

**Monitoring the social and economic impacts of forestry:**

**Recommended indicators for monitoring social and economic  
impacts of forestry over time in Australia**

**Report prepared for Department of Agriculture, Fisheries and  
Forestry by the Fenner School of Environment and Society,  
Canberra**

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## **Executive Summary**

This report provides recommendations on indicators that can be used to monitor the social and economic impacts of forestry in Australia, and other research that needs to be undertaken to improve understanding of these impacts. The report was prepared for the Forest Industries Branch of the Department of Agriculture, Fisheries and Forestry (DAFF).

The indicators were developed to be cost effective, valid, replicable over time, applicable across different forestry sectors and at a range of geographic scales, and perhaps most importantly, to provide information on the relevant social and economic impacts. A key priority was to identify indicators that can be readily and cost effectively measured over time using available sources of data, as well as identify where further information is needed, but not as easily accessible.

Indicators were developed by reviewing the types of information needed about social and economic impacts of forestry, followed by identifying methods that can be utilised to measure these impacts. Information needs were identified by reviewing current forest policies, media reports on forestry, recent research recording public perceptions about forestry, and reports produced by stakeholders with an interest in forestry in Australia. Methods for measuring indicators were identified by reviewing the data currently produced on forestry by different organisations such as the Australian Bureau of Statistics, and reviewing methods used in recent research studies to measure the impacts of forestry.

The initial list of indicators identified were discussed at a workshop of forestry stakeholders, and prioritised based on these discussions. Indicators were then tested in two case study regions, and refined based on the results of the case studies. The results of the two case studies are presented in separate reports.

Based on this process, the following four types of indicators are recommended for monitoring the social and economic impacts of forestry in Australia:

- Indicators which measure characteristics of the forest industry:
  - Direct employment in the forest industry;
  - Proportion of land utilised by the forest industry;
  - Estimated value and volume of production;
  - Efficiency of production, measured as labour productivity; and
  - Consumption of wood and paper products.
- Impacts of the forest industry on the broader community:
  - Dependence on the forest industry, measured as the proportion of the employed labour force working in the forest industry;
  - Social characteristics of forestry-dependent communities;
  - Location of forest industry employment;
  - Impact of plantation forestry on rural population; and
  - Values, uses and perceptions of forestry activities.
- Impacts of the forest industry on its workforce:
  - Income earned by forestry workers;
  - Physical and mental health of forestry workers;
  - Self-rated wellbeing of forestry workers;
  - Age and gender of forestry workers;
  - Forestry workers' attachment to place;
  - Forestry workers' cultural and family attachment to forestry;
  - Hours worked by forestry workers; and

- Education qualifications of forestry workers.
- Impacts of the forest industry on Indigenous people:
  - Quantity of Indigenous employment in the forest industry;
  - Types of Indigenous employment in the forest industry; and
  - Area of forest owned or accessed by Indigenous people.

The majority of these indicators can be measured at a range of geographic scales, from local to national scale. Most can be measured for different forestry sectors, such as the ‘forestry and logging’ and ‘wood and paper product manufacturing’ sectors. However, only a limited set can be measured separately for the plantation and native forest sectors; separating data for these sectors often involves considerably higher expense as much existing data collected about the forest industry does not differentiate between native forest and plantation based employment.

The recommended indicators enable consistent monitoring of some key social and economic aspects of forestry in Australia using cost effective approaches, but can only provide a limited picture of the wide variety of social and economic impacts related to forestry. Any indicator is by nature a limited representation, or proxy, of a more complex idea, and should be tested through undertaking more in-depth examination that enables assessment of the relevance and usefulness of the indicator, and how well it measures what it is intended to measure. In addition, some types of impact cannot be represented by cost-effective indicators, requiring more in-depth study at greater expense than is feasible for a set of indicators to be repeated regularly over time. The indicators recommended in this report should therefore be accompanied by less regular, in-depth studies which help to broaden and deepen understanding of social and economic impacts of forestry, and which can provide information that improves interpretation of the recommended indicators.

In particular, studies should be undertaken which improve understanding of successful strategies for increasing the capacity of Indigenous people to work in the forest sector; perceptions, attitudes and values of different groups about different types of forestry; the indirect impacts of the forest industry on employment and spending; how different people experience social and economic impacts related to the forest industry; factors influencing capacity of communities to adapt to forest industry changes; the meaning of changes to social and economic characteristics of forest-dependent communities and forestry workers; and community engagement strategies.

While there is a need for more costly and in-depth studies, the recommended indicators, if measured regularly, can provide an improved understanding of the social and economic changes associated with changing forestry activities in Australia, providing improved understanding of the social and economic impacts of forestry.

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## 1.0 Introduction

In April 2008, the Forest Industries Branch of the Department of Agriculture, Fisheries and Forestry (DAFF) engaged the Fenner School of Environment and Society to identify a set of indicators to describe and quantify the social and economic impact of forestry in Australia over time.

The indicators developed need to:

- Be cost effective, to enable regular monitoring;
- Be valid – measure what they are intended to measure;
- Be replicable over time – requiring a consistent, replicable and cost effective methodology;
- Be applicable across both native forest and plantation sectors;
- Be applicable at local, regional and national scale where possible; and
- Provide information on the most relevant social and economic impacts.

A key priority was to identify indicators that can be readily and cost effectively measured over time using available sources of data, as well as identify where further information is needed, but not as easily accessible.

The recommended indicators enable consistent monitoring of some key social and economic aspects of forestry in Australia using cost effective approaches, but can only provide a limited picture of the wide variety of social and economic impacts related to forestry. The indicators should be accompanied by in-depth studies which help to broaden and deepen understanding of social and economic impacts of forestry, and which can provide information that improves interpretation of the recommended indicators.

This report provides:

- A summary of the indicators recommended, and of other work required to better understand social and economic impacts of forestry in Australia;
- A brief discussion of key considerations when assessing social and economic impacts;
- A detailed description of the methods recommended for measuring each indicator; and
- A discussion of other work that could be usefully undertaken to better understand social and economic impacts of forestry in Australia.

The recommended indicators were identified based on a comprehensive review of literature on (a) social and economic information needs for Australian forestry, and (b) indicators used in previous studies; and on testing of proposed indicators in two case study regions. The results of the two case studies are presented in separate reports.

## **2.0 Summary of recommended indicators and other studies needed**

This section summarises the social and economic indicators recommended, and briefly describes further research needed to improve current understanding of the social and economic impacts of forestry.

### **2.1 Recommended indicators**

The following tables provide a brief description of the indicators recommended for monitoring social and economic impacts of forestry. All are able to be measured over time using either existing data, or relatively low cost surveys. As with any indicator, each has limitations, care is needed in interpreting the meaning of the indicator, and the indicators should be understood as representing a subset of the possible data that could be collected on social and economic impacts.

Recommended indicators are grouped into four categories, which can be used to monitor the following over time:

- Table 1: Characteristics of the industry, e.g. total number of jobs and production;
- Table 2: Impacts of the industry on the broader community;
- Table 3: Impacts of the industry on its workforce; and
- Table 4: Impacts of the industry on Indigenous people.

**Table 1: Characteristics of the forest industry: recommended indicators**

<b>Indicator</b>	<b>Description - Characteristics of the forest industry</b>
<b>Direct employment in the forest industry</b>  <b>Type:</b> Social and economic  <b>Scale<sup>1</sup>:</b> Local, regional, national	This indicator describes how many people are employed in the forest industry, in the following sectors: <ul style="list-style-type: none"> <li>• Forestry and logging</li> <li>• Wood and paper manufacturing</li> <li>• Plantation forestry (hardwood, softwood, MIS and non-MIS)</li> <li>• Native forestry</li> </ul> The absolute number and rate of change over time can be compared to the workforce for other industries.
<b>Proportion of land utilised by the forest industry</b>  <b>Type:</b> Social and economic  <b>Scale:</b> Local, regional, national	This indicator describes the proportion of land in a given area being utilised by the forest industry, separated into native forest and plantation sectors.
<b>Estimated value of production</b>  <b>Type:</b> Economic  <b>Scale:</b> Regional, national	Estimated value of production of the forest industry for a defined period of time and defined products. The absolute number and rate of change over time can be compared to other industries and to overall gross domestic product/gross state product <sup>1</sup> .
<b>Estimated volume of production</b>  <b>Type:</b> Economic <b>Scale:</b> Regional, national	Estimated volume of production of the forest industry for a defined period of time, at defined points in chain of production. The rate of change over time can be compared to other industries and/or gross domestic product/gross state product.
<b>Efficiency of production (labour productivity)</b>  <b>Type:</b> Economic  <b>Scale:</b> Regional, national	This indicator measures the volume of output (roundwood, sawnwood, wood based panels, paper and paperboard) produced per unit of labour input. This provides a measure of the efficiency of labour. Rate of change over time can be compared to other industries.
<b>Consumption of wood and paper products</b>  <b>Type:</b> Social and economic  <b>Scale:</b> National	Consumption rates for different wood and paper products, per capita. Consumption rates can be compared to other countries.
<sup>1</sup> Scale <sup>1</sup> refers to the scale at which the indicator should or can be measured, based on testing each indicator in two case study regions. The reports on each case study provide detailed discussion on the scale of reporting appropriate to each indicator.	

<sup>1</sup> Many measures of the economic value of the forest industry are possible. Gross value of production has been selected as data on value of production are more readily accessible than data on other aspects such as expenditure or investment in infrastructure and works, and because production data are readily comparable across industries.

**Table 2: Impacts of the forest industry on the broader community: recommended indicators**

Indicator	Description – Impacts of industry on broader community
<p><b>Dependence on the forest industry (% employment)</b></p> <p>Type: Social</p> <p>Scale: Local, regional, national</p>	<p>Measures the proportion of the workforce in a given area that depend on the forest industry for employment. Increased dependence of a region on the forest industry is likely to indicate the region will experience greater impacts from any changes to the forest industry. Overall dependence and change over time in dependence can be compared to other regions, and other industries.</p>
<p><b>Social characteristics of forestry-dependent regions</b></p> <p>Type: Social</p> <p>Scale: Local, regional, national</p>	<p>Monitors key characteristics of forestry-dependent regions believed to be related to that region’s ability to adapt to change, and how these change over time, namely:</p> <ul style="list-style-type: none"> <li>• Total population;</li> <li>• Unemployment rate;</li> <li>• Educational qualifications;</li> <li>• Median age;</li> <li>• Median household income; and</li> <li>• Proportion of population in different age groups.</li> </ul> <p>Forestry-dependent regions can be compared to other regions to identify any differences in social characteristics of regions that are more or less dependent on forestry.</p>
<p><b>Location of forest industry employment</b></p> <p>Type: Social</p> <p>Scale: Local</p>	<p>Measures the proportion of forest industry employees based in small, medium and large towns, compared to the total labour force and agricultural labour force. This indicator identifies the likely distribution of forest industry employment and hence which types of towns/cities experience change when the forest industry changes.</p>
<p><b>Impact of plantation forestry on rural population</b></p> <p>Type: Social</p> <p>Scale: Local</p>	<p>Measures the rate of change in rural population in areas experiencing plantation expansion, compared to the average rate of change in rural population across all areas. This indicates whether expansion of plantation forestry has impacts on rural population levels.</p>
<p><b>Values, uses and perceptions of forestry activities</b></p> <p>Type: Social</p> <p>Scale: Local, regional, national possible – for repeated monitoring over time, national scale is most cost effective</p>	<p>Measures a wide range of indicators on public perceptions of forestry and uses, values and attitudes related to forestry. Gathering data on perceptions is usually done via a survey of a statistically significant sample of the population whose views are being examined. By repeating the survey over time, it is possible to identify how values, attitudes, uses and perceptions are changing.</p> <p>In addition to the small number of topics suggested to be regularly monitored through a survey, more in-depth irregular studies are needed to look at a broader range of aspects of values, uses and perceptions of forestry.</p>

**Table 3: Impacts of the forest industry on its workforce: recommended indicators**

<b>Indicator</b>	<b>Description – Impacts of forest industry on workforce</b>
<b>Income earned by forestry workers</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Measure of the income earned by forest workers, compared to the average for the labour force as a whole. Forestry workers can be broken into individual forestry sectors (e.g. forestry & logging; wood & paper product manufacturing).
<b>Physical health – reported injury rates</b>  <b>Type:</b> Social <b>Scale:</b> National	Measures the rate of occupational disease and injury per 1,000 forest industry workers. Forest industry rates of disease and injury can be compared to those in other industries and across all Australian industries.
<b>Self-rated health (physical and mental)</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Measures self-assessed health based on how often workers report experiencing physical and mental health problems such as difficulty sleeping, depression, stress or anxiety and physical injury while working, as well as the level of work-related risk arising from physical conditions in their work place, hours worked, equipment used, noise and stress. Measured via direct survey of forest workers.
<b>Self-rated wellbeing</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Measures self-assessed well-being. Comparison can be made to results of regular national surveys of wellbeing (e.g. the Australian National Unity Wellbeing Index <sup>2</sup> ) if the survey measures wellbeing using a comparable scale. Measured via direct survey of forest workers.
<b>Age</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Identifies the age distribution of forestry workers, compared to age distribution of the broader labour force.
<b>Gender</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Identifies the proportion of men and women employed in the forestry industry, compared to gender distribution of the broader labour force.
<b>Attachment to place</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Identifies level of attachment to the local area they live and work in, as determined by questions relating to the length of time lived in the local area and whether forest workers expect to stay in the area in the future. This can help indicate the potential impacts of changes in forestry jobs which involve changing availability of employment in particular regions. Measured via direct survey of forest workers.
<b>Cultural and family attachment to forestry</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Identifies level of cultural and family attachment to the forest industry. Cultural and family attachment to forestry can influence flexibility and willingness to work in other industries if there is a change in forestry-based employment. Measured via direct survey of forest workers.
<b>Hours worked</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Identifies the number of hours worked per week by forest industry workers, compared to the overall labour force. Higher working hours are often considered indicative of lower well-being for workers.
<b>Educational qualifications</b>  <b>Type:</b> Social <b>Scale:</b> Regional, national	Monitors the proportion of forest industry workers with different levels of formal educational qualifications, compared to the average for the labour force. The presence of low levels of education can indicate potential literacy and industry development challenges, and predict difficulty adapting to changing skills needs and technology.

<sup>2</sup> For more information, see <http://www.australianunity.com.au/wellbeingindex/> The Australian Unity Wellbeing Index has been undertaken since 2001 on a regular basis and is expected to continue into the future.

**Table 4: Impacts of the forest industry on Indigenous people: recommended indicators**

<b>Indicator</b>	<b>Description – Impacts of forest industry on Indigenous people</b>
<b>Indigenous employment in the forest industry – quantity</b>  <b>Type:</b> Social and economic  <b>Scale:</b> Regional, national	Identifies the proportion of forest industry workers who are Indigenous, compared to the average for the labour force as a whole. It can help identify achievement against the goals of the National Indigenous Forestry Strategy.
<b>Indigenous employment in the forest industry – type</b>  <b>Type:</b> Social and economic  <b>Scale:</b> National	Identifies the proportion of Indigenous people employed in the forest industry with different types of occupation (eg manager, administrative, field worker). This enables improved understanding of the types of employment Indigenous people have in the forest industry. The rate of Indigenous and non-Indigenous employment for each occupation types within the forest industry can be compared.
<b>Area of forest owned or accessed by Indigenous people</b>  <b>Type:</b> Social and economic  <b>Scale:</b> Regional, national	The total area of forest owned or accessed by Indigenous people.

The recommended indicators do not include several types of indicator that might be expected. In particular, it is not recommended that downstream economic impacts be measured on a regular basis, due to the high cost of ongoing monitoring. The following section provides recommendations on occasional higher-cost studies which should be undertaken to accompany the regular monitoring of the recommended indicators. These studies can broaden understanding of social and economic impacts beyond the limited picture that can be provided by the recommended indicators, and provide information enabling improved interpretation and use of the recommended indicators.

## 2.2 Other studies needed

The previous section identified a set of cost effective indicators which can be monitored over time to identify some of the likely social and economic impacts of forestry in Australia. As with any set of indicators, they have limitations:

- The recommended indicators do not represent all types of social and economic changes associated with the forest industry;
- Indicators measure social and economic changes, but must be accompanied by studies which identify what these changes mean – in other words, how they impact forest industry workers and/or the broader community; and
- Indicators cannot uncover the diversity of ways individuals are changing, as they represent the average change experienced across a large group of people.

For the cost effective indicators recommended in Section 2.1 to be of greatest use, they should be accompanied by other studies which are undertaken less regularly, and provide a more in-depth understanding of social and economic impacts of forestry.

In particular, there is a need to undertake studies which provide an understanding of the impacts of changes, as this can assist interpretation of the meaning of changes in the recommended indicators over time. These studies can also act to check the validity of the indicators, ensuring they are useful measures of the concepts they are intended to represent.

Table 5 below briefly lists the key types of studies needed to make best use of the recommended indicators. These are described in more detail in later sections of this report.

**Table 5: Other studies needed to better understand social and economic impacts of forestry**

Topic	Studies needed
<b>Indigenous capacity to undertake work in the forest industry</b>	Work is required to build a greater understanding of Indigenous people’s capacity to undertake fulfilling and successful work in the forestry industry. Factors influencing capacity include the ability to work unsupervised, or work in a supervisory or management role, confidence, the long-term availability of work in the local region, the ability or willingness of Indigenous people to change location in order to obtain work, the work culture within the community, educational attainment and the attainment of forestry-specific skills.
<b>Improved understanding of attitudes, values and uses of forests</b>	Continued research is needed which examines the attitudes, values and perceptions of forests and forest management held by different individuals and groups. In particular, studies are needed which go beyond identifying how many people hold particular attitudes, values and perceptions, to developing an understanding of why different people and groups have differing values and attitudes.
<b>Indirect impact of forest industry on employment and spending</b>	Like any economic activity, the forest industry generates ‘flow on’ (or ‘indirect’ or ‘upstream and downstream’) expenditure and employment in local and regional communities, which is generated as a result of spending by forestry businesses and workers. There is currently limited data on the downstream impact of employment and spending by the forest industry for many Australian regions, and almost none which separates the impacts of native forests and plantations. Many input-output studies have been undertaken to identify downstream impacts of the forest industry as a whole for a defined region, but this has still resulted in reasonably limited coverage of different regions, and has rarely examined the downstream impacts of native forest and plantation related activities separately. Further work is needed to extend coverage of regions, and to specifically examine downstream impacts of different forest industry sectors.

Topic	Studies needed
<b>Studies examining subjective experiences of impact</b>	Communities and individuals may experience a diversity of positive and negative social and economic impacts as a result of forest industry-based activity. The way people experience impacts depends on their perceptions and understandings of those impacts. Studies are required to gain a greater understanding of how perceptions of impact relate to measurable social and economic changes, and whether the impacts identified are solely a result of forest industry-based activities, or a greater array of factors. This can assist policy makers, the forest industry and communities in better understanding the impacts of forestry – both positive and negative – and how to maximise positive and minimise negative impacts.
<b>Studies to better understand the resilience and adaptability of forest-dependent communities</b>	A considerable body of work currently suggests that communities that have particular social and economic characteristics are more readily able to adapt to changing circumstances, such as change in the forest industry. However, there has been relatively little study of the applicability of these theories in the context of the forest industry. Studies are required to better understand the multiple attributes which influence the resilience and adaptability of forest-dependent communities, and to assess the resilience and adaptability of communities based on the presence or absence of these attributes. A greater understanding of the requirements for resilient and adaptable communities would allow the comparison of suggested attributes to traditionally used proxy indicators, to assess their reliability and usefulness.
<b>Social and economic characteristics of forest-dependent communities and forestry workers</b>	The use of objective data (eg total population, unemployment rate, median age, gender) to assess the social and economic characteristics of communities can identify how communities are changing, but does not assist in understanding why they are changing, or the impacts of the changes observed. Similarly, the recommended indicators can provide a detailed profile of how the forestry workforce is changing – for example, whether it is ageing, or the gender balance is shifting – but this does not necessarily help to understand the impacts of these changes. In-depth qualitative studies can generate an understanding of the meaning of social change, both in forestry dependent communities and in the forestry workforce. This analysis can then assist in more meaningful interpretation of the recommended indicators.
<b>Rate of road accidents attributable to forest industry-related road use</b>	Further examination is needed of the potential to develop indicators comparing the rate of forest industry-related road accidents and other road accidents, in order to determine whether forest industry vehicles are more or less likely to be involved in road accidents than other road users. Further work is needed to assess if it is possible to identify appropriate indicators; it is possible data are not currently collated in ways that enable this type of analysis to be undertaken.
<b>Community engagement processes</b>	While not directly related to improving understanding and interpretation of the recommended indicators, community engagement is essential to any impact assessment process. Community engagement research is needed to improve communication and understanding between the stakeholders who have an interest in Australian forestry. While community engagement is commonly recommended as a way of generating strategies for maximising positive and minimising negative social and economic impacts of forestry activities, relatively few studies have examined which types of community engagement techniques are most effective for Australian forestry. The types of stakeholders involved in discussions over forestry issues change over time, indicating a need for regular studies to ensure community engagement strategies evolve over time to meet the changing needs of stakeholders involved in forestry in Australia.

