income in different areas. For example, Gundagai, Holbrook and Tumbarumba all experienced generally higher income growth over 1986-1991 and 1996-2001 than their comparison regions, while Tumut experienced slightly slower growth. However, Tumut started with overall higher average income than its comparison regions.



Source: National Economics *YourPlace* database

Figure 46: Average household income in SWS and comparison regions by LGA, 1986 to 2001



Source: National Economics *YourPlace* database

Figure 47: Average annual change in household income in SWS LGAs and comparison regions, 1986 to 2001

10.0 Service provision

Provision of key services in different LGAs of the SWS was analysed over time. This data was collected primarily via focus groups held in the SWS, as well as from some state and national data sets.

Provision of education, health, government, community/volunteer and retail services were examined as far as possible given the limited data available. As most data was sourced locally or from state data sets, it was not possible to compare changes in the SWS with comparison regions in many cases. The extent of measurement of change was also limited – in many cases, only the broad direction and type of change could be identified, rather than quantitative measures of change.

Key findings on changes in service provision are detailed in Box 6.

Box 6: Key findings on service provision

Limited data was available on changes occurring to service provision in the SWS, such as community groups, health services or retail services. While it was possible to identify general trends in service provision, achieving a detailed understanding of the magnitude of change was not generally possible.

Key trends in service provision included:

- Declining enrolments in schools in all areas. This reflects the decline in children as a proportion of the population, and relatively low population growth in the region. However, the Shire of Tumut experienced a lower rate of decline in school enrolments than other LGAs;

- Membership of community groups, and the number of community groups, was greater in areas experiencing higher population growth. However, in LGAs where many people are employed in manufacturing focus group attendees reported that it was sometimes difficult to maintain memberships in some community groups, particularly sporting groups, as shift workers employed in processing facilities can find it difficult to attend meetings or games on a regular basis. Additionally, in areas with ageing populations there is sometimes a trend of declining membership of sports groups such as football groups, while membership of other groups such as golf or bowling clubs is steady or rising; and

- Somewhat stronger growth in the retail sector in the Shire of Tumut compared to other 'small population' LGAs of the SWS. This is likely a result of both the strong plantation processing sector in Tumut, and the general trend in which the town of Tumut has been acting as a small regional centre for surrounding areas.

Overall, changes in the level of education, health, government, retail services and community groups were influenced by a range of factors. Probably the greatest of these was overall population change.

In focus groups, many participants reported that investment in fire fighting services by Forests NSW has provided important benefits in the region. Forests NSW invests in considerable fire fighting capabilities to protect the large plantation estate in the region. Other landholders in the region have benefited from rapid response to fire incidents by Forests NSW, which reduces fire damage on both plantation land and other land in the region.

10.1 Education

Changes in education services were analysed by examining data on level of school enrolments in four key LGAs – Gundagai, Tumbarumba, Tumut and Wagga Wagga. Enrolment data for individual schools in these LGAs was obtained from the NSW Department of Education and Training.

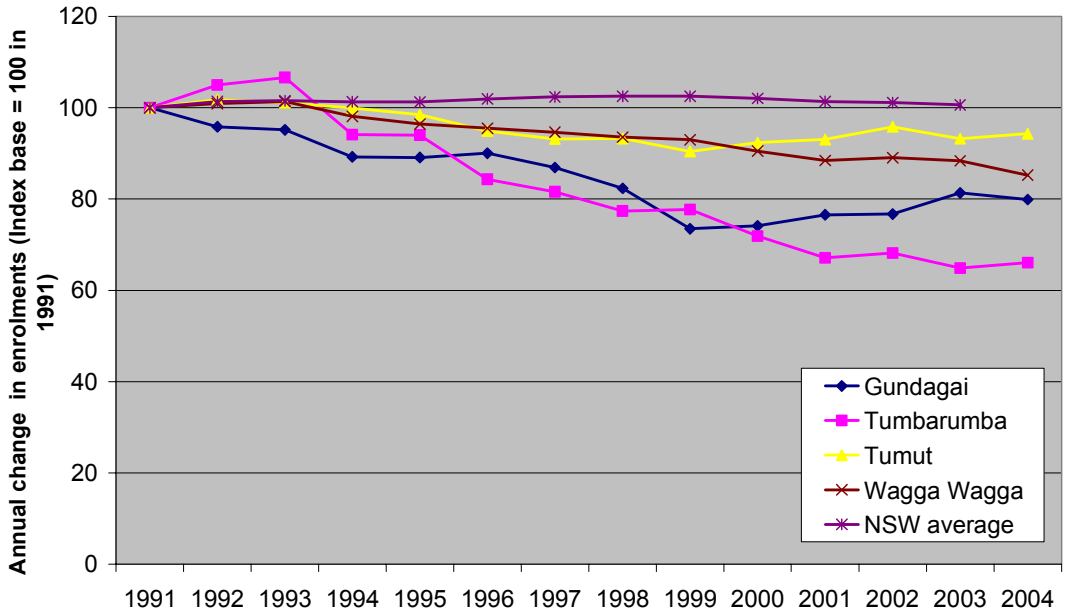
Figure 48 shows the changes in enrolment over time in all schools up to the final year of high school. It is an index of change, with 1991 the base year. It can be seen that in all four LGAs, the number of students enrolled fell. The decline was highest in Tumbarumba and lowest in Tumut.

The high decline in Tumbarumba most likely reflects the high rate of decline in population of age 0-14 in the LGA, which was the highest in the SWS region. Tumut, meanwhile, experienced the lowest decline in child-age population in the region, and this is the key reason for the lower rate of decline in total enrolments in Tumut.

In focus groups, participants generally related school enrolment decline to rural decline processes. In Tumut, most participants reported school enrolment to be strong and believed it was likely to remain steady due to the large number of young working age people living in the community.

The trends seen are unlikely to be related specifically to the plantation sector, given that the two LGAs most economically reliant on the plantation sector show quite different trends in school enrolments over time.

It was not possible to obtain school enrolment data for a broader range of LGAs or comparison regions, and so trends are compared to the average across all NSW.



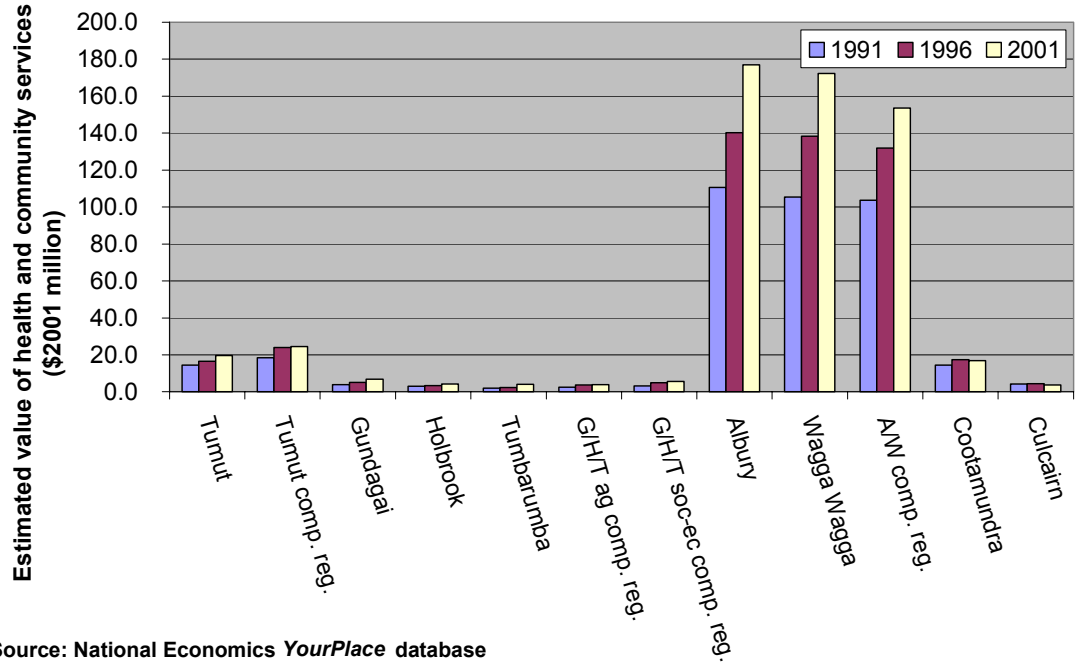
Source: NSW Department of Education and Training

Figure 48: Annual change in school enrolments in key LGAs, 1991 to 2004

10.2 Health and government services

Changes in provision of health and government services were measured by examining the change in estimated total value of this sector, using estimates produced by National Economics for the *State of the Regions* report[23].

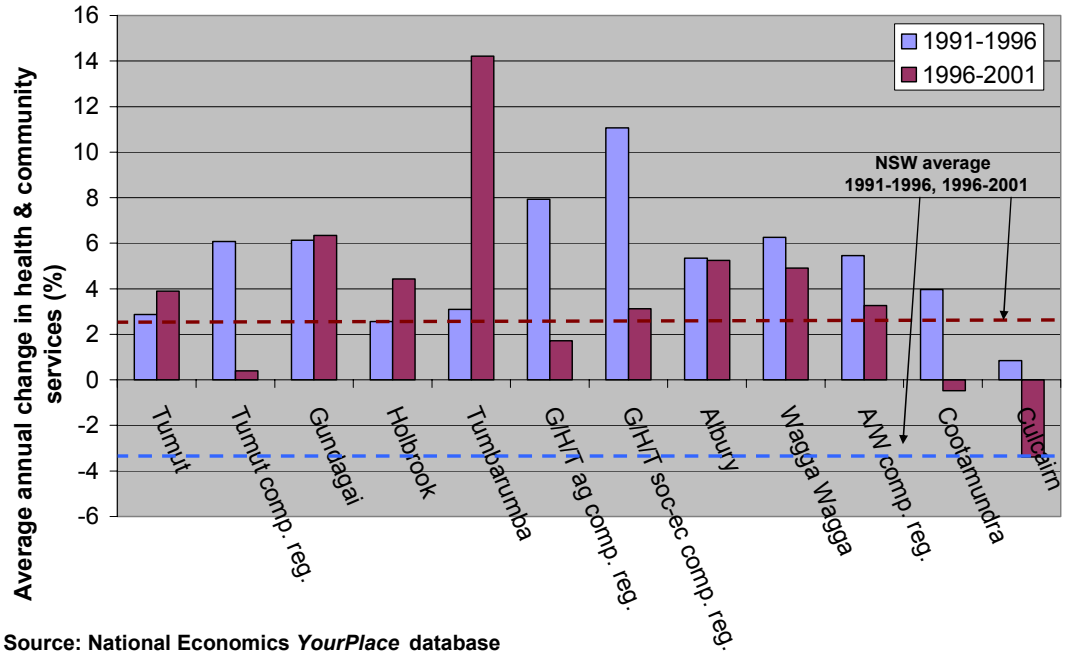
Figure 49 shows the estimated $2001 value of health and community services over 1991 to 2001 in the SWS and in comparison regions, while Figure 50 shows the average annual change in the $2001 value of health and community services over this period. Figures 51 and 52 provide the same data for government administration services.



Source: National Economics *YourPlace* database

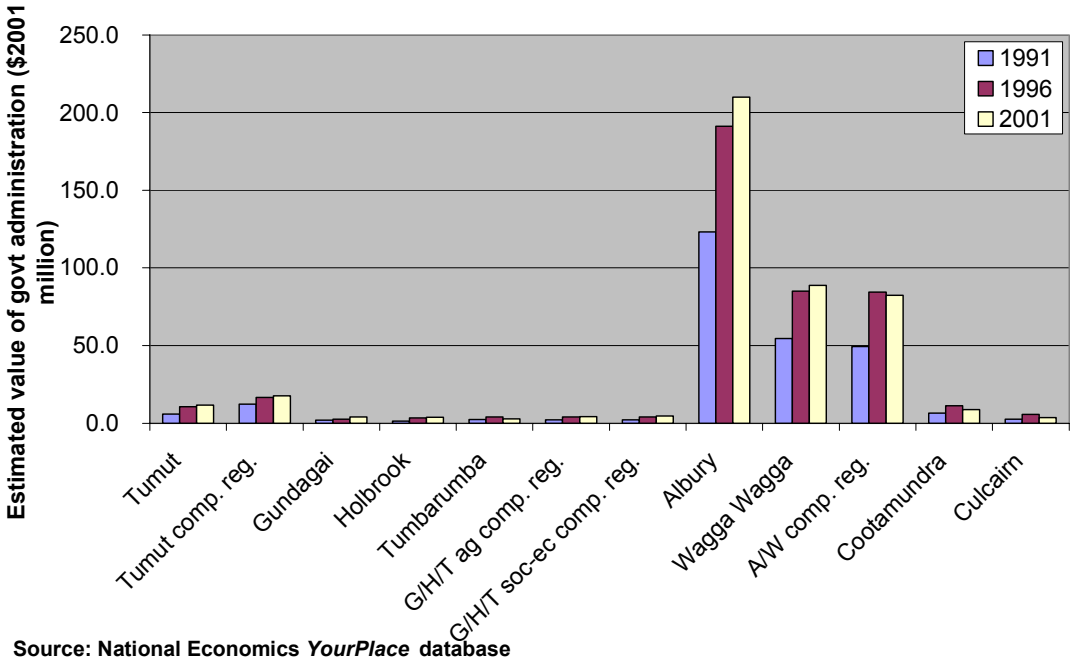
Figure 49: Value of health and community services by LGA, 1991, 1996 and 2001

[23] National Economics derives these estimates from reported employment in the sector, with known value of the sector at State level proportioned by LGA according to the proportion of employment in the sector occurring in that LGA.



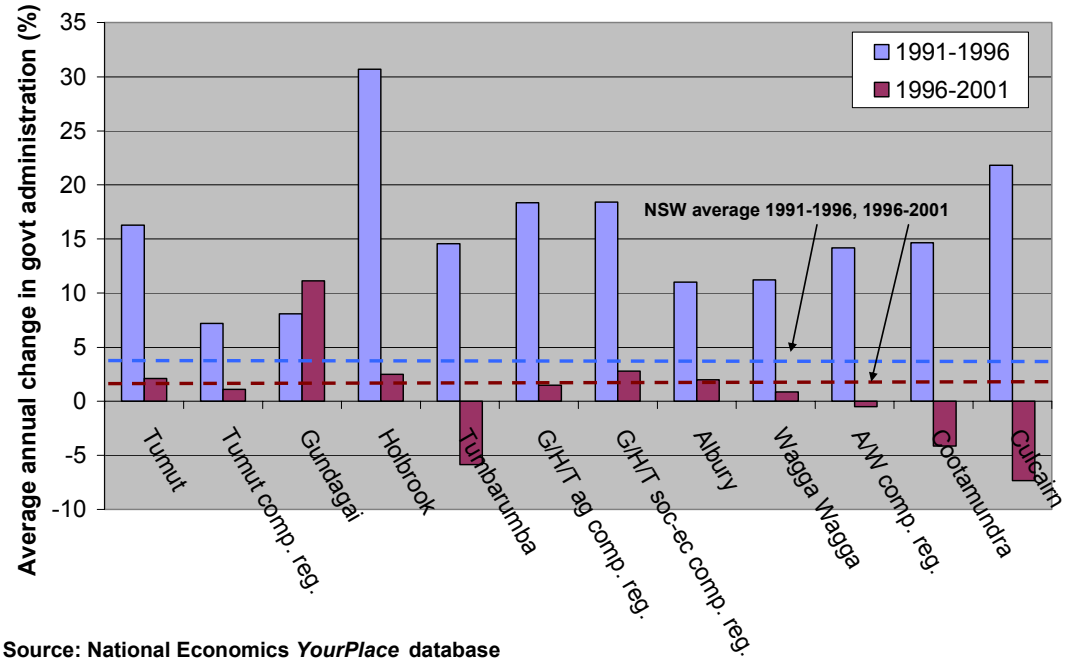
Source: National Economics *YourPlace* database

Figure 50: Average annual change in value of health and community services over time by LGA



Source: National Economics *YourPlace* database

Figure 51: Value of government and administration sectors by LGA, 1991, 1996 and 2001



Source: National Economics *YourPlace* database

Figure 52: Average annual change in value of government and administration sectors over time by LGA

The comparisons show that for the most part, plantation LGAs experienced similar types and rates of change in health and community and government services to comparatively sized LGAs not experiencing plantation expansion. Exceptions were that:

- Expenditure in Tumut was higher than in comparison regions, perhaps reflecting that many regional offices of state government agencies are located in the LGA; and
- Albury and Wagga Wagga had higher levels of spending than their comparison LGAs overall.

It is unlikely that these differences are related to the plantation sector, and no links were drawn by focus group participants between these trends and plantation sector activity.

10.3 Community and volunteer groups

Community groups such as sports clubs, hobby groups and Civic groups (e.g., Lions, Rotary) play a very important role in local communities.

By their very nature – they are usually local, there are a large number of groups and a range of different people are involved in them over time – changes in community groups are hard to track over time. In many cases, groups are not listed in a local or regional directory, although in some cases local governments have produced a local guide to community groups. Usually this guide is for a single point in time, and so does not assist in examining change over time. Some groups update their registers of members over time, while many do not.

