

N A T I O N A L S U S T A I N A B I L I T Y C O U N C I L



Australian Government

SUSTAINABLE AUSTRALIA REPORT 2013

CONVERSATIONS WITH THE FUTURE



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N A T I O N A L S U S T A I N A B I L I T Y C O U N C I L



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Letter of Transmittal

Dear Minister

On behalf of the National Sustainability Council, I am pleased to present our inaugural report, *Sustainable Australia 2013: Conversations with the Future*.

Our first report provides a picture of Australia – what we look like and who we are. It tells the story of how we have changed as a nation over the last 30 years. We have made great progress in many areas. Australians are living longer, our health and levels of educational attainment have improved. We have benefited from a strong economy, with low unemployment and increasing incomes. However, these gains have not been equally shared, and the health of our natural environment has been declining in some key areas.

The report also highlights a number of trends in Australia and the world that are set to have a significant impact on the next generation of Australians. We need to plan for an ageing population, rising health costs, growing cities and changes in traditional work and family roles. The growth of the middle class in Asia will continue to drive demand for our commodities, agricultural products and a range of services. New technologies will be integrated into our daily lives, providing opportunities for innovation, new jobs, and medical breakthroughs but impacting on our social relationships and family life. We will need to be more respectful of nature, more efficient in the use of resources and adapt to the consequences of climate change.

The Council intends to use the report as a starting point for a national conversation about our future and the kind of future we want for our children and grandchildren. The decisions we make today will determine whether our children and grandchildren are able to live lives that are at least as good as ours. The Sustainable Australia Report, the first of its kind in Australia, provides the evidence base we need for this conversation.

Between now and 2015, the Council also intends to provide advice to you on how to improve the core set of sustainability indicators that has been used in this report. In preparing our first report, the Council has recognised limitations to the current indicators, with a lack of accessible and consistent information on our natural environment, and a lack of comparable data at the local level.

Thank you for the opportunity to be part of the National Sustainability Council. The progress outlined in this report gives us hope for the future. The Council is optimistic that Australians can make the decisions that are needed to meet the challenges outlined in the report and set us on a path for a sustainable Australia.

John Thwaites
Chair

Introduction

Australians today have a material standard of living and a quality of life that could hardly have been imagined by our grandparents. Much of this progress is the result of adopting and applying new knowledge. This new knowledge has enabled us to produce many new goods and services and to greatly increase the power and efficiency of our production systems. As a result, our material standard of living has risen dramatically. But this same knowledge has enabled us to extract resources from our natural environment more rapidly and extensively than ever before and this puts our natural systems at risk. New knowledge and capabilities have also triggered changes in the ways we work, in our family and social structures, and in many aspects of our daily lives. Some of these changes are not always for the better and, while on average we are better off, the benefits have not been evenly shared.

We live better than earlier generations because we ‘stand on their shoulders’, benefitting from their decisions, discoveries and achievements. To ensure that our children and grandchildren can maintain a good quality of life, our generation must build an equally strong legacy. We must leave future generations the social, economic and environmental platforms that will provide the foundation for lives that are at least as good as our own (and ideally better). We must do our best to make sure that those who come after us – as well as ourselves in future decades – have choices, options and opportunities to meet new challenges and secure their wellbeing. To do this, our progress must be made in ways that are sustainable.

Decisions and actions taken over the next 10 years will determine whether the next generation of Australians is the first in recent history to be worse-off than their parents and grandparents, or whether they are able to enjoy economic prosperity and stability, environmental amenity and function, and social cohesion that are comparable to – or better than – those we inherited.

The National Sustainability Council was established in October 2012 by the Minister for Sustainability, Environment, Water, Population and Communities, the Hon Tony Burke MP, as a source of independent, expert advice on sustainability issues. One of the Council’s primary roles is to produce a public report every two years identifying important developments that affect Australia’s sustainability, to provide information to citizens and decision makers at national and community levels. The Council’s reports draw on a set of Sustainability Indicators for Australia that were also established in 2012.

This first Sustainable Australia Report highlights a number of trends in Australia and the world that are set to have a significant impact on the next generation of Australians. The growth of the middle class in Asia will continue to drive demand for our commodities, agricultural products and a range of services. New technologies will be integrated into our daily lives, providing opportunities for innovation, new jobs and medical breakthroughs, and impacting on our social relationships and family life. The population will be larger and older. Australians will live longer, though more of us are likely to be overweight and suffer chronic diseases. There is a risk that the gap between the rich and poor in our society will continue to widen. We face the loss of some of our unique biodiversity. We will need to adapt to the consequences of climate change – higher temperatures, less rain, more extreme weather events and rising sea levels.

The Council considers this first report as a starting point that seeks to stimulate and provide evidence for a conversation between Australians on Australia’s future and our collective wellbeing.



A set of sustainability indicators for Australia

In May 2011, the Australian Government released *Sustainable Australia – Sustainable Communities: A population strategy for Australia*. The strategy recognised that to build a sustainable Australia, we need improved information about our economy, environment and society, and the connections between them, to better inform decisions and policy making. We also need to take a longer-term view and consider how our actions and decisions today may affect the opportunities available to future generations.






A set of National Sustainability Indicators, announced by the government in October 2012, along with the establishment of the National Sustainability Council, respond to this need. The indicators have been designed to measure and provide information about important aspects of sustainability in Australia, including social, environmental and economic dimensions. The indicators have been developed in close consultation with key data agencies, including the Australian Bureau of Statistics, and are based on consultation with stakeholders and experts across Australia, taking into account international and domestic best practice.





The set of sustainability indicators for Australia has been designed to provide information about our:

- social and human capital (skills and education; health; employment; security; institutions, governance and community engagement)
- natural capital (climate, atmosphere, natural resources, water, waste, land, ecosystems and biodiversity)
- economic capital (wealth and income, housing, transport and infrastructure, and productivity and innovation).






Further information on the National Sustainability Indicators, the Population Strategy and the Australian Government's Measuring Sustainability Program is available at: www.environment.gov.au/sustainability.

Figure 1.1 – Sustainability indicators for Australia – Key themes

Social and Human Capital				
				
Skills and Education	Health	Community Engagement	Employment	Security
Educational attainment* Primary education (literacy and numeracy) Early development Research and development	Self-reported physical health Life expectancy Mental health Smoking Obesity	Level of trust in core institutions Volunteering Cultural activity attendance Participation in sport Community engagement by persons with a disability	Under-employment Unemployment Hours worked Employment to population ratio	Feelings of safety Incidence of personal crime Incidence of household crime

Economic Capital			
			
Wealth and Income	Housing	Transport and Communications	Productivity and Innovation
Household net worth Income disparity Financial stress	Housing supply Housing affordability	Vehicle and passenger kilometres travelled Travel time to work Mode of transport to work Broadband internet connections	Productivity Business innovation

* bold denotes a headline indicator

Natural Capital					
					
Climate Change	Atmosphere	Land, Ecosystems and Biodiversity	Water	Waste	Natural Resources
Greenhouse gas emissions Observed climate change Energy intensity Carbon stored in the landscape	Air quality	Extent of native vegetation Ground cover Ecosystem protection (protected areas)	Water quality Water consumption Water availability to meet demand	Waste disposed to landfill Recycling rate	Fish stocks Timber resources Mineral and fossil fuel reserves

In addition, the following contextual indicators will provide key information to assist with interpretation of the sustainability indicators:

Topic	Population	Cultural Diversity	Regional Migration	Land Use
Indicator	Population size Population density Gender and age profile	Proficiency in spoken English Indigenous population Country of birth	International migration Domestic migration	Land use change



What do we mean by ‘sustainability’?

The idea of ‘sustainability’ has been the subject of extensive discussion and debate. While sustainability emerged as a significant international issue in the 20th century, concerns over the potential limits to economic and population growth can be traced back to the 18th century and have long been a feature of some Eastern philosophies and numerous traditional cultures.

The 1960s and 1970s saw more widespread recognition of the significance of continuing ecological decline amid increasing population and economic growth. The 1987 World Commission on Environment and Development, known as the Brundtland Commission, provided a particular focus on socio-political and distributional issues, especially the connections between poverty and environmental degradation. As such, the emphasis was on ‘sustainable development’, which the Commission’s report, *Our Common Future*, defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”¹

The concept of sustainability continues to evolve. However, core elements feature in most definitions:

- Sustainability is concerned with the future and with the ability to maintain certain values, assets or capabilities over the long term.
- Sustainability involves decisions that address the interaction between environmental, social and economic domains.
- Sustainability requires choices considering equity within society and across generations.

In recent years, the *wellbeing* of individuals, communities and society has been widely accepted as an appropriate objective of governments. This view has become increasingly influential domestically and internationally, for example, through the Organisation for Economic Co-operation and Development (OECD).²

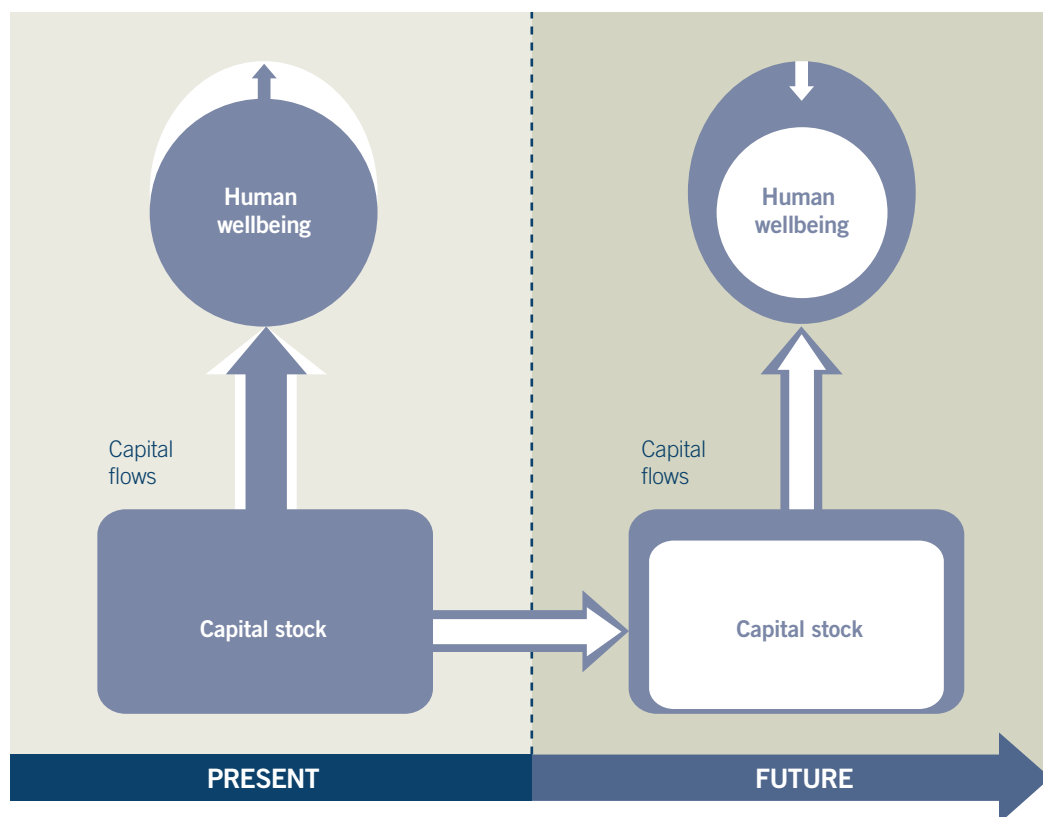
Wellbeing – whether at the level of the individual or society – goes beyond material living standards. It is a combination of community liveability, environmental sustainability and economic prosperity. It depends on the availability, quality and use of a range of resources, including financial (such as income and savings), built (such as housing and infrastructure), natural (for example, a healthy environment, natural resources and essentials such as clean air and water and healthy food) and social (such as educational and other institutions, social networks and security) resources. These resources are often referred to as different forms of ‘capital’.