### 3.0 Assessing social and economic impacts

This consultancy examines indicators which can be utilised to help monitor the social and economic impacts of forestry in Australia.

The terms ‘social impact assessment’ and ‘socio-economic impact assessment’ (SEIA) are perhaps most commonly used to refer to processes that attempts to predict and mitigate future impacts of a proposed change. However, the process of impact assessment is agreed by most to go well beyond this. In particular, SEIA is agreed by most practitioners to include ongoing assessment and monitoring of impacts, as is focused on in this consultancy.

Monitoring processes are commonly used at several points in an impact assessment process. The indicators recommended in this report have been developed to be used in the following types of impact assessment situations:

- Monitoring the outcomes of a policy or process as it is implemented, with indicators informing adjustment of that policy/process over time to mitigate negative impacts and maximise positive impacts; and
- Providing information that informs a process in which the potential impacts of a proposed change are being assessed, and strategies developed to maximise the potential positive impacts and minimise potential negative impacts of that change.

Measurement of the indicators recommended in this report does not constitute an impact assessment in and of itself. Instead, the measurement of indicators over time should be understood as being a key part of the broader process of assessing social and economic impacts of forestry, and developing policy and practice to address those impacts.

When using indicators as part of monitoring social and economic impacts, some key issues need to be considered:

- Identifying social and economic changes versus impacts;
- Identifying the impact of one factor (e.g. a change in the forest industry) versus others on social and economic conditions; and
- In the forest industry, separating impacts of different forestry sectors.

#### Identifying social and economic changes versus impacts

Attempting to measure any type of impact is challenging, but measuring social and economic impacts has particular difficulties. While it is often possible to identify the social and economic *changes* or *characteristics* that result from a particular sector or group such as the forest industry, it is much harder to identify the impacts those changes have on people’s lives. A change such as a shift in the type of employment generated by the forest industry may be experienced as a positive impact by one person, and a negative impact by another.

Because different people will be impacted by change in different ways, Slootweg et al (2001: 25) argue that it is necessary to examine both the social changes/characteristics that are caused by an industry such as forestry, and the impacts of those social changes/characteristics:

In the context of our approach, human impacts should be seen in the broadest sense. This means that they refer to quantifiable variables such as economic or demographic issues, as well as to changes in people’s norms, values, beliefs and perceptions about the society in which they live ... we argue that a distinction between social change processes and human impacts should be identified in the social setting. ... An increase in population, or the presence of strangers, is not the

experienced impact, the experienced impact is likely to be changed perception about the nature of the community ('communityness', community cohesion), changed perception about personal attachment to the community, and possibly annoyance and upset as a result of the project. The ways in which the social change processes are perceived, given meaning, or valued, depends on the social context in which various societal groups act.

It is therefore important to understand both the social changes and characteristics that may result from forestry (for example, to identify how demographic characteristics or the nature and availability of employment differ in regions with differing levels of dependence on forestry), and how people experience these changes.

Indicators are useful for identifying social changes. It is then necessary to interpret what these changes mean for different people – what impacts they have. For this reason, indicators which monitor social change should be accompanied by studies which provide a basis for identifying the likely impacts of these.

### **Identifying impact of forest industry versus other factors**

A key challenge when examining the social and economic impacts of any specific industry is identifying whether a social or economic changes has resulted from a change in the industry being studied, or from other causal factors.

For example, public concern has been expressed by several groups about the impact of changes in forest policy and practice on rural population levels in some Australian regions. Expansion of plantation forestry in some rural regions has been associated with debate about the impacts of this change on rural population levels. Identifying whether plantation expansion has had an impact on rural population requires disentangling the impacts of plantation-related changes from the many other factors that may be simultaneously influencing rural population levels in that community, such as migration from rural to urban areas, farm amalgamation and an ageing population.

Where possible, indicators should clearly identify the impact of the forest industry versus other factors. Where it is not possible to develop indicators which adequately separate impacts, this must be clearly communicated and understood.

The recommended indicators described in this report attempt to address this issue wherever possible. In particular, each of the recommended indicators has clearly identified benchmarks which identify whether the forest industry, or an area dependent on the forest industry, is different to an appropriate comparison industry, region or labour force. In some cases, however, it is not possible to clearly separate impacts of the forest industry from other factors in the indicators. For example, while it is possible to monitor changes in social and economic characteristics of forestry dependent communities over time, these indicators on their own provide no information about the extent to which the forest industry versus other factors contributed to the changes observed. The limitations of each indicators are described in detail in the 'methods' section, and must be clearly communicated when using the recommended indicators.

### **Separating impacts of different forestry sectors**

The terms of reference for this consultancy specify that the indicators developed must be applicable across the range of forest sectors. The impact of each sector – e.g. native forest, plantation - must be able to be understood separately.

Separately measuring the impacts of different forestry sectors is currently difficult in Australia. Official statistics on the forest industry do not separate the plantation and native forest sectors. Employment data gathered by the Australian Bureau of Statistics (ABS) is collected for the whole forest industry only, and cannot be separated into plantation and native forest sectors, although it can be separated by different stages in the chain of wood production. The Australian Bureau of Agriculture and Resource Economics (ABARE) *Forest and Wood Products Statistics (FWPS)* separate the two sectors for some, but not all, data reported in the *FWPS* series. With a rapidly growing hardwood plantation sector in Australia, there is a pressing need for indicators which clearly monitor impacts of hardwood sourced from plantation versus native forest.

When developing the recommended indicators described in this report, methods were identified to separate the native forest and plantation sectors wherever possible. In some cases, however, it is not possible to cost-effectively separate these sectors. The extent to which each indicator can be measured separately for the native forest and plantation sector is discussed when methods for measuring the indicator are described.

## 4.0 What information is needed about social and economic impacts of forestry?

Hundreds of social and economic impacts of forestry could potentially be monitored over time, including the impacts of the forest industry on human wellbeing, employment, local and regional economies, and other aspects of social and economic life in Australia. Each of these categories can be ‘unpacked’ to examine many different types of indicators. For example, monitoring employment impacts might involve the use of any of the following different indicators:

- Quantity of employment: How many jobs? How many jobs in local versus regional centres? How many jobs during different times of year or rotation? How many jobs per unit area of plantation or native forest or harvested timber?
- Quality of employment: How many casual, part-time and full-time jobs? How does this compare to other industries? How satisfied are forestry workers with their employment? Average income of employees?
- Comparative employment: How many jobs are generated by forestry versus alternative uses for the same land? and/or
- Characteristics of the workforce: Gender distribution, age distribution, educational qualification and skills attainment.

To identify which social and economic impacts are of highest priority, current Federal and state government policies, recent media articles discussing issues related to forestry in Australia, and research documenting perceptions of different groups about forestry were reviewed. Table 6 briefly reviews key information needs about social and economic impacts, as identified from these varied sources.

**Table 6: Social and economic information needs identified in review of key policies and public communication**

Policy, public debate topic	Description and key information needs
Montreal process	<p>Criteria 6: <i>Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of society</i> requires collection of socio-economic data.</p> <p>The 19 socio-economic indicators for Criteria 6 of the Montreal Process require social and economic information on a wide range of topics relating to production and consumption, recreation and tourism, investment in the forest sector, cultural social and spiritual needs and values, and employment and community needs. See Appendix 1 for full list.</p>
Regional Forest Agreements	<p>The objectives of the Regional Forest Agreements (RFAs) include aiming to ‘maintain heritage and social values’ and to produce decisions that ‘meet the requirements of the governments involved, the community and industry and are consistent with the principles of ecologically sustainable development’. These principles require information on social and economic impacts of forestry in Australia (<a href="http://www.daff.gov.au/rfa/about/process/introduction">http://www.daff.gov.au/rfa/about/process/introduction</a>).</p> <p>As part of the RFA process, Brooks et al. (2001) developed a recommended methodology for undertaking social assessments. Their recommendations are summarised in Appendix 2, and focus on identifying features that may indicate a community’s increasing vulnerability to change; or decreasing viability and adaptability. This is argued to help in prediction of likely impacts of changes in the forest industry.</p>

Policy, public debate topic	Description and key information needs
Plantations for Australia: the 2020 Vision	<p>The <i>2020 Vision</i> has an overarching goal of enhancing regional wealth creation and international competitiveness through a sustainable increase in Australia's plantation resources, based on a notional target of trebling the area of commercial tree crops by 2020. Key social and economic information needs identified in the policy include:</p> <ul style="list-style-type: none"> <li>• Investment: Total private investment in plantations, in downstream processing (\$/yr); location of investment</li> <li>• Area of new plantations: hectares established, rate of planting, location of planting, species/tree type, funding sources/incentives supporting expansion.</li> <li>• Trade: Value of exports (%/yr), import/export balance, contribution of plantations to import/export balance</li> <li>• Value: to the Australian economy, rural communities and regional development.</li> <li>• Employment: number of jobs in rural/regional areas in growing, harvesting, domestic processing, transport, downstream/flow on industries, suppliers.</li> <li>• Impacts: of plantation expansion on communities, families and individuals, eg employment and unemployment rates, income, training opportunities, morale in rural/regional communities, sociodemographic characteristics such as population, education, age structure.</li> </ul>
National Forest Policy Statement (enacted largely via RFAs)	<p>The National Forest Policy Statement outlines objectives and policies underlying the future of Australia's public and private forests, as agreed upon by the Commonwealth, State and Territory Governments. The Statement includes eleven goals to guide the use of the forest estate and ensure that the community obtains a balanced return from all forest uses. Social and economic information required to measure outcomes includes:</p> <ul style="list-style-type: none"> <li>• Conservation of Indigenous and non-Indigenous heritage and cultural values: values that exist and where they apply.</li> <li>• Wood production efficiency and industry development: total value adding compared to the volume of wood harvested.</li> <li>• Plantation development: total land area, area of plantation integrated with other agricultural land uses, and volume of production as a proportion of land area.</li> <li>• Tourism and recreation: total profits and employee wages, location, participants, and social value related to recreational uses of forests.</li> <li>• Employment, workforce education and training: forestry employment by sector, type of employment (full/part time or casual), skills base of employees, and opportunities for training.</li> <li>• Public awareness, education and involvement: methods used to foster community awareness and support for the forest industry; and opportunities for involvement in decision making.</li> </ul>

Policy, public debate topic	Description and key information needs
National Indigenous Forest Strategy	<p>The National Indigenous Forest Strategy aims to encourage Indigenous Australians to become more involved in forestry activities. Monitoring the success of the strategy involves the collection of information on Indigenous communities, and the involvement of Indigenous people in the forest industry and wider community, including:</p> <ul style="list-style-type: none"> <li>• Level of economic and social independence: household income, education, cultural ties to land, health facilities, and proportion of the local economy attributed to forest industry.</li> <li>• Employment: availability, location, type, sector (including timber and non-timber uses of forests), and training/promotion opportunities.</li> <li>• Involvement in decision making: Indigenous participation on/position in forest management committees; conflict within/between the community/industry.</li> <li>• Business partnerships: number of partnerships, profits (for who), and power balance between forest industry/Indigenous community.</li> <li>• Diverse workforce: percentage of Indigenous employees as a proportion of total forestry workforce, level of seniority, perception of contribution and cultural training.</li> <li>• Resource base/management: area of Indigenous owned/protected forest land, volume at harvest/value to the economy, and rate of expansion.</li> <li>• Active participation: participation of Indigenous people in sporting teams/volunteer organisations; and sharing of knowledge.</li> </ul>
National Principles Related to Wood Production in Plantations	<p>The <i>National Principles</i> provide a framework in which to expand Australia's commercial plantations. Monitoring requires social and economic information on:</p> <ul style="list-style-type: none"> <li>• Principles of environmental care: sites/areas that need to be protected/monitored, current/planned forestry operations in the area, and level of community participation in plantation/forest industry management.</li> <li>• Safety: number of accidents/number of accident free days, qualification and training experience of operators, training opportunities and on-site monitoring policies.</li> <li>• Planning: policies/measures in place and amount of time provided to consider the potential environmental, social and economic effects of plans, and opportunity for public participation.</li> <li>• Access: number of accidents on the roads, and public opinion of public/truck drivers etc on the state of the roads.</li> <li>• Establishment and maintenance: expected input costs (establishment/management) and output costs (expected returns)</li> <li>• Timber harvesting: procedures to assess safety risk, training in risk management and confidence of workers to be pro-active in identifying issues of concern.</li> </ul>

Policy, public debate topic	Description and key information needs
Public debates over <b>plantation expansion</b> in Australia (drawn from review in Schirmer et al. 2005a,b)	<p>Public debate related to plantation forestry includes many questions about the social and economic impacts of plantations. Themes commonly raised in the public debate, and information required to assess these themes can be summarised as:</p> <ul style="list-style-type: none"> <li>• Employment in plantation forestry: amount, type, location and security.</li> <li>• Population trends: impact of the plantation industry on population levels, particularly related to rural decline.</li> <li>• Impact of plantation forestry on the industries (agriculture) that existed prior to plantation expansion: land values, land availability, isolation.</li> <li>• Economic returns: for the plantation industry, local/regional communities, government, and individual forest industry employees and non-forest industry based business owners (including farmers).</li> <li>• Housing: housing/land prices, affordability and availability.</li> <li>• Community participation by the incoming population and the plantation sector: participation in community events and volunteer organisations eg rural fire fighting, and location of suppliers i.e. local/non local.</li> <li>• Visual/scenic quality: impact on rural culture.</li> <li>• Services and infrastructure: quality, provision and maintenance, including roads, health facilities.</li> <li>• Plantation industry contribution to government revenue: taxes.</li> </ul>
Public debates over <b>native forestry</b> in Australia (based on review of NAFI media articles on native forestry: Sept 2007-April 2008).	<p>Public debate about native forestry in Australia also includes many questions about the social and economic impacts of alternative uses of native forests, and of changes to these uses. Key issues raised indicate that information is required concerning:</p> <ul style="list-style-type: none"> <li>• Public perceptions: Perceptions about different uses of native forests, including better understanding of the diversity of views</li> <li>• Effectiveness of communication: Evaluation of measures taken to address debate eg public consultation, explanation of activities/science through the media.</li> <li>• Employment: the amount of employment generated by different uses of native forests, and at different stages of the forest industry e.g. during construction of infrastructure and during operation.</li> <li>• Impacts on rural communities: Impact of native forest industry eg through level of forest industry spending in the local community, participation in community events/organisations, provision/maintenance of services.</li> <li>• Economic benefits: value of production and processing, value added through the chain of production, impact on gross regional product.</li> </ul>

Based on the information in Table 6, key social and economic issues on which information is needed for Australian forests and forestry are described in Table 7. Many of these issues have been examined in academic and consultancy reports in recent years. These reports were reviewed as part of this consultancy to identify the topics studied and methods used to measure social and economic change. Appendix 3 contains a summary of the social and economic impacts that have been studied, and the methods used to study them.

**Table 7: Information required to measure key social and economic impacts, based on Table 6.**

Impacts of forestry	Required information to measure impacts
Social characteristics of forestry dependent communities	<ul style="list-style-type: none"> <li>• Total population;</li> <li>• Population by education/level of qualification;</li> <li>• Length of residence in area;</li> <li>• Age structure/dependency ratios;</li> <li>• Number of people on government support; and</li> <li>• Unemployment rate and labour force.</li> </ul>
Characteristics of the forest industry	<ul style="list-style-type: none"> <li>• Area of native forest under production/area of plantations;</li> <li>• Volume, value and type of logs harvested and wood and paper products produced;</li> <li>• Employment in the industry (see ‘employment’ next row); and</li> <li>• Consumption of wood and paper products.</li> </ul>
Employment in industries dependent on forestry	<ul style="list-style-type: none"> <li>• Total jobs;</li> <li>• Jobs during construction of infrastructure;</li> <li>• Part/full time or casual;</li> <li>• Length of time on the job and job security;</li> <li>• Rate of unemployment;</li> <li>• Dependence on forestry - employment in the forest industry as a proportion of total employment in the region;</li> <li>• Income;</li> <li>• Injury rates - number of accidents/accident free days;</li> <li>• Qualifications/level of education of employees;</li> <li>• Training opportunities;</li> <li>• Employment of local/non-local people; and</li> <li>• Demographic characteristics of employees – age, gender, Indigenous.</li> </ul>
Economic value of the forest industry to the: <ul style="list-style-type: none"> <li>• Nation</li> <li>• Region</li> <li>• Local community</li> <li>• Family</li> <li>• Employee</li> </ul>	<ul style="list-style-type: none"> <li>• Proportion of the local economy dependent on forest-derived activities;</li> <li>• Revenue per business/sector eg harvesting, production, transport;</li> <li>• Value-added through chain of production;</li> <li>• Indirect/downstream economic impact, e.g. indirect spending and jobs generated in a region as a result of forest industry activities;</li> <li>• Value of public/private investment in forestry;</li> <li>• Contribution of forestry to gross regional/state/domestic product;</li> <li>• Taxes - contribution to government revenue;</li> <li>• Expenditure (on wages, transport, maintenance of equipment, raw materials);</li> <li>• Opportunity cost – return from forestry or employment in forestry versus return/employment generated by alternative uses of the same land; and</li> <li>• Value of leasing land for plantations.</li> </ul>
Perceptions and uses of and values and attitudes held about forests and forestry	A wide range of questions can be asked about people’s perceptions and uses of forests, and their values and attitudes about appropriate use of different types of forest. These may relate to perceptions about how forests are used, acceptability and desirability of different practices, impacts of forestry, and current and planned future uses of forests, amongst others.
Impact of the forest industry on local and regional communities	<ul style="list-style-type: none"> <li>• Availability/quality of services and infrastructure including: health, education, training, roads;</li> <li>• Participation in decision making: effectiveness of methods used to discuss issues with industry representatives;</li> <li>• Population: influx/outflux;</li> <li>• Non-wood uses of the forest: eg impact on tourism and recreation;</li> <li>• Investment into local economy eg spending by employees, payment for services, impact of the larger population (employees and their families);</li> <li>• Participation by forest industry employees/families in community groups;</li> <li>• Land/house prices and availability; and</li> <li>• Conflict within the community or between community and industry.</li> </ul>
Values and impacts of for Indigenous people	<ul style="list-style-type: none"> <li>• Uses, values of forests for different Indigenous groups; and</li> <li>• Involvement of Indigenous people in Australian forestry.</li> </ul>

Some of the social and economic impacts listed in Table 7 can be readily examined by monitoring indicators of social and economic impact over time. Others cannot be examined in this way, and can only be understood through more in-depth studies, which can be undertaken less regularly than the monitoring of indicators.

## 5.0 Current data availability

This consultancy requires development of indicators that are replicable over time. There are currently limited data produced on social and economic aspects of forestry in Australia on a regular basis. These data are described in Table 8.

**Table 8: Currently available social and economic information related to Australian forestry**

Data source	Description
ABS statistics available at a small scale (defined as the Statistical Local Area [SLA] scale, roughly equivalent to local government areas)	<i>Census of Population and Housing (CPH)</i> : Every five years, the CPH collects data on the number of people employed in the forest industry and in key occupations in the forest industry. Some of these data are not published publicly as part of the ABS' public reporting, and take up to two months to access from the ABS through data purchase requests.
ABS statistics available at a larger scale	<i>Manufacturing statistics</i> : The ABS produce statistics on wood and paper product manufacturing. In recent years, changes in methodology have reduced comparability of these statistics over time. Data are available only to regional scale (Statistical Division), rather than local scale.
	<i>Labour Force Survey (LFS)</i> : The LFS is undertaken monthly by the ABS and collects data on employment by industry and occupation, although not at the same level of detail as CPH data. Data are available for 77 'labour force regions' across Australia, with smaller scale data not published from the LFS.
ABARE <i>Forest and Wood Products Statistics (FWPS)</i>	The FWPS are produced quarterly, and provide data to the State level on employment and manufacturing in the forest industry.
Regional data collections	Some States and regional areas collate some data on forestry, but not typically in a consistent way over time or at small scales.
'One-off' surveys and projects	In recent years, a number of stand alone projects have been undertaken in which the social and economic impacts of the forest industry were examined, including the social assessments undertaken for the Regional Forest Agreements (RFAs). The questions examined and methodologies used have varied considerably, so that the data have limited comparability across studies, and few have examined impacts over time. It is important to assess whether some of these studies could be followed up to provide time series data on social and economic impacts of forestry. These one-off studies have also gone a considerable way towards developing indicators and methodologies for assessing social and economic impacts of forestry. Appendix 3 contains a review of the types of impacts examined in these studies, and methods used.
The 'Communities' project of the CRC for Forestry	The Communities project is a seven year research project, in which a range of social dimensions of forestry are being studied. It includes a large-scale, regular survey of employment in the forest industry in Tasmania and Western Australia, in which native forest and plantation employment are separated; and large-scale analysis of the social and economic changes resulting from the forest industry in these two states, using a range of sources of data. See <a href="http://www.crcforestry.com.au">www.crcforestry.com.au</a> for further information.