For this study, it was determined that the most effective method of identifying broad changes in the number and membership of community groups over time would be via focus groups held in the case study region. In the focus groups, long-term residents discussed changes they had observed in community groups over time.

Attendees at focus groups were able to identify changes not only in their local area, but often in adjacent areas. For example, many had knowledge of sporting groups in several surrounding regions through their involvement in regional competitions. However, attendees were only able to identify broad changes in numbers, size and types of community groups.

Table 8 below summarises key findings on change in community groups in different regions.

Table 8: Key changes in community groups in different regions

Albury	Stable or growing numbers of all types of groups generally reported, albeit with some individual groups not growing as strongly, or individual groups closing while others have been started. Overall picture of growth.
Wagga Wagga	Stable or growing numbers of all types of groups generally reported, albeit with some individual groups not growing as strongly, or individual groups closing while others have been started. Overall picture of growth.
Holbrook/ Gundagai/ Tumbarumba	Some groups have grown while others have declined. High impact sports groups, eg football clubs, have tended to decline in membership. In Tumbarumba, strong growth in some groups in recent years and increasing confidence in future of the community particularly over the last three to five years.
Tumut	Stable or growing numbers of all types of groups generally reported, albeit with some individual groups not growing as strongly, or individual groups closing while others have been started. Overall picture of growth and strong community spirit, with focus group attendees describing a feeling of growing enthusiasm in the community in recent years. However, some difficulties maintaining sporting groups reported, due to limited ability of shift workers – who make up much of the working age population – to attend games regularly. A local radio station, manned largely by volunteers, has started operation in the last two years.

In general, smaller rural areas reported struggling to maintain some community groups, while areas with larger towns reported more growth in community groups. Additionally, however, some smaller communities reported managing to maintain community groups through strongly encouraging local participation.

Clearly a range of factors affect change in community groups. A key factor discussed in focus groups was the role of community spirit and enthusiasm in supporting community and volunteer groups. In both Tumut and Tumbarumba, a 'turnaround' in the past decade was described by many all focus group participants who had lived in these Shires for several years.

In Tumut, participants described the mid 1990s as a period when many residents were uncertain about the future of the community, fearing that the wood processing mills might close and the community decline as a result. This was due to ongoing speculation that the mills - then owned by CSR - might close. However, since CSR sold the mills to Weyerhaeuser and Carter Holt Harvey, and Visy Industries invested in the new pulp and paper mill, there has been a shift in these attitudes. Focus group participants unanimously agreed that since the late 1990s there has been a change to a strong feeling of confidence in Tumut's future, and that this has translated into an increasingly active community involved in a range of volunteer and community activities.

However, in Gundagai, neighbouring Tumut, a similar feeling of confidence was not expressed. Focus group participants who have lived or worked in Gundagai described some members of the community as having a less positive view of the future. Similarly in Holbrook, there were mixed feelings about the future of the area. However, in both there was strong effort to maintain community groups, but reportedly often by a small group of highly active residents.

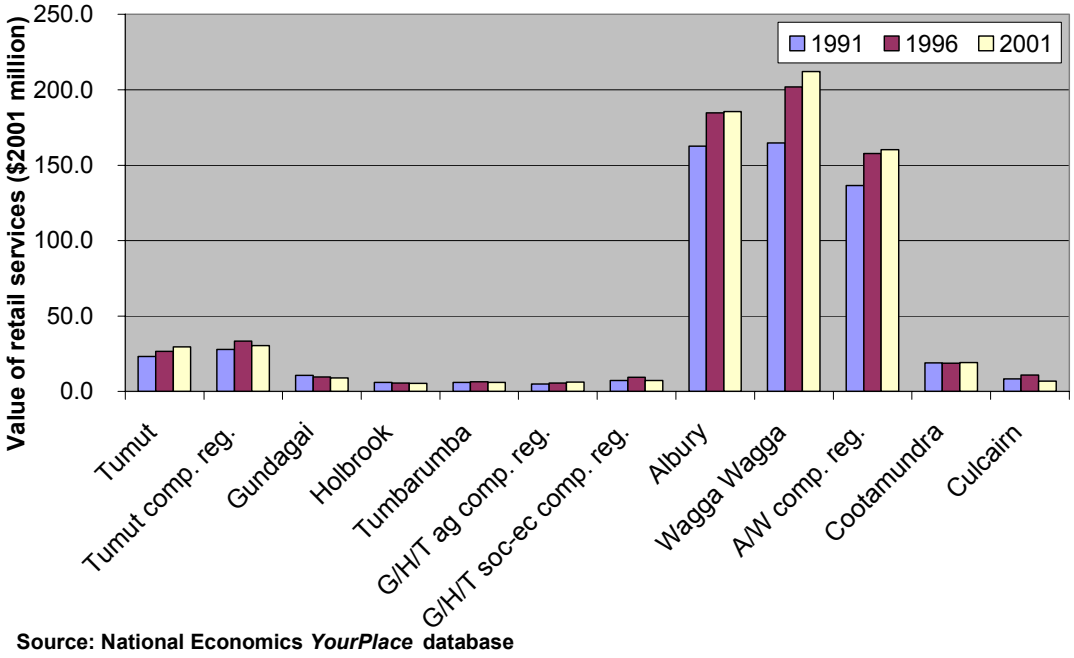
In Tumbarumba, a similar 'turnaround' to that experienced in Tumut was apparent. Particularly since 2001, confidence in the future of the town of Tumbarumba has increased, with new shops opening in the main street and plans to build a new medical facility.

Further detailed study would be needed to better explore and understand these trends.

10.4 Retail sector

Changes in provision of retail services- e.g., supermarkets, newsagents, clothing and other retail stores - were measured by examining the change in value of this sector, using estimates produced by National Economics for the *State of the Regions* report.

Figure 53 shows the estimated $2001 value of the retail sector over 1991 to 2001 in the SWS and in comparison regions, while Figure 54 shows the average annual change in the $2001 value of the retail sector over this period.



Source: National Economics *YourPlace* database

Figure 53: Value of the retail sector by LGA, 1991, 1996 and 2001

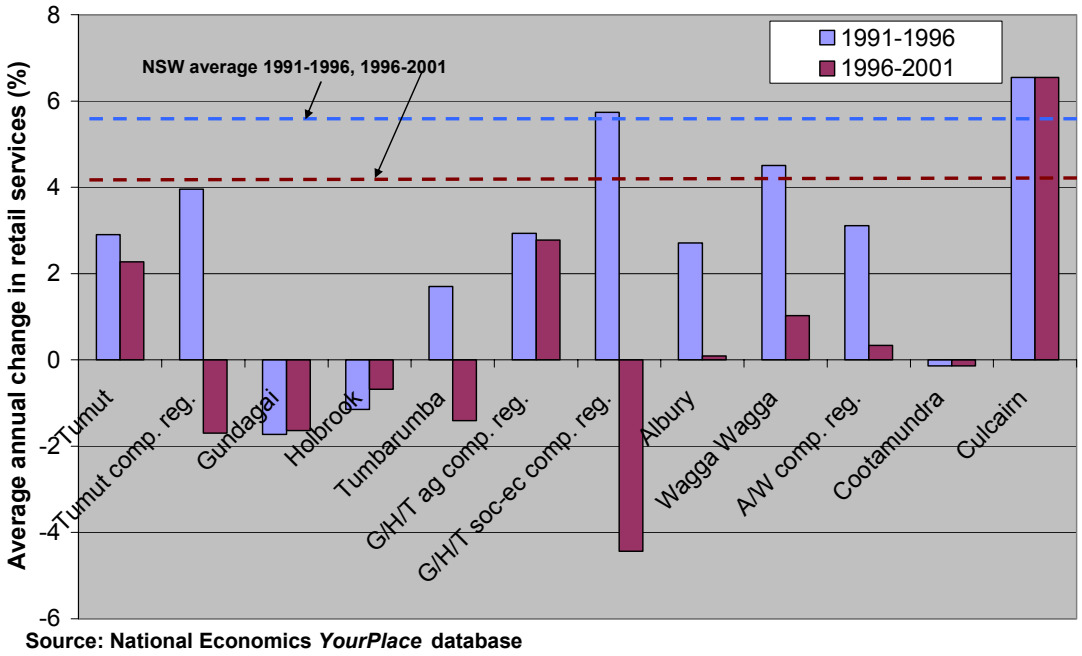


Figure 54: Average annual change in value of the retail sector over time by LGA

The growth for all SWS regions was lower than the State average, likely due to the trend for strong retail growth to be focussed on large cities such as Sydney and not in regional areas such as the SWS.

In general, Tumut showed more consistent growth in the retail sector than comparison LGAs, while Gundagai, Holbrook and Tumbarumba all experienced lower growth (or higher decline) than similar regions, and Albury and Wagga experienced similar trends to their comparison regions. This is likely a result of both the strong economy in Tumut, much of which is based around plantation processing, and the general trend in which Tumut town has been acting as a small regional centre for nearby areas, including Gundagai and Tumbarumba.

10.5 Fire fighting

Many participants in focus groups reported that investment in fire fighting services by Forests NSW has provided important benefits in the region. Forests NSW invests in considerable fire fighting capabilities to protect the large plantation estate in the region, and other landholders in the region have benefited from their rapid response to fire incidents. While only one of the agencies providing fire fighting services in the region, the use of spotter planes and fire towers by Forests NSW, along with their overall rapid fire response, was believed by many focus group participants to have reduced overall fire risk in the region.

11.0 Residential property markets

Available data on rent and residential property values were used to examine trends in residential property markets over time. Real estate agents in the region participated in focus groups and discussed trends they had observed in both rental and residential sales markets. Box 7 details key findings on changes in rental and housing availability in the region.

Box 7: Key findings on residential property markets

A wide range of factors affect rental prices, rental vacancy rates, house prices and housing availability. One of the most important factors is availability of land on which to build new housing. In Tumut, limited new land has been available in recent years.

In Tumut, rental vacancy rates have been low since the 1980s. During the construction of the Visy Industries pulp and paper mill (from 1999 to 2001), it became extremely difficult to find housing to rent. Rental vacancies have remained low to date. In Tumbarumba, upgrading of the Hyne and Son mill over 2003 to 2004 resulted in a similar fall in rental vacancy rates. Some residents have had to rent or purchase housing in towns some distance away and commute to the towns of Tumbarumba and Tumut to work as a result of low availability of local accommodation.

In focus groups, a point emphasised by real estate sector employees was that low rental vacancies did not necessarily lead to rapid rises in rental prices – rents were, instead, directed by average incomes in the region. Despite this, rents did rise more rapidly in Tumut, Tumbarumba, Gundagai and Holbrook over 1991 to 2001 than the NSW average. Some real estate agents have observed rental prices increasing more rapidly in the town of Tumut in recent years, and believed this had resulted from increasing numbers of high paid workers shifting into the region.

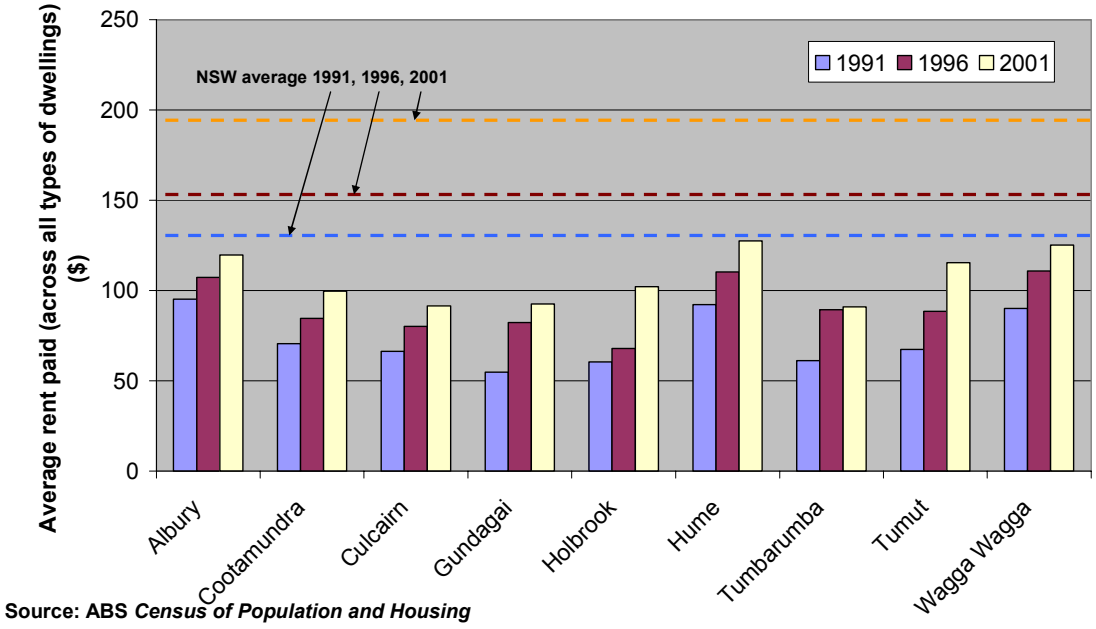
Sales data show an overall trend of rising residential property prices in recent years. Local real estate agents believed the key factor causing these price rises has been increased demand from investors outside the region and a strong residential property market nationally. This trend has dominated overall price movements, generally masking other influences, such as any that may have resulted from expansion of the plantation sector.

The number of new building approvals over time, a common indicator used when examining real estate trends, was not used as an indicator of changes in the housing market for this study. While this data is readily available, it does not necessarily reflect the true level of demand for new buildings. All real estate agents and local government employees who participated in focus groups agreed that a key factor affecting rates of new building approvals was availability of land for new development. While in a low demand market the number of new buildings demanded might be less than the total amount of land available, in an area with high demand the limiting factor is often available land. This has reportedly been the case in Tumut for several years, with a strong demand for new housing but shortages of available builders to design and undertake building, along with a shortage of available land for new developments, limiting the amount of new residential building in the area.

Instead, available data on average rent and average residential sales prices were accessed as far as possible to examined trends in housing over time.

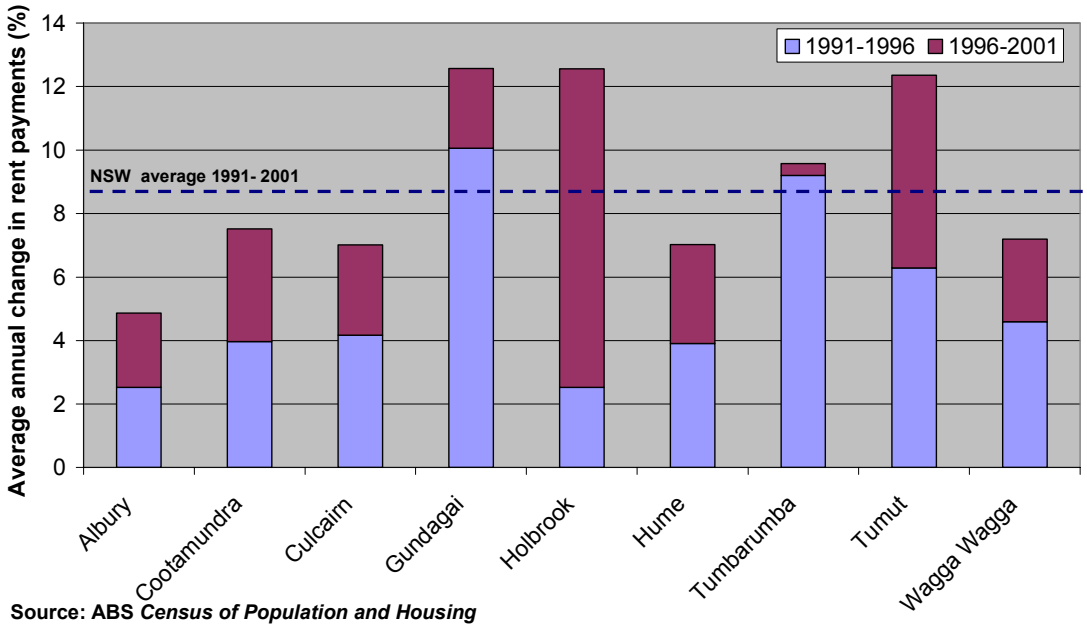
11.1 Rental markets

Figure 55 shows the average rent paid over time in different LGAs of the SWS, compared to the averages for the larger regions in which these LGAs are situated – Murray Statistical Division, and Murrumbidgee Statistical Division – and the NSW average. Figure 56 shows average annual changes in rent paid over time. These figures are estimates drawn from the ABS *Census of Population and Housing*. They are calculated based on the number of households reporting rent payments within different 'bands', eg the number paying between $1 and $78. The average was calculated by taking the mid-point of each band and multiplying this by the number of households reporting rent payments within that band.



Source: ABS *Census of Population and Housing*

Figure 55: Average weekly rent paid across all types of dwellings by LGA, 1991, 1996 and 2001



Source: ABS *Census of Population and Housing*

Figure 56: Average annual change in weekly rent paid across all types of dwellings by LGA, 1991 to 2001

The numbers may to some extent reflect the type of housing stock available. For example, if housing stock in an LGA included a large number of single bedroom units and few large houses, it might be expected that the average rent would be lower than for an LGA with many large houses and few small units available for rent. The quality of housing stock also influences rental prices, as does the level of demand for housing.

