

Indicator 6.5c: Resilience of forest-dependent communities to changing social and economic conditions (2024)



This indicator provides a measure of the extent to which forest-dependent communities are able to successfully respond and adapt to change. Resilient forest-dependent communities will adapt to changing social and economic conditions, ensuring they remain viable into the future.

Context and definitions

Many communities that rely on employment in Australia's forest and wood products industries continue to be exposed to structural changes in the industry. Changes in employment patterns, or changes in the level of dependence on a specific sector, can pose challenges for these communities.

Communities are considered to be dependent on the [forest and wood products industries](#) ('forest-dependent') when direct employment in this sector is at least 2% of total workforce employment, and the community contains more than 20 workers employed in the sector.

Information on the resilience of forest-dependent Indigenous communities to changing social and economic conditions is presented in [Indicator 6.5d](#)

Understanding community resilience

The information provided in this indicator can be used to inform our understanding of the resilience of forest-dependent communities to changing social and economic conditions.

The resilience of forest-dependent communities is conceptualised through:

- community dependence on [forest and wood products industries](#)
- community adaptive capacity, represented by a combination of *economic diversity* of industries that provide employment within the community, and the *social capital* and *human capital* resources available in the community, and
- selected characteristics that contribute to resilience at the level of individual workers.

For this Indicator, indices were calculated using data from the 2021 Australian Bureau of Statistics *Census of Population and Housing*. More information can be found in [Supporting information for Indicator 6.5c](#).

Dependence on forest and wood products industries

A total of 25 Local Government Areas (LGAs) were assessed as dependent on the forest and wood products industries in 2021 (Table 6.5c-1). All forest-dependent LGAs are located in major areas of plantation development and native forest sector employment. Three LGAs had 9% or more of the workforce employed in forest and wood products industries: Oberon and Snowy Valleys in New South Wales, and Mount Gambier in South Australia, all of which are plantation-based regions (Figure 6.5c-1).

Employment in the forest and wood products industries decreased slightly by 1.7% from 2016 to 2021, compared to a 13% increase nationally across all industries (Table 6.5c-1, see also [Indicator 6.5a](#)). Employment in forest and wood products industries increased in 11 of the 25 forest-dependent LGAs, whereas total employment grew in 23

of the 25 LGAs. The largest proportional increases in forest and wood products industries employment were in the Central Highlands (Tasmania; 19%), Glenelg (Victoria; 41%), Roper Gulf and West Arnhem (Northern Territory; 100% and 26%, respectively) and Wyndham-East Kimberley and Nannup (Western Australia; 18% and 21%, respectively).

This indicator uses data from the 2021 ABS *Census of Population and Housing*, and therefore does not capture the potential impact of recent policy decisions to cease most native forest harvesting on public land in Victoria and Western Australia from January 2024.

Table 6.5c-1: Number of people employed in forest and wood products industries and proportion of workforce, by forest-dependent Local Government Area and jurisdiction

Jurisdiction	Local Government Area	Employment in forest and wood products industries			All industries
		Number of people employed, 2021	Proportion of workforce, 2021 (%)	Change in employment, 2016-21 (%)	Change in total employment, 2016-21 (%)
New South Wales	Clarence Valley	401	2	0	13
	Oberon	359	15	12	9
	Snowy Valleys	859	13	-5	9
Northern Territory	Roper Gulf	36	3	100	-5
	West Arnhem	34	2	26	1
Queensland	Gympie	631	3	1	16
South Australia	Grant	292	7	-12	7
	Mount Gambier	1,071	9	-6	6
	Wattle Range	405	8	-11	3
Tasmania	Central Highlands (Tas.)	32	3	19	21
	Circular Head	126	3	-13	1
	Derwent Valley	186	4	-12	20
	Dorset	149	5	-14	12
	George Town	82	3	-15	14
Victoria	Alpine	237	4	-1	15
	Benalla	139	2	-22	11
	Colac-Otway	405	4	7	12
	Glenelg	267	3	41	6
	Latrobe	1,052	3	-12	9
	Wangaratta	283	2	12	11
Western Australia	Bridgetown-Greenbushes	60	3	3	17
	Donnybrook-Balingup	58	2	-12	10
	Manjimup	185	4	-32	4
	Nannup	46	7	21	14
	Wyndham-East Kimberley	78	2	18	-1
Australia		51,120	0.4	-1.7	13