Our wellbeing depends on our ability to maintain this range of resources, or capital, over time. Just as a business generates income from its human and economic capital, communities generate wellbeing from their own stocks of capital. If these stocks fall, our ability to live well is also likely to decline. Understanding sustainability as maintaining and enhancing the stocks of capital on which wellbeing depends highlights the decisions and trade-offs that society makes and their impact on these stocks of capital. The balance of capital left to future generations to maintain or improve wellbeing is being determined by the decisions and trade-offs that we are making now.

As depicted in Figure 1.2, while increased use of capital stocks can lead to improved human wellbeing in the short-term, this may result in less stock being available in the longer term, which may limit wellbeing in the future.



Figure 1.2 – Stocks and flows of capital and impacts on human wellbeing through time



The Council's approach to assessing sustainability focuses on measuring our stocks of social, human, natural and economic 'capital', with a view to ensuring that the resources inherited by future generations allow for the same (or greater) levels of wellbeing as enjoyed by Australians today.



Why sustainability?

Australia has experienced almost two decades of continuous economic growth and our economy continues to grow faster than that of other developed countries. Our quality of life is routinely ranked among the best in the world, and real incomes have been increasing significantly. At the same time we are continuing to grapple with persistent and emerging problems in environmental and social spheres, which call into question the way that we measure 'progress' as a society. These environmental and social pressures put continued economic growth at risk and may diminish wellbeing for current and future generations of Australians.

Our children – those living in Australia today and born over the next few years – will experience a vastly different environment, economy and society to that which we inherited. There have been undeniable and impressive advancements in many areas such as health, science, technology and education. However, these have occurred against the backdrop of long-running economic and social challenges such as: growing income inequality and persistent disadvantage among some groups; high and increasing rates of chronic disease; and declining performance on some measures of productivity and innovation.

The implications of environmental degradation and damage are no less significant. While we have managed to stabilise many areas of deterioration in the state of our natural resources, this has occurred against the backdrop of drastic levels of overexploitation in years gone by (as shown

by levels of land clearing, biodiversity loss and the over-allocation and overuse of freshwater supplies). In other areas, most notably in relation to climate change, there are growing concerns about the global impacts of human actions.

For more than 30 years, there has been widespread recognition that economic growth cannot be sustained if it occurs at the expense of the environment on which that growth – and our health and wellbeing – depend. As recently explained by the United Nations Secretary General's High Level Panel on Global Sustainability, economic growth, environmental protection and social equity are one and the same agenda: the sustainable development agenda. We cannot make lasting progress on one without progress on all.

Despite the obvious challenges, the Council believes that exciting and promising opportunities exist for real, lasting and positive change.

Beyond GDP

Globally, there is growing consensus that we need to look beyond conventional economic measures to see if life is getting better. The interest in broader-based measures of progress and wellbeing has been driven by recognition that traditional measures tend to be too narrowly focussed to provide information across the multiple facets of societal progress or wellbeing, and are often used for purposes for which they were never designed or intended.³

Since the 1950s, Gross Domestic Product (GDP) has been commonly used as a summary measure to present the status and overall economic performance of a nation. GDP continues to be reported and used to rate and compare the progress of countries. However, as is now widely recognised, a single measure such as GDP only tells a part of the story. Measures of progress must move beyond GDP to reflect the multidimensional nature of our lives and the myriad aspects that underpin wellbeing.⁴

OECD framework for measuring wellbeing and progress

The imperative to ‘move beyond GDP’ is driven by the understanding that what and how we measure things affects the decisions we make. The OECD states that “the needs, concerns and aspirations of people and the sustainability of our societies” must be “at the core of policy action”.⁵

The OECD’s framework for measuring wellbeing adopts the following dimensions and themes:

- *material living conditions*: income and wealth, jobs and earnings, housing
- *quality of life*: health status, work and life balance, education and skills, civic engagement and governance, social connections, environmental quality, personal security, subjective wellbeing

- *sustainability*: the sustainability of wellbeing over time requires the preservation of natural, economic, human and social capital.

Commission on the Measurement of Economic Performance and Social Progress

Chaired by Nobel Prize winning economist Joseph Stiglitz, the Commission was established in 2008 by then French President Nicholas Sarkozy to identify the limits of GDP as an indicator of economic performance and social progress. It was also asked to consider additional information required for a more relevant picture of economic performance and social progress and how best to present this information.

The Commission’s report⁶ distinguishes between assessment of current wellbeing and assessment of sustainability. Current wellbeing relates to both economic resources (such as income) and non-economic aspects of peoples’ lives, including the environment in which they live. The report asserts that sustainable levels of wellbeing depend on whether stocks of capital that matter for our lives (natural, physical, human and social capital) are passed on to future generations.

As well as material living standards (income, consumption and wealth), the report identified other dimensions to take into account when assessing wellbeing: health, education, personal activities including work, political voice and governance, social connections and relationships, the environment (present and future conditions), and security. The report noted that all dimensions should include an assessment of inequalities.

The Commission recommended that, in order to measure wellbeing, indicators presenting the quality and quantity of ‘stocks’ of natural resources and of human, social and physical capital should be displayed together as a ‘dashboard’ of information. To assess sustainability, indicators showing change in these ‘stocks’ should be included with a view to using the information to prevent the passing of critical thresholds.

The Council's approach

Sustainability requires that future generations are able to enjoy at least the same levels of wellbeing as we do today. In developing this report, the Council has focused on the implications of current trends and drivers for the next generation of Australians – those born over the next few years and who will come of age in the early 2030s. While this timeframe may seem distant, it is alarmingly short given the challenges involved and the rates of change being experienced in a range of areas.

The set of national sustainability indicators has provided the starting point for the Council's analysis. The indicators provide a framework for assessing current trends and for beginning to examine their implications for the future, and they serve to highlight potential concerns that require more detailed examination. The analysis of the indicators also reveals a number of important gaps in our knowledge: areas in which the information collected across Australia is inadequate or inconsistent, or is not available at appropriate scales to inform decisions and planning for Australia's future wellbeing.

Working on timescales involving future generations is difficult. It involves assumptions and uncertainties, and complexity and volatility can conspire to make the future less and less predictable. There is no doubt that our responses will include actions and innovations that cannot be known today. To assist, the Council has looked to the work of organisations such as the CSIRO and considered a number of 'megatrends'. These long-term processes of transformation in environment, economic and social conditions provide a cue to thinking about what the future might look like. These trends serve as a backdrop to the analysis and discussions in this report.

Building on the foundation provided by the sustainability indicators, the Council has drawn on other information sources and the expertise of Council members to better understand and elaborate points of interest or concern. Nine such topics are discussed in the *Key issues and challenges*

chapters of this report. The Council has chosen to emphasise this subset of issues in our first report because, in our view, they require the most pressing attention. How we address them will determine how successfully we achieve a sustainable Australia in practice. While governments, business and communities are actively addressing many of the matters discussed, in the Council's view each topic warrants a more dedicated and inclusive discussion.

In this first report, the Council has not sought to provide recommendations for how best to respond to these challenges. To do so would, in our view, not do justice to the complexity and importance of the issues involved – each could be (and indeed most have been) the subject of dedicated reports in their own right. What we have aimed to do is to initiate a national conversation on the importance of a sustainable Australia and on the opportunities and challenges before us in pursuing that goal.

This is a conversation in which all sectors of society need to be involved – because the responses required are beyond the means of government. Indeed, the Council believes that it will be impossible to achieve action on the scale required without meaningful engagement from enterprises, individuals and communities. This should not be as difficult as it may seem: the opportunities for 'win-win' outcomes in these areas are immense and there are already many examples of leading businesses and community organisations realising these opportunities (see p. 17).

The Council's hope is that with this report and the Council's ongoing work, we can raise the prominence of the issues, challenges and opportunities associated with sustainability. We hope to help in sharing ideas and examples for success, and in promoting a greater understanding of the importance of a sustainable Australia.

International context

Australia's performance on global indices

A range of international organisations produce indices aimed at capturing various aspects of human development and wellbeing. In general, as indicated in Figure 1.3, Australia tends to perform well on measures that emphasise social and economic dimensions of wellbeing (such as the Human Development Index and 'Your Better Life'). Australia's comparative performance tends to be lower based on measures that include a stronger focus on the value of natural capital. The 2012 Inclusive Wealth Report, for example, aims to provide a comprehensive analysis of the different components of wealth based on measuring a combination of natural, manufactured, human and social forms of capital. Of the 20 countries assessed in the report, Australia ranks highly on a per capita basis but remains lower than countries such as Japan, the United States and Norway.

Rio+20 outcomes

The Rio+20 Conference on Sustainable Development, held by the United Nations in June 2012, brought together almost 200 governments to discuss contemporary sustainability challenges and responses.

The Conference recognised the need for broader-based measures of progress (beyond GDP) to better inform policy decisions and requested the UN Statistical Commission, in consultation with other relevant organisations, to launch a programme of work in this area building on existing initiatives.

The Conference also made a commitment to develop a set of global sustainable development goals that incorporate all three dimensions of sustainable development, as a mechanism for pursuing focused and coherent action on sustainable development.

Figure 1.3 – International Human Development Indicators⁷

	Gross National Income per capita (2005 PPP\$) (2012)	Per Capita Inclusive Wealth Index (millions of constant US\$ of year 2003) (2008)	Human Development Index Value (2012)	Rank	Gender Inequality Index value (2012)	Rank	Inequality-adjusted Human Development Index (2012)	Rank	OECD "Your Better Life Index" (Equality on dimensions) (2011)	Rank
Australia	34,340	283,810	0.938	2	0.115	17	0.864	2	0.81	1
Germany	35,431	236,115	0.92	5	0.075	6	0.856	6	0.69	16
Ireland	28,671	-	0.916	7	0.121	19	0.85	7	0.71	15
Japan	32,545	435,466	0.912	10	0.131	21	-	-	0.61	19
Netherlands	37,282	-	0.921	4	0.045	1	0.857	5	0.75	10
New Zealand	24,358	-	0.919	6	0.164	31	-	-	0.79	4
Norway	48,688	327,621	0.955	1	0.065	5	0.894	1	0.78	5
Sweden	36,143	-	0.916	7	0.055	2	0.859	4	0.8	3
Switzerland	40,527	-	0.913	9	0.057	3	0.849	8	0.75	8
United Kingdom	32,538	219,089	0.875	26	0.205	34	0.802	24	0.73	13
United States	43,480	386,351	0.937	3	0.256	42	0.821	16	0.75	7

Next steps

This report provides a platform for Australians to draw upon in making decisions about our future. It also provides a benchmark against which we can measure our progress over time – including in the next Sustainable Australia Report in 2015.

The report also provides a starting point for an ongoing national conversation on sustainability – what it means to Australians, the opportunities available to us and what we would like our future Australia to look like. The Council's hope is that in our 2015 report, we will be able to reflect an even richer set of information, drawing on our conversations about Australia's future. The questions set out below and at the end of each of the *Key Issues and Challenges* chapters in this report, provide a possible focus for these conversations.

A SUSTAINABLE AUSTRALIA – QUESTIONS FOR THE FUTURE

- What additional indicators should be considered for inclusion in the Council's next report to inform a discussion on Australia's sustainability?
- Should objectives and targets be linked to reporting against the sustainability indicators? If so, what should they be?
- How can the information in this report be best used by governments, businesses and communities?
- What should be the priority areas for action to ensure a sustainable Australia?

Between now and 2015 there is scope to improve the core set of sustainability indicators used in this report.