However, according to local real estate agents the housing stock available for rent is relatively similar in the different LGAs of the SWS. Therefore there is a reasonable degree of comparability between the LGAs shown in Figures 55 and 56.

The highest total growth in average rent over 1991-2001 occurred in Tumut, Gundagai, Holbrook and Tumbarumba. In Tumut the growth occurred over both the 1991-1996 and the 1996-2001 period, while in the others growth mostly occurred in only one of the five year periods.

Additionally, Tumut has a higher average rent than other small LGAs in the region, with rents almost as high as those in the larger regional centres. In focus groups, real estate agents in the area explained that rental vacancy rates in Tumut have been low since the mid 1980s. Rental prices have generally been set as high as is affordable given the average wages in the region. The construction of the Visy mill from 1999 led to rises in rents in the Shire as increased competition for vacant rentals occurred and, reportedly, incomes in the region rose.

In focus groups, explanations for the changes in average rent for Gundagai, Holbrook and Tumbarumba included:

- Expansion of manufacturing in Gundagai, with increased employment in the area particularly from 1991 to 1996;
- Ongoing expansion of manufacturing activities in Tumbarumba; and
- Employment associated with construction and operation of the Hyne and Son sawmill in Holbrook in the latter half of the 1990s.

Clearly expansion of manufacturing activities – which often brings an influx of population during construction or upgrading of processing facilities – has had a significant influence on rental markets in some of the LGAs of the SWS. In many cases, the expansion has been related to the plantation sector, with no other major changes identified that were likely to be linked to changes in the rental market.

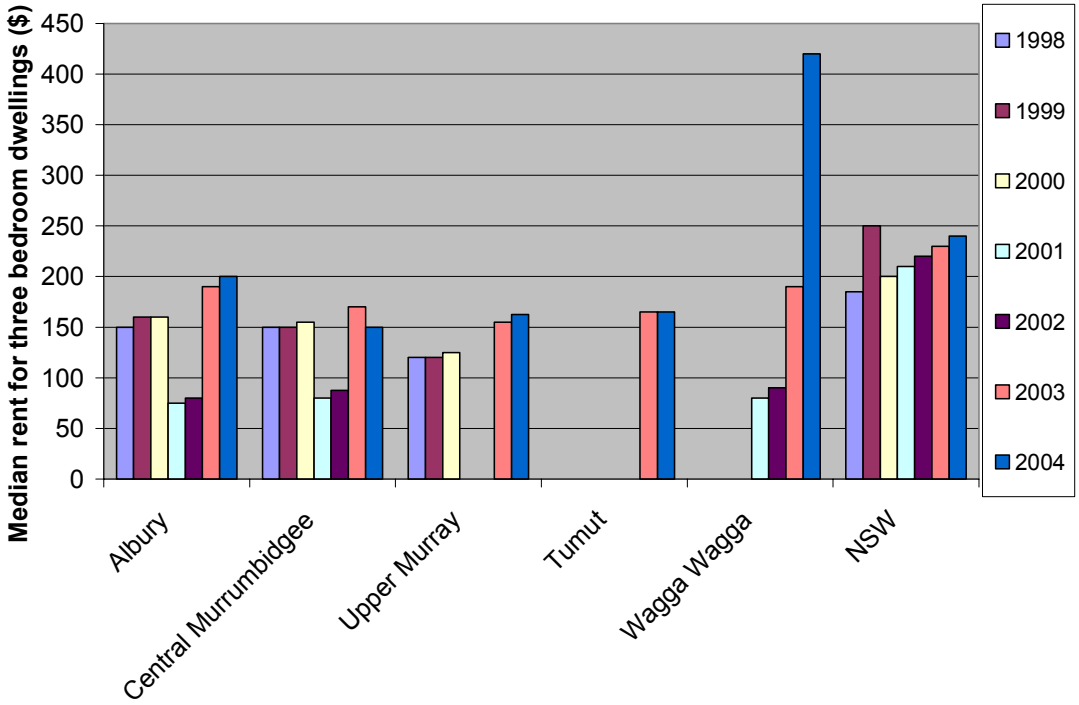
The average rent paid for new residential rentals was also examined. The data provided in Figures 55 and 56 above includes rent paid by residents who have been renting their property for several years, and for whom annual rent increases are capped[24]. The rent charged for newly rented properties, however, is not restricted. In other words, rents can be increased by greater amounts when a new tenants shifts into a rental property than when an existing tenant renews their lease.

Data on rent charged for new tenants is only available for a limited number of years, and, due to the low number of new bonds lodged in most rural LGAs, is often only available at the statistical subdivision (SSD) level rather than at LGA level.

[24] A limit is placed on the rent increases a lessor may impose when a lease is renewed for an ongoing tenant

Figure 57 shows the average weekly rent charged for new leases established over two bedroom dwellings from 1998 to 2004. Table 9 provides details of the LGAs that are located within the 'Albury', 'Central Murrumbidgee' and 'Upper Murray' Statistical Sub-Divisions (SSDs) shown in Figure 57. Data for some LGAs and SSDs is not provided in all years, due to (a) lack of availability of LGA-scale data prior to 2001, and (b) to low numbers of new tenants in preventing reporting of data in some periods post-2001. Data for three bedroom dwellings is not provided as there were often few new bonds lodged for this type of dwelling.

While average rents rose fairly consistently over 1998 and 2004 in NSW as a whole, some different trends were evident in the SWS region. Some spikes occurred in rental prices in 2001 and 2002 in Albury, the Central Murrumbidgee SSD, and Tumut. The latter two are consistent with the reports in focus groups that rents increased in Tumut and surrounding regions during construction of the Visy Industries pulp and paper mill. It is not known why Albury showed a similar pattern. In Wagga Wagga, meanwhile, rents rose rapidly in 2004, but focus group attendees could not identify likely explanations for this rapid rise. The Upper Murray region, which includes Tumbarumba, experienced relatively steady increase in rents.



Source: NSW Department of Housing

Figure 57: Median weekly rent paid by new tenants for two bedroom dwellings by LGA and SSD, 1998 to 2004

Although consistent with some changes known to have occurred in the plantation sector, this shorter term data does not provide sufficient information to identify the impact of changes in the plantation sector on the rental market in recent years.

In focus groups, all attendees described a severe rental shortage in Tumbarumba and Tumut associated with both expansion of processing facilities, but also with longer term issues of low replacement of housing stock in the LGAs, and lack of available builders to construct new dwellings or undertake renovations to existing dwellings.

However, low rental vacancy rates have not always resulted in rapidly rising rental prices, according to local real estate agents, as the average income of those in the region has effectively placed an upper limit on the level of rent that can be charged. Some real estate

agents reported that in recent years in Tumut – predominantly the past five years – higher rent increases have occurred than occurred previously, a trend they have attributed to creation of higher income jobs in the town of Tumut, particularly in the plantation sector.

Table 9: LGAs located in Statistical Sub-Divisions of the SWS

Statistical Sub-Division (SSD)	Local government areas located in the SSD
Central Murrumbidgee	Coolamon Cootamundra Gundagai Junee Lockhart Narrandera Temora Tumut Wagga Wagga
Albury	Albury Hume
Upper Murray	Corowa Culcairn Holbrook Tumbarumba Urana

11.2 Residential property markets

Data on trends in residential property sales was examined from 1998 to 2004[25].

A key difficulty when examining sales trends in small rural areas is that there are often a small number of residential property sales in any given years. In small rural towns, there are often less than 10 houses or units sold in a year. Because the type of houses sold may be quite different from year to year, the median price of these sales may change substantially from year to year. For example, if in one year there were 18 sales, and most of these were four bedroom houses recently built in a new development, while in the following year there were nine sales, mostly of three bedroom houses built several decades ago, the median price would be likely to fall in the second year - but this would reflect differences in the types of dwellings sold, rather than changes in the housing market overall.

The numbers of annual residential property sales is small in the majority of SWS LGAs. The exceptions are Albury, Wagga Wagga and, to a lesser extent, Tumut, which generally have higher numbers of sales.

Figure 58 shows the median sales price for residential property sold in the different LGAs, in the statistical subdivisions (SSD) they were located in, and for NSW. Table 9 provides details of the LGAs located in each SSD. Figure 59 shows the average rate of change in median sales prices for Tumut, Wagga Wagga, the SSDs and NSW as a whole. Rates of change were not calculated for other LGAs due to low numbers of total sales.

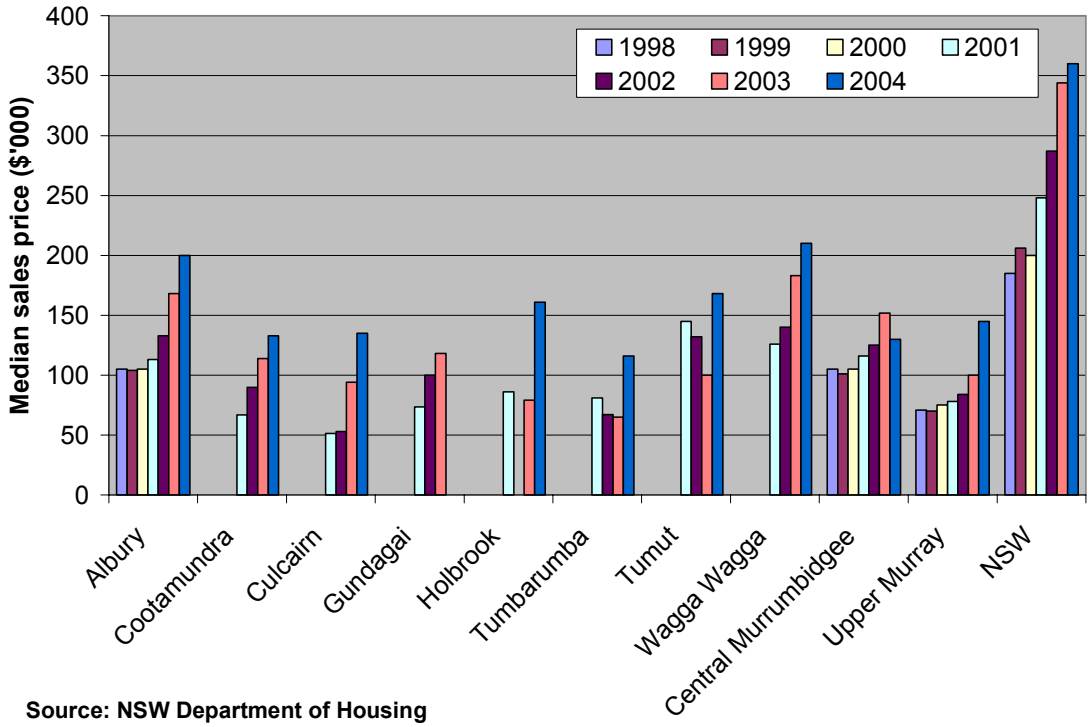
[25] These are the years for which statistics gathered in a consistent manner are available from the NSW Department of Housing

Data for individual LGAs was only available for the years 2001 to 2004, and it is important to emphasise that, as discussed above, changes in the median price in some LGAs may reflect sales of different types of property in different years, rather than market trends.

Over the period 1998 to 2004:

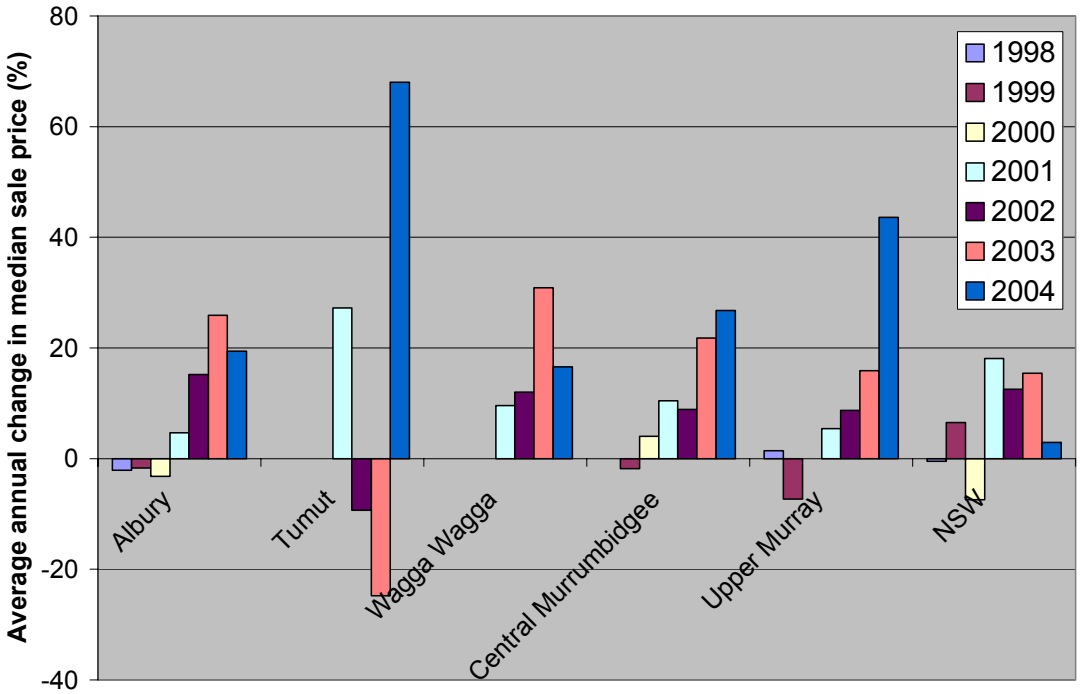
- Residential property prices generally rose, and rose fastest from 2000 to 2003;
- In the latter part of the period – primarily 2002 to 2004 – much of the SWS experienced higher rates of sales price increases than the NSW average. In focus groups, real estate agents described this as resulting from increasing interest by non-resident investors in the region's property market. As rapid price increases have reduced returns from property investment in metropolitan areas, such as Sydney, investors have shifted attention to rural areas such as the SWS; and
- Tumut appears to show a variable pattern of median sales prices. However, in the region, real estate agents agreed that the pattern was one of overall growth. It is possible that the relatively small number of overall sales has led to median sales prices fluctuating substantially over short periods of time.

From this data, it is not possible to identify the impacts of the plantation sector on residential sales prices. In focus groups in the region, real estate agents identified investment by people living outside the region as the key factor leading to rising residential sales prices, associated with rapid growth in the national housing market during this period. The increase in values resulting from this trend has masked any influences that may have resulted from changes in the plantation sector.



Source: NSW Department of Housing

Figure 58: Median sales price for residential dwellings by LGA and SSD, 1998 to 2004



Source: NSW Department of Housing

Figure 59: Average annual change in media sales price for residential dwellings by LGA and SSD

12.0 Roading and transportation

A key challenge for an expanding plantation sector is coordinating maintenance and upgrading of transportation networks to support transport of logs to processing facilities, and of wood products from processing facilities to markets.

Two transportation infrastructure issues have been raised in previous perceptions studies:

- Concern that available funding is not sufficient to undertake the maintenance and upgrading required for plantation sector traffic, particularly on roads managed by local government; and

- Concern that increased plantation sector traffic on roads will create road congestion and/or a safety hazard.

Each of these issues is discussed below. Key findings are detailed in Box 8.

Box 8: Transportation and the timber industry

Plantation sector transportation needs have the potential to place a significant burden on road networks in the region, some of which were originally designed and built to carry lower weights. The plantation industry and local and state governments have been working together on an ongoing basis to plan for funding required to maintain and upgrade roads in the region, and to prioritise transport infrastructure needs. This, together with ongoing discussion of alternate transportation options – such as a proposed re-opening of the Tumut to Cootamundra railway line – is essential to meeting the transport infrastructure needs of the expanding plantation sector.