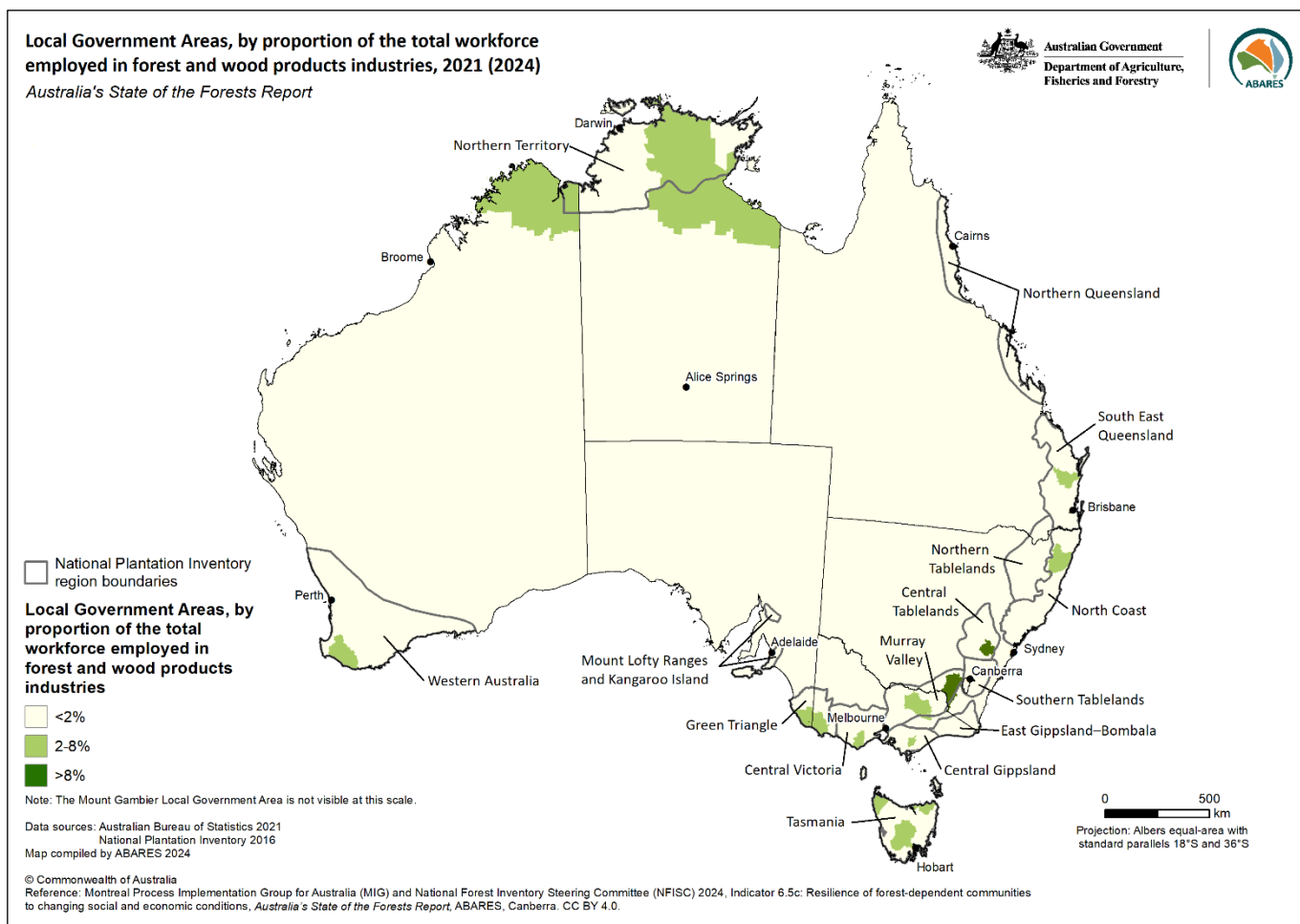
2016 LGAs are best fit to 2021 LGAs, Australian Statistical Geography Standard (ASGS).