The current set of indicators will run into well-known limitations:

- First, we have relatively limited information on Australia's natural capital. Compared to data on our economic and social systems, information on natural systems has historically received far less attention and investment. The result is that we are often unable to access reliable, relevant and nationally consistent information on some of our most important national assets, such as land use, water quality and biodiversity.
- Secondly, we need improved local level data across all three dimensions of sustainability – social, environmental and economic. A recurring theme in the report is that place matters; experiences differ markedly from place to place across the social, environmental and economic dimensions of sustainability. While the Council has tried to reflect this diversity, improving the resolution, comparability and timeliness of sustainability information is an area of significant opportunity. It is also an area that requires effective coordination and collaboration between governments, researchers and business. The Council hopes to be able to make a positive contribution in this area, including through its role in advising the Australian Government on opportunities for data and indicator improvements.



Why does sustainability matter to business?

Sustainable businesses recognise that one of the most significant threats to their longevity and performance over time is the failure to adapt to changing circumstances – whether those changes occur in the environment and society or through disruptive technologies or shifting customer preferences.

There are clear risks to be managed as a result of this changing environment, but these changes also bring business opportunities for those who are forward looking and open to them. Well managed companies are aware of these factors and are implementing changes to their businesses in response.

Businesses thinking about current and future opportunities, sustainability and performance will be considering the issues raised in this report from a number of perspectives:

Seventy eight financial global institutions (including four Australian institutions) are signatories to the Equator Principles, which require that clients manage and minimise the environmental and social impacts of their operations as a condition to gaining access to project finance.

Thirty nine financial institutions, including National Australia Bank, have signed the Natural Capital Declaration and committed to understanding the risks related to clients' use and dependence on natural capital, with a view to including this information in future consideration of credit risk and pricing decisions.

- *Access to capital:* The report highlights key trends in social, environmental and economic indicators, many of which can lead to business risk. Financial institutions increasingly include assessments of how their clients are managing environmental, social and economic risk in lending and investment decisions. For example, they review how clients give regard to natural capital risks such as water security and entitlements and carbon liability. This is leading to changes in appetite for lending to certain activities and industry sectors and may result in reduced access to capital or high risk premiums for some companies.
- *Changes to regulation:* Government responses to a range of sustainability challenges – such as environmental degradation, energy, water and food security, community safety and social equity – can lead to increased compliance costs for business or changes in access to resources. Proactive responses to these trends can minimise regulatory change and compliance costs.

Treasury Wine Estates, a global wine company with operations in many parts of Australia, recognises the importance of a sustainable supply of quality water and has developed its own water risk assessment methodology, implemented water efficiency initiatives and made business decisions to secure its current and future water supply.

- *Access to natural resources and security of supply in a resource constrained world:* Business relies on the natural environment to provide critical inputs upon which many companies and industry sectors, and the economy as a whole, depend.
- *Preferences and attitudes of employees and customers and social licence to operate:* Customers and employees want to buy from and work for companies that reflect their values and interests, including reducing negative social and environmental impacts. Sustainability will increasingly play a role in shaping the lens through which people view and interact with companies.
- *Avoiding unnecessary business costs and improving productivity:* Avoiding pollution and waste and improving the efficiency with which

Linfox, one of Australia's largest transport and logistics companies, cut its carbon emissions by 37% through improved business practices, better technologies and the behaviour of its people. Linfox developed the Eco-Drive program to teach its drivers how to be more fuel efficient, using techniques such as accelerating gradually, avoiding harsh braking and using cruise control. The change in driver practices alone reduced the company's transport emissions by between 9% and 11%.

resources such as water and energy are used can deliver productivity gains. In many areas, there is scope to treat waste as a resource and to improve recycling rates and reduce business and societal costs by reducing the amount of waste generated. Trends in the health of Australians such as an increasing incidence of mental illness, chronic disease and obesity can have a direct impact on workplace productivity. Leading companies are recognising the value of helping their employees to identify and manage these health issues.

- *Opportunity to differentiate brands, innovate and create new products and markets:* Improvements in educational attainment, trends in our ability to innovate and the diversity of the Australian population are all areas of focus in this report with links to business drivers. For example, having our population diversity represented in the workforce (through a mix of age, gender, culture or other facets of diversity) can increase the potential for innovation and new business opportunities by tapping into specialised skills and accessing critical insights.

Visy remanufactures packaging products from materials collected from households and businesses, and creates clean energy from its non-recyclable residues. Visy's Tumut paper mill operates at the lowest per unit water use in the world.



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TRENDS AND DRIVERS

Megatrends and drivers

Megatrends provide an alternative lens on the future

Megatrends are long-term changes in environmental, economic and social conditions that significantly reshape opportunities and risks. Many of these trends are global, but they will have an impact on Australian households and businesses.

Megatrends are neither predictions nor forecasts, but rather guides to understanding complexity and uncertainty. They enable us to see and understand connections and trade-offs between various forces, providing a basis for thinking about the future. They also enable us to consider the underlying forces reshaping our world and to factor these into our strategies and choices.

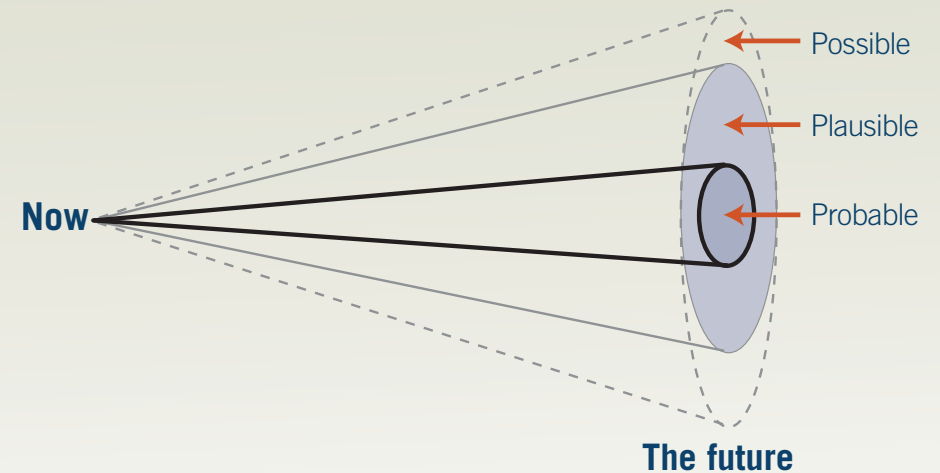
Understanding megatrends helps us to not only manage but also shape change, giving us the opportunity to deliberately recalibrate our strategies and choices before it becomes unavoidable, prohibitively costly or simply too late.

We cannot know how megatrends will unfold – to varying degrees they are characterised by uncertainty. For example, trends such as population ageing are relatively predictable, whereas future economic and social evolutions are not.

Megatrends are ‘big picture’ phenomena – they occur at the level of systems and societies, take hold over the course of decades and have transformative impacts.

They encourage us to iterate between *what is* today and *what might be* tomorrow. Tools such as the futures cone illustrated below can be used to emphasise how the range of possible outcomes increases with the time period being considered.

Figure 2.1 – Futures cone¹



Looking across generations reminds us that the future will be shaped not only by today's megatrends, but also by the links between them (that could give rise to scenarios that are not part of our deliberations) and by forces not yet visible.

Above all, this uncertainty and unpredictability implies a need for respect, humility and precaution in making our decisions and choices.

Global megatrends will affect our economy, society and environment

Major megatrends informing the Council's deliberation are outlined in Figure 2.2.

The megatrends featured here draw on a growing body of work by global experts and Australian researchers, including from the CSIRO², on the large systemic changes driving and reshaping economies and societies.

While the subject of debate, these megatrends are more than mere speculation. They are agreed, measurable forces already in motion that are likely to be of increasing importance to Australia.

Sustainability in a connected world requires us to think across the breadth of megatrends, including the relationships between them, rather than considering issues in isolation. This approach recognises that we live in a complex and connected world, and enables us to better understand the risks and opportunities we face.

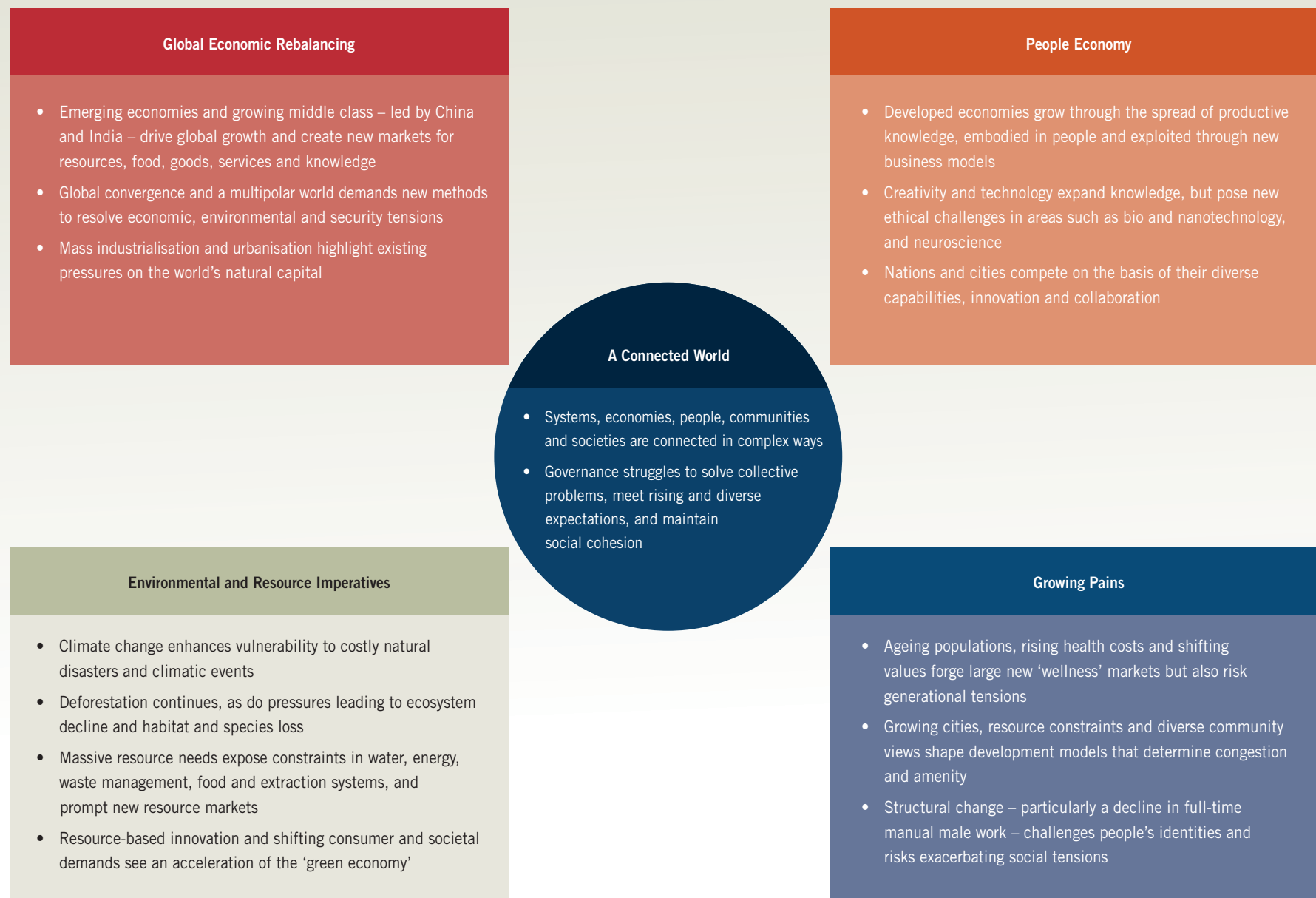
The megatrends identified in this report help to reveal challenges specific to Australia:

- *Embracing our region:* The 'Asian Century' can be one of abundant economic opportunity for Australia if we can adopt the mindsets and develop the business models needed for our region.
- *Getting connected:* Broadband connection will gradually improve Australians' ability to access and share knowledge and ideas, but it will be the subtler capacity to combine a range of skill sets that will power productivity.
- *Planning for growth:* The infrastructure requirements of Australia's major cities are already exposing environmental, congestion and amenity costs, and will need to be met by a more integrated approach to urban development.