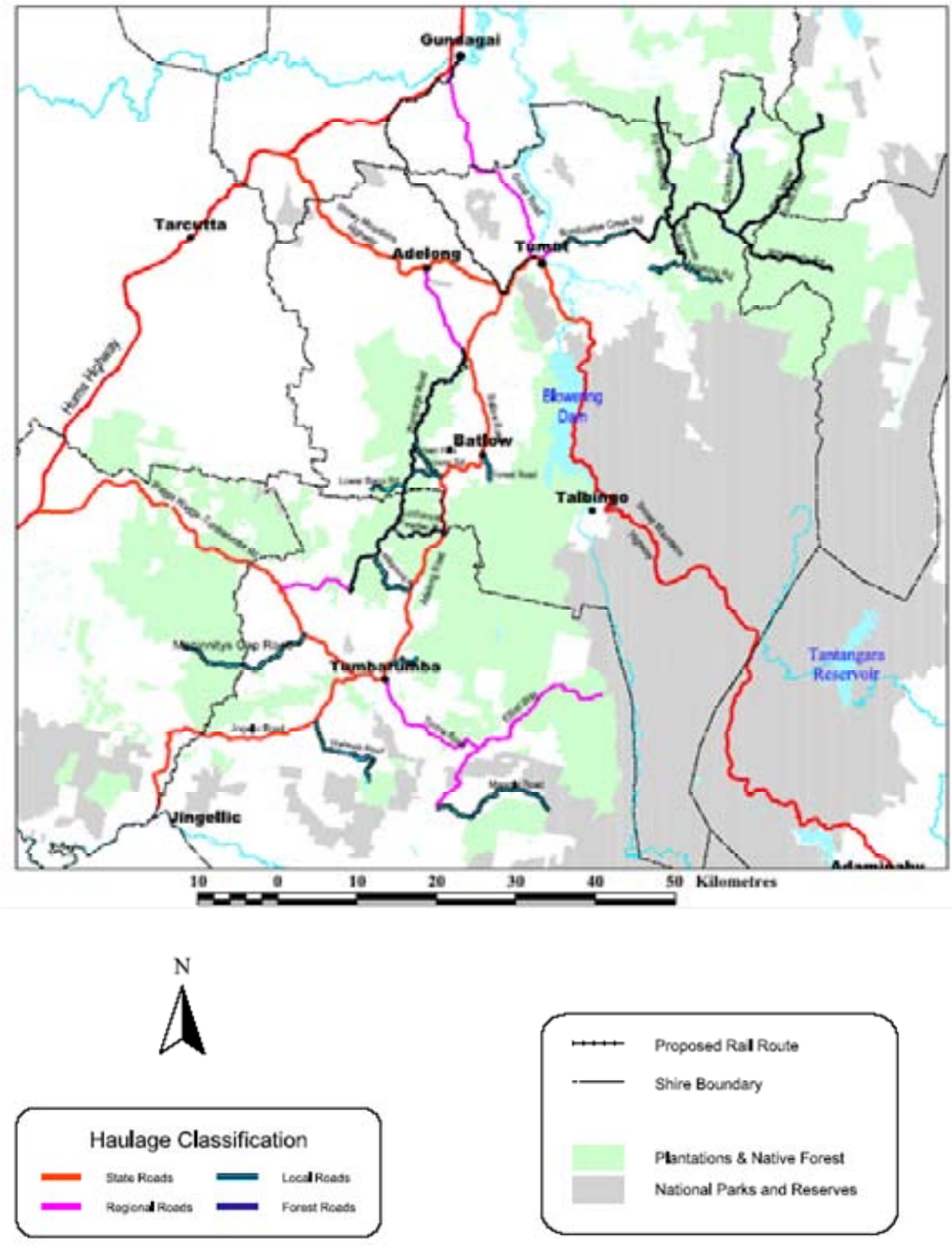
It is difficult to identify the impact – if any – of plantation sector traffic on road congestion and safety. In the two LGAs with the highest volumes of plantation sector traffic – Tumut and Tumbarumba – accident rates per capita have been well below the rates occurring in those LGAs that contain national transport corridors (eg major highways), and generally at or below the NSW average. In recent years Tumbarumba has experienced higher rates of accidents per capita than the NSW average. According to focus group participants, this pattern has largely been a result of accidents not involving plantation sector traffic. Other LGAs in the region which do not have national transport corridors within their boundaries have generally experienced lower accidents per capita than Tumut or Tumbarumba. Examining this trend further would require detailed data on traffic movements in the region, and the proportion and type of traffic represented by the plantation sector.

12.1 Transport infrastructure

Figure 60 shows the key roads used in the region by plantation sector traffic. From 'feeder' roads constructed in plantation areas (mostly maintained by Forests NSW except on some private plantation estate), logs are transported on local, state and national roads to processors, and then to markets.

Table 10 summarises the growth in the tonnage of timber transported on the region's roads since 1990. The total volume of logs transported increased by 114% between 1990 and 2001, and is expected to continue to increase. By 2006, an estimated 4.4 million tonnes of softwood logs and products will be transported annually in the region (PEECE Consulting 2005).

A key issue as this increase occurs is that many roads were not originally designed to transport the loads now being carried. In the 1940s and 1950s, when many of the region's roads were initially constructed, log haulage trucks typically carried 12 tonnes. Currently, trucks may carry anywhere from 42.5 to 62.5 tonnes (PEECE Consulting 2005).



Source: PEECE Consulting (2005)

Figure 60: Key transport networks for the plantation sector in the South West Slopes

Table 10: Volume of timber transported in the region

	Total tonnage transported ('000 tonnes or cubic metres)		
	1990	**2001**	**2006 (estimated)**
Harvested logs being transported to processors	1000	2050	*2445*
Residues (eg chip, bark) and product (eg sawntimber, panels) transported between processors or to market	710	1612	*1966*
Total	1710	3662	*4411*
Source: PEECE Consulting (2005) **Note: These figures include some transport of logs and processed products from native forests, although this forms a small percentage of the total**			

In May 2005, a regional transport plan was released, providing a framework for planning for the timber industry's transportation needs into the future (PEECE Consulting 2005). This is the most recent of a series of ongoing plans and strategies, developed and implemented by the Softwoods Working Group (SWG).

The SWG is made up of representatives from the timber industry, State and local governments. Members work collaboratively to plan for transport infrastructure needs for the timber industry. Since 1990, when the first Road Haulage Study for the timber industry was published, priorities for road upgrading to support the timber industry have been identified, and improvements made to key problem areas.

The cost of required infrastructure improvements over 2005-06 to 2013-15 is estimated at $93,635,000 (PEECE Consulting 2005). Of these improvements, the forest industries propose to fund 17% of the costs.

A submission has recently been made by the Councils of Tumut, Gundagai and Cootamundra for Commonwealth funding to re-open the Tumut to Cootamundra railway line. This would enable transport of finished product by rail rather than road, reducing the number of truck movements on local roads.

12.2 Road traffic volume and safety

A large number of factors influence road safety and congestion, making it extremely difficult to isolate any impacts on traffic safety from a particular sector. For example, factors known to lead to higher rates of accident include driver fatigue, road design, weather conditions, driving under the influence of alcohol, driver age and vehicle type (Roads and Traffic Authority 2004).

Road safety is measured for international reporting purposes using three measures[26]:

- Rates of accidents per head of population, eg per 1,000 or 10,000 people;

[26] See ATSB (2004) for examples of reporting of Australian road safety compared to other members of the OECD using these three measures

- Rates of accidents per number of registered vehicles, eg per 1,000 cars for car accidents, or per 1,000 articulated trucks for accidents involving articulated trucks; and

- Rates of accidents per volume of traffic, eg per million vehicle kilometres travelled.

In this study, it was not possible to obtain data on traffic volumes by local government area, or on the proportion of this volume that is plantation sector traffic[27]. Measuring volumes of traffic would therefore require direct study of traffic volumes on a number of roads in the region.

Using data on locally registered vehicles at an LGA level would be misleading as a large proportion of traffic at the LGA level involves vehicles travelling in LGAs other than those they are registered in.

As a result, only 'per capita' measures could be used to examine road safety issues. These, too, have their limitations. Major highways with a high volume of traffic often pass through areas with a relatively low population. As higher numbers of accidents might be expected with a higher volume of traffic, the per capita accident rate for these types of areas are likely to be higher than average, and do not necessarily mean that a local resident is more likely to be involved in an accident.

An in-depth examination of whether areas with high levels of plantation sector traffic experience higher than average road congestion or safety issues would require data detailing:

- Total volume and type of traffic travelling on particular roads;

- The proportion of traffic on specific roads that is plantation sector related over time;

- Road construction/upgrading/changes over time; and

- Identification of whether the proportion of accidents involving plantation sector traffic is higher than the proportion of all traffic movements involving plantation sector traffic. In other words, this would identify whether plantation sector vehicles are more likely to be involved in accidents than other similar vehicles (eg other large trucks) or other types of traffic.

The data required to undertake this type of analysis is not available at the level of detail necessary to undertake this analysis. The types of data available, therefore, allow only limited analysis of road safety issues.

Figures 61 and 62 show (a) the total number of accidents in the region, and (b) the rate of accidents per 1,000 population. It is important to emphasise that the 'per capita' rate is a limited measure which often simply indicates where there are roads with particularly heavy traffic in a region with low population.

The most prominent pattern visible is the impact of the Hume Highway, the national highway which runs through the LGAs of Albury, Hume, Holbrook and Gundagai; and the Olympic Highway, running through Wagga Wagga. Through Albury, the Hume Hwy passes through the centre of the city with low speed limits, whereas in the other LGAs, the highway is a 100km zone or higher.

[27] The ABS *Motor Vehicles Use* survey makes data available only at State/Territory level.

While the highest *number* of accidents occurred in the regional cities of the area, followed by Tumut (which has the next highest population), the highest *rate* of accidents per 1,000 population occur in Gundagai and Holbrook – both small population LGAs through which the Hume Highway runs.

The majority of LGAs other than Gundagai and Holbrook had per capita accident rates lower than the NSW average, with the exception of the average for the Riverina region (the western part of the Riverina includes the LGAs of Cootamundra, Gundagai, Tumut and Wagga Wagga); Tumbarumba in some years; and Tumut in 2001.

In Tumbarumba, completion of sealing of the Alpine Way was believed by focus group participants to be a major factor in the increased rate of accidents in recent years. The Alpine Way services tourist traffic (plantation sector traffic does not use this road), and focus group participants reported that there had been increased numbers of accidents on the road since the sealing has been completed.

When rates of accidents involving (a) fatalities, (b) injury and (c) no injury were compared (shown in Figures 63 through 65), some differences in rates of occurrence of particular types of accidents could be seen. Tumbarumba had a relatively high rate of accidents involving injury, and Hume had a high rate of accidents involving fatality.

It is difficult to identify the impact – if any – of plantation sector traffic on road congestion and safety. In the two LGAs with the highest volumes of plantation sector traffic – Tumut and Tumbarumba – accident rates per capita have been well below the rates occurring in those LGAs that contain national transport corridors (eg major highways), and generally at or below the NSW average. In recent years Tumbarumba has experienced higher rates of accidents per capita than the NSW average. According to focus group participants, this pattern has largely been a result of accidents not involving plantation sector traffic. Other LGAs in the region which do not have national transport corridors within their boundaries have generally experienced lower accidents per capita than Tumut or Tumbarumba. Examining this trend further would require detailed data on traffic movements in the region, and the proportion and type of traffic represented by the plantation sector.

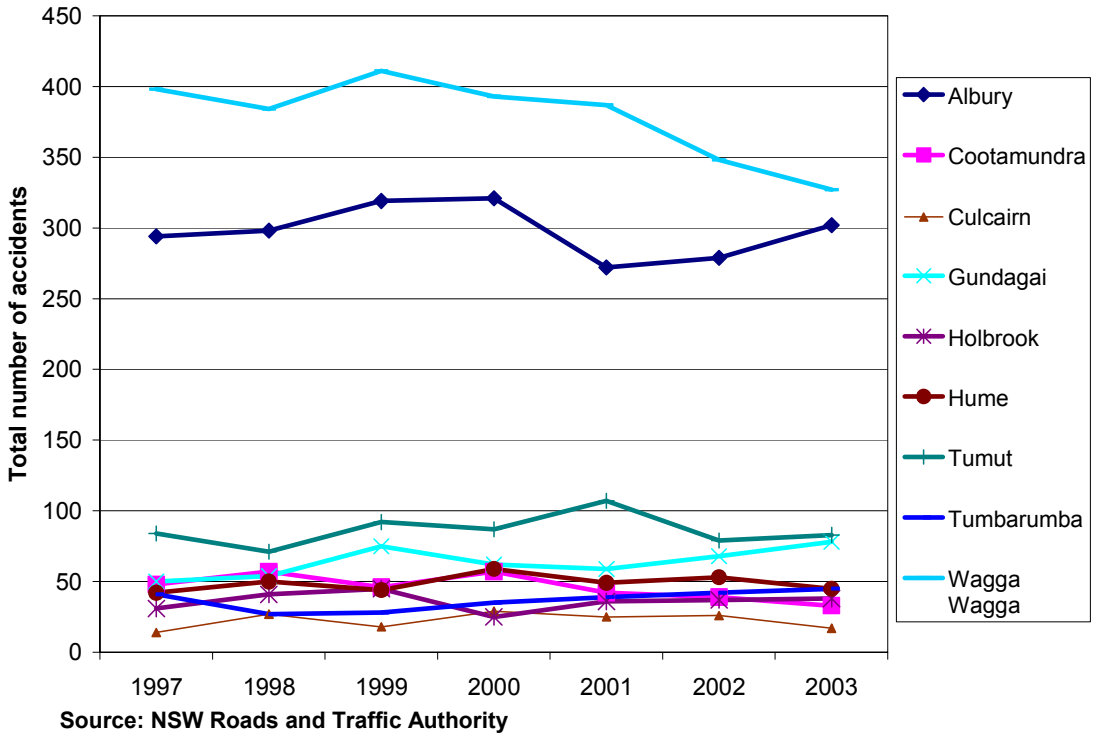
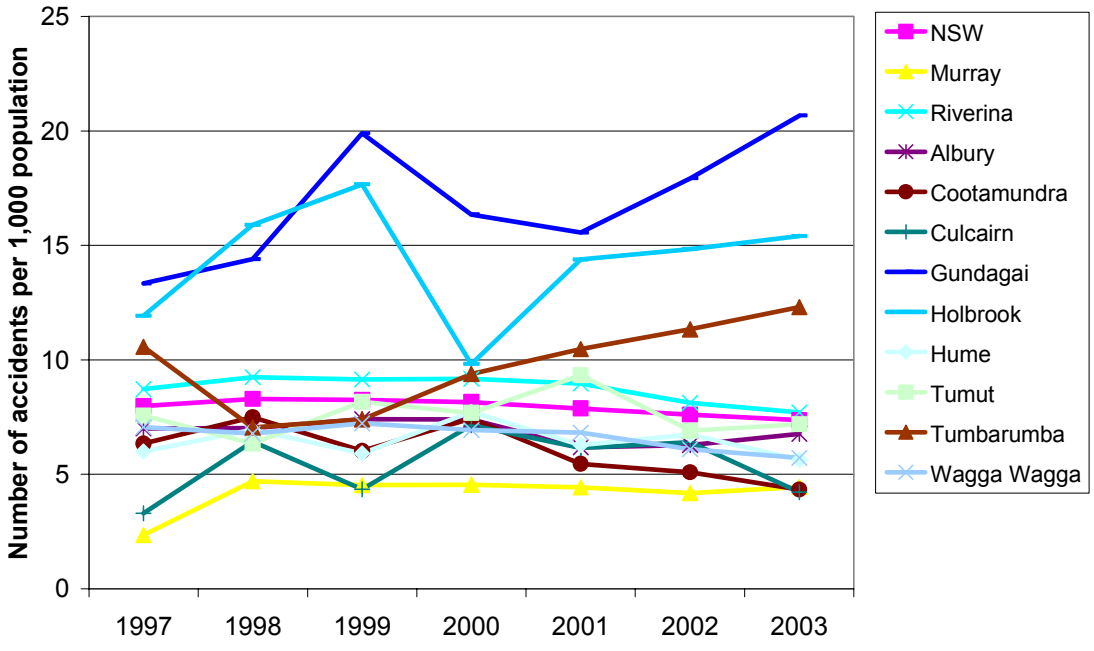
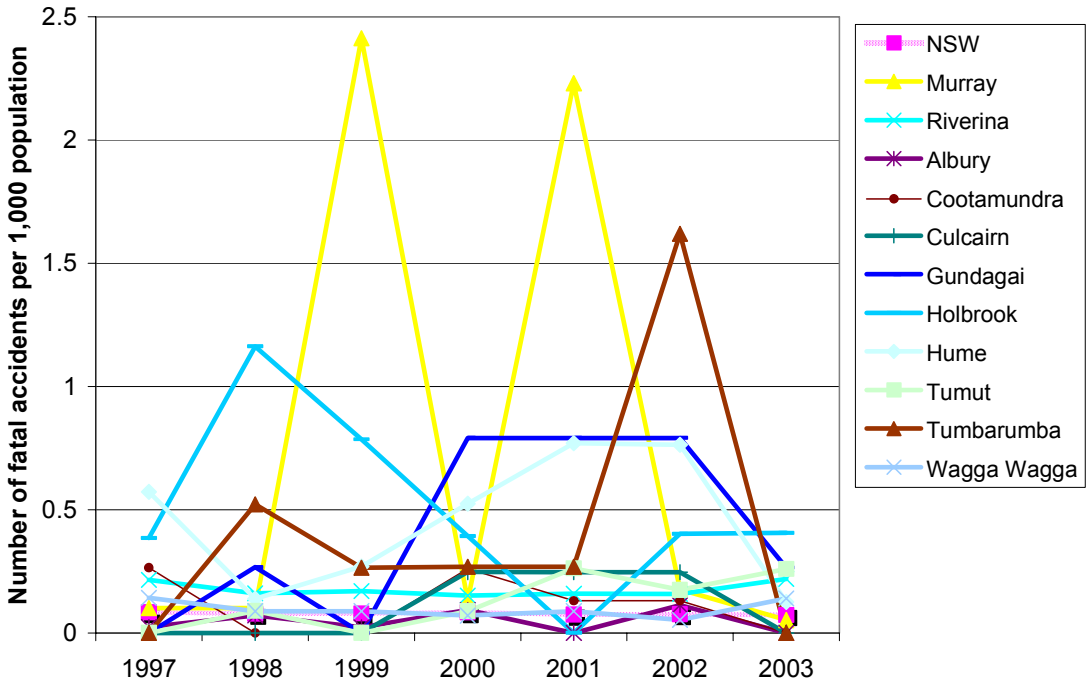