The review of data availability was used to inform development of methods for measuring the recommended indicators discussed in Section 6.

## 6.0 Recommended indicators – methods

Based on the review presented in Sections 4.0-5.0, a set of indicators were identified which could feasibly be used to monitor social and economic impacts of forestry in Australia. Indicators were developed based on (a) identification of information needs, and (b) identification of cost effectiveness of potential data collection methods.

The initial set of proposed indicators was discussed in a workshop held in May 2008 with a group of researchers and forest industry representatives, at which the proposed indicators were discussed and prioritised. The prioritised set of indicators were then tested in two case study regions and revised before being presented in this report<sup>3</sup>.

This section provides a detailed description of the methods used to calculate each of the recommended indicators, and how the indicator should be used, including the following:

- Description of the indicator;
- Data sources required to measure the indicator;
- How often it can be measured;
- Benchmarks the indicator can be compared to;
- Cost, where:
  - Low cost means the indicator could be measured at national and state scale for < \$1,000 and at local scales for \$1,000-\$10,000 depending on the number of local areas to be included across Australia;
  - Medium cost means the indicator could be measured for \$10,000 to \$50,000 depending on the number of businesses required to be surveyed and/or number of local areas to be included; and
  - High cost means the indicator would cost > \$50,000 to measure in most cases;
- Forestry sectors which can be measured;
- Scale of measurement, where:
  - ‘Local’ means the indicator can be measured at or below the scale of the local government area;
  - ‘Regional’ means the indicator can be measured at the State scale or for a large region within a State; and
  - ‘National’ means the indicator is able to be measured at the national scale, providing a single figure for all of Australia;
- Key questions answered;
- Limitations of the indicator; and
- Methods used to measure the indicator.

Indicators are presented in four groups:

- Social and economic characteristics of the forest industry;
- Impacts of the forest industry on the broader community;
- Impacts of the forest industry on its workforce; and
- Impacts of the forest industry on Indigenous people.

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<sup>3</sup> Results of the case studies are presented in two separate reports (Schirmer et al. 2008a,b).

## **6.1 Characteristics of the forest industry: recommended indicators**

The following characteristics of the forest industry should be monitored regularly over time to understand the social and economic characteristics of forestry in Australia:

- Direct employment in the forest industry;
- Proportion of land utilised by the forest industry;
- Estimated value of production;
- Estimated volume of production;
- Efficiency of production (labour productivity); and
- Consumption of wood and paper products.

This information about the industry forms the basis for other indicators, and provides the basic information on size and nature of the industry necessary to understand its impacts.

Recommended methods for measuring each indicator are described on the following pages.

### 6.1.1 Direct employment in the forest industry

**Description:** This indicator measures the total number of people employed, by location, in the following sectors:

- Forestry and logging;
- Wood and paper product manufacturing;
- Plantation forestry (hardwood, softwood); and
- Native forestry.

**Data source/s required:**

- ABS *Census of Population and Housing* data on employment in forestry and logging, and wood and paper product manufacturing;
- National Forest Inventory (NFI) and National Plantation Inventory (NPI) data showing types of forestry occurring in different regions; and
- Direct telephone survey of forest industry experts, forestry growers and processors to identify the proportion of employment in following forestry sectors: native forestry, softwood plantation, hardwood plantation.

**How often can it be measured?**

- When based on *Census of Population and Housing*, every 5 years; or
- It is feasible to undertake a brief annual survey of forestry firms to provide interim employment data between Censuses.

**Benchmark/s:** Absolute number and rate of change over time can be compared to the workforce for other industries, particularly other primary and manufacturing industries.

**Cost:** Low. While this indicator requires a survey of forestry growers and processors, this requires relatively low investment as the small number of questions required can be asked via phone, and there are a small number of growing and processing businesses in most regions. If contracting businesses were also surveyed, the cost would increase substantially.

**Type/s of forestry:** ABS forestry employment data separate the ‘forestry and logging’ and ‘wood and paper product manufacturing’ sectors. To identify the proportion of employment in the native forest and plantation sectors requires direct survey of forestry firms.

**Scale/s of measurement:** Local, regional, national.

**Key questions answered:** How many people are employed in the forest industry? How many depend on different sectors, eg plantations versus native forestry? How is total employment within the industry changing over time – is it growing or declining?

**Limitations:** This is a fairly broad measure which provides the basis for other indicators, such as dependence on forestry. A key limitation occurs at local scale, where it can be difficult to estimate the proportion of employment dependent on the native forest versus plantation sector with reasonable accuracy. It is recommended that care be taken when presenting data at local scale, and if there is uncertainty about where native forest and plantation sector employees of individual forestry businesses are located, these data should be presented at regional scale only.

This consultancy examined whether it is possible to identify the proportion of employment dependent on Managed Investment Schemes (MIS) within the plantation sector. This is only realistically possible within the ‘forestry and logging’ sector, as wood and paper product manufacturers typically cannot identify what proportion of their wood or fibre input derived from MIS versus non-MIS plantation. Within the forestry and logging sector, the extent of measurement is still limited, as:

- it is difficult to identify what proportion of employment is dependent on MIS and non-MIS activities for businesses which undertake both types of activity; and
- both MIS and non-MIS companies generate considerable employment in silvicultural contracting, and it is very difficult to identify the proportion of silvicultural contractors who are dependent on MIS versus non-MIS plantation-related activities.

It is therefore recommended that rather than attempt to regularly monitor the proportion of employment in MIS and non-MIS related plantation forestry, which would require an in-depth survey of all forestry growing, processing and contracting businesses at high cost, a better approach is to undertake irregular studies which identify these figures.

**Methods:** A key constraint of ABS data is that it does not separate native forestry and plantation sector employment. Direct phone survey of forest industry experts, major forestry growers and processors, can be used to obtain data enabling ABS data to be segmented into these sectors. This is done by:

- Obtaining ABS *Census of Population and Housing* data on forestry employment (in ‘forestry and logging’ and ‘wood and paper product manufacturing’);
- For each region, identifying what types of forestry and associated processing are undertaken using the Bureau of Rural Sciences’ National Plantation Inventory (NPI) and National Forest Inventory (NFI) data. If only one sector (eg native forestry, softwood plantations) exists in the region, it is possible to classify all employment in forestry and logging as falling within that sector. More care is needed when classifying processing employment, as wood and paper product manufacturers may source their wood and fibre input from areas a considerable distance from the processing plant, and therefore may not rely solely on the forest resource located within the region being examined. It is therefore recommended that a phone survey of forestry businesses be undertaken to ensure accuracy in estimation of employment in plantation versus native forest sectors for wood and paper product manufacturers;
- Where more than one sector operates in a region, drawing up a list of forest growers and processors with the assistance of local experts, e.g. Private Forestry Development Committees, and also asking those experts to estimate business size and the sectors in which each business operates; and
- Contacting forest growers and processors to survey them on (a) the sector/s in which they operate (native forests, softwood plantation, hardwood plantation), and (b) their total employment based on each sector.

Where a grower operates in more than one sector – for example, growing both plantations and native forest - the employment considered to be in each sector should be based on the percentage of total employee time spent in each sector. Where a processor operates in more than one sector, the employment considered to be in each sector should be based on the percentage of total wood input from each sector.

This method was tested in the two case study regions, and was successful in identifying employment in the native forest and plantation sectors to regional scale. It provided some data at the local scale, however the latter should be considered accurate to only within +/- 10%, due to difficulty identifying where employees of individual forestry businesses live in relation to the business office. Where data could not be obtained from individual businesses, local industry experts were a useful source of information on sector and business size, enabling more accurate classification of forestry employment into the different sectors.

### 6.1.2 Proportion of land utilised by the forest industry

**Description:** This indicator describes the proportion of land in a given area utilised by the forest industry, separated into native forest and plantation sectors.

**Data source/s required:**

- Data on area of land (obtainable from ABS geographic areas);
- Data on area of native forest used for different purposes e.g. commercial wood harvest, conservation (Bureau of Rural Sciences *National Forest Inventory* [NFI]);
- Data on area of softwood and hardwood plantations (Bureau of Rural Sciences *National Plantation Inventory* [NPI]); and
- Data on area of agricultural land.

**How often can it be measured?** This indicator can be measured at any point at which NFI and NPI data are updated.

**Benchmark/s:** Comparison of proportion of land used for native forestry and plantations in different regions.

**Cost:** Low

**Type/s of forestry:** It is important to ensure data are presented separately for native forests and plantations, as the differing nature of production in these sectors means it is not useful to combine the two when examining what proportion of land is used by forestry.

**Scale/s of measurement:** Local, regional, national.

**Key questions answered:** What area and proportion of land is used for native forestry? What area and proportion of land is used for plantation forestry? The latter can help answer concerns raised about the proportion of agricultural land being established to plantation forestry in some regions.

**Limitations:** In some cases, measuring the area of forestry as a proportion of total land area will not answer key questions asked by the community. For example, when examining expansion of plantation forestry, a key question asked is how much agricultural land in a region has been established to plantation over time. A measure based on total area of land may not provide an answer to this question, as the total area of land includes both agricultural land and other land tenures, such as publicly owned land and conservation reserves. When examining plantation forestry, the proportion of agricultural land established to plantation should be identified rather than the proportion of total land area, if possible. Estimates of agricultural land area vary across different data sources. It is recommended the estimates of the ABS *Agricultural Census* not be used, as they change over time depending on responses to the census, and the area of agricultural land excludes large-scale plantations, meaning it cannot be used to calculate proportion of land established to plantations.

**Methods:** This indicator is calculated quite simply, with the following equation used once data are obtained for a defined region:

$$\frac{\text{area of native forest/plantation}}{\text{area of land}}$$

### 6.1.3 Estimated value of forest industry production

**Description:** This indicator measures the gross value of production (GVP) of the forest industry. It can be measured at various stages in the chain of production to determine the value of:

- log production (roundwood);
- sawnwood;
- wood based panels; and
- paper and paperboard.

Where several steps of the value-adding chain are measured, it is possible to use this indicator to measure value-added at each stage of production<sup>4</sup>.

**Data source/s:** ABARE *Forest and Wood Product Statistics (FWPS)* or direct survey of forest industry growing and processing businesses.

#### **How often can it be measured?**

- When based on ABARE *FWPS*, annual (or even quarterly) measurement is possible; or
- When based on survey, this indicator can be measured at any time.

**Benchmark/s:** Comparison to the value of production in other industries, and comparison of the rate of change to change in overall domestic product/gross state product over the same period.

#### **Cost:**

- If based on ABARE *FWPS* – low; or
- If based on direct survey – medium to high.

#### **Type/s of forestry:**

- If using ABARE *FWPS*, it is not possible to distinguish between native forest and plantation sectors; or
- If using a direct survey, it is possible to distinguish between native forest and plantation sectors.

#### **Scale/s of measurement:**

- ABARE *FWPS* data enable this indicator to be measured at national and state scale; or
- When using a direct survey, all scales are possible. However, the survey will typically be higher cost if aiming to produce small-scale data as well as large-scale data, because this requires a larger sample size. Confidentiality provisions may present reporting of data for local regions where fewer than three forestry processors operate.

**Key questions answered:** What is the dollar value of forest industry production? How is this changing over time? Changes in the dollar value of production can indicate potential for positive or negative impacts on regional economies, depending on the nature of the change.

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<sup>4</sup> Many measures of value of the forest industry are possible, including measures of the dollar value of goods produced, value added through the chain of production, expenditure, and levels of different type of investment. The measure of gross value of production is recommended here as it is relatively easy to measure and to compare across industries.

**Limitations:**

- It is important to carefully define at what points GVP will be measured, and to avoid double counting if GVP is calculated at multiple points in the chain of production;
- The dollar value of production is not a measure of who receives the benefits of the industry – it provides no information about the distribution of the industry's value and flow of benefits to different individuals and groups; and
- The indicator does not provide information on the implications of changes in the value of production over time for local/regional/state/national communities, markets and economies.

**Methods:**

*Using ABARE FWPS:* ABARE *FPWS* data are presented in readily useable format, and all that is required is calculation of rates of change in the data over time, based on available *FWPS* data.

*Using a direct survey of forestry businesses:* The more expensive approach to this indicator is to directly survey forest industry growing and processing businesses involved in different parts of the forest industry. Because there are often a small number of forest growers and processors operating in a given area, and they operate businesses of widely varying size and nature, it is typically necessary to survey all growers and processors to obtain useful data. For example, a single region may have five sawmills, but one of these may process more wood than the other four combined, and they may use very different processing technology, resulting in widely differing volumes, and hence value, of production. It is necessary to survey all these businesses to obtain adequate data.

The survey needs to ask each business:

- The volume of product produced over a defined period, for each product produced. In many cases, a business may produce several types of product;
- The proportion of product derived from plantation and native forest sources. In some cases, products such as pulp or paper are produced using a combination of native forest and plantation sourced material. In these cases, the proportion of input from each sector must be identified to accurately identify the value of production derived from plantation and native forest sources; and
- The value of the product, measured as gross payments received for that product.

## 6.1.4 Estimated volume of forest industry production

**Description:** This indicator measures of the volume of different products produced by the forest industry. Volume may be measured at the following stages:

- log production (roundwood);
- sawnwood;
- wood based panels; and
- paper and paperboard.

It is also possible to use a single measure of ‘gross roundwood equivalent’, which estimates total production as the equivalent of roundwood.

**Data source/s:** ABARE *Forest and Wood Product Statistics (FWPS)* or direct survey of forest industry growing and processing businesses.

### **How often can it be measured?**

- When based on ABARE *FWPS*, annual (or even quarterly) measurement is possible; or
- When based on survey, this indicator can be measured at any time.

**Benchmark/s:** Comparison of rate of change over time to the rate of change in volume produced by other industries.

### **Cost:**

- If based on ABARE *FWPS* – low; or
- If based on direct survey – medium to high.

### **Type/s of forestry:**

- If using ABARE *FWPS*, it is not possible to distinguish between native forest and plantation sectors; or
- If using a direct survey, it is possible to distinguish between native forest and plantation sectors.

### **Scale/s of measurement:**

- ABARE *FWPS* data enable this indicator to be measured at national and state scale; or
- When using a direct survey, all scales are possible. However, the survey will typically be higher cost if aiming to produce small-scale data as well as large-scale data, because this requires a larger sample size. Confidentiality provisions may present reporting of data at local scales where fewer than three forestry processors operate.

**Key questions answered:** What volumes are produced by the forest industry within different sectors and at different levels of production? How does this change over time? Changes in the volume of production can indicate potential for positive or negative impacts on regional economies, depending on the nature of the change. A drop in volume can indicate a likely fall in employment in the industry.

### **Limitations:**

Volume of production can be measured at various stages in the chain of production. It is important to carefully define at what points volume will be measured.

This indicator provides an indication of change in volume of production but does not provide information on the implications of these changes for local/regional/state/national communities, markets and economies. It can reasonable safely be assumed that a rapid decrease or increase in volume of production has employment implications for the industry, which is likely to have flow-on impacts on local and regional communities.

### **Methods:**

*Using ABARE FWPS:* ABARE *FPWS* data are presented in a readily useable format, and all that is required is calculation of rates of change in the data over time based on the available *FWPS* data.

*Using a direct survey of forestry businesses:* The more expensive approach to this indicator is to directly survey forest industry growing and processing businesses involved in different parts of the forest industry. Because there are often a small number of forest growers and processors operating in a given area, and they operate businesses of widely varying size and nature, it is typically necessary to survey all growers and processors to obtain useful data. For example, a single region may have five sawmills, but one of these may process more wood than the other four combined, and they may use very different processing technology, resulting in widely differing volumes, and hence value, of production. It is necessary to survey all these businesses to obtain adequate data.

The survey needs to ask each business:

- The volume of product produced over a defined period, for each product produced. In many cases, a business may produce several types of product; and
- The proportion of product derived from plantation and native forest sources. In some cases, products such as pulp or paper are produced using a combination of native forest and plantation sourced material. In these cases, the proportion of input from each sector must be identified to accurately identify the value of production derived from plantation and native forest sources.

The survey should be combined with questions about value of production if measuring both Indicators 6.1.3 and 6.1.4.

### 6.1.5 Efficiency of production (labour productivity)

**Description:** This indicator measures the efficiency of production, based on volume of output produced per unit of labour input. Increasing efficiency of production over time is considered a sign of increasing productivity of an industry. The most feasible measure that can be undertaken cost effectively at regional and national scales for the forest industry is output produced per unit of employment.

#### **Data source/s:**

This indicator can be measured in two different ways:

- Using ABS data on forest industry employment combined with ABARE *FWPS* data on volume of production, efficiency of labour can be calculated at State and National scale for the whole forest industry. Using these data sources, it is not possible to calculate efficiency of specific forestry sectors, and there is limited scope for assessing efficiency of production for different types of wood products. This measure therefore has limited use as the forest industry produces highly diverse products and, as this measure does not differentiate between them, it is not possible to identify if the productivity measured differs because of a real difference in productivity, or differences in the types of wood and paper products being manufactured in different regions; or
- Using Indicator 6.1.1 together with data from direct survey of forestry businesses providing information on volume and value of production, more specific measures of labour productivity by wood and paper product type and sector are possible. These are more useful than the generic measure based on ABS and ABARE data.

#### **How often can it be measured?**

- When based on ABARE *FWPS*, annual (or even quarterly) measurement is possible; or
- When based on survey, this indicator can be measured at any time.

**Benchmark/s:** Efficiency of production over time can be compared to other industries, and to international benchmarks for the forest industry. Comparison to national and state averages can be made by comparing the percentage change in efficiency for the forest industry and for national/state economies over the same time period.

#### **Cost:**

- If based on ABARE *FWPS* and ABS forestry employment data – low; or
- If based on direct survey – medium to high.

#### **Type/s of forestry:**

- If using ABARE *FWPS* and ABS forestry employment data, it is not possible to distinguish between native forest and plantation sectors, or different types of wood and paper products; or
- If using a direct survey, it is possible to distinguish between native forest and plantation sectors, and different types of wood and paper products.

#### **Scale/s of measurement:**

- ABARE *FWPS* enables this indicator to be monitored at national and state scale; or

- When using a direct survey, all scales are possible. However, it is recommended that this indicator be reported at regional scale to ensure that a large enough sample of businesses are included to ensure the reporting reflects overall trends in the forest industry, rather than trends for a single forestry business.

**Key questions answered:** How efficiently does the forest industry utilise labour to produce outputs? How is efficiency of labour changing over time? An increase in efficiency per labour unit usually indicates investment in technology or other changes in business practices are enabling more efficient production of wood-based products.

**Limitations:** Increasing productivity may have multiple impacts, which are not easily identified based on the indicator alone. For example:

- If less employment is required to generate output, this may result in job losses unless there is a corresponding increase in output; and
- Profits may grow if productivity increases, but this depends on how and why productivity increased – for example, an increase in efficiency per unit of labour may have resulted from investment in technological advances, with the same overall costs incurred but less labour used.

Therefore changes in the indicator may have multiple implications for social and economic impacts on human communities, which are difficult to identify based on the indicator alone.

**Methods:** Using data on (a) volume of outputs produced, (b) employment utilised, whether from ABARE/ABS or direct survey, this indicator is calculated as:

$$\text{Efficiency of production of labour} = \frac{\text{units of output produced}}{\text{units of labour}}$$

It is essential that the output produced and units of labour be consistent – in other words, that there is certainty that for the output being examined, the labour data is specific enough to identify the employment required to produce that specific type of output.

Productivity should be measured for individual wood products, rather than generically across all types of wood and paper products produced, to ensure the productivity reflects efficiency of labour rather than differences in types of products and level of value adding occurring across different regions.

## 6.1.6 Consumption of wood and paper products

**Description:** This indicator measures consumption rates, per capita, for different wood and paper products such as sawnwood, wood-based panels, and paper-based products.

**Data source/s:** ABARE *Forest and Wood Products Statistics*, ABS *Estimated Resident Population*

**How often can it be measured?** This indicator can be reported annually based on ABARE *FWPS*.

**Benchmark/s:** Consumption rates can be compared to rates of change in other countries and regions, if measured in the same way.

**Cost:** Low.

**Type/s of forestry:** Currently available data does not distinguish between consumption of plantation and native forest-based products.

**Scale/s of measurement:** National. It is not currently possible to measure consumption at other scales using available data. Collection of data enabling measurement at smaller scales would be a high-cost option not suitable for regular monitoring.