- *Managing change:* The face of Australia's population is changing and we need to manage old and new tensions as more of us become older, more women assume positions of power, traditional work and family roles change, and our cultural and linguistic diversity evolves.

These trends and challenges have provided important context for the Council's analysis of the key sustainability issues facing Australia. Importantly, in many cases, signs of these trends also emerge from the sustainability indicators. Their implications for a sustainable Australia are explored in more detail in the *Key Issues and Challenges* chapters later in this report.

Figure 2.2 - Global megatrends: a connected world³



Australians care about the ‘big picture’

The Council asserts that Australians care about the society and world they live in, and the future these hold for their children.

This is not a universally held view – for instance, some research has argued that “Australians are effectively indifferent to global and societal issues”⁴. This latter view receives just as much, perhaps more, prominence in popular debate.

Recently, the Australian Bureau of Statistics (ABS) has sought a better understanding of what Australians really value through the *Measures of Australia’s Progress* (MAP) project.⁵

Over two years, the ABS consulted Australians about what ‘progress’ means to them with the aim of helping the ABS in reviewing whether it was still measuring those aspects of life that matter most to Australians.

The picture Australians paint in their contributions to the MAP project – of what they value and how they think about current and future concerns – has limited correlation with the opinion polls and reporting that dominate our impressions of public values.

The ABS findings suggest that Australians, when given the opportunity to reflect, have a far more sophisticated and balanced perspective on progress and values.

Figure 2.3 summarises the key domains and themes emerging from this research.

The MAP project identified environmental sustainability, economic resilience and social equity as recurring themes that matter to Australians. It revealed a growing awareness that Australia’s future is embedded in and inseparable from the world around us.

The project also lent support for the notion that governance – *how* we discuss, deliberate and decide – should itself be seen as an important new domain of progress.

In identifying priority issues, the Council has considered the views of Australians, as well as academic literature and data on key sustainability indicators.

Figure 2.3 – Measures of Australia's Progress (Australian Bureau of Statistics): themes and aspirations⁶

Society	Environment
<p>Health Australians aspire to good health for all</p> <p>Close relationships Australians aspire to a society that nurtures families and other close relationships that support people.</p> <p>Home Australians aspire to have secure places to live that provide a sense of belonging and home, and are adequate to their needs.</p> <p>Safety Australians aspire to a society where people are safe and feel safe.</p> <p>Learning and knowledge Australians aspire to a society that values and enables learning.</p> <p>Community connections and diversity Australians aspire to support each other and embrace diversity</p> <p>A fair go Australians aspire to a fair society that enables everyone to meet their needs.</p> <p>Enriched lives Australians aspire to value all aspects of life that are important to people and enrich their lives.</p>	<p>Healthy natural environment Australians aspire to a healthy natural environment.</p> <p>Appreciating the environment Australians aspire to appreciate the natural environment and people's connection with it.</p> <p>Protecting the environment Australians aspire to care for and protect our natural environment.</p> <p>Sustaining the environment Australians aspire to manage the environment sustainably for future generations.</p> <p>Healthy built environments Australians aspire to healthy built environments.</p> <p>Working together Australians aspire for government, business and communities to work together locally and globally for a healthy environment.</p>
Economy	Governance
<p>Opportunities Australians aspire to the economic opportunities they need to thrive.</p> <p>Jobs Australians aspire to an economy that provides them with quality jobs.</p> <p>Prosperity Australians aspire to a prosperous and efficient economy.</p> <p>A resilient economy Australians aspire to an economy in which people can manage risk and be resilient to shock.</p> <p>A sustainable economy Australians aspire to an economy that sustains or enhances living standards into the future.</p> <p>Fair outcomes Australians aspire to an economy that supports fair outcomes.</p> <p>International economic engagement Australians aspire to fruitful economic engagement with the rest of the world.</p>	<p>Trust Australians aspire to have institutions and processes they can trust and hold to account.</p> <p>Effective governance Australians aspire to governance that works well.</p> <p>Participation Australians aspire to have the opportunity to have a say in decisions that affect their lives.</p> <p>Informed public debate Australians aspire to well-informed and vibrant public debate.</p> <p>People's rights and responsibilities Australians aspire to a society where everyone's rights are upheld and their responsibilities fulfilled.</p>

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IMAGES

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PAST AND FUTURE: SNAPSHOTS

Where have we been; where are we going?

Sustainability is about ensuring that future generations have at least the same quality of life as we have had. It requires us to consider the long-term impacts of our decisions and how our actions today may affect future generations. One way we can do this is by looking at the past, identifying current trends, and thinking about how these trends might play out to reshape life in the future.

Looking at snapshots of what the future could look like raises a number of questions. Are we happy with what it holds? Which elements would we like to change and which would we like to encourage? And what can we do now to ensure that these aspirations are achieved?

Where were we 20 years ago?

Figure 3.1: Australia in the early 1990s, at a glance

	Then	Now
Population ¹	17 million	23 million
Births ²	264,200	301,600
Median age of mothers (years) ³	28.7	30.6
Life expectancy at birth (years) ⁵	Females: 80.4 Males: 74.5	Females: 84.2 Males: 79.7
Median age of the population (years) ⁶	32.4	37.3
Born overseas ⁷	22%	26%
Degree or higher qualifications (20–64 year olds) ⁸	13%	28%
Year 12 retention rate ⁹	70%	80%
Unemployment rate ¹⁰	11.0%	5.3%
Used a car to get to work ¹¹	75%	78%
Greenhouse gas emissions (Mt CO2-e) ¹²	502.7	546.5

In the early 1990s our population was in the midst of some big changes.

Concerns around the aging population were increasing as the large baby boomer generation dominated the peak working age population (25–45 years).¹⁴ Migration was also changing, with an increasing emphasis on attracting skilled workers, rising numbers of temporary migrants, and increasing levels of long-term emigration of Australians.¹⁵

Australia's economy in the 1990s looked very different to today's

The early 1990s saw a significant downturn in the economy with unemployment rates peaking at just over 11% in the aftermath of the recession.¹⁷

Significant long term changes to the labour market were also underway. Part-time participation rates and female participation were rising. Declining numbers of people were employed in production industries such as agriculture and manufacturing. Employment was increasing in service industries such as health care, social assistance and professional, scientific and technical services (including IT).¹⁸

Living arrangements were changing.

Couples were marrying later, increasingly after a period of living together; women were having children later in life; the proportion of people living on their own was increasing; and there was an increasing trend in the number of young adults of Generation X who were living with their parents.¹⁹

In 1992, concern about the environment was extremely high.

75% of people were concerned about environmental problems, as compared to 62% in 2012. Our biggest environmental concerns were air pollution (40%), destruction of trees and ecosystems (33%), ocean pollution (32%), and the ozone layer (29%). Compared to today, we used more water and recycled less waste. Looking at 2012, our main concerns were water shortages and climate change.²⁰

House prices were about to increase dramatically

Between 1995 and 2005, real house prices in Australia increased by more than 6% per year, with an average annual increase of almost 15% from 2001 to 2003.²¹ This was well above the average annual increase over the 20 years to 1995 of 1.1%,²² and had dramatic impacts on housing affordability. Since the 1990's household debt has risen significantly faster than household income, mostly due to housing debt.^{22b}

Household disposable incomes were significantly lower

Average household weekly disposable income rose 57% between 1995 and 2010, after taking inflation into account. However, the overall level of income inequality is higher than it was in the mid-1990s – with average weekly disposable incomes for the lowest income group rising 47% compared to 67% for the highest income group.²³

Education levels were significantly lower

In 1994, 60% of Australians aged 20 to 64 years had completed Year 12 or post-school vocational or higher education qualifications. This is compared to 79% in 2012. In 1991, around 70% of students continued to Year 12. In 2012 this figure was 80%.²⁴

Atmospheric lead levels in Australian cities regularly exceeded guidelines

Before the Australian phase-out of leaded petrol in 1993, national guidelines for atmospheric lead concentrations were regularly exceeded in urban environments.²⁵

Where could we be 20 years from now?

How will our health be?

Life expectancies are forecast to increase for men and women to almost 85 and 88 respectively – up from 77 and 82 at the turn of this century.²⁶

Based on current trends, we will have higher rates of lifestyle related chronic illnesses such as obesity and type 2 diabetes.²⁷

Total health and residential aged care expenditure is projected to increase by 189% in the period 2003 to 2033, from \$85 billion to \$246 billion. This is an increase from 9.3% of gross domestic product (GDP) in 2002–03 to 12.4% in 2032–33. Increases in volume of services per treated case are projected to account for half of this increase.²⁸

How equitable will our community be?

On current trends²⁹, income inequality will be even greater than today and health and education outcomes will continue to be significantly lower for those in our most disadvantaged areas.

What will our climate be like?

The best estimates indicate that by 2030, Australia will face: a further 1 degree Celsius of warming in temperatures; up to 20 per cent more months of drought; up to a 25 per cent increase in days of very high or extreme fire danger; and increases in storm surges and extreme weather events.³⁰

How will we do business?

By 2030 the bulk of global GDP is expected to be generated from non OECD countries, especially China, India, Brazil and Russia.³¹

Where will we live?

Urban fringe development will continue, potentially contributing to further rises in travel times to work³² and the potential social isolation of outer-suburb living.³³ Coastal and other locations favoured by retirees will face population, infrastructure and service pressures.

How will we work?

With improvements in telecommunications, working from home and innovative work-from-anywhere arrangements are likely to increase and may reshape the way we go about our everyday lives.³⁴

In 2030, the 'dependency ratio' – the ratio of people of working age to those aged 65 or older – is projected to decline from 5:1 in 2010 to 3.2:1.³⁵ This may see an increase in the participation rate of older people in the workforce.

What will our environment be like?

Population, economic growth and climate change will see increasing pressures on the natural environment.³⁶

Climate change will see added strain on overallocated water systems, although our capacity to manage those stresses has improved. Natural resources are likely to be better managed due to lessons learned in recent years. However, legacy issues – for example invasive species and historic land clearing – will pose continuing problems.³⁷

What will our population be like?

By 2031 Australia's population is expected to be close to 29 million people.³⁸ Most of this growth will be accommodated in existing urban areas.

The proportion of the population aged over 65 will be almost 20% by 2031, compared to 14% in 2011.³⁹

What kind of world will we be living in?

The population of the world will be over 8 billion with nearly 5 billion middle class consumers, the majority in Asia.⁴⁰ Countries will be struggling to meet the increased demand for energy, water and food while at the same time meeting environmental stresses of global warming, loss of species habitat, ocean acidification and over-harvesting of fauna and flora.

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Images:

Father and daughter watering home grown vegetables with watering can on thier property in Ainslie, Mark Mohell
Eurobin Creek, Trevor Ierino
Mining image, Dragi Markovic
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EDUCATION - BUILDING AUSTRALIA'S HUMAN CAPITAL

In brief...

- Australia has experienced substantial improvements in levels of educational attainment over the past 20 years, particularly amongst women.
- There are significant disparities between Australia's highest and lowest performing students, with clear associations between lower educational attainment and low socio-economic background, Indigenous background and the remoteness of a school.
- Our tertiary education sector attracts a very high share of international students.
- High quality schools and teaching are critical to building our human capital. Attracting and retaining excellent teachers, and ensuring they are equipped to deal with an increasingly complex teaching environment is key.
- Australia is currently faced with the challenge of reducing the gap between high and low performing school students.
- Matching workforce skills to current and expected demand is fundamental to economic productivity and sustainability more broadly. The future economy will present new challenges in this regard.