Figure 61: Total number of accidents by LGA



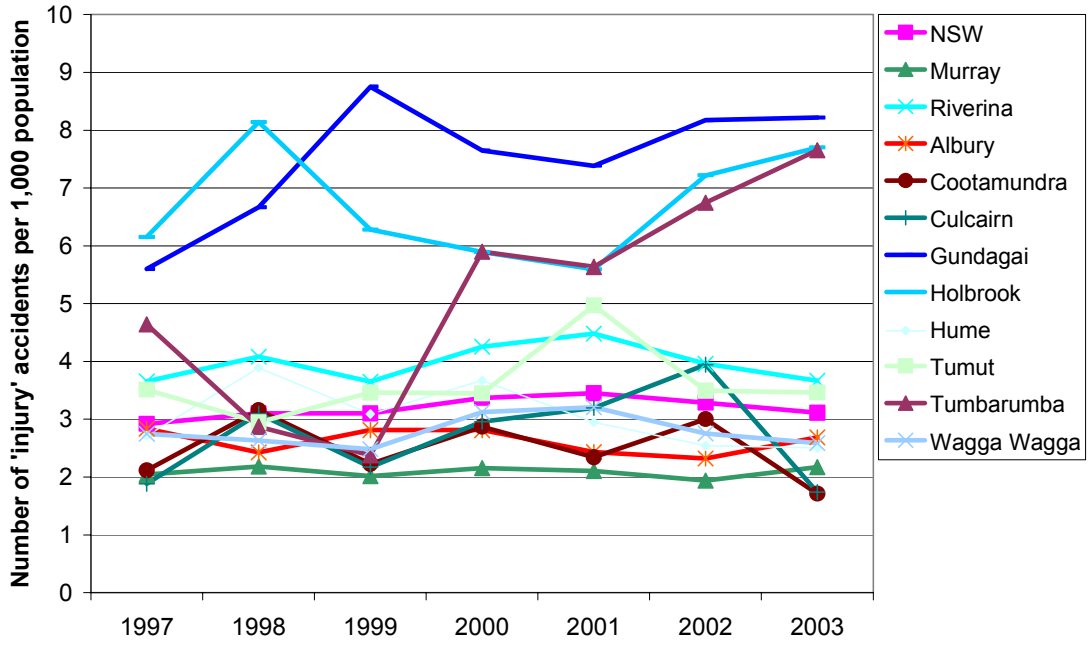
Source: NSW Roads and Traffic Authority

Figure 62: Rate of all types of accidents per 1,000 population by LGA



Source: NSW Roads and Traffic Authority

Figure 63: Rate of fatal accidents over time per 1,000 population by LGA



Source: NSW Roads and Traffic Authority

Figure 64: Rate of injury-causing accidents over time per 1,000 population by LGA

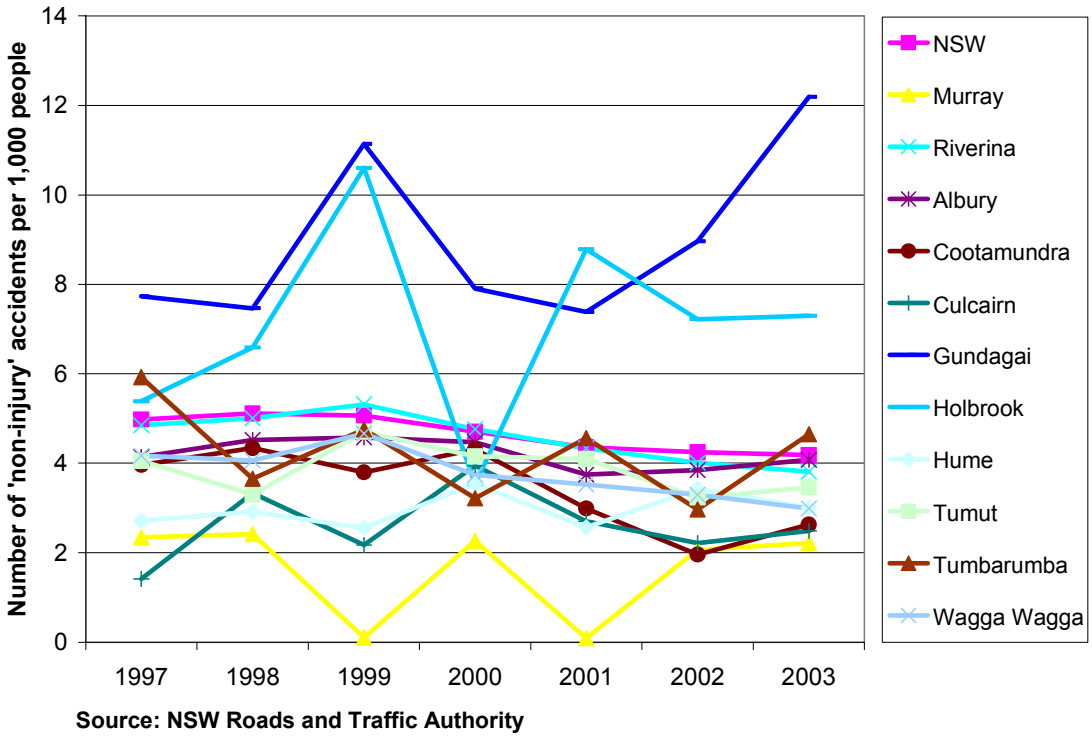


Figure 65: Rate of accidents involving no injuries over time per 1,000 population by LGA

13.0 Discussion and conclusions

At the start of this study, eight key questions were identified about the socio-economic impacts of a mature plantation estate. The discussion and conclusions below focus on answering these questions as far as is possible using the results of this study. The effectiveness of the methods used in the study is then explored.

For several of the socio-economic characteristics examined in the study, no observable differences were found between regions experiencing plantation expansion and those that had few or no plantations. This is an important result, as it indicates that the establishment of plantations has in many cases not been associated with large-scale change in particular socio-economic characteristics of the regions where plantations have been established.

Question 1: How much employment is provided by the plantation sector and where is the employment based?

The softwood plantations of the SWS support a large number of jobs in the region, largely due to the presence of world-scale processing facilities within the SWS which process the majority of logs harvested from the region's plantations. This enables the employment generated through value adding up to the point of finished products going to market to be largely captured within the region, and leads to a considerably higher level of plantation sector employment in the region than would occur if these processing facilities were not located in the SWS.

The plantations grown in the SWS supported 1,682 direct jobs in 2003-04 as well as flow-on employment both within and outside the SWS. The level of direct employment equated to 1.53 jobs per 100 hectares of plantation, of which 1.03 were in processing and 0.50 in plantation management, harvesting and haulage. The growing of plantations to the point of harvest generates less employment than harvesting and haulage or processing. It is not until a plantation estate reaches maturity, with areas of plantation harvested on an ongoing rotation, that the maximum level of employment is generated by plantations.

Although increasing mechanisation of activities such as harvesting and processing has led to higher output per employee, employment levels have remained relatively steady in the plantation sector over time, as the volume of timber processed has increased at a rate high enough to match the improvements in efficiency over time and keep employment steady.

Between 92% and 94% of direct employment has been based in the SWS between 1991-92 and 2003-04. Within the SWS, the majority of employment - over 900 jobs – is based in the Shire of Tumut, while just under 200 jobs are located in each of Tumbarumba and Hume, and smaller numbers in Holbrook and Wagga Wagga.

Question 2: What type of employment is provided by the plantation sector?

The majority of jobs in the plantation sector are full-time, with relatively little part-time or seasonal work. The latter is mostly confined to work establishing seedlings and fire fighting work. The high level of full-time employment in the plantation sector has led to the Shires of Tumut and Holbrook experiencing growth in full-time employment over 1996 to 2001, where most other areas experienced growth mostly of part-time employment.

This high level of full-time employment is largely a result of employment policies of plantation growers and processors, who generally employ full-time rather than casual or temporary staff.

Question 3: How much spending occurs from the plantation sector and where, and what is the value of output of the plantation sector?

The location of most employees and processing facilities within the SWS region means that much of the spending by the sector is captured within the region, rather than occurring outside the region. The majority of wages and salaries are paid to employees based within the SWS, and many inputs to the sector are purchased from within the region. This ensures that considerable flow-on activity is generated within the region by plantation sector activities. However, some supplies and services used by the plantation sector – particularly of items such as chemicals and fuel used in processing – are often sourced outside the region.

The value of output per hectare of plantation increased from an estimated $401.4 million in 1993-94 to $574.5 million in 2002-03. The increase has resulted from much of the plantation estate reaching maturity over the past decade, and from improved utilisation of plantation logs as a result of the availability of integrated processing opportunities in the region. Having a market for sawlog, pulplog and residues allows a higher value of output per hectare to be achieved than would be the case with a smaller, less diverse processing sector in the region.

Question 4: Does plantation processing and harvesting expansion have a demonstrable impact on the total population?

A range of factors affect population change in a region. In Albury and Wagga Wagga, areas of the SWS with high levels of plantation sector activity, the size of the population of the LGAs meant that it was not possible to identify any overall population impact from the plantation sector. However, in other areas some patterns could be identified and explored.

Ongoing management of plantations and expansion of the volumes of plantation timber harvested and processed in the SWS have contributed to stabilisation of the populations of towns with processing facilities. In particular, the population of the towns of Tumut and Adelong grew over 1996 to 2001 while other towns of similar size experienced population decline; while the town of Tumbarumba experienced smaller declines in population than other similarly sized towns in the SWS. These three towns have the highest proportion of employment dependent on plantation processing in the SWS. No alternative explanations for this population growth were offered by focus group participants or apparent from data on key industry and land use changes occurring in the region over the same period.

However, in Holbrook the establishment of a single processing facility was not associated with the same type of effect, most likely because Holbrook's economy remained highly dependent on broadacre agriculture, whereas Tumbarumba, which has a similar proportion of its economic activity dependent on the plantation sector, had a more diverse mix of economic activities underpinning the Shire's economy.

Question 5: Does the plantation sector have a demonstrable impact on socio-demographics of the population within a region, eg through an influx of new residents into a community

While a number of socio-demographic characteristics were examined, only three are likely to have been influenced by the expanding plantation sector – working age population, proportion of new residents, and household income growth. These are likely to be related to each other, with the plantation sector attracting new residents to the region, who are of working age, and paying incomes often determined by award wage rates which show a pattern of steady growth rather than being dependent on market changes.

LGAs with a strong manufacturing sector tended to experience higher growth in working age population compared to LGAs with a high dependence on broadacre agriculture, which experienced more growth in retirement age population. In several LGAs of the SWS – particularly Tumut and Tumbarumba – the manufacturing sector is dominated by plantation processing, which is creating opportunities for the growth observed in working age

population. Growth in working age population is an indicator of good prospects for ongoing economic growth in a Shire.

Household income growth tended to be steadier and higher in Shires with more diverse economies, which included most of those with high levels of plantation sector activity.

The Shires of Tumut and Holbrook both experienced an increase in the proportion of recently arrived residents in their population over 1996 to 2001, probably at least partly a result of the establishment of new wood processing mills in both Shires.

Most of the socio-economic benefits of the plantation sector occur in the towns in which people working in the sector are based. LGAs with high areas of plantation but little associated employment do not show the same patterns of stable employment growth occurring in LGAs where plantation managers, contractors and processors are based. Instead, they have generally experienced changes typical of LGAs with a high dependence on the agricultural sector – generally declining population and fluctuations in household income reflecting changes in the agricultural sector.

Question 6: Does the plantation sector have a demonstrable impact on provision of different services in local regions

Changes in provision of services such as education, government programs and health and community facilities tend to follow population trends. In the SWS, service provision grew in larger regional centres and was more likely to decline in smaller population centres.

Perhaps the only service clearly linked to the presence of the plantation sector was fire fighting services. In focus groups, many participants reported that considerable investment in fire fighting by Forests NSW has benefited the region. Changes in other services could not be linked to plantation sector activity.

Question 7: Is change in the level of processing and harvesting demonstrably associated with changes in housing availability in processing towns?

A wide range of factors affect rental prices, rental vacancy rates, house prices and housing availability. From the data available, it was not possible to identify any links between plantation sector expansion and changes in residential sales values, with national trends driven by property investors masking any influence. However, ongoing rental vacancy shortages were identified as a key issue in several areas of the SWS, including Tumut, Tumbarumba and Holbrook, and these areas experienced higher than average increases in average rent over 1991 to 2001.

Key challenges in areas where plantation processing is expanding include enabling adequate housing stock to be provided in the region both for short-term rental during construction of processing facilities, and in the longer term as population and household income growth occur as a result of expansion of the plantation sector.

Question 8: Do harvesting and processing activities lead to transportation challenges?

Plantation sector transportation needs have the potential to place a significant burden on road networks in the region, some of which were originally designed and built to carry lower weights. The plantation industry and local and state governments have been working together on an ongoing basis to plan for funding required to maintain and upgrade roads in the region, and to prioritise transport infrastructure needs.

It was not possible to measure the impact of plantation sector traffic on road congestion and safety. In general, the highest rates of traffic accidents per capita in the SWS occur in LGAs containing national transport corridors such as the Hume Hwy. LGAs with the highest volume of plantation sector traffic – Tumut and Tumbarumba – experienced accident rates per capita

lower than those in LGAs with national transport corridors, but slightly higher than some other nearby small population LGAs. A large number of factors may have contributed to this pattern, only one of which is plantation sector traffic. For example, many accidents in Tumbarumba in recent years have occurred on the Alpine Way, a road not used by the plantation sector traffic. Examining this topic further would require detailed data on traffic movements in the region, and the proportion and type of traffic represented by the plantation sector.

Effectiveness of methods used

The methods used in this study were designed to better identify where plantation sector activity may be associated with socio-economic impacts, and to better quantify some of these impacts.

For the most part, these methods have been relatively effective. Key strengths included:

- It was possible to accurately identify the level of employment and spending generated from a specific area of plantation, and the spatial pattern of this employment and spending. This enables analysis of the extent to which the economic activity generated as a result of growing plantations is captured within particular regions. Plantation sector businesses were able to easily identify location data as well as numerical information on their employment and spending. However, accessing historical data was difficult in some cases, indicating an ongoing need to data collection before records become inaccessible;

- By identifying all key land use and industry changes occurring in the region, it was possible to link socio-economic changes to shifts in a range of industries, rather than focussing only on the plantation sector. This ensured that links between the plantation sector and socio-economic change were not made inappropriately due to lack of knowledge of other changes occurring in the region;

- By comparing to regional and national averages, and to similar comparison regions, it was possible to identify what was a 'typical' trend affecting the nation, the State or other similar regions, versus changes which were specific to LGAs within the SWS. This reduced the number of topics for which explanations of difference needed to be identified; and

- Use of focus groups allowed local knowledge of changes to be incorporated into analysis of independent data. This enabled a richer understanding of potential explanations for socio-economic change in the region, and generated new questions which could be further explored using independent data. It also enabled identification of limitations of independent data. If independent data from sources such as the ABS had been used and interpreted without the assistance of focus group participants, a considerably poorer analysis would have resulted. Focus group participants were able to identify where data should not be used due to inaccuracy or lack of completeness – for example, apple growers identified that data on number of apple trees did not necessarily reflect meaningful changes in the size of apple growing enterprises due to shifts in the types of tree stock used in the region. Focus group participants were also able to rapidly identify the different changes to local business and industry that may be associated with particular socio-economic changes, whereas attempting to identify this type of information from data collections is difficult as no single data collection contains information about all the different socio-economic changes affecting a region at any given time. This represented an improved methodology for interpreting and using data from independent sources, with many previous studies presenting

and/or interpreting independent data without incorporating interpretation and analysis from local residents with knowledge of the processes and changes being examined.

However, there were limitations to the methods used:

- There are limits to the qualitative data analysis approach used. Focus group participants could not explain some socio-economic changes that had occurred in the region. For example, participants found it difficult to identify why unemployment rates had fallen by a larger percentage in some LGAs than others. In some cases, no explanations for socio-economic change could be generated either from focus groups or from data on land use and industry change in the region;

- In this study, focus groups were used to assist in analysing and interpreting data, but not in setting the initial study questions to be examined. While participants identified that the questions examined where of relevance to their regions, ideally focus groups should be used more interactively to assist in developing guiding questions for the study. This would ensure the issues of interest/concern to local communities are targeted as effectively as possible by the study;

- The analysis was only effective where comparable, quality independent data was available over time for different socio-economic characteristics. In several cases, only limited data was available, and the level of analysis possible from this data was similarly limited; and

- The study examined questions which could be answered, at least to some degree, using independent data. This focus was chosen due to the identification of a lack of detailed use of this type of data in previous SEIA of plantations. A SEIA may examine a range of broader questions than those examined in this study, including gathering a range of primary data and directly studying perceptions of and attitudes to plantations. It is important to recognise that the questions examined in this study represent only some of those that may be studied as part of SEIA.