Australia total is the sum of all LGAs in Australia, including those that are not forest-dependent.

Source: ABARES calculations based on ABS census data (ABS 2016, 2021a)

[Click here for a Microsoft Excel workbook of the data for Table 6.5c-1.](#)

Figure 6.5c-1: Local Government Areas, by proportion of the total workforce employed in forest and wood products industries



[Click here for high-definition copy of Figure 6.5c-1.](#)

Community resilience

Six Local Government Areas (LGAs) dependent on forest and wood products industries (four in Tasmania, and one in each of New South Wales and the Northern Territory) had a low adaptive capacity rating in 2021 relative to other forest-dependent LGAs, while three had a high adaptive capacity rating (Wyndham-East Kimberley in Western Australia, and Wangaratta and Alpine in Victoria) (Table 6.5c-2).

Community resilience is hard to measure quantitatively, but measures of community adaptive capacity can be used as a proxy for community resilience. Quantitative indices of economic diversity, human capital, and social capital are used to represent adaptive capacity within a community (Stenekes et al. 2012). Higher levels of these indices can indicate greater adaptive capacity and potential resilience to industry change of both communities and individuals. Information on community resilience and the associated indices can be found in [Supporting information for Indicator 6.5c](#)

Table 6.5c-2: Adaptive capacity of Local Government Areas dependent on forest and wood products industries

Jurisdiction	Local Government Area	Economic diversity index ^a	Social capital index	Human capital index ^b	Adaptive capacity rating
New South Wales	Clarence Valley	0.9	0.3	0.2	Medium
	Oberon	0.5	0.1	0.3	Low
	Snowy Valleys	0.5	0.4	0.3	Medium
Northern Territory	Roper Gulf	0.4	0.0	0.6	Low
	West Arnhem	0.5	0.1	0.5	Medium
Queensland	Gympie	0.8	0.2	0.2	Medium
South Australia	Grant	0.4	0.4	0.3	Medium
	Mount Gambier	0.8	0.3	0.3	Medium
	Wattle Range	0.3	0.6	0.1	Medium
Tasmania	Central Highlands	0.2	0.3	0.0	Low
	Circular Head	0.3	0.3	0.3	Low
	Derwent Valley	0.9	0.0	0.3	Medium
	Dorset	0.3	0.4	0.1	Low
	George Town	0.7	0.1	0.0	Low
Victoria	Alpine	0.8	0.8	0.3	High
	Benalla	0.8	0.5	0.2	Medium
	Colac-Otway	0.6	0.4	0.2	Medium
	Glenelg	0.6	0.5	0.2	Medium
	Latrobe	0.8	0.1	0.3	Medium
	Wangaratta	0.8	0.5	0.3	High
Western Australia	Bridgetown-Greenbushes	0.5	0.9	0.2	Medium
	Donnybrook-Balingup	0.5	0.7	0.3	Medium
	Manjimup	0.4	0.6	0.3	Medium
	Nannup	0.4	1.0	0.1	Medium
	Wyndham-East Kimberley	0.7	0.4	1.0	High

^a The economic diversity index (Hachmann Index, as described in Stenekes et al. 2012) measures the variety of employment sectors present in a local area, relative to the Australian economy, on a scale between 0.0 and 1.0.

^b The adaptive capacity rating is the combination of the indices for economic diversity, human capital and social capital. Adaptive capacity is then rated relative to the average adaptive capacity of all LGAs with 20 or more forest sector workers. For the calculation of these indices see Stenekes et al. (2012).