**Key questions answered:** What is the per capita demand for wood and paper products in Australia?

**Limitations:**

- It can be difficult to estimate total consumption of wood and paper products when many end products include embedded wood and paper combined with other materials; and
- The data provide an indication of change in consumer demand, but do not provide information on the reasons for changes, or their implications for the forest industry or consumers of wood and paper products.

**Methods:** Calculated as:

$$\frac{\text{Volume consumed of specified product}}{\text{Population}}$$

## **6.2 Impacts of the forest industry on the broader community: recommended indicators**

The following indicators should be monitored regularly over time to help understand the impacts of the forest industry on the broader community:

- Dependence on the forest industry (% employment);
- Social characteristics of forestry-dependent regions;
- Location of forest industry employment;
- Impact of plantation forestry on rural population; and
- Values, uses and perceptions about forestry activities.

This information answers some key questions about impacts of the industry, and provides detailed information that helps identify where further information about impacts, gathered via more in-depth studies, may be needed. For example, these indicators may show that the social characteristics of forestry regions are changing in different ways to non-forestry regions over time, indicating a need to undertake studies that examine why this is the case.

Recommended methods for measuring each indicator are described on the following pages.

## 6.2.1 Dependence on the forest industry (% employment)

**Description:** This indicator measures the percentage of the workforce in a given area that is dependent on the forest industry. It is measured as the proportion of the employed labour force employed in the forest industry. This indicator identifies which areas are the most highly dependent on forestry, enabling identification of communities likely to be most impacted by any changes to the forest industry.

### Data source/s:

- Estimate of employment in forest industry (from Indicator 6.1.1); and
- ABS *Census of Population and Housing* labour force data.

It is important to ensure that both Indicator 6.1.1 and labour force data are based on the same Census count method. It is recommended that the ‘place of usual residence’ count method be used, as a large proportion of the wages/salaries earned by forest industry workers will be spent in the locality in which they live, rather than that in which they work<sup>5</sup>.

### How often can it be measured?

- When based on ABS forestry employment data, this indicator can be measured every 5 years; or
- It may be possible to update the indicator in the interim based on (a) direct survey of the forest industry and (b) using labour force estimates derived for the ABS *Labour Force Survey*<sup>6</sup> and, at local scales, by the Labour Market Strategies Group (LMSG) *Small Area Labour Market* data, which estimates the labour force to a small-area scale on a quarterly basis<sup>7</sup>.

**Benchmark/s:** Comparison to other regions provides an indication of relative level of dependence on the forest industry.

**Cost:** Low.

**Type/s of forestry:** If using Indicator 6.1.1 data, dependence can be identified for all types of forestry. If unadjusted ABS data are used, then it is not possible to distinguish different types of forestry employment beyond different stages in the chain of production (forestry and logging, and wood and paper product manufacturing).

**Scale/s of measurement:** Local, regional, national.

**Key questions answered:** Which communities/regions depend on the forest industry for employment, and are therefore most likely to be impacted by any changes to the forest industry? How dependent are they on the forest industry?

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<sup>5</sup> Census data are reported based on three Census count methods: place of usual residence (data are reported based on where a person indicates they usually live), location on Census night (data are reported based on where a person was physically located on Census night), and place of employment (data are reported based on where a person works).

<sup>6</sup> See

<http://www.abs.gov.au/websitedbs/c311215.nsf/0/BF6068ABC64802DECA256BD500169F18?Open> for further information on the ABS *Labour Force Survey*.

<sup>7</sup> See

<http://www.workplace.gov.au/workplace/Publications/ResearchStats/LabourMarketAnalysis/SmallAreaLabourMarkets/> for further information on the *Small Area Labour Markets* data series.

**Limitations:**

It can be difficult to define the threshold at which a community should be said to be ‘highly’ dependent on the forest industry. It is therefore recommended that levels of dependence be evaluated based on examining relative levels of dependence across different regions. Further study is needed to better understand the implications of different levels of dependence on forestry employment for a region.

**Methods:** This indicator is measured by calculating, for a defined region:

$$\frac{\text{Number of people employed in forest industry (or in a defined forest industry sector)}}{\text{Total employed labour force}}$$

As noted in the ‘data sources’ section, both figures should be based on the same ‘count’ method, with figures based either on where all types of workers live, or where they work, as a person’s place of work and home residence are sometimes different.

## 6.2.2 Social characteristics of forestry-dependent regions

**Description:** This indicator monitors the nature and rate of change in key social characteristics of forestry dependent regions. Each characteristic, or sub-indicator, is chosen as it is believed to be related to the ability of the community living in that region to adapt to change. This is important as a community's ability to adapt to change affects how it is impacted if a change occurs to an industry such as the forest industry.

It is commonly hypothesised that the ability of a community to adapt to change may be enhanced if the people living and working in that community have:

- an average or above average household income;
- an lower than average dependency ratio, such that there is not a high proportion of the population dependent on working age people;
- a low unemployment rate;
- high education levels;
- high economic diversity; and
- a population that is stable or growing, rather than declining in size.

Therefore the characteristics recommended to be profiled are:

- Total population;
- Unemployment rate;
- Educational qualifications – the proportion of the population aged over 15 with (a) no post-school qualifications, (b) certificate/diploma, (c) bachelor degree or higher;
- Median household income;
- Median age;
- Economic diversity, measured as the proportion of employment dependent on the top three employing industries; and
- Dependency ratio: the ratio of working age population (age 15-64) to child (0-14) and retirement age (65+) population.

**Data source/s:** ABS *Census of Population and Housing* (CPH). These data should be based on the 'place of usual residence' count method.

### **How often can it be measured?**

Social characteristics can be profiled every five years when an ABS *CPH* is undertaken. It is not possible to measure most of the individual characteristics at more regular intervals, except for unemployment, which is estimated quarterly to a local area scale by the *LMSG Small Area Labour Markets* data series, and at larger scale by the *ABS Labour Force Survey*.

**Benchmark/s:** Characteristics of forestry dependent regions can be compared to averages for all Australian regions, to identify if forest-dependent regions have different characteristics to other regions.

**Cost:** Low

**Type/s of forestry:** The use of ABS data does not allow different types of forestry to be distinguished. However, if the types of forestry operating in a given region are

known based on Indicator 6.1.1, it may be possible to compare regions which are dependent on different types of forestry.

**Scale/s of measurement:** Local, regional. National scale data provide a useful average with which to compare characteristics of forestry dependent regions.

**Key questions answered:** Do forest-dependent regions differ to other regions in terms of characteristics such as their rate of population growth, the average level of education of the adult population, age distribution, and household income?

**Limitations:** While these indicators will identify if forestry-dependent regions are different to other regions, they do not provide an indication of whether the differences are related to the activities or presence of the forest industry in that region.

**Methods:** The calculation of each subindicator is described below:

- Total population: Using ABS *CPH* population data, all that is required is calculation of the average annual rate of change in total population over time;
- Unemployment rate: Unemployment data are readily available and require no additional calculation;
- Educational qualifications: This is calculated as the proportion of the population aged over 15 with (a) no post-school qualifications, (b) certificate/diploma, (c) bachelor degree or higher;
- Household income: Household income data are readily available and require no additional calculation;
- Median age: Median age data are readily available and require no additional calculation;
- Economic diversity: This sub-indicator is calculated by firstly identifying the top three employing industries for the region being studied, using ABS *Census of Population and Housing* data on employment by industry. The sum of people employed in the top three employing industries for a region is then divided by the sum of the total labour force to identify the proportion of the employed labour force dependent on the top three employing industries; and
- Dependency ratio: The dependency ratio is calculated as the ratio of working age population (number of people aged 15-64) to the sum of the number of people aged 0-14 years and over 65 years of age.

### 6.2.3 Location of forest industry employment

**Description:** This indicator measures the proportion of forest industry employees based in small, medium and large towns. It is a useful measure of where impacts of changes in the forest industry are likely to occur, and provides answers to commonly asked questions about where forest industry employees are located. For example, some have questioned whether establishment of plantations on agricultural land changes job availability in small and regional towns, believing that forest industry workers are typically located in different sized towns to the agricultural industry workers who were previously employed on land established to plantation (Schirmer et al. 2008).

**Data source/s:**

ABS *CPH* urban centre/locality (UC/L) data: total labour force by UC/L, and employment in the forest industry by UC/L.

An ‘urban centre/locality’ refers to a town with 200 or more residents, as calculated by the ABS using a specific methodology for defining the boundaries of urbanised areas. A locality is defined by the ABS as a settlement with 200-999 residents, and an urban centre has 1,000 or more residents.

**How often can it be measured?** This indicator can be measured very five years when an ABS *Census of Population and Housing* is undertaken.

**Benchmark/s:** Comparison of location of forestry employment to distribution of the total labour force across different sized UC/Ls, or to the labour force of comparison industries such as agriculture or manufacturing.

**Cost:** Low.

**Type/s of forestry:**

ABS forestry employment data by UC/L differentiate employment into the ‘forestry and logging’ and ‘wood and paper product manufacturing’ sectors. It is more difficult to accurately estimate forestry employment in the native forest and plantation sectors for individual UC/Ls, as the method used for adjusting forestry data described in Indicator 6.1.1 is less reliable for small scales, and data gathered from forestry firms does not provide detailed information on what specific towns their employees live in. A relatively expensive survey of forestry firms would be required to specifically identify plantation and native forest employment by UC/L, as firms would need to provide detailed data on home address of individual employees, cross-referenced by the forestry sector in which that employee works.

Therefore this indicator cannot currently be measured separately for plantation and native forest employment, unless a high-cost survey of forestry businesses is undertaken.

**Scale/s of measurement:** Individual urban centre/locality.

**Key questions answered:**

- What size towns are forest industry employees typically based in?
- Is a greater proportion of forest industry employment located in large regional towns compared to other rural industries? and

- Where are the impacts (negative and positive) of forest industry-based employment experienced?

**Limitations:** Care is needed to identify appropriate thresholds for defining ‘small towns’ versus ‘medium’ and ‘large’ urban centres/localities.

**Methods:** This indicator is calculated by calculating the distribution of forest industry employment by town size, and comparing it to distribution of agricultural industry employment and of the total labour force.

The town size classes recommended are:

- Rural land and localities with < 200 population;
- 200-499 population;
- 5,00-999 population;
- 1,000-1,999 population;
- 2,000-2,999 population;
- 3,000-4,999 population;
- 5,000-9,999 population; and
- > 10,000 population.

This range of town sizes is recommended as many of the towns in the case study regions in which indicators were tested had a population of less than 5,000, and so it was considered useful to ensure several categories of town size were included. Rural and regional areas in which the forest industry is typically located have very few urban centres with over 10,000 residents, and so it is not recommended that large towns be further differentiated beyond the ‘> 10,000 population’ category.

## 6.2.4 Impact of plantation forestry on rural population

**Description:** This indicator measures the rate of change in rural population over time in areas experiencing plantation expansion, compared to the average for rural areas. It can answer questions commonly asked about whether plantation expansion has a negative impact on the number of people living in rural areas.

**Data source/s:** ABS *Census of Population and Housing* population data (requiring data on total population of a region and population of the UC/Ls within that region), and Bureau of Rural Sciences *National Plantation Inventory* data on area of plantations over time.

**How often can it be measured?** This indicator can be profiled every five years when an ABS *Census of Population and Housing* is undertaken. It is not possible to profile this indicator between censuses.

**Benchmark/s:** The indicator can compare rates of rural population change in areas experiencing plantation expansion to the average for all rural areas.

**Cost:** Medium.

**Type/s of forestry:** Plantation forestry only. This indicator is specifically designed to answer questions about expansion of plantation forestry, and does not examine other types of forestry.

**Scale/s of measurement:** Local. This indicator is only meaningful at the local scale, as across a larger region it is likely plantation expansion will vary considerably and hence the indicator does not necessarily provide an indicator relevant to plantation forestry. At the local scale it is possible to identify areas experiencing high and low rates of plantation expansion and compare rural population change in these areas. However, the indicator needs to be measured for a large number of local areas with differing rates of plantation expansion to provide useful answers on impacts of plantation expansion on population change. The number of local regions able to be compared in the case studies conducted for this consultancy was relatively low, and provided data of limited usefulness.

**Key questions answered:** Is expansion of plantation estate associated with changes in total population of rural and regional areas?

**Limitations:** Many factors influence change in rural population. It is important to compare rural population change in plantation areas to an appropriate range of averages to ensure that change is not inappropriately identified as being due to expansion of plantations. If possible, analysis should include more in-depth identification of the different factors that may affect population levels in forest dependent areas, to gain a more holistic understanding of population trends.

**Methods:** This indicator is calculated by:

- Identifying the rate of first rotation plantation establishment in a defined region over a defined period of time (using National Plantation Inventory data);
- Calculating rate of change in rural population over the same period of time. Rural population is defined the number of people living on rural properties or in

localities with less than 200 residents, and is calculated by, for a defined region, subtracting the total UC/L population from the total regional population; and

- Comparing rates of change in rural population in areas experiencing differing levels of plantation expansion.

## 6.2.5 Values, attitudes, uses and perceptions of forestry activities

**Description:** This indicator refers to the measurement of values and attitudes towards forestry, uses of forests, and other perceptions about forest-related activities. The goal is to understand the perceptions and understandings of forestry held by different groups, and what they value about forests. A wide range of different indicators related to values, attitudes and uses can be measured. These indicators are presented as a single group as they have one thing in common: they involve measuring subjective perceptions.

**Data source/s:** Direct survey of the general population, repeated over time to enable comparisons. The number of people to be sampled would vary considerably depending on the scale at which results need to be interpreted. A survey can ask multiple questions relating to (a) the values held regarding different types of forests, (b) uses of different types of forests, (c) perceptions and awareness of forest industry activities.

**How often can it be measured?** This indicator can be measured at any time.

**Benchmark/s:** Comparisons to be made over time and between different groups included in the survey.

**Cost:** Medium-high, depending on size of sample and number of questions asked.

**Type/s of forestry:** All types of forestry can be distinguished when using a direct survey to collect data.

**Scale/s of measurement:** All scales possible; higher cost if aiming to produce small-scale data as well as large-scale data.

**Key questions answered:** What do people value most about forests? How are these values changing over time? How are forest uses changing over time? Is the general public's understanding of forestry practices the same as that of forest managers? These questions help inform decisions about managing forests to achieve valued outcomes, and can also inform design of communication about forestry.

**Limitations:** It is important to carefully choose and design questions; only a relatively small set of questions can be asked on a single survey, and both the questions and the survey sample need to be designed to be readily replicable over time.

**Methods:** Direct survey of a statistically significant sample of the general population of defined regions. Sample sizes would vary considerably depending on the region/s being examined, the number of regions for which a statistically significant sample was required, and the number of groups whose views are to be compared.

Recommended topics to be included in a regularly repeated survey are (see Section 7.2 for further detail):

- Acceptability of different forest practices;
- Values and beliefs about the environment/natural resource management;
- Perceptions about the nature forestry activities;

- Information dissemination and communication – where and how do people obtain information about forestry and interact with the forest industry; and
- Socio-demographic characteristics of respondents.

### **6.3 Impacts of the forest industry on its workforce: recommended indicators**

The following indicators should be monitored regularly over time to help understand the impacts of the forest industry on forestry workers:

- Income earned by forestry workers;
- Physical health – reported injury rates;
- Self-rated physical and mental health;
- Self-rated wellbeing;
- Age distribution;
- Gender;
- Attachment to place;
- Cultural and family attachment to forestry;
- Working hours; and
- Educational qualifications.

This information answers some key questions about impacts of the industry, and provides detailed information that helps identify where further information about impacts, gathered via more in-depth studies, may be needed. For example, these indicators may show that the forestry workforce is ageing rapidly in some regions and not others, or that forest worker wellbeing is better in some regions than others, indicating a need to undertake studies that examine why this is the case and can be used to develop strategies to address ageing or low well-being.

Recommended methods for measuring each indicator are described on the following pages.

### 6.3.1 Income earned by forestry workers

**Description:** This indicator measures the average income earned by forestry workers. It is possible to identify and compare income earned in different forestry sectors, and to compare these to average income earned across the whole labour force.

**Data source/s:** Data can be collected in two ways:

- ABS *Census of Population and Housing* data – this requires a special data request from the ABS, which does not publicly publish data on forest worker income; or
- Direct survey of forestry workers, in which they are asked their income.

**How often can it be measured?**

- ABS *Census of Population and Housing* data – every five years; or
- Direct survey of forestry workers – at any point in time.

**Benchmark/s:** Comparison of forest industry worker's incomes can be made with income earned by the labour force working in the same region.

**Cost:**

- ABS data – low-medium cost, depending on extent to which forestry sectors are separated; or
- Survey – medium-high cost.

**Type/s of forestry:**

- ABS *Census of Population and Housing* data – it is possible to separate the forestry and logging and wood and paper product manufacturing sectors, but not to separate plantation and native forest sectors; or
- Direct survey of forestry workers – it is possible to identify income separately for all types of forestry sector.

**Scale/s of measurement:** Regional, national.

In the case study regions, this indicator was tested at local scale, but the data produced could not be easily interpreted due to the small number of workers in many local areas. It was not possible to identify if variance in income across different local areas was due to real differences in income paid by forestry businesses, or simply the natural variance expected with a small sample of workers. It is therefore recommended this indicator be measured only at the regional and national scale.

**Key questions answered:** Do forestry workers earn an adequate income? How does the income of forestry workers compare with others?

**Limitations:**

While this indicator can identify if forestry workers earn a similar income to the general labour force in the same region, it does not provide information on how income influences wellbeing.

**Methods:**

- ABS data: Comparison of forest industry workers income to the general labour force, for different income categories (e.g. nil income, \$0-399, \$400-599, \$600-799 etc, based on weekly individual income). The comparison made should be of the proportion of the workforce falling into each category rather than the total

number of workers, to enable appropriate comparison over time. Note that the ABS changed the categories into which they classify income between the 2001 and 2006 Censuses. This limits the ability to identify change in income over time, as the income categories for 2001 and those for 2006 have ranges which do not overlap in some cases; or

- Direct survey of a statistically significant sample of workers employed in different parts of the forest industry: This is only needed if there is a desire to identify income of forestry workers employed in the native forest versus plantation sectors, as ABS data enable identification of income of forestry workers working in forestry and logging versus wood and paper product manufacturing.

### 6.3.2 Physical health – reported injury rates

**Description:** This indicator identifies the rate of reported injuries per 1,000 forest industry workers over a 12 month period, based on worker’s compensation statistics.

**Data source/s:** The Australian Safety and Compensation Council’s *National Workers’ Compensation Statistics* database (<http://nosi.ascc.gov.au/>). Annual data are available from 1997/98 onwards.

**How often can it be measured?** This indicator can be monitored annually using data from the Australian Safety and Compensation Council’s *National Workers’ Compensation Statistics* database.

**Benchmark/s:** Forest industry data can be compared to the Australian average rate of injuries per 1,000 workers and to benchmarks for appropriate comparison industries. For example, injury rates for wood and paper products manufacturing can be compared to injury rates in the manufacturing sector as a whole.

**Cost:** Low.

**Type/s of forestry:** It is possible to separate injuries occurring in the forestry and logging sector from those occurring in wood and paper processing. It is not possible to distinguish other forestry sectors e.g. native forest versus plantations.

**Scale/s of measurement:** National. The database does not contain data for regional or local scales.

**Key questions answered:** Are forestry workers more or less likely to be injured than those working in other Australian industries?

**Limitations:** The database does not include unreported or uncompensated injuries, and so represents a subset of all health and safety issues in the industry.

**Methods:** Obtain data on injury rate per 1,000 workers from *National Workers’ Compensation Statistics Database*. Note that the injury rate is calculated as:

$$= \frac{\text{Total number of injuries}}{\text{Total number of workers}} \times 1000$$

An alternative way of collecting data on workplace injuries is via survey of forestry workers, as discussed in Indicator 6.3.3.

### 6.3.3 Self-rated health (physical and mental)

**Description:** This indicator identifies the self-rated health of forestry workers as measured through a direct survey in which workers are asked to indicate the extent to which they have experienced symptoms such as difficulty sleeping, depression, stress or anxiety, and physical injury while working, as well as the level of work-related risk perceived to result from the physical conditions in the workplace, hours worked, equipment used, noise and stress.

**Data source/s:** Data collected through direct survey of forestry workers.

**How often can it be measured?** A direct survey of forestry workers can be undertaken at any point in time.

**Benchmark/s:** Questions can be designed so responses of forestry workers can be compared to national benchmarks on rates of workplace injury, mental illness, and physical health. Ideally, the benchmark should be compared on the basis of socioeconomic status (gender and age) and location.

**Cost:** Medium-high depending on the sample surveyed. If it is necessary to compare many small regions or different forest industry sectors, a larger number of forestry workers will need to be surveyed than if the goal is simply to identify general trends across a single large region or the whole industry, incurring higher cost.