A key challenge in this study was identifying which comparisons were most meaningful for uncovering differences between 'plantation' and 'non-plantation' areas. Areas that had experienced rapid plantation industry expansion were compared to (a) other LGAs of the SWS (b) similarly structured LGAs or regions outside the SWS, and (c) State and national averages.

Perhaps the least useful comparison for the purposes of this study was the comparison to State and/or national averages. Regional areas vary so much that it is likely any area will be experiencing a trend different to the average – so if an area experiencing plantation industry expansion is also experiencing trends different to a State or national average, it is not possible to state whether this is likely to be related to plantation industry expansion. In a limited number of cases, however, these comparisons were useful. For example, when examining rent increases, some 'plantation' towns of the SWS had experienced more rapid growth in average rent than the NSW average, despite the NSW average including metropolitan areas.

More useful were comparisons of 'high plantation' regions to nearby areas not experiencing plantation industry expansion, and to comparison regions of similar structure. The former is useful as it gives an idea of whether changes in a plantation region were a result of processes affecting the surrounding region, or if they were unique to the plantation region. If unique to the plantation region, explanations for this could then be explored for. The latter is useful as it provides a useful picture of the ways regions with similar socio-economic and land use structure changed over time in the absence of plantation expansion. However, it would be useful to identify a larger number of these comparison regions than was used for this study.

This would allow a better understanding of the diversity of socio-economic change occurring in regions that at one point in time had relatively similar characteristics; however, it is resource intensive identifying and analysing a large number of comparison regions.

However, the most useful approach to analysing whether and why plantation industry expansion was associated with socio-economic change is development of an in-depth qualitative understanding of the different changes occurring within a plantation region over time, and the likely impacts of each on different socio-economic characteristics. It is essential to understand the range of trends affecting regions experiencing plantation industry expansion, and particularly to identify if particular trends were already occurring prior to plantation industry expansion, or if an observable shift occurred in parallel with the expansion of plantation harvesting and processing activity. It was this, in combination with comparing trends in 'plantation' regions with a range of other regions, that allowed trends to be identified as associated or not associated with plantation industry expansion with a reasonable degree of confidence.

The longitudinal approach used was highly suited to identifying whether plantation industry expansion was associated with distinct types of socio-economic change. It is recommended that this approach be used in future studies. Any studies examining only a single point in time should be explicitly designed to be followed up over time.

As long as the limits of the analysis are clearly identified, using clearly defined methods to qualitatively analyse independent data on socio-economic change allows a more rigorous analysis than may occur otherwise. The methods used in this study have ensured some common problems of data interpretation are avoided. In particular, the problem of 'over-explaining' a phenomenon based on change in a single sector, while assuming no other changes are occurring at the same time, has been addressed. In addition, the use of focus groups enabled rich local understanding of socio-economic change to be combined with quantitative independent data to provide more in-depth understanding of the complexity of socio-economic change in the SWS.

14.0 Recommendations for future research

This study has provided a range of results based on available data. This data, while useful and uncovering a range of important results, has a number of limitations. These have been discussed throughout the report.

Recommendations for further socio-economic impacts research include:

- This study has been designed to be updated over time. It should be repeated when data from the 2006 *Census of Population and Housing* are available, to analyse the socio-economic impacts of the ongoing expansion of the plantation sector in the region and begin building an ongoing data series tracking socio-economic impacts of the plantation sector at regular intervals;

- Any subsequent study of the SWS should include examination of the impact of the recent increase in areas of new plantations being established. This increase began to occur in 2004 and is likely to continue; the influences of this expansion of plantation estate on rural land markets and population should be monitored over time;

- More specific data on the numbers of 'lifestyle' residents living in rural areas, and their impacts on rural regions, is needed in order to understand the socio-economic impacts of the different land use changes occurring in the region;

- This study primarily examined data at the local government area scale (in this study, this was generally equivalent to the ABS Statistical Local Area scale). However, there may be changes occurring at the sub-LGA scale as a result of plantation expansion or other changes in land use. This was raised in some focus groups as a key issue requiring examination, with participants pointing out that plantation industry expansion may result in a shift in where most of the population of an LGA live, even if the overall population of the LGA remains the same. Future studies should examine data for smaller scale regions where possible.

- It may also be useful to examine the aggregate impacts of plantation related activity on larger-scale regions when some types of impacts, such as impact on flows of economic activity, are being examined;

- Regular collection of data on employment and expenditure by the plantation sector – including growers, contractors and processors - should occur. This would allow accurate estimation of employment and expenditure from the sector on a regular basis. Preferably, data should be collected at the same time data collection occurs for key socio-economic data sets (e.g., the *Census of Population and Housing*), to ensure comparability of data. Given that markets for wood products can lead to relatively rapid fluctuations in processing volumes, an annual survey would be most appropriate to ensure both short and long term trends can be analysed;

- Regular collection of comparable data on employment and expenditure by the industries that would be using land if it were not used to grow plantations, eg sheep or beef graziers. It is important to collect this data in a way that allows direct comparison to plantation sector employment and expenditure, which requires accessing data for the same time period and to the same point in the production chain across different land use industries;

- Regular data collection on trends in local residential property markets should occur. While data is not readily available at the local government level, regular contact with real estate agents in the region would be useful to monitor changes in local real estate markets;

- Further detailed studies of traffic movements, and the proportion of plantation traffic as a percentage of all traffic movements on different roads, would allow a more detailed analysis of road safety and congestion issues;

- Collection of data on membership of community groups over time, via a regular survey, is needed to accurately track trends in number and size of community groups over time. This could be undertaken via a regular phone survey of key community group organisers. Similarly, collection of data on other types of service provision on a regular basis would enable better understanding of changes in services over time. This type of data collection could then be used to better understand the factors linked to changes in service provision;

- Ongoing exploration of the potential to use cross-sectional analysis to identify statistically significant differences between socio-economic characteristics of plantation and other regions; and

- This study examined only those impacts which could be studied using 'non-perceptions' data. However, many socio-economic impacts can only be understood by examining attitudes and perceptions of plantations. Further studies could usefully integrate these different types of data collection to provide an integrated understanding of people's perceptions and understandings of plantations, as well as the socio-economic changes able to be documented using independent data. In particular, when specific regions are being studied it is useful to identify the specific questions local communities have about socio-economic impacts of plantations, so that the study can be designed to examine these questions.

Appendix 1: Review of perceptions about the socio-economic impacts of plantations

Introduction

This section examines key perceptions about the socio-economic impacts of plantations recorded in previous Australian studies.

A perception is the way a person interprets a particular object, action or issue. Different people may hold different perceptions about the same action or issue. For example, one person may believe that the earth is flat while another believes it is a sphere. Both have used available information and their own observations to interpret the information available to them, and their differing information and interpretation of that information has led to different conclusions (for further discussion of the concept of perception, see Marshall 1996).

A diversity of perceptions about the socio-economic impacts of plantations have been documented. In many cases, contradictory perceptions of impacts have been recorded. For example, Pickworth (2005) found that while some residents of the Bombala region of NSW believed plantation expansion brought new population into the community, others believed it led to a reduction of population.

What was included in the review?

The purpose of this review was to identify different perceptions about socio-economic impacts of plantations, in order to develop a set of questions about specific types of impacts, which could then be examined in this study.

This review does not examine the distribution of perceptions. In other words, it does not try to identify *who* or *how many* people hold particular views about plantations. To date there have been very few studies undertaken in Australia that have quantified the proportion of a given population that holds particular attitudes or perceptions. Those that have been undertaken have generally identified a diversity of perceptions about particular socio-economic impacts (see for example Tonts *et al.* 2000; Petheram *et al.* 2001; Pickworth 2005).

Perceptions about biophysical, environmental, health and landscape impacts were not reviewed, although these are often argued to have associated socio-economic impacts. This is because this study aimed to focus on direct socio-economic impacts.

Finally, only perceptions about plantations were reviewed. Perceptions of plantations differ substantially to perceptions about impacts of changes to native forest management and, as such, it was appropriate to focus on plantation sector literature only.

Within the literature reviewed, there is considerable variability. Socio-economic studies of plantations in Australia have included:

- studies of perceptions of impact;
- studies of factors affecting adoption of farm forestry or plantation forestry;
- studies examining interactions between different groups about plantations; and
- studies aiming to quantify socio-economic impacts of the plantation sector.

Studies which examined willingness to adopt farm forestry or plantations were not included in this review unless they examined general perceptions about existing plantations[28]. Studies and papers which examined ways of addressing concerns about some impacts of plantations, but which did not explicitly explore perceptions or evaluate impacts (eg Schirmer and Tonts 2003, Howard 2004) are not included in this review.

The different studies that have examined perceptions are not directly comparable to each other, as they have gathered data using different methods. Some used quantitative surveys with pre-determined questions about perceptions; others asked open-ended questions in in-depth interview with individuals (e.g. 'what are the main impacts of plantations?'). Table A2 in Appendix 2 provides an overview of the methods used in different studies.

Despite the diversity of methods used, many similar perceptions have been recorded in the different studies. Table A1 below describes the key types of perceptions recorded in previous studies.

Key questions about socio-economic impacts of plantations

The review of perceptions summarised in Tables A1 and A2 was used to develop a set of key questions to be explored in this project. Boxes A1 and A2 detail the key questions posed as a result of the review of common perceptions of the socio-economic impacts of plantations.

In general, perceptions fell into two broad categories:

- Perceptions about impacts of the expansion of plantation estate; and
- Perceptions about impacts of plantation processing and harvesting activities.

The key questions identified are separated into these two categories.

Some key perceptions recorded in previous studies are not included in the list of key questions examined in this study. They were not included as they relate to feelings of attachment to and culture of rural communities, for which the only evidence of impact can be the self-reported perceptions of those in the communities. These perceptions have already been well recorded in previous studies, and methods for uncovering further evidence about them were therefore not explored in this study.

[28] Useful adoption studies which examine the reasons why farmers do and don't adopt farm forestry or plantations include Soutar and Wallis 1986; Byron and Boutland 1987; Curtis and Race 1996; Schirmer 1998).

Box A1: Key questions about socio-economic impacts of expanding plantation estate:

Question 1: How much employment is provided by the plantation sector and where is the employment based in relation to the plantation estate?

Question 2: What type of employment is provided by the plantation sector?

Question 3: How much spending occurs from the plantation sector and where does that spending occur in relation to the plantation estate?

Question 4: Does plantation estate expansion have a demonstrable impact on the numbers of people living in rural communities?

Question 5: Does plantation estate expansion have a demonstrable impact on the socio-demographics of the population, eg through an influx of new residents into a community?

Question 6: Does expansion of plantation estate lead to a demonstrable change in levels of provision of local education, fire fighting, retail and other services?

Question 7: Does plantation estate expansion lead to a demonstrable change in land prices?

Question 8: Is there a demonstrable change in other agricultural industries associated with expansion of plantation estate?

Box A2: Key questions about socio-economic impacts of plantation processing and harvesting activities:

Question 1: How much employment is provided by the plantation sector and where is the employment based in relation to the plantation estate and processing and harvesting activities?

Question 2: What type of employment is provided by the plantation sector?

Question 3: How much spending occurs from the plantation sector and where, and what is the value of output of the plantation sector?

Question 4: Does plantation processing and harvesting expansion have a demonstrable impact on the total population?

Question 5: Does the plantation sector have a demonstrable impact on socio-demographics of the population within a region, eg through an influx of new residents into a community?

Question 6: Does the plantation sector have a demonstrable impact on provision of different services in local regions?

Question 7: Is change in the level of processing and harvesting demonstrably associated with changes in housing availability in processing towns?

Question 8: Do harvesting and processing activities lead to transportation challenges?

Table A1: Key perceptions of socio-economic impacts of plantations recorded in previous studies

Study	Barlow and Cocklin (2003)	Kelly and Lymon (2000)	Lane (1997)	Naughton (2001)	Oberon Community Development Study	Petheram *et al.* (2000)	Pickworth (2005)	Schirmer (2002)	State Plantations Impact Study (1989, 1990)	Tonts *et al.* (2001)
Agricultural industries perception # 1: Commercial plantations displace agricultural activities causing decline in agricultural industries	X	X		X	X	X	X	X	X	X
Agricultural industries perception # 2: Plantations provide farmers an opportunity to obtain income from leasing land for plantation establishment		X				X				
Economic viability perception # 1: Plantations will not produce positive economic returns	X	X				X		X	X	X
Economic viability perception # 2: There is a lack of available markets for plantation wood		X				X		X		X
Employment perception # 1: The plantation sector provides little local employment	X	X				X	X	X	X	
Employment perception # 2: Expansion of plantation estate processing provides employment opportunities in regional areas, particularly large regional towns	X	X	X	X	X	X	X		X	
Employment perception # 3: The plantation sector provides mostly low skilled, casual or part-time employment					X		X	X		
Housing availability perception # 1:					X					

Study	Barlow and Cocklin (2003)	Kelly and Lymon (2000)	Lane (1997)	Naughton (2001)	Oberon Community Development Study	Petheram *et al.* (2000)	Pickworth (2005)	Schirmer (2002)	State Plantations Impact Study (1989, 1990)	Tonts *et al.* (2001)
Increased forest industry activity, particularly processing, leads to higher rents, higher house prices and lower housing availability in processing towns										
Population perception # 1: Plantation estate expansion leads to rural population decline		**X**	**X**			**X**	**X**	**X**	**X**	**X**
Population perception # 2: Plantation estate expansion accelerates existing rural population decline	**X**		**X**			**X**		**X**	**X**	**X**
Population perception # 3: Plantation estate and processing expansion bring new people into local and/or regional communities	**X**			**X**		**X**	**X**			
Population perception # 4: The new people who come to live in communities do not always integrate well with existing members of the community	**X**	**X**				**X**		**X**		
Rural culture perception # 1: The plantation sector does not participate in the local community	**X**	**X**								**X**
Rural culture perception # 2: Plantation expansion results in loss of scenic views and/or landscape change	**X**	**X**					**X**	**X**	**X**	**X**
Rural land market perception # 1: Plantation expansion increases demand in the land market, benefiting those wanting to sell their land	**X**	**X**				**X**	**X**	**X**		

Study	Barlow and Cocklin (2003)	Kelly and Lymon (2000)	Lane (1997)	Naughton (2001)	Oberon Community Development Study	Petheram *et al.* (2000)	Pickworth (2005)	Schirmer (2002)	State Plantations Impact Study (1989, 1990)	Tonts *et al.* (2001)
Rural land market perception # 2: Plantation expansion leads to rising land prices		X	X			X	X	X	X	X
Rural land market perception # 3: Plantation expansion reduces sale price of land, particularly neighbouring land								X	X	X
Rural road network perception # 1: Increased log traffic leads to higher levels of road damage				X	X	X	X		X	X
Rural road network perception # 2: Increased log traffic creates congestion, noise and/or road safety problems		X		X	X		X		X	X
Rural road network perception # 3: Road funding activities related to the plantation sector have improved road maintenance				X						
Services and spending perception # 1: Expansion of plantations leads to downturn in local retail, agricultural and governments businesses and service provision at a local scale	X	X				X	X	X	X	X
Services and spending perception # 2: Plantation expansion leads to lower availability of volunteers for fire brigades		X				X		X	X	X
Services and spending perception # 3: Plantation companies have invested in fire fighting equipment and personnel which		X			X			X		X

Study	**Barlow and Cocklin (2003)**	**Kelly and Lymon (2000)**	**Lane (1997)**	**Naughton (2001)**	**Oberon Community Development Study**	**Petheram *et al.* (2000)**	**Pickworth (2005)**	**Schirmer (2002)**	**State Plantations Impact Study (1989, 1990)**	**Tonts *et al.* (2001)**
improve fire fighting efforts and response										
Services and spending perception # 4: Expansion of plantation estate and/or processing has led to establishment of new locally and regionally based businesses		**X**		**X**	**X**		**X**			**X**
Services and spending perception # 5: Plantation companies often obtain supplies non-locally		**X**				**X**		**X**	**X**	**X**
Taxation perception # 1: Plantation agencies/ companies do not contribute adequately to government, eg via rates (usually a perception held about publicly owned plantations)					**X**			**X**	**X**	

Appendix 2: Previous socio-economic impact studies

Table A2 below provides a summary of previous studies of socio-economic impact of plantations in Australia. It includes details of the topics examined, and the methods used to examine these topics.