Source: ABARES calculations based on ABS census data (ABS 2021a)

[Click here for a Microsoft Excel workbook of the data for Table 6.5c-2.](#)

Worker characteristics

Median age, qualifications and household income of workers vary across the Local Government Areas (LGAs) dependent on forest and wood products industries. An individual's ability to adapt to change is difficult to quantify, because changes in any industry, including the forest and wood products industries, can affect individuals differently independent of their situation in the broader community. Age, qualification and skills, and income influence the individual resilience of workers and can indicate their ability to adapt to change.

In 2021, the median age of the national forestry workforce was 45 years, ranging from 33 to 55 years across the 25 forest-dependent LGAs (Table 6.5c-3). Between 2016 and 2021 there was a small increase in the median age across most LGAs, and only one LGA in each of Queensland, Tasmania, Victoria and Western Australia had

younger forest sector workers in 2021 than in 2016. Older workers may find it more difficult to find alternative employment.

Nationally, 58% of forestry workers had non-school qualifications in 2021 such as certificates, diplomas or degrees, compared with 69% in the total workforce (Table 6.5c-3). In most communities, the proportion of forestry workers with non-school qualifications increased between 2016 and 2021. Qualifications and formal skills recognition can increase opportunities for workers, meaning they are more able to adapt to change.

Nationally, the proportion of forest sector worker households with weekly incomes below the median household equivalised income (\$959) was slightly higher (28%) than for total workforce households (24%) (Table 6.5c-3). Household incomes are likely a better indicator of the overall ability of workers to meet living costs than individual income. Workers with a higher household income may have more financial resources to meet cost of living or adapt to change.

Table 6.5c-3: Forestry worker characteristics in Local Government Areas dependent on forest and wood products industries, 2016 and 2021

Jurisdiction	Local Government Area	Median age (years) 2021	Median age (years) 2016	Proportion of workers with non-school qualifications 2021 (%)	Proportion of forest sector worker households with equivalised income <\$959/week 2021 (%) ^a
New South Wales	Clarence Valley	47	44	48.4	44.1
	Oberon	44	40	46.2	22.1
	Snowy Valleys	46	43	56.5	19.5
Northern Territory	Roper Gulf	39	30	44.4	84.4
	West Arnhem	34	29	8.8 [^]	59.4
Queensland	Gympie	44	45	53.6	31.4
South Australia	Grant	49	47	50.0	22.7
	Mount Gambier	45	43	49.5	26.1
	Wattle Range	49	48	44.0	22.1
Tasmania	Central Highlands (Tas.)	42	44	15.6 [^]	33.3 [^]
	Circular Head	46	43	42.9	35.8
	Derwent Valley	49	48	41.9	22.5
	Dorset	44	41	43.0	44.3
	George Town	41	38	41.5	31.4
Victoria	Alpine	51	47	47.3	26.5
	Benalla	44	41	45.3	45.7
	Colac-Otway	39	40	50.9	24.4
	Glenelg	38	38	42.3	29.6
	Latrobe	47	47	65.9	14.1
	Wangaratta	43	43	55.1	31.5
Western Australia	Bridgetown-Greenbushes	52	48	41.7	23.8
	Donnybrook-Balingup	49	42	58.6	35.7
	Manjimup	51	48	37.3	34.5
	Nannup	55	52	17.3 [^]	52.8
	Wyndham-East Kimberley	33	36	60.3	25.9
Australia^b	Australia-forest workers	45	43	57.9	27.8
Australia^c	Australia-all workers	40	40	0.0	23.9

Local Government Areas (LGAs) are considered to be dependent on the forest and wood products industries when direct employment in the sector is at least 2% of total workforce employment, and the community contains more than 20 workers employed in these industries. The Australian Capital Territory is not listed because employment in forest and wood products industries is below 2% of total workforce employment.

[^] Number not considered reliable due to <10 households with people working in forest and wood products industries in this LGA, at a given point in time.

2016 LGAs are best fit to 2021 LGAs, Australian Statistical Geography Standard (ASGS).

Non-school qualifications include certificate, diploma, advanced diploma, bachelor's degree, graduate certificate, graduate diploma or postgraduate degree.