**Type/s of forestry:** All types of forestry can be distinguished when using a direct survey to collect data. However, if the goal is to compare health and wellbeing across many different forestry sectors, a larger survey sample size will be needed compared to gathering data for the whole forest industry.

**Scale/s of measurement:** All scales are possible, although costs will increase if many small regions need to be compared, as this requires high sample sizes.

**Key questions answered:** How healthy are forestry workers compared to the general population? Do people in the general population from the same location, of similar gender and age to forestry workers, experience similar health problems to those in the forest industry?

**Limitations:** While it may be possible to identify how healthy forestry workers are compared to the general population, for health issues other than direct injury incurred at work it is difficult to identify whether working in the forest industry is the factor causing differences in the health of industry workers and the general population. Many confounding factors may exist, including that people living in rural locations or with particular socio-demographic characteristics may be more susceptible to particular health problems than those living in urbanised areas.

**Methods:** Direct survey of a statistically significant sample of workers employed in different parts of the forest industry. Care is needed to identify an appropriate sample if the goal is to compare different forestry sectors and/or different geographic regions.

### 6.3.4 Self-rated wellbeing

**Description:** This indicator measures the average wellbeing of forestry workers, as self-rated by forestry workers.

**Data source/s:** Data to be collected through direct survey of forestry workers.

**How often can it be measured?** A direct survey of forestry workers can be undertaken at any point in time.

**Benchmark/s:** Comparison can be made to results of regular national surveys of wellbeing if the survey uses a comparable scale to that used in the comparison survey (e.g. the Australian National Unity Wellbeing Index<sup>8</sup>). Note that the ABS does not undertake regular surveys of health and wellbeing, having last undertaken a ‘one-off’ survey of mental health and well-being in 1997.

**Cost:** Medium-high depending on sample size required. A higher sample size would be required if there is a need to compare wellbeing of workers operating in different forest industry sectors; or a need to compare wellbeing of workers in many different local regions.

**Type/s of forestry:** All types of forestry can be distinguished when using a direct survey to collect data. However, a larger sample is needed to compare several sectors to each other, as this requires a statistically significant sample of workers from each forestry sector to be compared.

**Scale/s of measurement:** All scales possible; higher cost if aiming to produce small-scale data as well as large-scale data.

**Key questions answered:** How happy are forest industry workers? How do they rate their well-being? This provides direct answers to the question of the wellbeing of workers, for which other characteristics, such as income, are commonly used as a proxy.

**Limitations:** This method can provide considerable detail, but is relatively costly compared to some other indicators. It is also difficult to identify the extent to which the level of wellbeing reported by forestry workers is related to or influenced by their work in the forest industry.

**Methods:** Direct survey of a statistically significant sample of workers employed in different parts of the forest industry. Care is needed to identify an appropriate sample if the goal is to compare different forestry sectors and/or different geographic regions.

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<sup>8</sup> For more information, see <http://www.australianunity.com.au/wellbeingindex/> The Australian Unity Wellbeing Index has been undertaken since 2001 on a regular basis and is expected to continue into the future.

### 6.3.5 Age of forest industry workers

**Description:** This indicator monitors the age distribution of forestry workers to identify if the forestry workforce as a whole is ageing or becoming younger over time. An ageing workforce may indicate problems with recruitment of new workers into the industry; a declining average age of the workforce may indicate a need for increased skills training provision for inexperienced workers.

**Data source/s:** Data can be collected in two ways:

- ABS *Census of Population and Housing* data – this requires a special data request from the ABS, which does not publicly publish data on forest worker age; or
- Direct survey of forestry workers in which they are asked their age. This requires a representative, statistically significant sample to ensure that the ages identified are representative of the total population of forestry workers.

**How often can it be measured?**

- ABS *Census of Population and Housing* data – every five years; or
- Direct survey of forestry workers – at any point in time.

**Benchmark/s:** Comparison of forest industry worker's age can be made with the age distribution of the labour force working in the same region.

**Cost:**

- ABS data – low-medium cost; or
- Survey – medium-high cost. It is important to survey a statistically significant, representative sample to ensure age distribution accurately reflects that of the forest industry as a whole.

**Type/s of forestry:**

- ABS *Census of Population and Housing* data – it is possible to separate the forestry and logging and wood and paper product manufacturing sectors, but not to separate plantation and native forest sectors; or
- Direct survey of forestry workers – it is possible to identify age distribution separately for all forestry sectors.

**Scale/s of measurement:** Regional, national.

In the case study regions, this indicator was tested at local scale, but the data produced could not be easily interpreted due to the small sample of workers available in individual local government areas. It was not possible to identify if variance in age distribution across different local government areas was due to differences in the forest industry across these areas, or simply the natural variance expected with a small sample of workers. It is therefore recommended this indicator be measured only at the regional and national scale.

**Key questions answered:** Is the forestry workforce older or younger on average than the general labour force? Is the forestry workforce ageing more rapidly than average? If yes, this may indicate unsustainable replacement of workforce, and a potential for increasing skills shortages.

**Limitations:** It can be difficult to interpret this indicator – is an ageing workforce necessarily negative? What should be considered a problematic rate of change in

average age of the workforce? Further work should be undertaken to improve interpretation of this indicator.

**Methods:**

- ABS data: Comparison of the proportion of forest industry workers and proportion of the general labour force falling into the following age categories: 15-24 years, 25-34 years, 35-44 years, 45-54 years, 55-64 years, 65 years and over. The comparison made should be of the proportion of the workforce falling into each category, rather than the total number of workers, to enable appropriate comparison over time; or
- Direct survey of a statistically significant sample of workers employed in different parts of the forest industry: This is only needed if there is a desire to identify income of forestry workers employed in the native forest versus plantation sectors, as ABS data enable identification of the age distribution of forestry workers working in forestry and logging versus wood and paper product manufacturing.

### 6.3.6 Gender of forest industry workers

**Description:** This indicator monitors the proportion of forestry workers who are male and female, compared to the labour force as a whole, and how the proportion of men and women is changing over time.

**Data source/s:** Data can be collected in two ways:

- ABS *Census of Population and Housing* data; or
- Direct survey of forestry workers in which they are asked their gender. Direct survey is only useful if there is a need to distinguish between gender distribution in the native forest versus plantation sectors, as ABS data can be used to identify gender distribution across other forest industry sectors.

**How often can it be measured?**

- ABS *Census of Population and Housing* data – every five years; or
- Direct survey of forestry workers – at any point in time.

**Benchmark/s:** Comparison of forest industry worker's gender can be made with gender distribution of the labour force working in the same region, or of the labour force working in relevant comparison industries.

**Cost:**

- ABS data – low cost; or
- Survey – medium-high. It is important to survey a statistically significant, representative sample to ensure age distribution accurately reflects that of the forest industry as a whole.

**Type/s of forestry:**

- ABS *Census of Population and Housing* data – it is possible to separate the forestry and logging and wood and paper product manufacturing sectors, but not to separate plantation and native forest sectors; or
- Direct survey of forestry workers – it is possible to identify age distribution separately for all forestry sectors.

**Scale/s of measurement:** Regional, national. In the case study regions, this indicator was tested at local scale, but the data produced could not be easily interpreted due to the small sample of workers available in individual local government areas. It was not possible to identify if variance in gender distribution across different local government areas was due to differences in the forest industry which have resulted in differing gender profiles of the workforce, or simply the natural variance expected with a small sample of workers. It is therefore recommended this indicator be measured only at the regional and national scale.

**Key questions answered:** Does the forestry workforce have a similar proportion of male and female workers as the overall labour force?

**Limitations:** It can be difficult to interpret this indicator – is a higher proportion of men than women necessarily negative? To what extent should dominance of the forestry workforce by male workers be considered problematic? Some studies have indicated that women may find it difficult to enter or maintain work in the forest industry (Buchy 2001), but few in-depth studies have been undertaken to examine why the forest industry typically has a higher proportion of male workers than the

average, and whether there are any barriers to women entering employment in the industry. Further work should be undertaken that can assist in interpreting the meaning of this indicator.

**Methods:**

- ABS data: Comparison of the proportion of forest industry workers and proportion of the general labour force who are male and female. The comparison made should be of the proportion of the workforce falling into each category rather than the total number of workers to enable appropriate comparison over time; or
- Direct survey of a statistically significant sample of workers employed in different parts of the forest industry. This is only needed if there is a desire to identify gender of forestry workers employed in the native forest versus plantation sectors, as ABS data enable identification of gender of forestry workers working in forestry and logging versus wood and paper product manufacturing.

### 6.3.7 Attachment to place

**Description:** This indicator identifies the level of attachment forestry workers have to the local area in which they are currently living. Attachment to place may influence the vulnerability of workers to change, dependency of workers on particular types or locations of employment, and worker's flexibility and willingness to move for employment. It can therefore affect unemployment rates, as well as provide some indication of the stability of the industry in an area.

**Data source/s:** Direct survey of forestry workforce

**How often can it be measured?** A direct survey of forestry workers can be undertaken at any point in time.

**Benchmark/s:** The data from this indicator can be monitored over time to identify if level of attachment to place is changing. As there are no sets of regularly collected data on attachment to place for the labour force as a whole, comparison to the general population or other industries must rely on opportunistic comparison to the results of one-off studies if and when they are undertaken.

**Cost:** Medium-high cost.

**Type/s of forestry:** All types of forestry can be distinguished when using a direct survey to collect data. However, a larger sample is needed to compare several sectors to each other, as this requires a statistically significant sample of workers from each forestry sector to be compared.

**Scale/s of measurement:** All scales possible; higher cost if aiming to produce small-scale data as well as large-scale data.

**Key questions answered:** To what extent do forestry workers identify themselves as having attachment to their local region and community, as evidenced by their length of residence, views about their local area as a desirable place to live, and expectations of continued residence.

**Limitations:** Care is needed to design questions which adequately reflect attachment to place. Many measures assume attachment to place is related to length of residence and an individual's stated views about the desirability of the area and community in which they live. It may also be useful to explore the extent to which an individual would change jobs or industry of employment in order to stay living in a particular location, or other aspects of attachment to place.

**Methods:** Direct survey of a statistically significant sample of workers employed in different parts of the forest industry.

### 6.3.8 Cultural and family attachment to forestry

**Description:** This indicator identifies the cultural and family attachment workers have to the forest industry, based on identifying the extent to which a forestry worker indicates their family and friends work in the forest industry, have an individual or family history of working in the industry, and the reliance of their social networks on the industry. These factors influence flexibility and willingness to work in other industries if there is a downturn in forestry-based employment. It can therefore affect unemployment rates and wellbeing. Long term attachment to the forest industry may also influence community identity.

**Data source/s:** Direct survey of forestry workforce

**How often can it be measured?** A direct survey of forestry workers can be undertaken at any point in time.

**Benchmark/s:** The data from this indicator can be monitored over time to identify if the level of attachment to the forest industry is changing. As there are no sets of regularly collected data on attachment to industry of employment for the labour force as a whole, comparison to the general population or other industries will rely on opportunistic comparison to the results of one-off studies if and when they are undertaken.

**Cost:** Medium-high cost.

**Type/s of forestry:** All types of forestry can be distinguished when using a direct survey to collect data. However, a larger sample is needed to compare several sectors to each other, as this requires a statistically significant sample of workers from each forestry sector to be compared.

**Scale/s of measurement:** All scales possible; higher cost if aiming to produce small-scale data as well as large-scale data.

**Key questions answered:**

- How many forestry workers have immediate/extended family or friends who work in forest industry or forest industry-related jobs?
- How long have forest industry worker's families worked in the industry? and
- To what extent are a forest industry worker's social networks dependent on the forest industry?

**Limitations:** This indicator assumes that involvement of friends and family in the forest industry, history of working in the industry, and depth of industry-dependent social networks are related to level of attachment to the industry. It assumes this is an indicator of likely reluctance to change jobs to take up work outside the industry, and of higher vulnerability to changes in the industry; however, this assumption requires testing in more in-depth studies.

**Methods:** Direct survey of a statistically significant sample of workers employed in different parts of the forest industry.

### 6.3.9 Hours worked by forest workers

**Description:** This indicator monitors the average hours worked per week by forestry workers, and how average hours worked is changing over time. This can identify if forestry workers on average work more or less hours than the labour force average. Working hours are considered a key indicator of wellbeing, with excessively high work hours often associated with decreased wellbeing. It is more difficult to assess wellbeing for workers who work less than full-time, as some may do this by choice, while others may have an unfulfilled preference to work longer hours.

**Data source/s:** Data can be collected in two ways:

- ABS *Census of Population and Housing* data – this requires a special data request from the ABS, which does not publicly publish data on hours worked by forest industry workers; or
- Direct survey of forestry workers in which they are asked about their working hours. This requires a representative, statistically significant sample to ensure that the working hours identified are representative of the total population of forestry workers.

**How often can it be measured?**

- ABS *Census of Population and Housing* data – every five years; or
- Direct survey of forestry workers – at any point in time.

**Benchmark/s:** Working hours within the forest industry can be compared to working hours for the labour force working in the same region.

**Cost:**

- ABS data – low-medium cost; or
- Survey – medium-high cost. It is important to survey a statistically significant, representative sample to ensure age distribution accurately reflects that of the forest industry as a whole.

**Type/s of forestry:**

- ABS *Census of Population and Housing* data – it is possible to separate the forestry and logging and wood and paper product manufacturing sectors, but not to separate plantation and native forest sectors; or
- Direct survey of forestry workers – it is possible to identify hours worked separately for all forestry sectors.

**Scale/s of measurement:** Regional, national. In the case study regions, this indicator was tested at local scale, but the data produced could not be easily interpreted due to the small sample of workers available in individual local government areas. It was not possible to identify if variance in hours worked across different local government areas was due to differences in the forest industry which have resulted in differing working hours for workers, or simply the natural variance expected with a small sample of workers. It is therefore recommended this indicator be measured only at the regional and national scale.

**Key questions answered:** Do forest industry workers work longer or shorter hours than the average? Working longer hours is generally interpreted as an indicator of a reduction in quality of working conditions.

**Limitations:** It can be difficult to identify whether a greater or lesser amount of hours worked means the industry's working conditions are better or worse than others. The indicator is only a partial indication of overall working conditions and wellbeing.

**Methods:**

- ABS data: Comparison of the proportion of forest industry workers and proportion of the general labour force falling into the following categories of hours worked per week: nil hours, 1-15 hours, 16-24 hours, 25-34 hours, 35-39 hours, 40 hours, 41-48 hours, 49 hours and over. The comparison made should be of the proportion of the workforce falling into each category rather than the total number of workers, to enable appropriate comparison over time; or
- Direct survey of a statistically significant sample of workers employed in different parts of the forest industry. This is only needed if there is a desire to identify hours worked by forestry workers employed in the native forest versus plantation sectors, as ABS data enable identification of the working hours of forestry workers working in forestry and logging versus wood and paper product manufacturing.

### 6.3.10 Educational qualifications of forest industry workers

**Description:** This indicator identifies the proportion of forest industry workers with different levels of formal educational attainment. It helps in identifying the extent of formal skills training achieved by industry workers, and how this is changing over time.

**Data source/s:** Data can be collected in two ways:

- ABS *CPH* data – this requires a special data request from the ABS, which does not publicly publish data on educational attainment of forest industry workers; or
- Direct survey of forestry workers in which they are asked to indicate their level of educational attainment, and or the ways they have learned the skills they use in their work. This requires a representative, statistically significant sample to ensure that the results identified are representative of the total population of forestry workers.

A third possible method is to ask forestry employers about the qualifications of the staff who work for their business, rather than directly surveying individual forestry workers. However, in many cases employers do not maintain records on the educational attainment of workers. A recent survey of forestry businesses in Tasmania asked this question of employers; too few employers were able to answer questions about the educational attainment of their staff to enable analysis of the responses (Schirmer 2008).

**How often can it be measured?**

- ABS *Census of Population and Housing* data – every five years; or
- Direct survey of forestry workers – at any point in time.

**Benchmark/s:** Comparison of forest industry worker's educational attainment can be made with the educational attainment of the labour force working in the same region.

**Cost:**

- ABS data – low-medium cost; or
- Survey – medium-high cost.

**Type/s of forestry:**

- ABS *Census of Population and Housing* data – it is possible to separate the forestry and logging and wood and paper product manufacturing sectors, but not to separate plantation and native forest sectors; or
- Direct survey of forestry workers – it is possible to identify educational attainment separately for all forestry sectors.

**Scale/s of measurement:** Regional, national. In the case study regions, this indicator was tested at local scale, but the data produced could not be easily interpreted due to the small sample of workers available in individual local government areas. It was not possible to identify if variance in educational attainment across different local government areas was due to differences in the forest industry which have resulted in differences in education level of workers, or simply the natural variance expected with a small sample of workers. It is therefore recommended this indicator be measured only at the regional and national scale.

**Key questions answered:**

- How does the level of education attained by forestry workers compare to other industries? Low levels of education can indicate potential literacy and industry development challenges, and predict difficulty adapting to changing skills needs and technology;
- Are different levels of educational attainment correlated with particular types of employment within the forestry sector? and
- When direct survey is used: how do forest industry workers learn their skills and how does this influence the type of employment they are involved in within the forestry sector?

**Limitations:** It can be difficult to interpret this indicator – is a low level of formal educational attainment necessarily negative? What should be considered the appropriate level of education for different types of forestry workers? Further work should be undertaken that can assist in interpreting the meaning of this indicator. Formal education is not necessarily a good indicator of the level of skills and experience a person has in their employment, and should always be considered to represent only a part of the set of skills a person has.

**Methods:**

- ABS data: Comparison of the proportion of forest industry workers and proportion of the general labour force with the following level of educational attainment: no post high-school qualification, certificate/diploma, or bachelor degree or other postgraduate qualification. The comparison made should be of the proportion of the workforce falling into each category rather than the total number of workers to enable appropriate comparison over time; or
- Direct survey of a statistically significant sample of workers employed in different parts of the forest industry: This is only needed if there is a desire to identify educational attainment of forestry workers employed in the native forest versus plantation sectors, or if there is a desire to obtain more detailed information on skills attainment than is possible from ABS data.

## **6.4 Impacts of the forest industry on Indigenous people: recommended indicators**

The following indicators should be monitored regularly over time to help understand the impacts of the forest industry on Indigenous people:

- Indigenous employment in the forest industry – quantity;
- Indigenous employment in the forest industry – quality; and
- Area of forest owned or accessed by Indigenous people.

This information answers some key questions about impacts of the industry on Indigenous people, although the indicators provided information on only a limited number of issues related to Indigenous access to forests. See Section 7.1 for discussion of other, in-depth studies needed to better understand impacts of the forest industry on Indigenous people.

Recommended methods for measuring each indicator are described on the following pages.

### 6.4.1 Indigenous employment in the forest industry – quantity

**Description:** This indicator identifies the proportion of forest industry workers who identify as Indigenous (Aboriginal or Torres Strait Islander).

**Data source/s:** ABS *Census of Population and Housing*. Identifying Indigenous people who work in the forest industry requires specific data order from the ABS, as these data are not produced as part of publicly released information by the ABS.

An alternative method of gathering data would be via direct survey of forestry workers, or of forestry businesses. A large sample of forestry workers would need to be surveyed to accurately identify the proportion of Indigenous employment, due to the low proportion of workers who are Indigenous. Care would also be needed to ensure the survey reached forestry workers who are Indigenous. A recent survey of forestry businesses asked them to identify the number of Indigenous workers they employed. Many businesses could not answer this question, as they do not ask workers if they are Indigenous (Schirmer 2008). ABS data, while having important limitations, are therefore the best measure currently available.

**How often can it be measured?** This indicator can be measured every five years, when the ABS *Census of Population and Housing* is undertaken.

**Benchmark/s:** Comparison of the proportion of Indigenous and non-Indigenous worker in the forest industry to the proportions in the overall labour force, and comparison of rates of change over time.

**Cost:** Low-medium cost.

**Type/s of forestry:** ABS data provide information on employment in the forestry and logging, and wood and paper product manufacturing sectors. It is not possible to identify Indigenous employment in the native forest versus plantation sectors using ABS data.

**Scale/s of measurement:** Regional, national. At smaller scales, the number of Indigenous employees is small and data cannot be considered accurate, both because of potential limitations of the data set (see ‘limitations’), and because of randomisation of data by the ABS, which limits usefulness of data involving very small numbers.

**Key questions answered:** How many Indigenous people are employed in the forest industry? What proportion of forest industry employees are Indigenous? These data provide information needed to monitor the outcomes of the National Indigenous Forestry Strategy.

**Limitations:** ABS data may underestimate total Indigenous employment in forestry, as the *CPH* requires self identification of Indigenous status. This is a significant issue, and it is difficult to identify the extent to which Indigenous employment will be under-estimated as a result of Census respondents deciding not to self-identify as Indigenous.