Table A2: Topics studied and methods used in previous studies on perceptions and socio-economic impacts of plantations

Study	Region	Period studied	Topics studied (perceptions and/or impacts)	Methods used
Access Economics (2002)	Timbercorp operations in Western Australia, Green Triangle	2000-01	• Economic impact assessment	• Direct and contract employment by Timbercorp • Timbercorp profits • Export value of future harvest • Review of types of economic contributions made by Timbercorp • Expenditure on wages, subcontractors, goods and services (broken down into WA, SA and Vic expenditure) • Likely future economic impacts once plantation harvesting begins • Direct impact of Timbercorp operations on government revenues including impacts on income tax paid by growers, payments of company and payroll tax, personal income tax, and indirect taxes from activity generated in economy over a single rotation of a blue gum plantation • Input-output analysis to estimate indirect employment and expenditure impacts
Barlow and Cocklin (2003)	Branxholme, Victoria	2002	• Perceptions of impacts of blue gum plantations	• Semi-structured interviews with selected farmers, town residents, local government and plantation sector
CIE (2005)	Willmott Forests activities in Bombala Shire, NSW	2004	• Socio-economic impact assessment	• Socio-demographics of region (1996, 2001 data) • Local services available in region • Direct employment by Willmott Forests in region • Expenditure by Willmott Forests in region • Output from Willmott Forests sawmill • Other socio-economic contributions of Willmott Forests to the region

Study	Region	Period studied	Topics studied (perceptions and/or impacts)	Methods used
				eg training • Comparison of agriculture and forestry employment per hectare (using data from different years) • Discussion of potential impacts of planned future expansion
Hayter (2003)			Review of studies of socio-economic impact of forest industries in Australia	• Review of previous studies of socio-economic impact of forest industries in Australia
Howard (2004)			Reviews key perceptions of impact found in socio-economic studies	• Review of previous studies
Kelly and Lymon (2000)	Plantagenet Shire, Western Australia	1997-2000	• Perceptions of social, economic, environmental impact • Social impacts	• Unstructured and semi-structured interviews with wide range of groups/individuals • Quantitative community surveys conducted in 1998 and 1999 • Secondary data (ABS, WA Government agencies, some showing trends over time up to 1996 or 1998, depending on source) • Documentary analysis
Lane (1997)	Tumut region	Historical (1960s onward)	• History of plantation development • Perceptions of social impacts focussing on cultural aspects	• Qualitative in-depth interviews
Margules Groome Poyry Pty Ltd (1995)	NSW (all)	1993-94	• Economic impact of NSW timber industry	• Economic profile of timber industry in NSW • Estimate of economic impacts (employment, wages, gross output, value added, wood flows) • Linkages between forest products industry and wider economy via input-output analysis • Analysed by region with ABS Statistical Divisions used as regions • Analysed by eight industry sectors (forest management, contracting, basic processing hardwood, basic processing softwood, basic processing cypress pine, export woodchipping, wood panel products and paper)

Study	Region	Period studied	Topics studied (perceptions and/or impacts)	Methods used
				• Survey of operators within sector (55.6% response rate)
Naughton (2001)	Tumut Shire, New South Wales	2001	• Willingness to adopt farm forestry • Perceptions of impact of expansion of farm forestry and processing	• Semi-structured interviews of key stakeholders from range of groups • Quantitative survey of landholders in Tumut Shire
Oberon Community (multiple reports produced from 1990 to 1995)	Oberon Shire, New South Wales and Central Tablelands Statistical Sub-Division (CTSS)	1985-86 to 1992-93	• Socio-economic impacts • Perceptions of impacts of timber industry • Financial impacts of forest industry on local government operations	• Direct and indirect employment and expenditure via input-output analysis of Oberon and CTSS economy • Quantitative survey of Oberon households in early 1989 and late 1991 • Quantitative surveys of forest industry employees in 1990 and 1994 • Interviews and focus groups • Secondary data on socio-demographics, housing, road accident statistics, and others • Estimated of financial impacts of forest industry on local government operations • Comparison of economic impacts of forestry per hectare to impacts of other key agricultural industries per hectare
Petheram *et al.* (2000)	South-west Victoria	1990-2000 (some variation in dates depending on data availability)	• Employment impacts • Comparison of employment per hectare for plantations and key agricultural land uses • Social impacts on population • Land price impacts • Roading movements • Attitudes to plantations and other key types of land use change in the region • Future scenarios	• Quantitative survey • Economic modelling of employment per hectare and regional cash flows (predictive) • Stakeholder group interviews discussing land use change • Wide range of secondary data on agricultural land use change, employment, school enrolments, much ABS Census data for 1990-91 to 1996-97
Pickworth (2005)	Bombala, NSW	2004	• Perceptions of social, economic and environmental impacts of plantations	• Interviews with key informants to identify key perceptions • Quantitative sample survey of Shire population to identify distribution of perceptions

Study	Region	Period studied	Topics studied (perceptions and/or impacts)	Methods used
Schirmer (2002)	Northern Tasmania, North-east Victoria	Dec 1999-Feb 2000	• Perceptions of impact • Processes used to address concerns	• Semi-structured interviews • Documentary analysis
Shea and Bartle (1988)	South-Western Australia	-	• Predicted potential future impacts • Financial returns • Estimated value of shelter benefits	• Potential returns per hectare from growing blue gums predicted • Prediction of total gross return per annum from 10,000 ha program of plantation establishment • Economic gains from shelter benefits of trees on farms
State Plantations Impact Study	Victoria	1989, and future (10 and 50 years into future)	• Recommended options for development of plantations (hardwood and softwood) • Potential social, economic and environmental impacts of planned expansion • Identified key perceptions about plantations	• Formal and informal interviews and encouragement of submissions on issues of concern (180 submissions received) • Secondary data including ABS • Questionnaire to plantation industry on employment • Expert literature on environmental impacts • Markets for plantation products • Estimated returns and employment per hectare from plantations • Estimated direct employment • Comparison of employment per hectare by plantation and other agricultural land uses • Estimated regional impacts
Tonts and Black (2003)	-	-	• Reports of impacts in previous studies • Perceptions of impacts	• Review of previous studies into social and economic impacts
Tonts *et al.* (2001)	Boyup Brook, WA; Bridgetown-Greenbushes WA; Wattle Range SA, West Wimmera VIC	2000	• Social impacts of plantation in different regions including employment impacts, population, land values • Perceptions of impact by residents of the four communities studied	• Socio-demographic data from range of sources including ABS Census of Population and Housing and Agricultural Census, DEWR, Taxation Statistics, local government and land values data • Semi-structured interviews with major stakeholders from range of groups (inc. local government, plantation sector, farmers, local business, State government agencies) in mid 2000 • Telephone survey of 80 residents (20 in each region studied)
URS Forestry (2004)	South West Slopes, NSW	2004	• Current economic impacts of plantation and native forest	• Value of timber production • Direct employment in management, harvesting, haulage, sawmilling

Study	Region	Period studied	Topics studied (perceptions and/or impacts)	Methods used
			sector	and preservation, panel production and pulp and paper production • Indirect employment (using multiplier of 2) • Wood flows in and out of region • Description of other benefits of forest industry including contributions to local community and provision of fire fighting services
Prospect Consulting Pty Ltd (2002)	North-east Victoria	2000-01	• Economic impact (employment, expenditure) • Location of economic impact by region • Socio-demographic characteristics of region	• Direct employment in softwood plantation, hardwood plantation and native forest sector in management, contract and milling sectors (not broken down by region within north-east Victoria but indicating employment inside and outside study area for some categories) • Expenditure and revenue in softwood plantation, hardwood plantation and native forest sectors • Proportion of total employment from forestry sector in study area • Prediction of benefits of 50% expansion in area of plantation by 2020 (in terms of employment, revenue) • Wood flows in and out of study area • Estimates of indirect employment using multiplier of 2 • Existing and planned capital investment • Socio-demographics of population of study area • Dependence of population on forest sector based on proportion of employment dependent on forest sector • Comparison of $GVP of timber to $GVP of other key industries operating in region

Appendix 3: National Economic *YourPlace I-O* model

YourPlace™ *IO*
An information booklet

National Institute of Economic and Industry Research
trading as National Economics

Using input-output tables in analysis

The following section describes input-output analysis and describes its practical uses. This section is followed with an information booklet on NIEIR's YourPlace-IO software.

The Australian Bureau of Statistics (ABS) collects the input-output tables which represent the flow of goods and services between industries. The basic tables and the industry-by-industry tables provided by the ABS are essentially an accounting record of the flows in the national economy. Using simplifying assumptions the input-output estimates can serve many analytical purposes.

Basic structure of input-output tables

The table below describes the basic structure of an industry by industry table with direct allocation of imports. Flows between industries are shown in quadrant 1 (Q1), called intermediate usage. Each column in this quadrant shows the intermediate inputs into an industry in the form of goods and services produced by other industries and each row shows those parts of an industry's output which have been absorbed by other industries. For example, the intersection of the first column (mining) and the third row (construction), indicates how many goods and services are used by the mining industry from the construction sector to produce mining output.

Industry to industry input/output table

Industry to industry input/output table									
To / From		Intermediate demand				Total	Final demand	Exports	Total supply
		Mining	Manufacturing	Construction	Services		Public and private		
Intermediate inputs	Mining	Intermediate usage Q1					Final demand Q2		
	Manufacturing								
	Construction								
	Services								
Primary inputs	Wages & salaries	Primary inputs to production Q3					Primary inputs to final demand Q4		
	Gross operating surplus								
	Taxes								
	Imports								
Australian production									

The intermediate usage quadrant and the final demand quadrant (Q2) show the total usage of goods and services supplied by each industry. Quadrants 1 and 3 together show the inputs used to produce the total supply (outputs) of each industry.

Final demand (Q2) represents the total level of demand for products (of industries) by households, business and governments. This includes both consumer and capital goods and services. Also goods and services produced for consumption overseas, exports, are included here.

Primary inputs to production (Q3) includes the proportions of labour, profits, taxes and imports used to produce the total supply of output of each industry. Wages and salaries are the labour component whilst gross operating surplus (GOS) is akin to profit. Taxes include all net government taxes on production. Also included are imports which are used as inputs to production by domestic companies.

As mentioned earlier the table above shows the input-output relationships using direct allocation of imports. Basically imports can be treated in 2 ways, either directly or indirectly.

The direct allocation of imports method treats imports as a separate item and imports used as inputs are factored in as a separate line item. That is as they are shown in the table in the last row in primary inputs. In this case quadrants 1 and 2 refer only to the use of domestic production and consequently quadrant 1 does not reflect the technological input structure of the economy. Indirect allocation of imports involves recording all imports as adding to the supply of the industry in quadrant 1. When the tables are depicted in this way the amounts of inputs into one industry supplied by each other industry reflect the true technological relationships between all inputs into the industry.

A simple application of the input-output table is calculating inputs as a percentage of the output of an industry and using these percentages for any given level of output of that industry. In the table above this is done by using quadrant 1 and 3 divided by Australian production in a given industry. The individual results are referred to as direct input-output coefficients.

These coefficients however do not tell the complete story. For example, in order to produce output from the chemicals industry inputs are required directly from the mining industry. To supply this direct requirement, the mining industry itself requires inputs from the chemical industry. To produce this indirect requirement of the mining industry, the chemical industry needs, in turn, additional output from the mining industry and so on in a convergent infinite series. This example is isolated to two industries. When the inter-relationships of all industries in the economy are considered the direct input-output coefficients have major shortcomings. This is not to be confused with the direct allocation of imports which is a separate issue.

What are needed are the total requirements coefficients. This is done by tracing, step by step, throughout the industrial structure, until the increments of output required indirectly from each industry become insignificant. If this operation is carried out for all industries and the direct and indirect requirements are added together, a matrix of total requirement coefficients are obtained. This process is done on a computer using matrix inversion.

In these tables a coefficient at the intersection of row i and column j in quadrant 1 and 3 represents the units of output of industry i required directly or indirectly to produce 100 units of output absorbed by final demand of industry j.

NIEIR's YourPlace-IO – regional input-output software

Input-output information is available for the Australian economy as a whole and is collected by the ABS. With this information a system of building blocks is used each of which shows, for a product (or more commonly combination of products):

- its origin or source of supply divided into domestic production and imports;
- its destination classified into usage by various industries and final demand categories; and

- the difference between the basic price and the purchasers price for each product or margin.

NIEIR has pioneered the creation of region specific input-output tables with the creation of YourPlace-IO. The geographical unit of analysis is the local government area (LGA) and several LGA's can be aggregated to create a regional economy.

This process can broadly be explained in four steps and is undertaken for every region.

These are elaborated on below.

STEP 1 Prepare the national indirect allocation of imports table

STEP 2 Gather all economic data on the region of interest, including industry output and consumption expenditure.

STEP 3 Analyse the regions industries input requirements given its output.

STEP 4 See how much of this input requirement can be sourced from local production.

The input-output tables are estimated for the 106 industries in the national input-output tables prepared by the Australian Bureau of Statistics (ABS). The ABS tables have 107 industries. However, data limitations forced aggregation of two: the agriculture and livestock industries.

YourPlace-IO uses the YourPlace data estimates for each LGA for:

- private consumption expenditure for 400 categories;
- construction expenditure;
- equipment expenditure;
- government consumption expenditure; and
- industry output.

YourPlace-IO estimates exports and imports by 106 industries; and then calculates input-output relationships based on the indirect allocation of imports by the ABS methodology.

To measure the strength of the supply chain within a region, however, the indirect allocation tables have to be converted to tables based on the direct allocation of imports into the LGA (Step 4). These tables show the inter-relationships between industries operating within each LGA boundary.

Such tables are estimated from:

(i) the LGA indirect import allocation tables (technological tables); and

(ii) the national direct import allocation tables (as described above).

Once all the steps are undertaken the following scenario can be analysed. A specific example using the meat industry will be considered. Suppose for a region it is found for the meat industry that the column sum is 1.41. This means that for each $1 million of demand for the meat industry in an LGA that $0.41 million of additional output is generated by other industries in the LGA.

The increase in the output of other industries will represent the supply from the:

- agriculture;
- business services;
- energy;
- transport; and
- other manufacturing,

industries into the next industry to enable the meat industry to function. The more the meat industry sources its supplies of goods and services from outside the region, the smaller will be the 1.41 column sum. This figure is refereed to as a Type I multiplier.

Using input-output for analysis

An important tool for analysts is the input-output multipliers. These provide a way of answering some of the questions often asked by economists and managers. These queries tend to arise because of the types of 'what if?' analysis for which input-output tables can be used (for example, what would be the impact on employment of an x per cent change in output by the chemicals manufacturing industry). This type of analysis is dependent on a knowledge of input-output multipliers and their shortcomings. Using input-output tables, multipliers can be calculated to provide a simple means of working out the flow-on effects of a change in output in an industry on one or more of imports, income, employment or output in individual industries or in total. The multipliers can show just the 'first-round' effects, or the aggregated effects once all secondary effects have flowed through the system.

The basic role of input-output analysis is to analyse the link between final demand and industrial output levels. The inverse table, total requirements coefficient in the national accounts context, could be used to assess the effects on the productive system of a given level of final demand. Employment implications are equally important in this respect.

Input-output tables can also be used for analysing changes in prices stemming from changes in costs or from changes in taxes or subsidies.

Here are some practical examples to help illustrate the application of input-output tables. For instance, it is possible to estimate the levels of output of the production sectors required by a given final demand. The effect on other industries of an additional final output of $100 million of the rubber and plastics industry, or a 30 per cent change in exports of steel can be calculated by assuming that average and marginal utilisation rates are the same.

Another example of input-output application is assessing the benefits of a specific project to a regional economy. The analysis of the impact must be broken up into two stages. Firstly the construction phase and secondly the operational phase. Irrespective of which type of industry the project is in, both phases will utilise different input requirements and need to be analysed separately.

For example, the construction of a new motor vehicle plant will require inputs from industries such as; construction, building services, steel and machinery and equipment. The impact of the construction of a $150 million automobile plant on the economy may be $105 million once the direct and indirect benefits have flowed through the economy. That is, regional suppliers have provided this amount of inputs.

Once the plant is up and running it will be drawing on inputs from a diverse range of industries including; rubber and plastics, transport equipment, non-metallic minerals (glass etc.) and the fabricated metals industry. An estimated annual output of $100 million for the plant, may have additional benefit to the regional economy of $75 million. That is, $25 million will be imported intermediate or primary inputs.

The total benefit to the region in the first year will equal $180 million (combining construction and operation impacts).

The results of user analyses will be correct to the extent to which input-output coefficients are stable. This depends on if the assumptions underlying the input-output estimates have been satisfied. One of the main assumption is homogeneity. It postulates that:

1. each sector produces a single output (i.e. all the products of the sector are perfect substitutes for one another or are produced in fixed proportions); and
2. there is no substitution between the products of different sectors.

The homogeneity assumption may be weakened by changes in the product mix (and consequent changes in inputs), the introduction of new products or materials and the substitution of imported products for domestic production. This assumption may be

realistic for the year the data is collected but becomes progressively less so as time goes on. NIEIR has accounted for the short falls due to the homogeneity assumption by allowing for some of these changes. Estimates of input changes brought about by technological advances have been accounted for using the latest international data and expert advice. Also changes from import substitution have been accounted for by using the indirect import allocation method and analysing trends in trade data.

The second main assumption is the proportionality assumption. It postulates that the changes in the output of an industry will lead to proportional changes in quantities of its input (i.e. for each output, each of these inputs will be a fixed proportion of the total). Economies of scale are therefore ignored. This effect could be accounted for by further refinement of the tables. Given however, that the tables (in quadrant 1 and 3 in our diagram above) represent production functions for firms large and small, any distortions created by the proportionality assumption are balanced out and do not overly bias their use in regional analysis.