^a Proportion of forest sector worker households with equivalised household income below \$959 per week. Equivalised household income is household income data adjusted by the ABS to enable comparison between households of differing size and composition.

^b Whole-of-workforce comparison values, forest and wood products industries for Australia.

^c Whole-of-workforce comparison values, all industries.

Source: ABARES calculations based on ABS census data (ABS 2016, 2021a, 2021b for household income data).

[Click here for a Microsoft Excel workbook of the data for Table 6.5c-3.](#)

Supporting information for Indicator 6.5c: Resilience of forest-dependent communities to changing social and economic conditions

Data sources

Data for this Indicator were drawn from the 2021 *Census of Population and Housing* (ABS 2021a) and 2016 *Census of Population and Housing* (ABS 2016).

Forest and wood products industries are defined here using the Australian and New Zealand Standard Industrial Classification (ANZSIC) 2021 categories for forestry industries and wood products industries: 030 Forestry and Logging; 051 Forestry Support Services; 140 Wood Product Manufacturing, not further defined; 141 Log Sawmilling and Timber Dressing; 149 Other Wood Product Manufacturing; 150 Pulp, Paper and Converted Paper Product Manufacturing, not further defined; 151 Pulp, Paper and Paperboard Manufacturing; 152 Converted Paper Product Manufacturing.

The economic dependence on forests resulting from other forest users such as apiarists, graziers, and ecotourism operators is difficult to determine, and thus these activities are not considered in this Indicator. Other indirect business activities connected with forest and wood products industries, such as input suppliers, training providers, transport contractors and timber wholesale businesses, are also not considered.

Community and individual resilience

The concept of resilience is defined, conceptualised and measured in a number of ways when understanding how individuals and communities deal with challenging circumstances. Social scientists often use the term when understanding particular socio-economic contexts, and to discern differences at the individual and community levels.

At the individual and community levels, various scholars define resilience as the ability to bounce back after a traumatic event or successfully adapt in the face of disturbance, stress, or adversity (Norris et al. 2008; Lowe et al. 2015; Patel et al. 2017; Sou 2019; Chen et al. 2020). Other scholars describe it to occur in three different ways: as recovery, as stability and as transformation (Maguire and Cartwright 2008).

Understanding resilience at individual and community levels can be derived from an understanding of adaptive capacity, and measures of individual and community adaptive capacity can be used as a proxy for individual and community resilience (Folke et al. 2010; see also Berkes and Ross 2013; Folke 2016; Jones 2019). Adaptive capacity is defined in this Indicator as the preconditions necessary to enable adaptation to take place, and is a latent characteristic that must be activated to effect adaptation (Brown and Westaway 2011).

Indicating resilience – Community adaptive capacity

Community adaptive capacity is represented by a combination of the economic diversity of industries that provide employment within the community, and the social capital and human capital resources available in the community.

Economic diversity is the variety of employment sectors in a local economy relative to the Australian economy. High economic diversity provides multiple income streams to a local economy and alternative employment for displaced workers, thereby potentially increasing community resilience to changes in any particular industry. An Economic Diversity Index (Hachmann Index; for details see Stenekes et al. 2012) utilises employment data from

the 2021 *Census of Population and Housing* to generate scores that show diversity of employment across sectors within a location, relative to that for Australia.

Human capital comprises factors that influence the productivity of labour, including education, skills and health. Human capital was calculated (Stenekes et al. 2012) from the 2021 *Census of Population and Housing* data for age of residents, employment rates, level of education and qualifications, financial position, household structure (such as the proportion of one-person households) and population mobility.

Social capital describes relationships, networks and connections between people, and hence the degree of support people can draw on in the face of challenges. Methods for measuring social capital are less established than those used to measure human capital. The index used here (Stenekes et al. 2012) includes the proportion of adults undertaking voluntary work, and the proportion of the female workforce in non-routine occupations. Several other factors can increase social capital, such as business funding, facilitation of community initiatives, and people's attitudes and values, which shape how changes are perceived and decisions are made. These factors cannot be measured using readily available data sources and are not included in the index.