Education - building Australia's human capital

Australia's education performance

Education is a key building block for human capital and is critical to the sustainability of societies.

'Human capital' refers to the knowledge, skills, competencies and attributes that facilitate improvements to wellbeing – for individuals and communities.¹ Education is a key factor affecting individual wellbeing, enabling people to live healthier and more productive lives. In general, people with higher education have improved employment and earning prospects, better health, longer life expectancies and higher levels of civic participation.²

A better-educated population also benefits society more broadly. A high quality education system deepens a society's knowledge base and range of skills and expertise, as well as increasing its capacity for innovation and productivity, which in turn will enhance the general wellbeing of society.

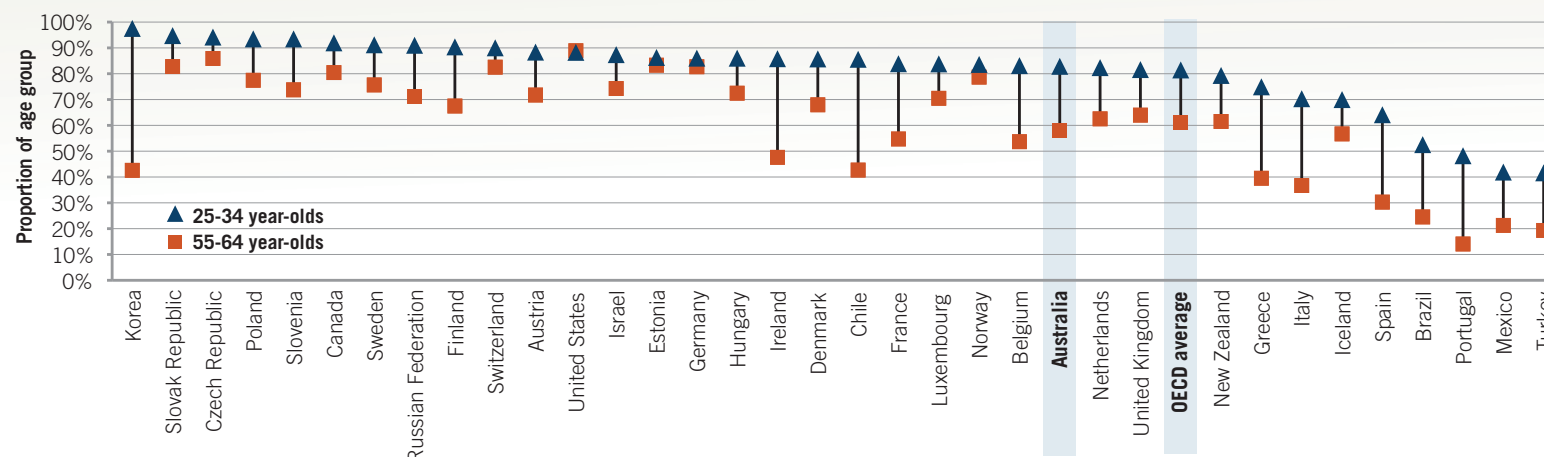
A skilled workforce with capacities for innovation and adaptation is also likely to be more resilient to changes and emerging challenges over time.

Levels of educational attainment in Australia have risen steadily since the 1980s.

Education levels in Australia have steadily risen since the 1980s, prior to which Australia had relatively poor educational attainment by international standards.³ In 2012, 79% of Australians aged 20 to 64 years had completed Year 12^a or post-school vocational^b or higher education qualifications,^c rising from 60% in 1994 (see chapter 13A *Education indicators*). Young men and women have experienced a similar rate of increases in Year 12 attainment, although women still remain more likely to complete Year 12.⁴ Moreover, significantly more Australians are now obtaining higher education qualifications than they were 20 years ago. Since 1991, there has been a steady increase in the proportion of the Australian population with post-secondary school qualifications (from 44% in 2002 to 58% in 2012).⁵

A generational shift in educational attainment among Australians can also be seen in international comparisons. In 2011, Australia was slightly above average for people aged 25 to 34 years, in strong contrast to our below average ranking for people aged 55 to 64 years, who were at school when retention rates were less than one in three.⁶

Figure 4.1 International comparison, attained at least upper secondary education, by age, 2011⁷

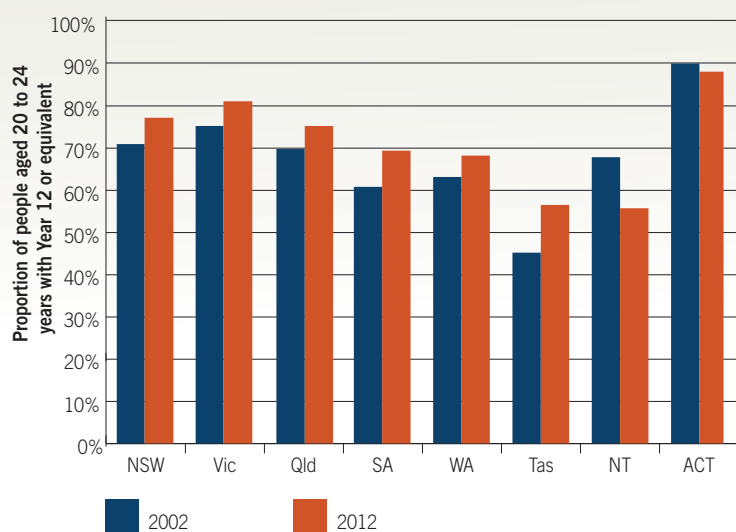


Increases in education levels have not been uniform across the Australian population. There are disparities based on geographic location and gender.

While the proportion of 20 to 24 year olds^d with Year 12 qualifications increased in most states and territories between 2001 and 2012, considerable variation exists (see Figure 4.2). For instance, in 2012, 89% of 20 to 24 year olds in the Australian Capital Territory had completed Year 12, while these completion rates were only 56% in the Northern Territory.⁸

One reason for the low rates of attainment for the Northern Territory may be the high proportion of Aboriginal and Torres Strait Islanders living remotely in the territory. Aboriginal and Torres Strait Islanders have a lower Year 12 attainment rate, as do Australians living in remote or regional areas.⁹ Low rates of attainment in Tasmania, South Australia and the Northern Territory may also be due to a reliance on the 20 to 24 year old cohort, many of which may have moved to other states to pursue tertiary education and other opportunities.

Figure 4.2 Year 12 attainment, by state and territory, 2002 and 2012¹⁰



When it comes to attainment of higher education qualifications, the rate of increase has been higher for women than for men. The proportion of women aged 20 to 64 with qualifications at bachelor degree level or above has risen from 12% in 1994 to 30% in 2012, in contrast to an increase from 13% to 26% for men (see chapter 13A *Education indicators*).

Australia has an above-average schooling system based on international comparisons. However, while the performance of Australian students relative to their international peers has remained steady in most areas, there are indications it has deteriorated in others.

In 2000 and 2009, Australia's mean scores for reading, mathematics and science in the Programme for International Student Assessment (PISA) were consistently higher than the OECD average. In 2009, Australia's mean scores in these domains ranged between 18 and 26 points above the OECD average score, which ranged from 493 and 501.¹¹

Since the National Assessment Program – Literacy and Numeracy (NAPLAN) testing began in 2008, performance of Australian students in most subject areas has generally remained steady. The proportion of Year 5^e students who met national minimum literacy and numeracy standards has been above 90% for each skill area (see chapter 13A *Education Indicators*).

However, there are indications that performance in some areas may be slipping. Some international assessments suggest a regression in reading and mathematics performance for Australian 15 year old students between 2000 and 2009.¹² Importantly, this decline in performance is evident amongst Australia's higher performing students as well as our lower performing students.¹³

The link between education and disadvantage

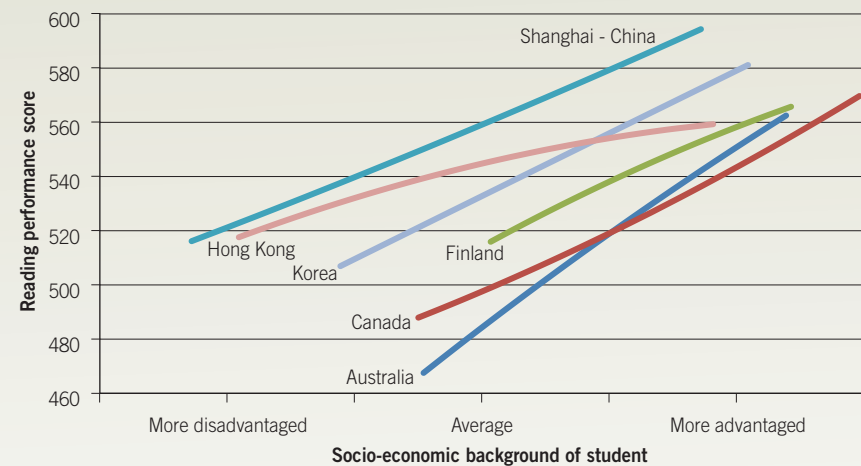
There is a significant gap between Australia's highest and lowest performing students, with a clear link between low levels of achievement and socio-economic disadvantage.

An inclusive and equitable education system maximises opportunities for all members of society to gain skills and knowledge that will enable them to live contributing, productive and fulfilling lives. It is particularly important in helping to overcome intergenerational disadvantage, by ensuring that coming from a disadvantaged background does not act as a barrier to obtaining quality schooling. By providing a potential pathway out of disadvantage, quality and accessible education can help to avoid the individual and social costs associated with people lacking the skills and knowledge necessary for satisfactory participation in society.

Socio-economic disadvantage has been demonstrated to increase the likelihood of poor performance in school. On average across OECD countries, disadvantaged students are twice as likely to be among the poorest performers in reading compared to advantaged students.¹⁴

While equity in education within Australian society increased slightly in the years between 2000 and 2009, we sit alongside the United States, the United Kingdom and New Zealand as countries with high overall performance and low equity levels.¹⁵ Figure 4.3 demonstrates that the relationship between socio-economic status and reading literacy levels is more marked in Australia than in other comparable high-performing OECD countries.

Figure 4.3 Reading literacy scores by socio-economic status, Australia and selected countries, 2009¹⁶



High concentrations of students from low socio-economic backgrounds in schools have been found to have a negative impact on the educational outcomes of other students at the school.¹⁷ A disproportionate number of students from the most disadvantaged backgrounds are represented in government schools. In 2010, 36% of students in government schools were from the bottom quarter of socio-educational advantage, compared to 21% and 13% of students in Catholic and independent schools respectively.¹⁸

Addressing the impact of concentration of disadvantage on educational outcomes has been a policy focus over a number of years, most recently outlined in the *Gonski Review of Funding for Schooling: Final Report*.¹⁹

Despite Australia's relatively poor performance on measures of equity, we perform well in terms of upward mobility in the education system. As many as 41% of 25 to 34 year old non-students have attained tertiary education, despite being from socio-economically disadvantaged backgrounds and having parents with low levels of education. This is well above the OECD average of 20%. Around half (49%) of young Australians in this group have attained a higher level of education than their parents, giving Australia the 5th highest level of upward mobility of 29 OECD countries with available data.²⁰

Despite some gains in Aboriginal and Torres Strait Islander education in recent years, Aboriginal and Torres Strait Islander background is still closely associated with poorer education outcomes.

On average, the education performance of Aboriginal and Torres Strait Islander students is still substantially lower than their non-Indigenous peers. In 2008, non-Indigenous adults were more likely to have attained at least Year 10 or a basic vocational qualification (92%) than Aboriginal and Torres Strait Islander adults (71%). Additionally, non-Indigenous adults were over four times as likely to have attained a bachelor degree or higher (24% compared with 5%).²¹

A number of initiatives are in place to ensure a fair education system in Australia. One such initiative – the Council of Australian Governments' National Education Agreement (COAG NEA) – aims to have '... all Australian school students acquire the knowledge and skills to participate effectively in society and employment in a globalised economy'.²² One COAG NEA target is to halve the gap for Aboriginal and Torres Strait Islander people aged 20 to 24 in Year 12 attainment rates by 2020. Progress to meet this target is on-track. In 2011, 53.9% of Aboriginal and Torres Strait Islanders aged between 20 and 24 years had achieved Year 12 or an equivalent qualification, compared with 47% in 2006 when the target was set.²³

The importance of schools and teachers

A well-performing schooling system and high quality teachers are crucial to our capacity to build and maintain human capital.