Appendix 4: *YourPlace I-O* data on flow-on impacts

Tables A4.1 to A4.4 below provides details of the output from the National Economics produced input-output model *YourPlace I-O* for the *Combined Overall Effects* of a one million dollar investment in the 'forestry and logging', 'sawmilling', 'other wood products' and 'paper, pulp and paperboard' sectors. In the SWS, the majority of activity in all these sectors is based on plantation forestry, although a small proportion is activity resulting from management of native forests for wood production.

Native forest-related production accounted for less than 1.5% of the value of output from the forest and wood products industries in the SWS in 2002-03, and just under 4.4% of employment (URS Forestry 2004). Its effects on calculation of multipliers for plantation-related activities would therefore be relatively small, and so the multipliers given below are an accurate reflection of the level of output, employment and income generated by a given level of investment in the plantation sector.

The *Combined Overall Effects* represent all the flow-on effects of this one million dollar investment, through several rounds of activity, and including both production and consumption induced effects.

All sectors in which there is more than $0.0001 million of flow-on effect are listed. In a number of other sectors, there are flow-on effects smaller than this, and they are not listed separately. As a result, the 'Total' figure does not equal the sum of the industry sectors shown. All figures are in $2001.

Table A4.1: *YourPlace I-O* Combined overall effects of $1,000,000 investment in forestry and logging

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
0300	Forestry and logging	1.0491	9.2649	0.3118
5101	Retail trade	0.0533	1.3014	0.0196
4501	Wholesale trade	0.0915	0.7035	0.0235
5401	Mechanical repairs	0.0423	0.4963	0.0125
5701	Accommodation , cafes and restaurants	0.0297	0.4470	0.0074
6101	Road transport	0.0268	0.3101	0.0091
8601	Health services	0.0190	0.2817	0.0072
2810	Other machinery and equipment	0.0292	0.2277	0.0083
7802	Legal accounting, marketing and business services	0.0200	0.1681	0.0065
7803	Other business services	0.0094	0.1659	0.0040
9301	Sport, gambling and recreational	0.0160	0.1387	0.0026
8701	Community services	0.0072	0.1466	0.0025
7101	Communication services	0.0160	0.1258	0.0046
8401	Education	0.0064	0.1270	0.0036
9501	Personal services	0.0055	0.1213	0.0019
7401	Insurance	0.0110	0.0977	0.0038
7301	Banking	0.0109	0.0919	0.0034
0107	Other agriculture	0.0098	0.0916	0.0019
2705	Fabricated metal products	0.0115	0.0881	0.0028
7702	Other property services	0.0425	0.0535	0.0019
7701	Ownership of dwellings	0.0918	0.00	0.00
2809	Agricultural, mining and construction materials	0.0095	0.0660	0.0026
0200	Services to agriculture	0.0063	0.0672	0.0019
2801	Motor vehicles, parts; transport equipment	0.0090	0.0567	0.0018
2101	Meat and meat products	0.0109	0.0458	0.0010
3601	Electricity supply	0.0136	0.0406	0.0017
2302	Other wood products	0.0068	0.0429	0.0012
7801	Scientific research, tech and computer services	0.0046	0.0378	0.0018
8101	Government administration	0.0044	0.0335	0.0011
2402	Publishing; recorded media	0.0049	0.0328	0.0010
9101	Motion picture, radio and television	0.0027	0.0288	0.0009
9601	Other services	0.0026	0.0277	0.0009
6601	Services to transport; storage	0.0027	0.0265	0.0009
7501	Services to finance, invest., insurance	0.0052	0.0238	0.0011
0103	Beef cattle	0.0023	0.0263	0.0004
2401	Printing and services to printing	0.0027	0.0226	0.0006
2704	Sheet metal products	0.0025	0.0226	0.0007
2509	Plastic products	0.0033	0.0212	0.0006
2106	Bakery products	0.0023	0.0222	0.0005
2102	Dairy products	0.0050	0.0193	0.0006
2902	Furniture	0.0019	0.0174	0.0003
7302	Non-bank finance	0.0023	0.0164	0.0006
9201	Libraries, museums and the arts	0.0015	0.0171	0.0004
2202	Textile products	0.0013	0.0135	0.0003
2501	Petroleum and coal products	0.0063	0.0084	0.0005

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
6201	Rail, pipeline and other transport	0.0013	0.0130	0.0005
2108	Other food products	0.0035	0.0100	0.0002
2103	Fruit and vegetable products	0.0021	0.0093	0.0002
2807	Household appliances	0.0015	0.0094	0.0003
2201	Textiles fibres, yarns woven fabrics	0.0019	0.0089	0.0002
0102	Grains	0.0015	0.0092	0.0002
2508	Rubber products	0.0016	0.0088	0.0003
2808	Other electrical equipment	0.0011	0.0089	0.0003
2303	Pulp, paper and paperboard	0.0021	0.0072	0.0003
3701	Water supply, sewerage and drainage	0.0018	0.0070	0.0003
2111	Wine and spirits	0.0019	0.0066	0.0002
2806	Electronic equipment	0.0011	0.0069	0.0003
2504	Medicinal, pharmaceutical, pesticides	0.0018	0.0060	0.0002
2105	Flour mill products and cereal foods	0.0024	0.0050	0.0001
2304	Paperboard containers; paperbags	0.0013	0.0042	0.0001
2702	Basic non-ferrous metals and products	0.0015	0.0038	0.0002
0105	Other livestock	0.0014	0.0033	0.0001
2502	Basic chemicals	0.0014	0.0033	0.0002
	Total	**1.8105**	**15.6941**	**0.4785**
	Total multiplier	**1.81**	**15.69**	**0.48**

Table A4.2: *YourPlace I-O* Combined overall effects of $1,000,000 investment in sawmill products

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2301	Sawmill products	0.8962	6.4571	0.1944
5101	Retail trade	0.0392	0.9582	0.0144
6101	Road transport	0.0769	0.8887	0.0282
0300	Forestry and logging	0.0907	0.8007	0.0269
5701	Accommodation, cafes and restaurants	0.0236	0.3557	0.0060
4501	Wholesale trade	0.0366	0.2814	0.0090
7803	Other business services	0.0123	0.2178	0.0057
8601	Health services	0.0145	0.2153	00056
7802	Legal accounting, marketing and business services	0.0213	0.1791	0.0073
5401	Mechanical repairs	0.0139	0.1624	0.0037
9301	Sport, gambling and recreational	0.0118	0.1019	0.0019
8701	Community services	0.0053	0.1081	0.0018
7101	Communication services	0.0122	0.0957	0.0035
8401	Education	0.0051	0.1009	0.0029
2302	Other wood products	0.0140	0.0888	0.0025
9501	Personal services	0.0041	0.0913	0.0014
6601	Services to transport; storage	0.0081	0.0783	0.0029
2303	Pulp, paper and paperboard	0.0191	0.0660	0.0030
3601	Electricity supply	0.0200	0.0596	0.0028
7702	Other property services	0.0337	0.0425	0.0015
7301	Banking	0.0074	0.0623	0.0023
7701	Ownership of dwellings	0.0677	0.00	0.00
0107	Other agriculture	0.0049	0.0456	0.0009
7801	Scientific research, tech and computer services	0.0055	0.0448	0.0022
8101	Government administration	0.0055	0.0416	0.0015
7401	Insurance	0.0047	0.0420	0.0015
2101	Meat and meat products	0.0081	0.0339	0.0007
2705	Fabricated metal products	0.0044	0.0334	0.0010
5402	Other repairs	0.0014	0.0360	0.0007
9601	Other services	0.0032	0.0339	0.0012
2810	Other machinery and equipment	0.0042	0.0325	0.0012
2801	Motor vehicles; parts; transport equipment	0.0048	0.0304	0.0009
2402	Publishing; recorded media	0.0034	0.0231	0.0007
0103	Beef cattle	0.0017	0.0195	0.0003
9101	Motion picture, radio and television	0.0018	0.0191	0.0006
2401	Printing and services to printing	0.0022	0.0184	0.0005
2509	Plastic products	0.0026	0.0167	0.0005
7501	Services to finance, invest., insurance	0.0033	0.0152	0.0007
2102	Dairy products	0.0037	0.0142	0.0004
2106	Bakery products	0.0016	0.0160	0.0003
6201	Rail, pipeline and other transport	0.0016	0.0159	0.0007
7302	Non-bank finance	0.0018	0.0131	0.0005
2902	Furniture	0.0014	0.0131	0.0003
9201	Libraries, museums and the arts	0.0011	0.0128	0.0003
2704	Sheet metal products	0.0011	0.0103	0.0003
2108	Other food products	0.0026	0.0073	0.0002
2103	Fruit and vegetable products	0.0016	0.0068	0.0002
3701	Water supply, sewerage and drainage	0.0016	0.0064	0.0002

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2601	Glass and glass products	0.0013	0.0066	0.0002
0102	Grains	0.0011	0.0067	0.0001
2201	Textiles fibres, yarns woven fabrics	0.0013	0.0058	0.0001
2105	Flour mill products and cereal foods	0.0018	0.0037	0.0001
2502	Basic chemicals	0.0015	0.0035	0.0002
2501	Petroleum and coal products	0.0021	0.0028	0.0002
2111	Wine and spirits	0.0011	0.0038	0.0001
2304	Paperboard containers; paperbags	0.0010	0.0034	0.0001
0105	Other livestock	0.0011	0.0024	0.00
	Total	**1.5483**	**12.2352**	**0.3528**
	Total multiplier	**1.55**	**12.24**	**0.35**

Table A4.3: *YourPlace I-O* Combined overall effects of $1,000,000 investment in other wood products

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2302	Other wood products	0.8619	5.4776	0.1597
5101	Retail trade	0.0364	0.8892	0.0134
6101	Road transport	0.0457	0.5282	0.0165
5701	Accommodation, cafes and restaurants	0.0228	0.3429	0.0059
4501	Wholesale trade	0.0384	0.2955	0.0096
7803	Other business services	0.0141	0.2499	0.0066
0300	Forestry and logging	0.0254	0.2244	0.0075
7802	Legal accounting, marketing and business services	0.0238	0.2001	0.0083
8601	Health services	0.0134	0.1993	0.0052
5401	Mechanical repairs	0.0101	0.1188	0.0026
2705	Fabricated metal products	0.0146	0.1113	0.0036
7101	Communication services	0.0135	0.1061	0.0040
9301	Sport, gambling and recreational	0.0108	0.0937	0.0017
8701	Community services	0.0049	0.0992	0.0017
8401	Education	0.0048	0.0963	0.0028
7702	Other property services	0.0395	0.0498	0.0018
9501	Personal services	0.0038	0.0842	0.0013
3601	Electricity supply	0.0204	0.0610	0.0029
6601	Services to transport; storage	0.0065	0.0631	0.0023
7301	Banking	0.0068	0.0569	0.0021
2303	Pulp, paper and paperboard	0.0142	0.0491	0.0022
7701	Ownership of dwellings	0.0621	0.00	0.00
7801	Scientific research, tech & computer services	0.0059	0.0479	0.0024
0107	Other agriculture	0.0043	0.0407	0.0008
7401	Insurance	0.0041	0.0368	0.0013
2101	Meat and meat products	0.0075	0.0314	0.0007
8101	Government administration	0.0042	0.0317	0.0011
2509	Plastic products	0.0047	0.0304	0.0010
5402	Other repairs	0.0012	0.0323	0.0006
9601	Other services	0.0028	0.0295	0.0010
2402	Publishing; recorded media	0.0041	0.0275	0.0009
9101	Motion picture, radio and television	0.0027	0.0286	0.0010
2801	Motor vehicles, parts; transport equipment	0.0042	0.0263	0.0008
2401	Printing and services to printing	0.0026	0.0222	0.0007
0103	Beef cattle	0.0016	0.0180	0.0003
7302	Non-bank finance	0.0022	0.0160	0.0006
7501	Services to finance, invest., insurance	0.0032	0.0148	0.0006
2102	Dairy products	0.0034	0.0131	0.0004
2106	Bakery products	0.0015	0.0147	0.0003
2704	Sheet metal products	0.0015	0.0137	0.0004
2902	Furniture	0.0014	0.0129	0.0003
6201	Rail, pipeline and other transport	0.0013	0.0130	0.0005
2702	Basic non-ferrous metals and products	0.0039	0.0098	0.0005
9201	Libraries, museums and the arts	0.0010	0.0121	0.0003
2502	Basic chemicals	0.0035	0.0084	0.0004
3701	Water supply, sewerage and drainage	0.0022	0.0088	0.0004
2108	Other food products	0.0023	0.0067	0.0002
2103	Fruit and vegetable products	0.0014	0.0063	0.0001

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2201	Textiles fibres, yarns woven fabrics	0.0013	0.0061	0.0002
2507	Other chemical products	0.0012	0.0050	0.0002
2304	Paperboard containers; paperbags	0.0012	0.0040	0.0001
2105	Flour mill products and cereal foods	0.0016	0.0034	0.0001
2504	Medicinal, pharmaceutical, pesticides	0.0011	0.0036	0.0001
2111	Wine and spirits	0.0010	0.0035	0.0001
2501	Petroleum and coal products	0.0015	0.0019	0.0001
	Total	**1.5876**	**11.4008**	**0.3238**
	Total multiplier	**1.59**	**11.40**	**0.32**

Table A4.4: *YourPlace I-O* Combined overall effects of $1,000,000 investment in pulp, paper and paperboard products

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2303	Pulp, paper and paperboard	0.9417	3.2626	0.1488
5101	Retail trade	0.0330	0.8064	0.0122
0300	Forestry and logging	0.0690	0.6097	0.0205
6101	Road transport	0.0455	0.5262	0.0165
5701	Accommodation, cafes and restaurants	0.0227	0.3417	0.0060
4501	Wholesale trade	0.0341	0.2618	0.0085
7803	Other business services	0.0116	0.2047	0.0054
8601	Health services	0.0117	0.1745	0.0045
7802	Legal accounting, marketing and business services	0.0191	0.1602	0.0066
3601	Electricity supply	0.0432	0.1288	0.0065
5401	Mechanical repairs	0.0117	0.1375	0.0032
8401	Education	0.0047	0.0944	0.0028
9301	Sport, gambling and recreational	0.0097	0.0844	0.0016
8701	Community services	0.0044	0.0895	0.0015
7101	Communication services	0.0105	0.0828	0.0030
2705	Fabricated metal products	0.0106	0.0813	0.0026
7301	Banking	0.0086	0.0721	0.0028
9501	Personal services	0.0035	0.0767	0.0012
9601	Other services	0.0056	0.0590	0.0022
6601	Services to transport; storage	0.0055	0.0534	0.0019
2304	Paperboard containers; paperbags	0.0131	0.0435	0.0018
7701	Ownership of dwellings	0.0560	0.00	0.00
7702	Other property services	0.0243	0.0307	0.0011
8101	Government administration	0.0055	0.0417	0.0015
7401	Insurance	0.0043	0.0382	0.0014
0107	Other agriculture	0.0041	0.0384	0.0007
2502	Basic chemicals	0.0122	0.0291	0.0015
6201	Rail, pipeline and other transport	0.0034	0.0334	0.0015
2402	Publishing; recorded media	0.0048	0.0320	0.0011
2101	Meat and meat products	0.0069	0.0289	0.0006
2801	Motor vehicles, parts; transport equipment	0.0039	0.0248	0.0007
2509	Plastic products	0.0038	0.0243	0.0008
3701	Water supply, sewerage and drainage	0.0054	0.0216	0.0009
2504	Medicinal, pharmaceutical, pesticides	0.0059	0.0197	0.0009
7302	Non-bank finance	0.0031	0.0223	0.0008
7501	Services to finance, invest., insurance	0.0037	0.0171	0.0008
2401	Printing and services to printing	0.0020	0.0172	0.0005
3602	Gas supply	0.0038	0.0146	0.0008
0103	Beef cattle	0.0015	0.0166	0.0003
9101	Motion picture, radio and television	0.0015	0.0163	0.0005
2102	Dairy products	0.0031	0.0119	0.0003
2106	Bakery products	0.0014	0.0133	0.0003
2808	Other electrical equipment	0.0015	0.0121	0.0004
2302	Other wood products	0.0018	0.0114	0.0003
2902	Furniture	0.0012	0.0107	0.0002
2704	Sheet metal products	0.0010	0.0093	0.0003
2108	Other food products	0.0021	0.0061	0.0002
2103	Fruit and vegetable products	0.0013	0.0057	0.0001
2201	Textiles fibres, yarns woven fabrics	0.0012	0.0056	0.0001

No.	Commodity name	Output ($ million)	Employment (number of people)	Income ($ million)
2507	Other chemical products	0.0012	0.0049	0.0002
2501	Petroleum and coal products	0.0022	0.0029	0.0002
2105	Flour mill products and cereal foods	0.0015	0.0031	0.0001
	Total	**1.5538**	**8.3185**	**0.2921**
	Total multiplier	**1.55**	**8.32**	**0.29**

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