Indicating resilience – Individual forest industry workers

Factors that influence the individual resilience of workers can include their age, level of education and qualifications, skills and financial position.

Older workers may face greater difficulty in adapting to change. They may find it more difficult to find alternative employment, and lack the mobility to take advantage of opportunities in other geographic locations.

Measures of educational attainment and ability to meet living costs have been positively correlated with subjective wellbeing measures of life satisfaction and health in surveys of forest and wood products workers (Binks et al. 2014). A worker's skill set will also influence their ability to secure alternative employment; unskilled workers may find fewer opportunities for employment.

Equivalised household income (income transformed to enable comparison between households of differing size and composition) is an indicator of financial position that enables comparison between different households. It is likely to be a better indicator of the overall ability of workers to meet living costs than individual income.

References

ABARES (2014). *Australian forest and wood products statistics, September and December quarters 2013*.

Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, CC BY 3.0.

ABS (Australian Bureau of Statistics) (2016). *Census of Population and Housing*, Census TableBuilder, accessed 15 December 2022. Australian Bureau of Statistics, Canberra.

ABS (Australian Bureau of Statistics) (2021a). *Census of Population and Housing*, Census TableBuilder, accessed 15 December 2022. Australian Bureau of Statistics, Canberra.

ABS (Australian Bureau of Statistics) (2021b). *Census of Population and Housing*, Customised report. Australian Bureau of Statistics, Canberra.

Berkes F, Ross H (2013). Community resilience: toward an integrated approach. *Society & Natural Resources* 26: 5-20.

- Binks B, Schirmer J, Kancans R (2014). *Regional socio-economic profiling of the forestry industry—Recommendations report*. Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.
- Brown K, Westaway E (2011). Agency, capacity, and resilience to environmental change: lessons from human development, well-being, and disasters. *Annual Review of Environment and Resources* 36: 321-342.
- Chen S, Bagrodia R, Pfeffer CC, Meli L, Bonanno GA (2020). Anxiety and resilience in the face of natural disasters associated with climate change: a review and methodological critique. *Journal of Anxiety Disorders* 76: 102297.
- Folke C, Carpenter SR, Walker B, Scheffer M, Chapin T, Rockström J (2010). Resilience thinking: integrating resilience, adaptability and transformability. *Ecology and Society*: 15: 20
- Folke C (2016). Resilience (republished). *Ecology and Society* 21: 44
- Jones L (2019). Resilience isn't the same for all: Comparing subjective and objective approaches to resilience measurement. *Wiley Interdisciplinary Reviews: Climate Change* 10: e552.
- Lowe SR, Sampson L, Gruebner O, Galea S (2015). Psychological resilience after Hurricane Sandy: the influence of individual-and community-level factors on mental health after a large-scale natural disaster. *PLoS One* 10: e0125761.
- Maguire B, Cartwright S (2008). *Assessing a Community's Capacity to Manage Change: A Resilience Approach to Social Assessment*. Bureau of Rural Sciences, Canberra.
- Norris FH, Stevens SP, Pfefferbaum B, Wyche KF, Pfefferbaum RL (2008). Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American Journal of Community Psychology* 41: 127-150.
- Patel SS, Rogers MB, Amlôt R, Rubin GJ (2017). What do we mean by 'community resilience'? A systematic literature review of how it is defined in the literature. *PLoS Currents* 9.
- Sou G (2019). Sustainable resilience? Disaster recovery and the marginalization of sociocultural needs and concerns. *Progress in Development Studies* 19: 144-159.
- Stenekes N, Reeve I, Kancans R, Stayner R, Randall L, Lawson K (2012). *Revised indicators of community vulnerability and adaptive capacity across the Murray–Darling Basin: a focus on irrigation in agriculture*. ABARES report to client prepared for the Murray–Darling Basin Authority, Canberra, December.

More information

Learn more about [Criterion 6 of Australia's State of the Forest Report](#).

Web agriculture.gov.au/abares/forestsaustralia/sofr/

[Download a Microsoft Excel workbook of the data presented in Indicator 6.5c.](#)

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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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