**Methods:** The proportion of Indigenous workers is calculated as:

$$\frac{\text{Number of Indigenous workers}}{\text{Total number of workers}}$$

## 6.4.2 Indigenous employment in the forest industry – type

**Description:** This indicator identifies the proportion of Indigenous (Aboriginal or Torres Strait Islander) forestry workers employed in different occupations. This information helps identify whether Indigenous workers are represented equally across all types of forest industry occupation, or tend to be employed in particular occupations.

**Data source/s:** ABS *Census of Population and Housing*. Identifying Indigenous forestry workers by occupation requires specific data order from the ABS, as these data are not produced as part of publicly released information by the ABS.

An alternative method of gathering data would be via direct survey of forestry workers, or of forestry businesses. A large sample of forestry workers would need to be surveyed to accurately identify the proportion of Indigenous employment by occupation, due to the low proportion of workers who are Indigenous. Care would also be needed to ensure the survey reached forestry workers who are Indigenous. A recent survey of forestry businesses asked them to identify the number of Indigenous workers they employed. Many businesses could not answer this question, as they do not ask workers if they are Indigenous (Schirmer 2008). ABS data, while having important limitations, are currently the best measure available.

**How often can it be measured?** This indicator can be measured every five years, when the ABS *Census of Population and Housing* is undertaken.

**Benchmark/s:** Comparison of the proportion of Indigenous and non-Indigenous forestry workers employed in different occupations within the forest industry.

**Cost:** Low-medium cost.

**Type/s of forestry:** ABS data provide information on employment in the forestry and logging, and wood and paper product manufacturing sectors. It is not possible to identify Indigenous employment in the native forest versus plantation sectors using ABS data.

**Scale/s of measurement:** Regional, national. At smaller scales, the number of Indigenous employees in some occupations is small and data cannot be considered accurate, both because of potential limitations of the data set (see ‘limitations’), and because of randomisation of data by the ABS, which limits accuracy of data involving very small numbers.

**Key questions answered:** Do Indigenous workers have the same types of jobs as non-Indigenous workers in the forest industries? If there are differences in occupation, what are they?

**Limitations:** ABS data may underestimate total Indigenous employment in forestry, as the *CPH* requires self identification of Indigenous status. This is a significant issue, and it is difficult to identify the extent to which Indigenous employment will be under-estimated as a result of Census respondents deciding not to self-identify as Indigenous.

**Methods:** Data on Indigenous employment in the forest industry and total employment in the forest industry by occupation are compared to identify whether there is a similar distribution of occupations across Indigenous and non-Indigenous workers. The occupations compared are:

- Managers;
- Professionals;
- Technicians and trades workers;
- Community and personal service workers;
- Clerical and administrative workers;
- Sales workers;
- Machinery operators and drivers; and
- Labourers.

For definitions of these occupations, see ABS (2006).

### 6.4.3 Area of forest owned or accessed by Indigenous people

**Description:** This indicator identifies the area of forest owned or accessed by Indigenous people, based on (a) area of forested land under Indigenous ownership and (b) area of forest on the Register of the National Estate for Indigenous values. These figures represent a subset of the forests that are important to Indigenous people in Australia, but provide some indication of how forest access and ownership by Indigenous people in Australia is changing over time.

**Data source/s:** Bureau of Rural Sciences *National Forest Inventory*.

**Benchmark/s:** Change over time can be analysed to identify if the area of forest owned or accessed by Indigenous people is increasing or decreasing.

**Cost:** Low cost.

**Type/s of forestry:** Native forest and plantation forests can be separated.

**Scale/s of measurement:** Regional, national.

**Key questions answered:** What areas of forest are owned and/or used by Indigenous communities?

**Limitations:**

This indicator provides information on specific types of Indigenous access to and ownership of forests in Australia. Many more forests would be regularly accessed and used by Indigenous people, or have cultural and spiritual significance. This indicator should be understood as a limited representation of Indigenous peoples' interests and interaction with Australia's forests. The indicator also provides no information on the types of interactions and uses of forests by Indigenous people.

**Methods:** Data analysed and reported in Australia's *State of the Forests* report are utilised for this indicator.

## **7.0 Other work needed to understand social and economic impacts**

As identified in Section 2.0, the set of recommended indicators provide a useful but limited understanding of the social and economic impacts of forestry in Australia. Indicators are necessarily limited to data which can be regularly monitored and measured over time and compared across regions. They do not provide the in-depth data needed to better interpret and understand the diversity of ways forestry activities impact different individuals and groups.

Eight key areas of research are needed in particular to complement the recommended indicators, and to enable improved interpretation and use of the indicators. A brief review of each is provided in the following sections, with some recommendations on the types of research needed:

- Indigenous capacity to undertake work in the forest industry;
- Perceptions, attitudes and values;
- Indirect impacts on employment and spending;
- Studies on subjective experiences of impact;
- Studies examining resilience and adaptability of forest-dependent communities;
- Social and economic characteristics of forest-dependent communities and forestry workers;
- Rate of road accidents attributable to forest industry-related road use; and
- Community engagement studies.

## 7.1 Indigenous capacity to work in the forest sector

Involvement and employment of Indigenous people and communities in Australia's forest industry has been encouraged and supported through Australia's State of the Environment Report 2003 (BRS), and more specifically, the National Indigenous Forestry Strategy (NIFS) (DAFF, 2005). It is acknowledged that this involvement can take many forms, and that while there is no single Indigenous attitude towards forestry, it can create opportunities for economic development that complement cultural objectives (Feary, 2008).

The type of Indigenous involvement in forestry will depend on the individual. Capacity and preference depends on factors such as education and skill level, location, the sector of forestry preferred (with preferences spanning from native forest production to non-wood uses), and preferred level of independence. The NIFS suggests that potential types of Indigenous involvement in the forest industry include:

- independent Indigenous business enterprises;
- business partnerships that combine Indigenous land ownership and employment with mainstream industry capital and business planning;
- partnerships between plantation companies and Indigenous communities;
- managing tree crops to produce timber for pulp and paper production;
- wage-based employment opportunities in natural forest management, timber transport and timber milling; and
- managing forest resources including on culturally significant sites (DAFF, 2005: 13 of 20).

It has also been suggested that Indigenous involvement in forestry can include many roles outside the forest industry, with forests providing important sites for cultural and social activities, as well as gathering a range of non-timber products.

The ability of Indigenous people to benefit from employment in the forest sector may be limited by their available skills and resources. The 2006 Census found that 966 Indigenous people worked in the forestry and logging or wood and paper product manufacturing industries. This represents 1.3% of all employees in these industries. The current low level of Indigenous participation in the forest industry is influenced by factors such as the low base of relevant skills, experience and ownership of forests or businesses (DAFF, 2005: 11). A study completed in 2007 found that key barriers to Indigenous employment in the industry include a lack of self esteem, skills and business culture in Indigenous society, and in some locations, reduced size of the native forest industry due to forest closure (Loxton, 2007: 52).

Increased capacity to participate in forestry is necessary to increase Indigenous involvement in the forest sector. This may require increasing skill levels, as well as overcoming cultural barriers and prejudice (Feary 2008: 281). Recent studies have identified successful examples of Indigenous involvement in the forest industry (Loxton 2007, Feary 2008), however further research is required to better identify:

- current and potential opportunities for Indigenous people in the forest industry;
- the gap between current and required capacity levels to take up these opportunities;
- potential methods to increase capacity (including skill levels); and
- the success of measures to increase involvement.

Each of these is discussed in turn below.

### ***Current and potential opportunities***

Work is required to identify the areas, jobs and positions Indigenous people are currently employed in, and other as yet unrealised opportunities. These opportunities include Indigenous-specific and general roles in the forest industry. Analysis of existing examples of Indigenous involvement should focus on assessing factors which make them more, or less, successful in terms of skill enhancement, long term employment or ongoing opportunities, and encouragement. This knowledge can then assist in designing future employment opportunities.

Identifying as yet unrealised opportunities is also important. Assessment of these opportunities can provide understanding of the limiting factors that prevent Indigenous people from taking employment in these areas. These limiting factors may then be acted upon through education of both potential employees and employers, and other practical assistance.

This research needs to both gather data on the current extent of Indigenous involvement in the industry, and its nature, and also to identify the more in-depth understanding of when, why and how opportunities exist and are realised.

Many of these questions were raised by the Scoping Report for a National Indigenous Forestry Strategy (see DAFF, 2005: 140).

### ***The gap between current and required capacity levels***

Once potential opportunities are identified, the gap between an individual's or community's capacity to undertake the employment can be assessed. Capacity involves the skills required to manage and undertake a task, including financial, practical and leadership capacity.

### ***Potential methods to increase capacity***

Methods to increase capacity can include on-the-job training, apprenticeships, community-organised, or locally-based training courses, as well as other forms of education such as TAFE or university courses. The type of education, as well as the practical experience required, will depend on the future expectations of the individual, the type of skills being learnt, and the availability of trainers.

Research is needed to identify what types of assistance are needed to help build capacity for both Indigenous and non-Indigenous people that can assist achieving growing Indigenous employment in the forest industry. Capacity building may go well beyond training and education to identifying key social and cultural constraints which may be presenting barriers to entry into forestry employment by Indigenous people.

### ***The success of measures to increase involvement***

Evaluation of the measures used to increase involvement in the forest industry is required to help guide future opportunities and ideas. Quantitative measures of success may include the length of time required to find a job, the number of people in new employment, or positions, and average income. Qualitative measures are equally important, and include the perceptions of Indigenous and non-Indigenous people about the success of measures to increase employment. Topics to be examined might include:

- How many Indigenous and non Indigenous people does the business/forest sector employ compared to \_\_\_ years ago?

- What is the annual production and turnover statistics for Indigenous owned/managed businesses?
- What is the staff turnover rate?
- How happy are employees, how has their health/wellbeing/outlook changed?
- Are employee's families or friends keen to become involved?
- Which methods have been most successful in increasing Indigenous people's capacity to work in the forest sector? and
- To what extent have Indigenous people benefitted both culturally and economically from land over which they have recognised rights?

### **Research methods**

A combination of methods is required to examine the issues discussed above. The method chosen will depend on the scale at which the data is required and the type of data collected. Methods include both collection and analysis of quantitative data and qualitative data, through mechanisms such as surveys and qualitative focus groups and interviews, and observation of successful involvement.

These methods provide differing levels of detail, and require differing levels of input. Statistical data can provide data at a broad scale, but does not give an explanation of the reasons for the data, whilst at the other end of the scale, interviews give a deep understanding of the data but are time and cost intensive. Due to the diversity of Indigenous communities - their values and aspirations, capacity, and demographic and geographical characteristics - studies at a small scale cannot be expected to capture all the issues affecting Indigenous people's involvement in the forest industry, but will provide a deeper understanding of what is occurring in the local area which are missed when using large scale data.

In addition to new research opportunities, previous research - such as the case studies completed as part of the scoping study for the National Indigenous Forestry Strategy - provides a good basis for follow up studies. The case study approach used community consultation and site visits. Follow up to identify whether these cases have had ongoing success would provide useful data.

Limitations that may affect qualitative data collection are the costs involved, particularly given the remote areas in which some communities are located, illiteracy, and the risks of over-researching communities. There is also a risk of generalizing issues, and Indigenous culture often dictates who may give information about certain issues, so individuals can be uncomfortable about speaking for a group, particularly if they believe somebody else is more informed about the topic.

## 7.2 Perceptions, attitudes and values

A considerable amount of work has been undertaken studying the attitudes and values held about forests and forestry by different people. Common methods used to assess people's attitudes and values include paper and telephone surveys, interviews, focus groups, media analysis and written submissions.

Past research concerned with attitudes and values relating to forestry production and development can be divided into four themes relating to:

- Scenic beauty and perception;
- Acceptability of forestry practices;
- Perception of forest-industry impacts; and
- Perceptions and expectations of forest use and management.

**Scenic beauty and perception:** The ranking of scenic beauty using photos or slides is a common method used to evaluate landscape and forest management preferences (Anderson, 1981, Clay and Daniel, 2000, Ribe, 2002, Silvenninen et al, 2001). Sometimes this is based on photos of 'real' landscapes, while some studies have examined simulated landscapes which are manipulated to identify potential outcomes of different forest management practices (Ford et al. 2005). Previous studies have developed a range of theories about the factors that influence perceptions of forest and forest management. For example, Ribe (2002) found that notions of acceptability and beauty were related to whether a respondent had productionist, protectionist or intermediate/nonaligned values regarding use of the environment, and found that perceptions of acceptability of forestry practices were not correlated to respondents' perspectives of scenic value.

**Acceptability of forestry practices:** The acceptability of forest practices have been evaluated in several studies. Work by Ford et al. (2005) tested the acceptability of a range of harvesting techniques, and explored the underlying values on which acceptability is based on. They examined whether providing information on the consequences of each technique had an influence on a participant's level of acceptance of harvesting practices. The study used computer-simulated pictures depicting different harvesting plans within the same landscape. Participants were asked to rate their acceptance of each picture. Half of the participants received information on the consequences of each harvesting type, and all participants were classified depending on their values, beliefs about harvesting and the intrinsic, non-use and use value of forests, and acceptance of harvest systems. This study covers several themes addressed by the above section on scenic beauty, suggesting that underlying values are a key factor in influencing perspectives on both the acceptability, and beauty, of forestry management and harvesting.

**Perception of forest-industry impacts:** Many perceptions studies have examined perceived impacts of forestry activities. In Australia, several studies have focused on perceptions related to the impacts of plantation forestry. Pickworth (2005) assessed the perceived benefits and disadvantages of plantation development linked to a variety of factors, while Schirmer (2002) focussed on identifying how differing perceptions led to social conflicts, and how this was mediated by different interventions aiming to achieve shared perceptions across different groups. Perceptions of impact may be examined at multiple scales – for example, different impacts of plantations may be perceived to occur at the individual property scale and the regional scales (Spencer and Jellinek 1995). Other studies on perceptions of impacts of forestry have been

completed by Barlow and Cocklin (2003), Tonts et al (2001) and Kelly and Lymon (2000), as well as Heer et al (2003) who focussed on the role of knowledge and behaviour. Several of the social assessments undertaken for the Regional Forest Agreements (RFAs) assessed public perceptions about impacts of native forestry.

**Perceptions and expectations of forest use and management practices:** Some studies have focused on comparing the values and expectations of different stakeholders regarding forestry (Hendee and Harris, 1970, Wagner et al, 1998). Comprehensive Regional Assessments undertaken as part of the RFA process examined issues such as local resident's opinions about forestry management and the industry (Western Research Institute and Illawarra Regional Informational Service, 2005), perspectives on desired future uses of forested land, values placed on land, and opinion of social or environmental issues (NSW Southern: Social Assessment Report, 2000), and the perceived potential impacts of suggested future management scenarios (NSW Southern: Community Case Study Report, 1999).

### **Key research needs**

While many studies have been undertaken on perceptions, few have been undertaken at more than one point in time, and as a result there is little understanding of how attitudes and values towards forestry are changing over time. Relatively few studies have examined in detail why people hold particular views, and further studies are also needed in this area.

Perceptions can be examined to some extent using media analysis, but this provides only a reasonably limited understanding of the varied perceptions held about forests by different people. For this reason, it is recommended that any ongoing indicators involve a survey which repeats the same questions about perceptions of forestry over time, and which is undertaken using a consistent sampling and survey delivery approach to ensure survey results can be compared over time.

Previous studies provide a comprehensive list of potential questions that can be asked related to attitudes, values and overall perceptions of forestry in Australia. The following are suggested as key topics that should be incorporated into a survey. The exact wording of questions and topics require further work and may need modification for different regions within Australia to ensure locally relevant terms are used. The following represent a subset of all questions that could be asked, and should be accompanied where appropriate by benchmark questions which enable comparison of forestry and non-forestry issues within a particular topic:

- Acceptability of forestry:
  - How acceptable are the following types of forestry - native forestry, plantation forestry – softwood, plantation forestry – hardwood, plantation forestry – Managed Investment Scheme, plantation forestry - non-Managed Investment Scheme;
  - How acceptable are the following types of native forest management – clearfelling, selective logging, aggregated retention (some large areas remaining uncleared), dispersed retention systems (many small areas remaining uncleared), no harvest;
  - How acceptable are the following types of forest-based activities - conversion of farm land to pine plantations, conversion of farm land to blue gum plantations, conversion of farmland to housing development, conversion of farmland to other land uses such as vineyards, conversion of cleared native forest to pine plantations, conversion of cleared native forest

- to blue gum plantations, allowing cleared native forest to naturally regenerate;
- Which of the following factors increase the acceptability of forest industry activities (respondent may be asked to rank or rate each) - Job creation for local residents, Improved working conditions/lifestyle including wages, Encouragement of new residents, Good communication by forest industry companies, Minimisation of environmental impacts, Improvement to roads, Support of local services, sporting groups, retail and activities, Design of forest plantations/management (visual amenity), Development and diversification of local industries; and
  - Which of the following factors decrease the acceptability of forest industry activity (respondent may be asked to rank or rate each) - Local jobs not given because they are not created, or are fulfilled by contractors/itinerant workers, Reduced working conditions/lifestyle including wages, Population losses associated with forest industry activities, Poor communication by forest industry companies, Environmental impacts, Damage to roads, Lack of support to local services, sporting groups, retail and activities, Visual impacts of forestry, Reduced development and loss of local industries;
- Values and beliefs:
    - A range of scales which aim to measure underlying values which may correlate to perceptions of acceptability of forest practices may be used; see Ford et al. (2005) for recent work;
  - Perceptions about forestry activities:
    - These questions would ask about perceptions of what occurs as part of forest industry activities, to identify if perceptions correlate to actual practices undertaken by the industry. For example, questions might ask whether the forest industry typically uses selective logging in a region or clearfelling, to identify if perceptions match the reality of the type of logging undertaken;
  - Information dissemination and communication:
    - Where do you obtain information about forestry in Australia (newspaper, radio, television, neighbours, friends, family, local government, state/federal government, other);
    - How much do you trust each of these sources of information?
    - How effective have community consultation measures by the forest industry been (very effective to not effective)?
    - Have you made an effort to communicate with forest industry companies? If yes: Have you received a response? And: Have your issues been addressed adequately (very adequately to not adequately)?
    - What forms of communication have been used by forestry companies to communicate with local residents: None, Letter, Public meeting, Newsletter, Radio, Local newspaper, Posters, Scientific-based report, Internet, Other; and
    - Which measures of communication would you prefer that forest companies use to inform you of their activities? and
  - Socio-demographic characteristics of respondents (usually including age, gender, education, links to forest industry if any, income).

### **7.3 Indirect impact of forest industry on employment and spending**

Like any economic activity, the forest industry generates ‘flow on’ (or ‘indirect’ or ‘upstream and downstream’) expenditure and employment in local and regional communities, which is generated as a result of spending by forestry businesses and workers. There is currently limited information on the downstream impact of employment and spending by the forest industry for many Australian regions, and almost none which separates the impacts of native forests and plantations.

Indirect impacts are usually measured using one of two related economic impact assessment methods: input-output models, and general equilibrium models.

Input-output (I-O) models model the linkages between inputs and outputs of different industries for an entire economy. This enables modelling of the extent to which a change in one industry would lead to changes in other industries. From this it is possible to derive what are usually termed ‘multipliers’ which indicate, for a given type of change in employment or expenditure by one industry and a defined region, what the flow-on effect of a change in a particular industry generates through the rest of the economy.

I-O studies have important limitations. I-O models are ‘static’ and assume relationships in the economy remain relatively unchanged by a change in one industry. I-O models operate based on key assumptions of homogeneity (that all products of a sector are perfect substitutes or are produced in fixed proportions, and there is no substitution between products of different sectors in the model) and proportionality (the model assumes changes in the output of an industry lead to proportional changes in the inputs required by that industry) (Schirmer et al. 2005a, Appendix 3).

General equilibrium models (GEMs) aim to provide a dynamic model of input and output flows, in which a greater range of assumptions are built into the model about how different sectors respond to change. In theory this ensures the model provides a more realistic assessment of the indirect effects of a change to a given industry. As GEMs are highly expensive to build and run, they are not reviewed further here.

Many input-output studies have been undertaken to identify downstream impacts of the forest industry as a whole for a defined region, but this has still resulted in reasonably limited coverage of different regions, and has rarely examined the downstream impacts of native forest and plantation related activities separately. See Hayter (2003) for a review of relevant studies and discussion of their findings.

Further work is needed to extend coverage of regions, and to specifically examine downstream impacts of different forest industry sectors. In particular, methodological studies are needed to identify the extent to which it is possible to separately model downstream impacts of native forestry versus plantation forestry, and to better identify the typical range of indirect impacts for differently sized regions.