Teacher quality is widely recognised as one of the most important in-school factors impacting on student educational outcomes.²⁴ Ensuring a skilled teaching workforce has been a focus across governments and is the subject of a broad range of schools workforce-related reforms. Several factors have brought renewed focus onto the performance of Australian schools recently, including the decline in the performance of Australian students on some international measures (discussed above).

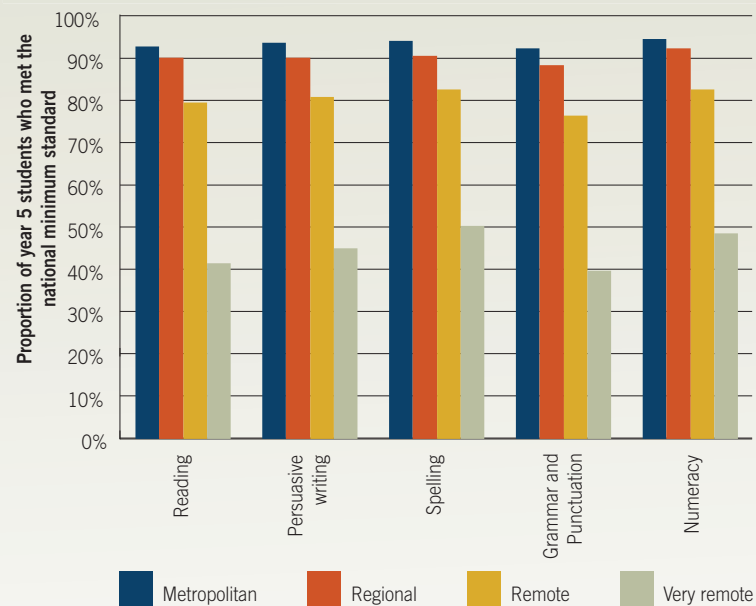
Demands on teachers as a result of factors such as diverse student populations, integration of special needs students into mainstream classrooms and heavy administrative loads imposed by curriculum and reporting requirements combine to make for a more complex and demanding teaching environment than in the past.²⁵ The attraction and retention of skilled educators, including by providing appropriate training and support for current and prospective teachers, is a fundamental requirement for continuing to build our human capital and supporting a more sustainable Australian society.²⁶

The remoteness of a school is another factor that impacts on student outcomes.

Students in remote and very remote schools are consistently outperformed by students attending metropolitan schools. Figure 4.4 shows that in 2012, an average of 94% of Year 5 students in metropolitan areas met national minimum standards across the five skills measured. This is in stark contrast with 81% of students in remote areas and 45% of students in very remote areas who met national minimum standards.²⁷

Non-metropolitan students also have lower rates of Year 12 attainment. In 2010, only 64% of young adults (20 to 24 years) living in remote or very remote areas had attained Year 12, compared with 81% of young adults living in major cities.²⁸

Figure 4.4 Year 5 student literacy and numeracy, by remoteness, 2012²⁹



Bridging the skills gap

Although skill shortages are less widespread than they have been over the last six years, recruitment difficulties continue in occupations such as engineering and the trades.

Employers are finding it easier to recruit skilled workers now than they have over the last six years: 43% of assessed occupations were in shortage in 2012, compared with 84% in 2007.³⁰ Notwithstanding the easing in the labour market, shortages are still persistent for certain occupations. The labour market remains particularly tight for trades such as the automotive and food trades, as well as for the engineering professions and resource sector occupations.³¹ While approximately 74% of vacancies for professions were filled in 2012, only 65% of vacancies were filled for technicians and trades. This compared with 62% for both in 2011.³²

Looking forward, there is expected to be a widening gap between the supply of higher-level skills and industry demand, with implications for Australia's productivity performance.³³

Some studies suggest that by 2025 Australia could be 2.8 million short of the number of higher-skilled qualifications that industry will demand.^f On these projections, a minimum annual growth of 3% in tertiary enrolments would be required to meet expected industry demand for worker qualifications. Factors anticipated to drive increased demands for qualifications include: the increasing size of the labour market, changing employment composition towards more skilled occupations and retirements. Additional factors include the demand for an increase in the level of skills of those employed in an occupation (skills deepening) and the demand for multiple qualifications at a particular level (skills broadening), along with the impact of globalisation and the international economy.³⁴

QUESTIONS FOR THE FUTURE:

- What are the best means for the Australian schooling system to improve the performance of students at all levels of achievement, with a specific focus on the lowest performing students?
- How can Australia best address the impact of socio-economic disadvantage, remoteness and cultural background to lift educational performance?
- How do we ensure that we have very high quality teaching in Australian schools, especially those with the lowest performing students?
- How might Australia ensure that we have education and training systems that provide the skills required for the future?

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Notes

- (a) 'Year 12' includes Year 12 or equivalent or vocational qualifications at the Certificate II level. Prior to 2001, this group includes those who completed highest level of secondary school and basic vocational qualifications.
- (b) 'Vocational qualifications' includes qualifications at advanced diploma and diploma levels, and Certificates III–IV levels. To maintain a hierarchical structure to the level of educational attainment, Certificate I–II level qualifications have been excluded in this definition. Prior to 2001, this group includes qualification at undergraduate diploma, associate diploma and skilled vocational levels.
- (c) Higher education qualifications include qualifications at the Bachelor degree, Graduate Diploma and Graduate Certificate, and Postgraduate levels. Prior to 2001, this group includes qualifications at the Bachelor degree, Postgraduate diploma and Higher degree levels.
- (d) 20–24 year old age group was used here as it most reflects the cohort attaining Year 12 qualifications.
- (e) Year 5 student results are used here as a gauge of literacy and numeracy towards the end of primary education.
- (f) Note that these projections are for qualifications and not for people. Given the propensity for people to hold more than one post-school qualification, by 2025 the annual shortfall of qualified people with qualifications at diploma level or above is projected to range from 108,650 to 162,485. The range reflects the variety of scenarios on which Australian Workforce and Productivity Agency's modelling is based.

IMAGES

Checking out one of the many information tents, Lyle Radford

Examining the 'Overfishing Problem' project, Lyle Radford

School students in the classroom, Dragi Markovic



SUSTAINABLE GROWTH AND PROSPERITY THROUGH INNOVATION AND ENGAGEMENT

In brief...

- Sustainable growth and prosperity depends on new and better ways of doing things. Innovation includes managerial, operational and technological advancements that boost competitive edge, generate new products and enable entry into new markets. They also help us overcome other sustainability challenges such as resource constraints.
- Australia's skills base and research and development systems provide a solid foundation for innovation, although historically this has not translated to strong innovation levels within business. While Australians are entrepreneurial, few firms grow into mid-sized global firms with broad innovation capabilities and strong international connections. A wider range of innovation capabilities including management, design, marketing, software and logistics is needed to support business innovation.
- Sustainable economic growth and higher living standards also depend on the connectivity and engagement of businesses at local, national and international levels. This allows the sharing of ideas and the development of collaborative relationships through which the risks of new and ambitious ventures can be spread.
- A particular focus on engagement with emerging Asian economies will be instrumental to Australia's sustainable economic growth. Australia will need to improve its development of relevant skills, new business models and new relationships to fully benefit from rapid increases in Asian demand.

Sustainable growth and prosperity through innovation and engagement

Innovation is critical to sustainable growth and prosperity

Sustainable growth and prosperity depends, fundamentally, on new ways of doing things.

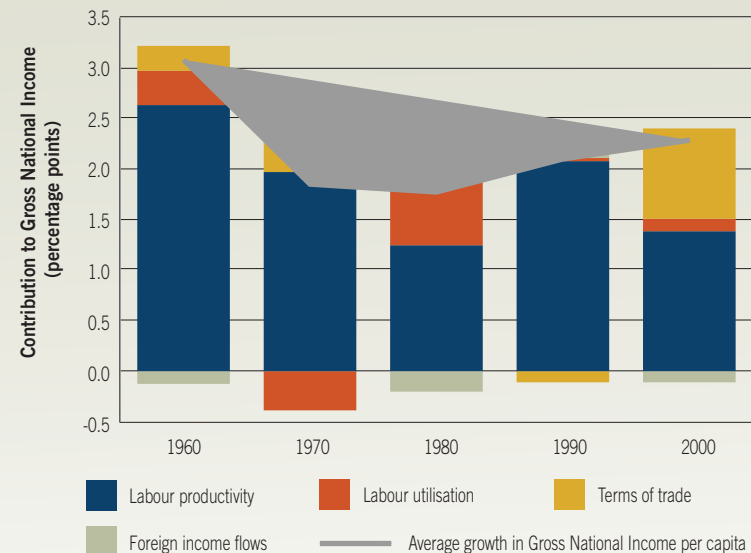
Innovation is also pivotal to overcoming other sustainability challenges, foreexample those associated with resource constraints. Chapter 10 *Reducing the environmental impact of economic growth* discusses a number of examples of where innovation has been – or will be – needed to support continued economic growth in ways that are less resource intensive or environmentally damaging. For example innovation has enabled us to reduce the water consumption of Australia's irrigated agriculture sector, thereby alleviating some of the stress on one of our most important natural resources.

Innovation is central to growing our economy. It influences how our markets, resources, institutions, human capital, technology, entrepreneurship and geography bring about change at organisational, systemic and societal levels.

Innovation drives productivity growth and higher standards of living.

Innovation is the key driver of economic development in advanced economies, accounting for as much as two thirds of productivity growth.¹ Productivity growth, in turn, drives economic growth over time – a key measure of material living standards.² From the 1960s until the turn of the century, productivity growth was the primary source of income growth in Australia. Throughout the 2000s, high terms of trade became as significant as labour productivity (comprised of capital deepening and multi-factor productivity) as contributors to income growth, providing a 'windfall gain' for Australia.³

Figure 5.1 Contributions to growth in average incomes, 1960s to 2000s⁴



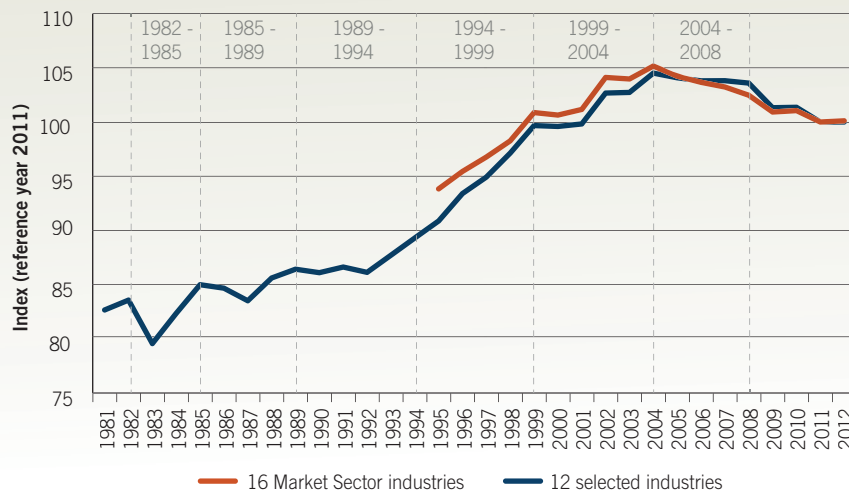
In the years ahead, it is projected that Australia's terms of trade will start to work against income growth and that our ageing population will dampen gains in workforce participation. This means that higher productivity growth will be required to maintain Australia's strong economic growth and rising living standards.