## **7.4 Studies examining subjective experiences of impact**

Communities and individuals may experience a diversity of positive and negative social and economic impacts as a result of forest industry-based activity. Many attempts to assess impact have focussed on identifying independent data on impacts, such as undertaking analysis of statistics that indicate how socio-demographic characteristics of a community change when there is a change in the forest industry (see for example Schirmer et al. 2005a,b).

However, the way people experience impacts depends on their perceptions and understandings of those impacts. It is their perceptions of impact that will drive their response – not whether that impact is ‘real’ or not. For example, if rural residents believe plantation expansion will lead to loss of rural population in their area, and that this will in turn lead to loss of some rural services, they may decide to respond by shifting from the area. The perception of change drives behaviour, whether or not the perceptions about population change are statistically correct.

The same type of change will also be experienced differently by different people. If plantation expansion leads to an increase in rural land prices, some people may experience this as a positive impact – for example, those wishing to sell land, while others may experience it as a negative impact – for example, those wishing to purchase land.

Complicating matters further, people’s experiences are influenced by the different changes occurring at a single time in their lives, of which changes relating to forestry are likely to be only one of many.

The complicated nature of human experiences of impacts of change mean that studies which aim to objectively measure change through analysing statistics can only be partly effective in assessing the social impact of changes to forestry.

Further work is required to gain a greater understanding of how perceptions of impact relate to measurable social and economic changes, and whether the impacts identified are solely a result of forest industry-based activities, or a greater array of factors. This can assist policy makers, the forest industry and communities in better understanding the impacts of forestry – both positive and negative – and how to maximise positive and minimise negative impacts.

These studies may use a range of qualitative and quantitative methods to gain a more in-depth understanding of how different people experience and understand the impacts of changes to forestry in Australia.

## **7.5 Studies to better understand the adaptability of forest-dependent communities**

A considerable body of work currently suggests that communities that have particular social and economic characteristics are more readily able to adapt to changing circumstances, such as change in the forest industry; and that some characteristics make communities relatively unlikely to change.

However, there has been relatively little study of the applicability of these theories in the context of the forest industry. Studies are required to better understand the multiple attributes which influence the adaptability of forest-dependent communities, and to assess the adaptability of communities based on the presence or absence of these attributes. A greater understanding of the requirements for adaptable communities would allow the comparison of suggested attributes to traditionally used proxy indicators, such as those suggested in the indicators recommended in this report, to assess their reliability and usefulness.

Work is needed to identify the most appropriate methods for undertaking this type of study. A longitudinal study would be best for identifying whether proxy indicators believed to indicate adaptability are present in communities that have adapted successfully to changes.

## **7.6 Social and economic characteristics of forest-dependent communities and forestry workers**

The use of objective data to assess the social and economic characteristics of communities (eg total population, unemployment rate, median age, gender) can identify how communities are changing, but does not assist in understanding why they are changing, or the impacts of the changes observed.

Similarly, the recommended indicators can provide a detailed profile of how the forestry workforce is changing – for example, whether the overall workforce is ageing, or the gender balance is shifting – but do not necessarily help to understand the impacts of these changes.

In-depth qualitative studies can generate an understanding of the meaning of social change, both in forestry dependent communities and in the forestry workforce. This analysis can then assist in more meaningful interpretation of the recommended indicators.

It is therefore recommended that, to accompany recommended indicators, occasional studies be undertaken which explore the meaning of change in social and economic characteristics of forest-dependent communities and forestry workers. For example, such a study might undertake focus groups of forestry workers and employers to identify whether ageing of the workforce is associated with any positive or negative outcomes for forestry businesses. This would ensure that indicators can be interpreted appropriately over time.

## **7.7 Rate of road accidents attributable to forest industry-related road use**

A perception sometimes reported in the public media and in previous research is that log-truck traffic is associated with decreased road safety in rural areas (see for example Schirmer et al 2005a,b).

Further examination is needed of the potential to develop indicators comparing the rate of forest industry-related road accidents and other road accidents, in order to determine whether forest industry vehicles are more or less likely to be involved in road accidents than other road users. The exploration of currently available data undertaken for this consultancy indicates that adequate data may not be available to assess this issue.

Assessing the question of safety would require comparing the rate of accidents for forestry-related traffic to that for general traffic of the same vehicle types. Currently most national and state databases of road accident data differentiate accidents by vehicle type, but not by the industry that vehicle is involved in.

Further work is needed to assess if it is possible to identify appropriate indicators on the issue of road safety and forestry-related traffic.

## **7.8 Community engagement**

While not directly related to improving understanding and interpretation of the recommended indicators, community engagement is essential to any impact assessment process. Community engagement refers to processes in which stakeholders with an interest or 'stake' in an issue engage in dialogue about that issue, sometimes with a goal of sharing information as a way of achieving shared perspectives on the issue being discussed, and sometimes with a goal of developing shared strategies to address the issue.

Community engagement has become a catchphrase, with most primary industries expected to incorporate some form of engagement with a wide range of stakeholders into their practices. It also forms an important part of many impact assessment processes, as stakeholders generate creative strategies to mitigate negative impacts and maximise positive benefits of an activity.

Community engagement research is needed to improve communication and understanding between the stakeholders who have an interest in Australian forestry. However, while commonly promoted, surprisingly little research has actively evaluated the success of different approaches to community engagement. Community engagement is commonly recommended as a way of generating strategies for maximising positive and minimising negative social and economic impacts of forestry activities, but few studies have examined which types of community engagement techniques are most effective for Australian forestry.

In addition to the lack of evaluative studies, the types of stakeholders involved in discussions over forestry issues change over time, indicating a need for regular studies to ensure community engagement strategies evolve over time to meet the changing needs of stakeholders involved in forestry in Australia.

Studies are needed to evaluate the benefits and costs of common community engagement strategies for addressing different forestry issues at different scales, and to identify and trial new community engagement strategies. They are also needed to ensure community engagement methods are adapted to changing circumstances over time.

## 8.0 Conclusions

This report has reviewed information needs related to the social and economic impacts of forestry and, based on this review, identified a set of cost-effective indicators which can be monitored at regular intervals over time, as well as a description of other work needed to better assess social and economic impacts of forestry.

Four types of indicators have been identified: indicators which describe key characteristics of the forest industry; the impacts of the industry on the broader community; the impacts of the industry on its own workforce; and the impacts of the industry on Indigenous people. Within each of these categories up to 10 specific indicators were identified and tested, and methods to measure each described.

These recommended indicators enable consistent monitoring of some key social and economic aspects of forestry in Australia using cost effective approaches, but can only provide a limited picture of the wide variety of social and economic impacts related to forestry. Any indicator is by nature a limited representation, or proxy, of a more complex idea, and should be tested through undertaking more in-depth examination that enables assessment of the relevance and usefulness of the indicator, and how well it measures what it is intended to measure. In addition, some types of impact cannot be represented by cost-effective indicators, requiring more in-depth study at greater expense than is feasible for a set of indicators to be repeated regularly over time.

The recommended indicators should therefore be accompanied by in-depth studies which help to broaden and deepen understanding of social and economic impacts of forestry, and which can provide information that improves interpretation of the recommended indicators. In particular, studies should be undertaken which improve understanding of successful strategies for increasing the capacity of Indigenous people to work in the forest sector; perceptions, attitudes and values of different groups about different types of forestry; the indirect impacts of the forest industry on employment and spending; how different people experience social and economic impacts related to the forest industry; factors influencing capacity of communities to adapt to forest industry changes; the meaning of changes to social and economic characteristics of forest-dependent communities and forestry workers; and community engagement strategies.

That said, the indicators recommended, if measured regularly, can provide an improved understanding of the social and economic changes associated with changing forestry activities in Australia, and can be interpreted to provide an understanding of the social and economic impacts of forestry.

## 9.0 References

- ABS (Australian Bureau of Statistics). 2001. *Measuring well-being: frameworks for Australian social statistics*. ABS Catalogue No. 4160.00. ABS, Canberra.
- Anderson, L.M. 1981 Land Use Designations Affect Perception of Scenic Beauty in Forest Landscapes. *Forest Science* Vol 27. No. 2 pp. 392-400.
- Australian Bureau of Statistics. 2006. *ANZSCO - Australian and New Zealand Standard Classification of Occupations*. First Edition. ABS Catalogue No. 1220.0. Australian Bureau of Statistics. Available online at [www.abs.gov.au](http://www.abs.gov.au)
- Australian Government 1992 and 1995 National Forest Policy Statement: A New Focus for Australia's Forests.
- Australian Government. 1997 Plantations for Australia: The 2020 Vision. Commonwealth government, Canberra.
- Barlow, K. and Cocklin, C. (2003) Reconstructing rurality and community: plantation forestry in Victoria, Australia. *Journal of Rural Studies*. Vol 19, pp. 503-519.
- Barrow, C.J. 1997. Environmental and social impact assessment: an introduction. Arnold, London.
- Bell, S. 2001 Landscape pattern, perception and visualisation on the visual management of forests Landscape and Urban Planning Vol 54, Issues 1-4, pp. 201-211.
- Bright, A.D.; Cordell, K.; Hoover, A.P. and Tarrant, M.A. 2003. A human dimensions framework: guidelines for conducting social assessments. United States Department of Agriculture Forest Service Southern Research Station, General Technical Report SRS-65. Southern Research Station, Asheville NC.
- Brooks, K., Kelson, S. and Tottenham, R. 2001. Summary of Australian Regional Forest Agreement Social Assessments and a Recommended Assessment Methodology. Report prepared for the Forest Industry Branch, AFFA. Bureau of Rural Sciences, Canberra.
- BRS (Bureau of Rural Sciences), 2003. Australia's State of the Forest Report 2003, Department of Agriculture, Fisheries and Forestry (DAFF), Canberra. Available online: <http://www.daff.gov.au/brs/forest-veg/nfi/state-forests-report/2003>. Date accessed: 3 May 2007.
- Buchy, M. 2001. Listening to Women's Voices in the Australian Forestry Workforce: You Learn to Cope and Get On with Things. Australian National University Forestry Occasional Paper. Australian National University, Canberra.
- Burdge, R.J. 1994. The concepts, process and methods of social impact assessment: Rabel J. Burdge and Colleagues. Social Ecology Press, Middleton, Wisconsin. pp. 283-292
- Burdge, R.J. 2003. The practice of social impact assessment – background. Impact Assessment and Project Appraisal Vol. 21. No. 2. pp. 84-88.
- Burdge, R.J. 2004. A community guide to social impact assessment. 3<sup>rd</sup> edition. Social Ecology Press, Middleton, Wisconsin.
- Carley, M. 1981. *Social measurement and social indicators: issues of policy and theory*. Contemporary Social Research Series 1. George Allen & Unwin, Boston.
- Centre for International Economics (CIE) 2005. *Plantations, jobs and investment in regional NSW: A socio-economic analysis of private forestry in the Bombala region*. Report prepared for Willmott Forests, March 2005. CIE, Canberra.
- Chesson, J.; Whitworth, B.; Stewart, J.; and Yapp, G. 2005. *Signposts for Australian Agriculture. Stage 2a: Refinement of preliminary framework and industry*

- profiles to include pathways to ESD*. BRR35. National Land and Water Resources Audit, Canberra.
- Clay, G.R. and Daniel, T.C. 2000. Scenic landscape assessment: the effects of land management jurisdiction on public perception of scenic beauty. *Landscape and Urban Planning* Vol 49. pp. 1-13.
- Coakes, S.; Fenton, M. and Gabriel, M. 1999. Application of repertory grid analysis in assessing community sensitivity to change in the forest sector. *Impact Assessment and Project Appraisal* Vol. 17. No. 3. pp. 193-202.
- Cornell, S. and Begay, M. (2003) *What is Cultural Match and Why is it so Important? Lessons from 14 years of the Harvard Project*, Building Effective Aboriginal Governance, Jabiru, NT. Available at:  
<[http://www.nt.gov.au/cdsa/Aboriginal\\_conference/web/html/papers.html](http://www.nt.gov.au/cdsa/Aboriginal_conference/web/html/papers.html)>
- Cox, G. 1995. Techniques for effective social impact assessment: a practical guide. Best Practice Paper 8. Office on Social Policy. NSW Government Social Policy Directorate, Sydney.
- Crisp R & Talbot L 1999, *Indigenous Social Profile Report for SEQ RFA: Final Report*, FAIRA Aboriginal Corporation, Gurang Land Council Aboriginal Corporation & Goolburri Aboriginal Corporation Land Council Queensland.
- DAFF (Department of Agriculture, Fisheries and Forestry). 1999. NSW Southern Community Case Study Report.
- DAFF (Department of Agriculture, Fisheries and Forestry), 2005. National Indigenous Forestry Strategy, Commonwealth of Australia, Canberra. Available online: <http://www.daffa.gov.au/forestry/policies/nifs>. Date accessed: 7 March 2007.
- DAFF (Department of Agriculture, Fisheries and Forestry). Regional Forest Agreements: Social and Economic Reports (<http://www.daff.gov.au/rfa>).
- Dwyer Leslie Pty Ltd and Powell, R.A. 1995. *Final report of the Oberon rural community development study*. State Forests of New South Wales, NSW. [Note: there is a set of associated reports with five preceding the publication of the final report
- EconSearch. 2005. Economic Impact of the timber Industry in the Green Triangle Region, 2003/4.
- Feary, S (2008) Social Justice in the Forest: Aboriginal engagement with Australia's forest industries Transforming Cultures eJournal Vol 3. No. 1.
- Ford, R.; Williams, K.; Ian Bishop, I. and Webb, T. 2005. *Social Acceptability of Forest Management Systems: Project Overview*. University of Melbourne, Victoria.
- Green Triangle Regional Plantation Committee. 2006. Forestry in the Green Triangle. Economic+Employment Contributions. Report prepared by EconSearch, South Australia.
- Gunns Ltd. Bell Bay Pulp Mill Draft Integrated Impact Statement Executive Summary.
- Hayter, M. 2003. *Review of studies of the socio-economic impact of forest industries in Australia*. Forest and Wood Products Research and Development Corporation, Melbourne.
- Heer, C.; Rusterholz, H. and Baur, B. 2003. Forest Perception and Knowledge in Hikers and Mountain Bikers in Two Different Areas in Northwestern Switzerland. *Environmental Management*. Vol 31. No. 6 pp. 709-723.
- Hendee, J.C and Harris, R.W (1970) Foresters' Perception of Wilderness- Use Attitudes and Preferences *Journal of Forestry*. Vol 68. No. 12. pp. 759-762.

- IISD (International Institute for Sustainable Development). 2002. *Seven questions to sustainability: How to assess the contribution of mining and minerals activities*. Mining, Minerals and Sustainable Development (MMSD) Initiative. IISD, USA.
- Institute for Social Research. 2000. *Social benchmarks and indicators for Victoria*. Consultants report for the Department of Premier and Cabinet, Victoria. December 2000. Swinburne University of Technology, Melbourne.
- Joint Commonwealth NSW Regional Forest Agreement Steering Committee. 2000. NSW Southern Social Assessment Report.
- Kalimo, E. 2005. OECD Social Indicators for 2001: a critical appraisal. *Social Indicators Research* Vol. 70. pp. 185-229.
- Kelly, G. and Lymon, K. 2000. *To trees, or not to trees? An assessment of the social impacts of the plantation industry on the Shire of Plantagenet*. School of Psychology, Curtin University of Technology, Perth.
- Landscapes. *Forest Science* Vol 27. No. 2 pp. 392-400.
- Lane, R., 1997. Frontiers of green: pine plantations and local communities. National Conference on Australian Forest History. *Australia's Ever-Changing Forests*. Proceedings. Pp. 155-165.
- Loxton, E., 2007. The Employment of Indigenous people in the Forestry Industry. Unpublished Honours thesis, The Australian National University, Canberra, Australia.
- Margules Groome Poyry Pty Ltd. 1995. *The Economic Impact of the New South Wales Timber Industry*. December 1995. State Forests of New South Wales, Sydney.
- MBAC Consulting. 2005a. *A socio-economic assessment of the plantation processing sector in Queensland*. Report produced for Timber Queensland, July 2005. URL: < <http://www.timberqueensland.com.au/images/2005-13%20Qld%20SWD%20Industry%20SE%20Study%20Final3.pdf>> Accessed 26/04/2006
- MBAC Consulting. 2005b. *The Timber Industry in Gippsland: A socio-economic assessment*. Gippsland Private Forestry Inc., Bairnsdale. URL: < <http://www.fwprdc.org.au/content/pdfs/GPF%20socio%20economic%20report.pdf>>
- Michalos, A.C. 2004. Social indicators research and health-related quality of life research. *Social Indicators Research* Vol. 65. pp. 27-72.
- Naughton, M. 2001. *Commercial farm forestry adoption in the Tumut Shire and its socio-economic impacts*. Honours thesis, Faculty of Science and Agriculture, School of Agriculture, Charles Sturt University – Riverina, NSW.
- Pepperdine, S. 2000. *Social indicators of rural community sustainability: an example from the Woody Yaloak catchment*. First National Conference on the Future of Australia's Country Towns. The Regional Institute. URL: <http://www.regonal.org.au/au/countrytowns/strategies/pepperdine.htm>
- Petheram, J.; Patterson, A.; Williams, K.; Jenkin, B. & Nettle, R. (2000). *Socioeconomic impact of changing land use in South West Victoria*. Institute of Land and Food Resources, University of Melbourne, Melbourne. Online at [www.gtplantations.org/publications](http://www.gtplantations.org/publications).
- Pickworth, J. 2005. *Community perceptions of pine plantations: A report based on a sample survey of residents in the Bombala region of NSW*. Report submitted as partial fulfilment of the Degree of Masters of Environmental Science, School of Resources, Environment and Society – Australian National University

- Productivity Commission. 2003. *Social capital: reviewing the concept and its policy implications*. Research Paper. AusInfo, Canberra.
- Prospect Consulting Pty Ltd. 2002. *The Timber Industry in North East Victoria A Socio Economic Assessment*. Plantations North East Inc. Albury.
- Requena, F. 2003. Social capital, satisfaction and quality of life in the workplace. *Social Indicators Research* Vol. 61. pp. 331-360.
- Ribe, R.G. 1989. The Aesthetics of Forestry: What has Empirical Preference Research Taught Us? *Environmental Management*. Vol 3. pp. 55-74
- Rice, R.W.; McFarlin, D.B.; Hunt, R.G. and Near, J.P. 1985. Organizational work and the perceived quality of life: toward a conceptual model. *Academy of Management Review*. Vol. 10. pp. 296-310.
- Ross, H. and McGee, T.K. 2006. Conceptual frameworks for SIA revisited: a cumulative effects study on lead contamination and economic change. *Impact Assessment and Project Appraisal*. Vol. 24. No. 2. pp. 139-149.
- Schirmer, J. 2002. *Plantation forestry disputes: case studies on concerns, causes, processes and paths toward resolution*. Technical Report No. 42 (Revised), Cooperative Research Centre for Sustainable Production Forestry, Hobart.
- Schirmer, J. 2005. *Approaches to assessing socio-economic impacts of plantation forestry*. Report produced for FWPRDC Project PN04.4007. Forest and Wood Products Research and Development Corporation, Melbourne
- Schirmer, J. and Tonts, M. 2002. *Plantations and sustainable rural communities*. Paper presented at Prospects for Australian Forest Plantations 2002 20-21 August, 2002, Canberra. Online at: [http://www.affa.gov.au/corporate\\_docs/publications/pdf/rural\\_science/forest\\_vegetation/plant\\_conf02/pap\\_6\\_schirmer.pdf](http://www.affa.gov.au/corporate_docs/publications/pdf/rural_science/forest_vegetation/plant_conf02/pap_6_schirmer.pdf)
- Schirmer, J.; Parsons, M.; Charalambou, C.; and Gavran, M. 2005a. *Socio-economic impacts of plantation forestry in the Great Southern region of WA, 1991 to 2004*. Report produced for FWPRDC Project PN04.4007. Forest and Wood Products Research and Development Corporation, Melbourne
- Schirmer, J.; Parsons, M.; Charalambou, C.; and Gavran, M. 2005b. *Socio-economic impacts of plantation forestry in the South West Slopes of NSW, 1991 to 2004*. Report produced for FWPRDC Project PN04.4007. Forest and Wood Products Research and Development Corporation, Melbourne
- Schirmer, J., Williams, K., Borschmann, P. and Dunn, C. 2008. *Living with land use change: different views and perspectives*. Report prepared for the *Socio-economic impacts of land use change* study. March 2008. CRC for Forestry Technical Report 180. CRC for Forestry, Hobart.
- Schirmer, J., Loxton, E. and Campbell-Wilson, A. 2008b. Monitoring the social and economic impacts of forestry: A case study of north-east Tasmania. Report prepared for the Department of Agriculture, Fisheries and Forestry by the Fenner School of Environment and Society, June 2008, Canberra.
- Schirmer, J., Loxton, E. and Campbell-Wilson, A. 2008a. Monitoring the social and economic impacts of forestry: A case study of the Green Triangle region. Report prepared for the Department of Agriculture, Fisheries and Forestry by the Fenner School of Environment and Society, June 2008, Canberra.
- Schmithüsen, F. and Wild-Eck, S. 2000 Uses and perceptions of forests by people living in urban areas- finding from selected empirical studies. *European Journal of Forest Research*. Vol. 119. pp. 395-408.