Innovation will be needed to lift productivity growth and maintain prosperity.

Australia's last major productivity boom in the 1990s was driven largely by earlier one-off reforms to open the Australian economy and strengthen competition. These reforms included floating the dollar, lowering trade barriers, opening financial markets, competition policy and enterprise bargaining.^a

Similarly, while there are differing views of the extent of the productivity growth slowdown observed since the early 2000s, there is consensus that the slowdown has been due to a combination of industry-specific factors in mining, agriculture and utilities (see Chapter 15D *Productivity and Innovation*) and a broader economy-wide loss of momentum.^b

Figure 5.2 Change in multifactor productivity over time⁵



The mining boom prompted a rapid increase in capital investment and labour inputs; however, the lag between this investment and additional output means that measured productivity declined. In the utilities sector between 2005 and 2010, increased energy demand and reduced water supply through lower rainfall prompted increased capital investment such as desalination and water recycling projects and extensive investment in upgraded electricity distribution networks. As these increased inputs do not necessarily translate into increased outputs, multifactor productivity reduced during the investment period.

While it is unclear how productivity growth will unfold, particularly given a rebound in the most recent figures, the stimulus provided by the move to more competitive and open markets is unlikely to reappear.

The stimulus of intensified competition and the gains of flexible markets remain, but further productivity improvement is now in the more difficult terrain of improving human capital and innovation.

Productivity Commission 2009, Submission to the House of Representatives Committee on Australia's Productivity Performance, p.37

Improving human capital and innovation will be more challenging than past reforms as it requires not merely changing market rules to promote competition, but also influencing the attitudes and actions of multiple stakeholders.

The slowdown in productivity growth and the policy imperative it implies has been overshadowed by the economy-wide benefits stemming from high terms of trade.⁶ As former Treasury Secretary, Dr Ken Henry, has observed:

*Today we find ourselves having avoided a recession that paralysed the rest of the developed world. We have low inflation, low unemployment, and a terms of trade boost that has, to date, boosted average living standards. How does one, today, communicate the imperative for action?*⁷

Entrepreneurs and innovative firms are critical to the innovation and productivity growth needed to underpin economic upgrade and renewal.

High-growth firms are critical to a dynamic economy. They develop new and improved goods and services, often for under-served markets. They strive to understand customer and user needs, pro-actively engage with customer problems and look externally for ideas and solutions. These firms also produce wider social benefits, as they embrace more flexible work-life arrangements, invest significantly more in their staff, and are more likely to contribute to wider societal challenges.⁸ Entrepreneurs are the ones who create and grow firms that make our economy more productive and diverse, forging new ways of doing things and underpinning economic renewal.

The outstanding characteristic of such firms is that they innovate. As seen in Chapter 15D *Productivity and Innovation*, the proportion of Australian businesses undertaking some form of innovative activity reached a plateau in 2007; since then it has held steady at around 40%.

However, it would be a mistake to conclude that Australians are not entrepreneurial. On the Global Entrepreneurship and Development Index, Australia jumped from eleventh in 2011 to third in 2012, behind only Sweden and the United States.⁹

A similar story is seen in terms of business start-ups, an area in which Australia does well. However, relatively few of these businesses grow into mid-sized global firms with broad innovation capabilities and strong international connections.¹⁰

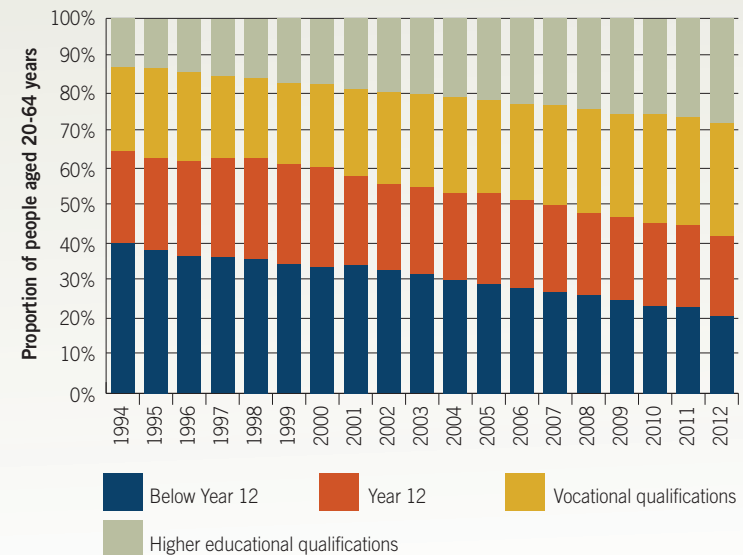
The policy levers shaping entrepreneurship are access to managerial and technical skills, access to early stage finance and the adoption of a global mindset.¹¹ The latter is particularly important, as Australia ranks third on the Global Entrepreneurship and Development Index for entrepreneurial attitudes (culture) and first on entrepreneurial actions (policies and institutions), but 15th on entrepreneurial aspirations (the desire for new products and new markets).¹²

Investment in education and research and development must deliver better outcomes

Australia's strong education and research and development (R&D) systems provide a good foundation for productivity growth, but investment does not always translate into outcomes.

Education levels in the Australian workforce have increased steadily over the past 16 years, as seen below.

Figure 5.3 Educational attainment, by highest qualification, 1994 to 2012¹³



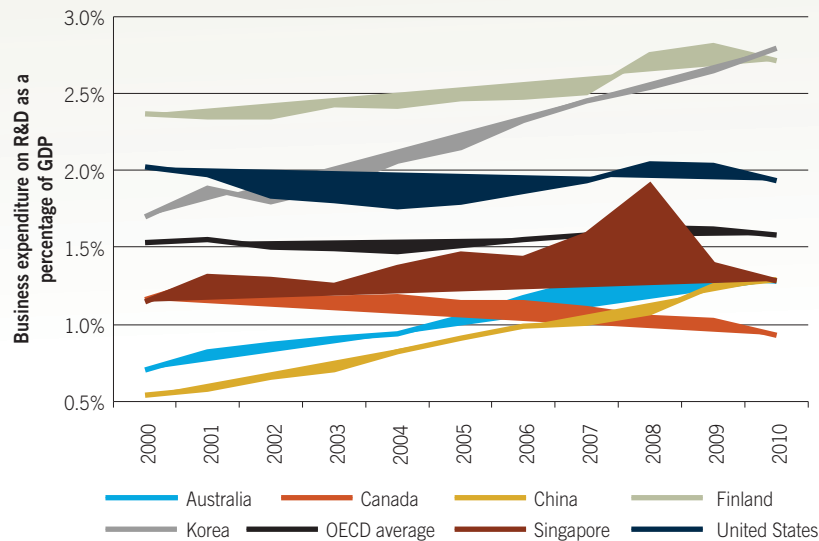
Despite this progress, Australia still lags significantly behind leading innovation nations such as the United States and Sweden on the skills of its workforce as measured by educational attainment (as seen in the international comparison of upper secondary education by age in Chapter 13A *Education*). This has implications for the ability of Australian firms to innovate.

Investment in research and development is arguably the most common measure of innovation, and indicates a nation's latent potential for innovation, but it does not tell the whole story.

The overall Australian research and development effort is significant and compares well relative to peer nations. However, Australia is distinctive in that research is much more likely to come from government than business, and our researchers are far more likely to work in higher education than business.¹⁴

This indicates a disconnect between the knowledge that is developed in institutions and the knowledge that is used productively in business. As one illustration, the Global Cleantech Innovation Index 2012 ranks Australia fourth for innovation inputs (investment and effort) but 42nd for innovation outputs (evidence of business innovation). In this respect, the 'efficiency' of Australia's innovation effort is consistently rated as very poor.¹⁵

Figure 5.4 International comparison of business expenditure on research and development, 2000 to 2010¹⁷



This is not to deny there has been progress in some areas. A policy focus of successive Australian Governments has been to lift Australia's historically low Business Expenditure on Research and Development (BERD). Australia's BERD performance has improved significantly – growing faster than most peer nations over the past decade and to a level that appears even stronger when industry structure is also considered.¹⁶

Higher levels of investment in 'intangible assets' are needed to boost the complexity and sophistication of Australia's economy and encourage the adoption of new ideas.

The greatest potential benefits for productivity lie in different ways of using existing knowledge, as opposed to the creation of new knowledge. Investment in intangible assets is a popular proxy for this.

While R&D matters, one of the major shifts in the innovation literature in recent years has been the recognition that a wider variety of innovation capabilities than R&D are driving productivity and growth.

Organisations need people who can develop new and better ways of doing things, including through adopting and adapting existing knowledge and technologies. Managerial skills are a critical input into innovations in organisational practice, while creative talent enables the development of new products as well as engaging client interest.

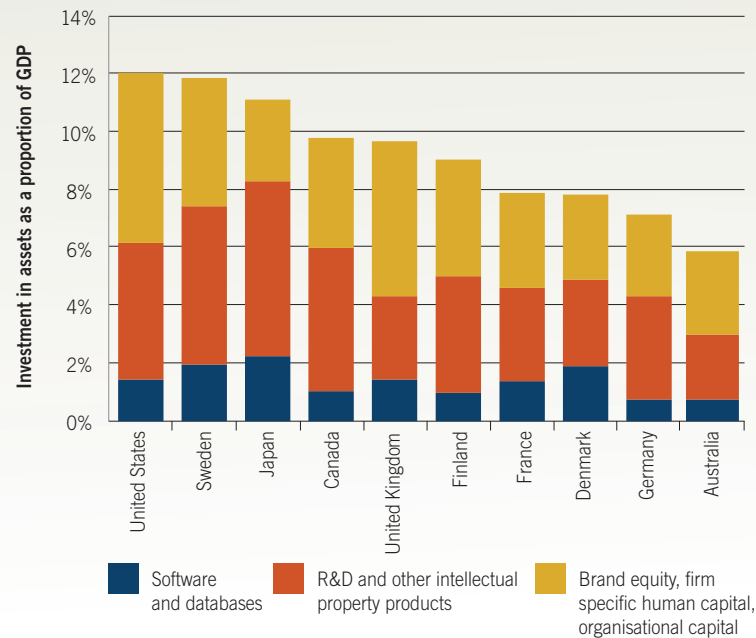
Source: Productivity Commission (2009), Australia's Productivity Performance, submission to the House of Representative Standing Committee on Economics, p.44

Innovation requires a diversity of capabilities, not all of which are treated as assets in national and company accounts. This includes investments in not only R&D and information and communications technology (the traditional focus), but also in capabilities such as management, design, marketing and logistics.¹⁸

Indeed, Australia's small domestic market and geographic remoteness make it difficult for Australia to lead the world in science-led innovation. Just as important for Australian businesses is the need to understand customers and anticipate how markets may evolve through this extended set of innovation capabilities.

Australia's low investment in these intangible assets (also referred to as knowledge based capital) suggests a limited breadth of economic capabilities. A number of broader measures also point to the limited complexity and sophistication of Australia's economy.^c

Figure 5.5 International comparison of investment in intangible assets, by selected countries, 2006¹⁹



The story that emerges for Australia is one of a 'fast follower' economy, where competitive markets and a skilled workforce enable the early adoption of new ideas, but where new-to-the world innovation is low. This is consistent with the productivity gains from Australia's rapid adoption of ICT in the 1990s.²⁰

The rising knowledge-intensity of economic activities observed across all industries and regions in advanced economies suggests that this may be a matter of growing concern.²¹ Similarly, intangible capital investment is now expanding rapidly in advanced nations, albeit at a lower rate in Australia than in others.²²

The Prime Minister's recent Taskforce on Manufacturing identified management and creativity as particular priorities for Australia.²³

Evidence on Australian management performance suggests that Australian managers are less likely to see innovation as a strategic tool.²⁴ Moreover, they are less likely to consider non-financial goals, look to the long-term or view performance from a team, as opposed to an individual, perspective.²⁵

Innovation draws on cumulative and collective know-how, so collaboration and connectivity are critical.