- Sloutweg R, Vanclay F, van Schooten M (2001) Function evaluation as a framework for the integration of social and environmental impact assessment. *Impact Assessment and Project Appraisal* Vol. 19. No. 1. pp. 19–28.
- Spencer, R. D, and L. Jellinek, 1995. Public concerns about pine plantations in Victoria. *Australian Forestry* 58:99-106.
- SPIS (State Plantations Impacts Study) Steering Committee. 1990. *State Plantations Impact Study Report & Recommendations*. May 1990.
- Standing Committee on Forests 1996, *National principles for forest practices related to wood production in plantations*, DAFF, Canberra.
- Stone, W. 2001. *Measuring social capital: towards a theoretically informed measurement framework for research social capital in family and community life*. Australian Institute of Family Studies, Melbourne.
- Sustainable Development Unit. 2005. *UK Sustainable Development Indicators*. Indicators are published on the SDU's website, URL: <<http://www.sustainable-development.gov.uk/progress/index.htm>> Accessed 13<sup>th</sup> April 2006
- Tahvanainen, L.; Tyrvaainen, L.; Ihalainen, M.; Vuorela, N. and Kolehmainen, O. 2001. Forest management and public perceptions- visual versus verbal information. *Landscape and Urban Planning*. Vol. 53. pp. 53-70.
- The Interorganizational Committee on Principles and Guidelines for Social Impact Assessment. 2003. Principles and guidelines for social impact assessment in the USA. *Impact Assessment and Project Appraisal*. Vol. 21. No. 3. pp. 231-250.
- The World Bank. 2002. Social analysis sourcebook: incorporating social dimensions into Bank supported projects. Working Draft. Social Development Department, The World Bank, August 7 2002. World Bank, no place of publication cited.  
<http://info.worldbank.org/etools/docs/library/238381/304420PAPER0SourcebookFINAL2003Dec.pdf> (2003).
- Tonts, M.; Campbell, C. and Black, A. (2001). *Socio-economic implications of farm forestry*. RIRDC, Canberra. URL: <<http://www.rirdc.gov.au/reports/AFT/01-045.pdf>>
- Tonts, M., and A. Black, 2003. The social and economic implications of farm plantation forestry: a review of some key issues. *Rural Society* Vol. 13. pp.174-192.
- UN Commission on Sustainable Development. 2007. *Indicators of sustainable development: guidelines and methodologies*. 3<sup>rd</sup> Edition. UNCSD.
- URS Forestry. 2003 An evaluation of the impact of the Visy Industries Pulp and Paper Mill on the forest Industry and Economy of the Tumut Region. Final Report
- URS Forestry. 2003. *Socio-economic study of the forest industries in Central Victoria*. Report prepared for Central Victorian Farm Plantations. URL: <<http://www.fwprdc.org.au/content/pdfs/urs%20socio%20economic%20report.pdf>>
- URS Forestry. 2004. *Profile of the value of the timber industry in the South West Slopes region of New South Wales*. Report prepared for the Riverina Regional Development Board, August 2004.
- Vanclay, F. 2003. International Principles for Social Impact Assessment: their evolution. Guest editorial. *Impact Assessment and Project Appraisal* Vol. 21. No. 1. pp. 3-4.

- Vanclay, F. 2003. Social Impact Assessment International Principles. IAIA Special Publication Series No. 2, May 2003. International Association for Impact Assessment, Fargo. URL: [http://www.iaia.org/Members/Publications/Guidelines\\_Principles/SP2.pdf](http://www.iaia.org/Members/Publications/Guidelines_Principles/SP2.pdf) Accessed 16/01/2007
- Western Research Institute (2005) The Economic Impact of Rural Subdivision and the Forest Industry with particular reference to the Central Tablelands region and the Oberon Shire of NSW. Prepared for Central Western Regional Development Board
- Timber Industry Perception Survey. Prepared for Central Western Regional Development Board
- Western Research Institute. 2005. The Economic Impact of Rural Subdivision and the Forest Industry with particular reference to the Central Tablelands region and the Oberon Shire of NSW. Prepared for Central Western Regional Development Board

## Appendix 1: Current Montreal process socio-economic indicators

From [http://www.rinya.maff.go.jp/mpci/rep-pub/1995/santiago\\_e.html#c6](http://www.rinya.maff.go.jp/mpci/rep-pub/1995/santiago_e.html#c6)

### Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies

Indicators:

#### *Production and consumption*

- a. Value and volume of wood and wood products production, including value added through downstream processing-(a);
- b. Value and quantities of production of non-wood forest products-(b);
- c. Supply and consumption of wood and wood products, including consumption per capita-(a);
- d. Value of wood and non-wood products production as percentage of GDP-(a or b);
- e. Degree of recycling of forest products-(a or b); and
- f. Supply and consumption/use of non-wood products-(a or b).

#### *Recreation and tourism*

- a. Area and percent of forest land managed for general recreation and tourism, in relation to the total area of forest land-(a or b);
- b. Number and type of facilities available for general recreation and tourism, in relation to population and forest area-(a or b); and
- c. Number of visitor days attributed to recreation and tourism, in relation to population and forest area-(b).

#### *Investment in the forest sector*

- a. Value of investment, including investment in forest growing, forest health and management, planted forests, wood processing, recreation and tourism-(a);
- b. Level of expenditure on research and development, and education-(b);
- c. Extension and use of new and improved technologies-(b); and
- d. Rates of return on investment-(b).

#### *Cultural, social and spiritual needs and values*

- a. Area and percent of forest land managed in relation to the total area of forest land to protect the range of cultural, social and spiritual needs and values-(a or b); and
- b. Non-consumptive use forest values-(b).

#### *Employment and community needs*

- a. Direct and indirect employment in the forest sector and forest sector employment as a proportion of total employment-(a or b);
- b. Average wage rates and injury rates in major employment categories within the forest sector-(a);
- c. Viability and adaptability to changing economic conditions, of forest dependent communities, including indigenous communities-(b); and
- d. Area and percent of forest land used for subsistence purposes-(b).

1: Indicators followed by an "a" are those for which most data are available. Indicators followed by a "b" are those which may require the gathering of new or additional data and/or a new program of systematic sampling or basic research.

2: IUCN categories include: I. Strict protection, II. Ecosystem conservation and tourism, III. Conservation of natural features, IV. Conservation through active management, V. Landscape/Seascape conservation and recreation, VI. Sustainable use of natural ecosystems.

## Appendix 2: Recommended methods for assessing social and economic impacts of forestry, from review of Regional Forest Agreement assessments

This Appendix summarises the recommendations of Brooks et al. (2001) on recommended methods for assessing social and economic impacts using readily available data. They recommend that each Comprehensive Regional Assessment region should be statistically profiled to the collection district and urban centre locality scales, with collection of the data summarised in the table below, and analysis of trends in the data. They then recommend that the analysis should focus on (p 134):

Identification of features which tend to indicate a community's increasing vulnerability to change, or a decreasing viability and adaptability. Features that would indicate a decrease in a community's capacity would include; an increase in the age of the population, unemployment, dependence on government pensions or allowances, or dependency ratios; and decreasing levels of education and median household incomes.

The methodology focuses on identifying community vulnerability to change which can assist in predicting likely impacts of change, rather than on assessing direct impacts of particular changes in the forest industry.

### Recommended indicators (Brooks et al. 2001: 131-4)

Data	Data Type	Measure
Local Economic Viability	Industry by employment	Employment by industry
Employment and Labour Force	Rate of unemployment*	Unemployment by Urban Centre Locality
	Age structure of Work Force	% Population by age category by industry
	Educational skill level of community	Education qualification attained (left school 16yrs, vocational and tertiary)
	Level of Indigenous employment	Number of indigenous employees by industry
Socio-demographic structure of communities	Level of household income	Median household income- UCL
	Population distribution	Total population and dependency ratios
	Age structure	Median age
	Ethnicity	% population English speaking
	Presence of dependent children	Proportion of children 0-14 + dependant youth (15-24) currently in full time education
	Years of residence in area	More than five years in location
Community infrastructure	Retail and trade service	Business register
Community vitality	Housing ownership	% home ownership
	Income distribution	Median income by age group
	Dependence on social* security	Adults over 25 years of age dependent on government pension of allowance

\* All data types used ABS data sources, except Rate of Employment (ABS and Department of Employment, Workplace Relations and Small Business), and Dependence on Social Security (CentreLink, & Department of Family and Community Services)

### Appendix 3: What impacts have been measured in the past?

Recent social and economic studies examining the Australian forestry sector were reviewed to identify what types of social and economic impacts have been studied, and the methods used to identify impacts. Table A3.1 summarises the findings of the review. The studies reviewed are listed in the references section.

**Table A3.1: Types of impacts measured in previous studies**

Sociodemographic impacts	What does it measure	Data sources/methods used in previous studies
Change in sociodemographic characteristics: population; education; labour force; house-hold composition; employment; income; and introduction of new social class.	<ul style="list-style-type: none"> <li>• Is the forest industry located in areas with particular/ unique sociodemographic characteristics? eg Brooks et al. (2001):               <ul style="list-style-type: none"> <li>➤ If yes, are unique characteristics a result of forestry industry activities?</li> <li>➤ How does unique characteristics influence the forest industry; and</li> <li>➤ How does change in the forest industry influence socio-demographic characteristics of the community.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Analysis of secondary statistics – however, statistics need interpretation;</li> <li>• Qualitative interpretation of statistics e.g. through local focus groups; and</li> <li>• Household survey.</li> </ul>
Socio-demographic impacts during initial construction of infrastructure.	<ul style="list-style-type: none"> <li>• Impact of infrastructure on population, employment, housing, income;</li> <li>• Impact on community relations, sense of place, social dynamics; and</li> <li>• Local community response to influx of construction workers/ families.</li> </ul>	<ul style="list-style-type: none"> <li>• ABS data on employment, migration etc; and</li> <li>• Interview/survey with community members and forest industry.</li> </ul>
Community involvement	<ul style="list-style-type: none"> <li>• Change in community participation as people arrive/leave the community; and</li> <li>• How this is related to change in the forest industry</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of club membership eg Rural Fire Service, sport/service clubs.</li> </ul>
People moving into/out of the community.	<ul style="list-style-type: none"> <li>• How do changes in forestry affect emigration/immigration of residents into and out of the region;</li> <li>• Changed trends in people selling/buying eg properties sold;</li> <li>• Where are people moving from/to? and</li> <li>• What are the impacts of changed population?</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of people buying/selling/ leasing;</li> <li>• ABS statistics on population change; and</li> <li>• Data identifying how different people experience change – focus groups, survey.</li> </ul>

Characteristics of the forest industry	What does it measure	Data sources/methods used in previous studies
Forest industry profile:.	<ul style="list-style-type: none"> <li>• Area managed for different purposes;</li> <li>• Volume harvested;</li> <li>• Volume and value of products produced;</li> <li>• Location;</li> <li>• Employment/economic indicators (listed below); and</li> <li>• How the industry is changing over time- required to interpret any associated social changes.</li> </ul>	Secondary data: <ul style="list-style-type: none"> <li>• ABS data: total turnover and volumes;</li> <li>• National Forest/ Plantation Inventory: area established/ harvested; and</li> <li>• <i>ABARE Forest and Wood Products Statistics</i>.</li> </ul> Primary data: <ul style="list-style-type: none"> <li>• Surveys of forest industry.</li> </ul>
Trends in broader industry profile (future).	<ul style="list-style-type: none"> <li>• Impact of area expansion on: output from harvesting and processing; type and number of jobs; and projected establishment rates.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey: future plans of forestry businesses;</li> <li>• Recent past trends and establishment rates;</li> <li>• Applications to increase plantation area;</li> <li>• Property sales to plantation companies; and</li> <li>• Location of new processing infrastructure.</li> </ul>

Employment impacts	What does it measure	Data sources/methods used in previous studies
Direct employment: number of forestry-based jobs; as a percentage of total jobs in region.	<ul style="list-style-type: none"> <li>• Changes in employment in the industry; and</li> <li>• Dependence on the forest industry (percentage of total workforce).</li> </ul>	<ul style="list-style-type: none"> <li>• ABS (CPH); and</li> <li>• Industry surveys.</li> </ul>
Characteristics of employees: flexibility eg willingness to move; characteristics of work eg full/part time; number of dependents; partner's employment and employee age, gender, education.	<ul style="list-style-type: none"> <li>• Job satisfaction (voluntary turnover);</li> <li>• Reliance/attachment (flexibility);</li> <li>• How many people are affected by a change in the industry (dependents);</li> <li>• Permanency/type/quality of jobs;</li> <li>• Median age compared to average; and</li> <li>• Employee vulnerability/ dependency ie dependency of households on the forest industry; flexibility.</li> </ul>	<ul style="list-style-type: none"> <li>• ABS; and</li> <li>• Industry surveys: employees and employers.</li> </ul>
Location of employment eg regional/rural.	<ul style="list-style-type: none"> <li>• Location of impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• ABS data: address of residence/employment; and</li> <li>• Surveys: employee/employer.</li> </ul>
Employment during construction: by type (influx/outflux of temporary workers).	<ul style="list-style-type: none"> <li>• Number of jobs; and</li> <li>• Usual residence of employees /residence five years ago, compared to total population/long term employees.</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis of past construction jobs; and</li> <li>• ABS data (total population/ comparison to long term trends).</li> </ul>
Economic impact: indirect employment -Indirect and induced (flow-on effects).	<ul style="list-style-type: none"> <li>• Number and location of jobs across a wide region; and</li> <li>• The broader economic impact/ dependency on the industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Surveys/interviews; and</li> <li>• Quantitative: indirect expenditure.</li> </ul>

<b>Economic impacts</b>	<b>What does it measure</b>	<b>Data sources/methods used in previous studies</b>
Direct economic impacts	<ul style="list-style-type: none"> <li>• Value;</li> <li>• Volume of timber production; and</li> <li>• Costs ie transport, processing, employment.</li> </ul>	<ul style="list-style-type: none"> <li>• Economic survey: industry-based businesses; and</li> <li>• ABS data.</li> </ul>
Indirect and induced economic impacts (flow on effects)	<ul style="list-style-type: none"> <li>• Value of regional development associated with secondary forest industry businesses post initial processing;</li> <li>• Sawmills: total log throughput; recovery: mill door prices/ production; input costs/costs of operation;</li> <li>• Value adding, market outlook;</li> <li>• Supplier: current purchases/location; and</li> <li>• Number/size of businesses per activity, local dependence, employees.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of businesses (contractors/processors);</li> <li>• Input output analysis- analysis of financial flows; and</li> <li>• Analysis of multipliers.</li> </ul>
Regional revenue/ gross regional product impact	<ul style="list-style-type: none"> <li>• Change over time;</li> <li>• Economic impact at a regional scale;</li> <li>• Regional dependence on the industry ie proportion of total revenue;</li> <li>• Use of revenue in the region ie indirect impact; and</li> <li>• Future availability.</li> </ul>	<ul style="list-style-type: none"> <li>• Councils: survey/data;</li> <li>• Survey of plantations owners: future availability;</li> <li>• Survey of suppliers;</li> <li>• ABS data; and</li> <li>• Australian Tax Office data.</li> </ul>
Government revenue	<ul style="list-style-type: none"> <li>• Change (objective);</li> <li>• Income received by government from taxes, spending etc; and</li> <li>• Revenue for the total timber industry.</li> </ul>	<ul style="list-style-type: none"> <li>• Industry spending/ tax data;</li> <li>• Australian Tax Office data;</li> <li>• ABS data; and</li> <li>• Input-output models.</li> </ul>
Land/house prices: <ul style="list-style-type: none"> <li>• Land value;</li> <li>• House prices; and</li> <li>• Cost to lease.</li> </ul>	<ul style="list-style-type: none"> <li>• Change (objective); and</li> <li>• Impact of local plantations on land value; willingness to pay; and desire to move to/from the area.</li> </ul>	<ul style="list-style-type: none"> <li>• Databases of land sales;</li> <li>• Real estate agents; and</li> <li>• Newspapers.</li> </ul>
Income - personal.	<ul style="list-style-type: none"> <li>• Change (objective); and</li> <li>• Value of industry to individuals.</li> </ul>	<ul style="list-style-type: none"> <li>• General trends of average income by region; and</li> <li>• Survey of employees- average by category.</li> </ul>

<b>Economic impacts</b>	<b>What does it measure</b>	<b>Data sources/methods used in previous studies</b>
Cost benefit and opportunity cost analysis: comparison of employment/ investment generated by alternative uses of the same resource.	<ul style="list-style-type: none"> <li>• Relative impact (objective- although choice of variables is subjective); and</li> <li>• The relative value of different opportunities for land use.</li> </ul>	<ul style="list-style-type: none"> <li>• Economic survey; and</li> <li>• Tax information.</li> </ul>
Economic viability of the local area.	<ul style="list-style-type: none"> <li>• Impact (objective); and</li> <li>• Opening/closure of local businesses/ franchises eg public pools, pubs, major supermarkets, petrol stations.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey;</li> <li>• Local council; and</li> <li>• Comparison to other rural towns with similar population.</li> </ul>
Economic impact of lost opportunity for other forest uses ie tourism/recreation.	<ul style="list-style-type: none"> <li>• Impact (predominantly objective);</li> <li>• Revenue (past, present, future trends); and</li> <li>• Predicted lost revenue.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of local businesses.</li> </ul>

<b>Perceptions, attitudes, values</b>	<b>What does it measure</b>	<b>Data sources/methods used in previous studies</b>
The effect of visual/nomenclature factors on perceptions.	<ul style="list-style-type: none"> <li>• Impact (subjective); and</li> <li>• Opinion about whether change in forest tenure (name) is positive/negative.</li> </ul>	<ul style="list-style-type: none"> <li>• Primary – visual assessment techniques (comparison of name and image). Could be done irregularly and provide useful data for several years.</li> </ul>
Perceptions felt by different groups.	<ul style="list-style-type: none"> <li>• Impact (subjective);</li> <li>• Differences perceptions of different groups/how they perceive each other; and</li> <li>• Identification of values and vision for the community and comparison to businesses/ new residences.</li> </ul>	<ul style="list-style-type: none"> <li>• Semi-structured interviews (explanatory);</li> <li>• Quantitative questionnaire eg attitude scale/response to hypothetical situations;</li> <li>• Behaviour eg visits to forested land;</li> <li>• Public forums and media analysis; and</li> <li>• Comparison of views of different groups.</li> </ul>
Public perception of how the forest industry changes/ influences community identity.	<ul style="list-style-type: none"> <li>• Impact (subjective);</li> <li>• How community identity changes if the forest industry changes; and</li> <li>• Strength of local ties and attachment to place.</li> </ul>	<ul style="list-style-type: none"> <li>• Qualitative interview- long-term residents;</li> <li>• Quantitative (agreement/disagreement with hypothetical statements);</li> <li>• Repertory grid analysis; and</li> <li>• Early histories of the area.</li> </ul>

<b>Perceptions, attitudes, values</b>	<b>What does it measure</b>	<b>Data sources/methods used in previous studies</b>
Social relations and norms of trust (social capital).	<ul style="list-style-type: none"> <li>• Impact (subjective); and</li> <li>• Changing relationships within the community.</li> </ul>	<ul style="list-style-type: none"> <li>• Interviews; and</li> <li>• Qualitative survey eg response to a range of community-focussed questions.</li> </ul>
Perceived loss of power due to changed local forest industry.	<ul style="list-style-type: none"> <li>• Impact (subjective); and</li> <li>• Changed power relations within the community.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey/interview.</li> </ul>
Community knowledge of different forest industry types.	<ul style="list-style-type: none"> <li>• Impact of greater or lesser knowledge about forests/the forest industry on perceptions of forestry.</li> </ul>	<ul style="list-style-type: none"> <li>• Quantitative survey: assess community's knowledge ie response to questions on alternative forest industry activities; and</li> <li>• Comparison to perceptions of the industry.</li> </ul>
Response to public perception: Methods/ effectiveness of industry/ government communication.	<ul style="list-style-type: none"> <li>• Impact (subjective);</li> <li>• Extent to which industry/government communicates with the public; and</li> <li>• Public concern and participation in the local area.</li> </ul>	<ul style="list-style-type: none"> <li>• Survey of industry/government/ community representatives- comparison;</li> <li>• Interviews/workshops: What do the public think that industry could do better? and</li> <li>• Quantitative interview.</li> </ul>