Innovation is about *cumulative and collective* know-how. As individuals, we are not radically more capable than our ancestors, but as a society we are capable of doing much more and doing it much better. This is because we rely on processes of organisational and social learning that *combine* our capabilities in far more effective ways.

Collaboration is how the knowledge embedded in individuals and groups is spread, shared and combined.^d It enables opportunities to be pursued and risks to be shared in a way that creates new economic value.

Notwithstanding advances in telecommunications, close connections remain critical to collaboration, innovation and productivity. Collaboration is strongest in organisations within close physical proximity,^e which explains the disproportionate contribution of cities to economic growth.²⁶

Between 1999–2000 and 2009–10, almost 80 percent of Australia's increased economic production took place in the major capital cities, with Sydney and Melbourne alone accounting for 43% of growth.²⁷ These figures emphasise the role that collaboration plays in business success and economic growth. The contribution of Australia's cities to economic growth and productivity is discussed further in Chapter 7 *Sustainable cities*.

As an urbanised, geographically vast and remote economy, Australia is likely to be particularly dependent on effective mechanisms for collaboration and connectivity. Wider access to high speed broadband,

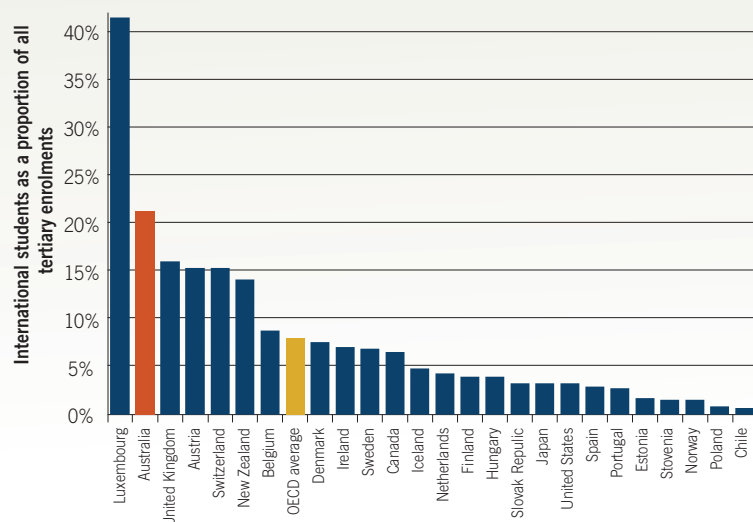
and the sharing of knowledge and ideas that this enables, represents a transformative opportunity for innovation and productivity across the nation.

Prospering in the Asian Century

Australia's prosperity in the Asian Century will be determined by both productivity growth and economic diversification.

Australia's prospects for sustainable growth are linked to the emergence of Asia as a rapidly growing economic power. The benefits to Australia from this emerging market growth have already been substantial. For example, Australia has become a world leader in international education (see Figure 5.6).

Figure 5.6 International comparison of the proportion of international students in tertiary institutions, 2012²⁸



However, Australia's share of Asia's growing non-resource sector imports (excluding intra-Asia trade) fell from 3.1% in 2001 to 2.8% in 2011.²⁹ So, while Australia is among a number of countries that are projected to benefit from rapid increases in Asian demand, it will need to better develop relevant skills, new business models and new relationships for opportunities to be fully realised.

Productivity growth and international connectivity go hand-in-hand, as they mutually reinforce not only the gains from trade but also the gains from learning (or knowledge spillovers). The implication is that Australia's economy will need to become more productive, more diverse and more connected in the years ahead.

A more innovative and connected Australian economy

In building a more innovative and connected economy, Australia has a unique combination of natural, people and social assets on which to build. Where such assets have been leveraged in sectors such as agriculture, mining, education and tourism, Australia has proven it can be highly productive and a global force.

Australia has one critical head start in the race for skilled people: Australia is very well placed to attract the world's most skilled and creative leaders, entrepreneurs, researchers and workers. Our modern economy and society, exceptional quality of life, strong education and tourism platforms, migration tradition and proximity to Asia add up to a uniquely Australian opportunity for sustainable economic growth.

QUESTIONS FOR THE FUTURE:

- What would enable more Australian small and medium-sized enterprises to build their innovation capabilities and connections, and expand into new products and new markets?
- How can we strengthen collaboration between research and industry to strengthen both business and societal innovation?
- In which activities and industries might Australia succeed in the Asian century, given our current strengths and emerging needs?
- How do we communicate the imperative for innovation, diversification and global engagement in the context of our relative economic prosperity?

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- (c) For example, on the 2012-13 Global Competitiveness Index, Australia ranks 13th on efficiency enhancers, 12th on basic requirements, and 28th on innovation and sophistication.
- (d) Alfred Marshall, in *Principles of Economics* (1890), famously refers to knowledge spillovers, noting that trade secrets are 'in the air'. Marshall refers to the pooling, matching, and learning benefits of agglomeration.
- (e) Keller, W, 'Geographic localisation of international technology diffusion', *American Economic Review*, 92:1, pp.120–142, (2002). See also: Fracasso, A and Marzetti, GV, *Taking Keller seriously: trade and distance in international R&D spillovers*, University of Trento, Discussion paper no.6, (2011). Keller finds that knowledge spillovers decline by half for every 1200 kilometers, although this distance is declining over time. It should be noted that 'proximity' may be not only geographic, but can also be administrative, cultural and economic – see Ghemawat, P, *World 3.0: Global Prosperity and How to Achieve It*, (2012).

IMAGES

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PLANNING FOR AN AGEING POPULATION

In brief...

- The ageing of Australia's population will create a number of opportunities and challenges for Australia's economic, social and environmental prosperity.
- The 'dependency ratio' – the ratio of people of working age (15 to 64 years) to those aged 65 years and over – declined from 7.5 in 1970 to 5.0 in 2010, and is projected to decline further to 2.7 by 2050.¹
- As Australia's demographics change, significant budgetary pressures are likely to occur in relation to the age pension, health services and aged care facilities. There will also be pressures on maintaining workforce participation and productivity levels.
- Population growth in desirable retirement locations and related demand for housing, services and recreational facilities will have implications for where and how people live in the future.
- Ageing presents opportunities through the development of new ways of engaging the 'young aged' in sustainable activities such as volunteering and environmental stewardship.
- There are no 'silver bullet' solutions to meeting the challenges associated with ageing in Australia, but an ageing population is manageable provided a range of appropriate interventions are initiated.

Planning for an ageing population

Challenges and opportunities from an ageing population

The ageing of Australia's population is inevitable and raises a number of challenges and opportunities in relation to sustainability.

The former Secretary of the Commonwealth Treasury, Dr Ken Henry,² has identified ageing as the first of four long term trends that will have a profound impact on the Australian economy and society. Dr Henry argues that an ageing population has the potential to undermine economic, social and environmental sustainability through increasing the dependency rate – the ratio of people of working age (aged 15 to 64 years) to those aged 65 years and over – and reducing productivity. If the right policy decisions are made in a timely way, however, many negative impacts such as these can be mitigated.

As Figure 6.1 shows, a major shift in Australia's population over the last three decades means that the proportion of the national population aged less than 35 has decreased (from 59% in 1981 to 47% in 2011), while the proportion of those aged 35 and older has increased (from 41% to 53%). Most focus has been on those aged 65 years and over whose numbers doubled over this period (from 1.5 million in 1981 to 3.1 million in 2011), while their proportion of the population increased from 10% to 14%. Over these three decades, the 65 years and over population grew more than twice as fast as the general population: 111% growth compared to 50% growth. All three population change processes – mortality, fertility and migration – have contributed to these patterns:

- Mortality has reduced and life expectancy increased, especially at older ages. An Australian turning 50 in 2012 can expect to live around eight years longer than his or her counterpart in 1971.
- Lower fertility has meant that Australia's young population is growing more slowly than in the past.

- The generation born in the high fertility 'baby boom' years of 1946 to 1966 are beginning to enter their retirement years. Baby boomers made up 25% of the population in 2011 and 36% of the workforce.
- While immigrants tend to be selectively drawn from the young working ages at the time of migration, immigrants themselves age and contribute to the growth of the older population. Hence in 2011, 19% of overseas-born Australians were aged 65 years and over, compared with 12% of people born in Australia.

Figure 6.1 Australian population, by age and gender, 1981 and 2011⁵

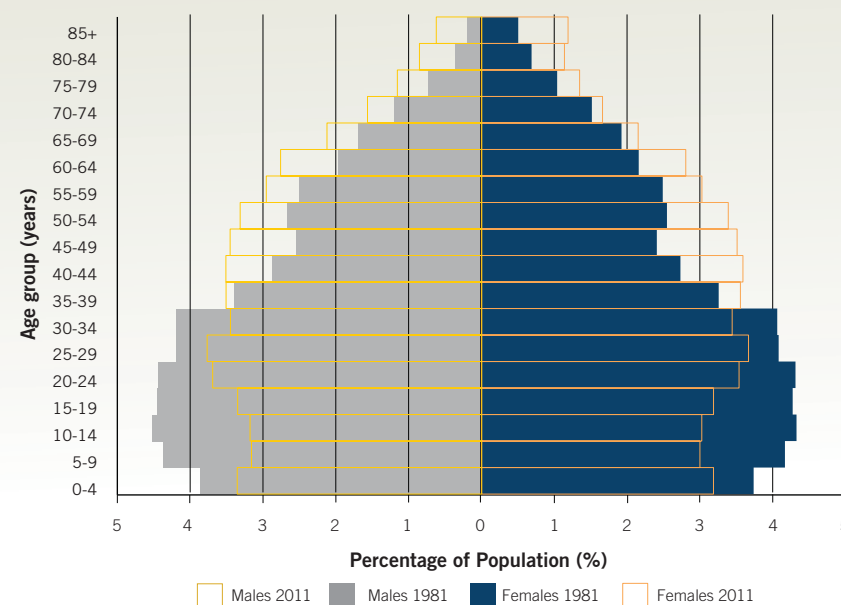


Figure 6.2 shows that between 2011 and 2031, the population aged 65 years and over is projected to grow from 3.1 to 5.7 million. In 2031, all surviving baby boomers will be 65 to 84 years of age. Between 2031 and 2051, baby boomers are projected to swell the population aged 85 years and over from 822,600 to 1.6 million.

Figure 6.2 Growth of the population aged 65 years and over and 75 years and over, actual and projected, 2006 to 2051⁶

Year	Population aged 65 and over			Population aged 75 and over		
	No. ('000)	%	% Growth pa	No. ('000)	%	% Growth pa
2006	2,692.7	13.0		1,280.4	6.2	
2011	3,119.0	14.0	3.0	1,430.1	6.4	2.2
2021	4,395.5	17.2	3.5	1,947.4	7.6	3.1
2031	5,732.1	19.9	2.7	2,868.9	10.0	4.0
2041	6,759.0	21.4	1.7	3,675.0	11.6	2.5
2051	7,628.7	22.3	1.2	4,227.9	12.4	1.4

Summing up, the demographic changes associated with the ageing of Australia's population will have four major dimensions between 2011 and 2031:

- The population aged 65 years and over will increase by 86% between 2011 and 2031.
- The percentage of the population aged 65 years and over will increase from 14% to 20%, and the 'dependency ratio' will decline.
- The baby boomers differ from the previous generation of older Australians in many ways and this will influence the nature and level of their need and demand for services. It will also influence their ability and preparedness to lead sustainable lives.
- The baby boomers will often live in different locations to the current generation of older Australians. Hence, the impacts of ageing will be magnified in particular local areas.

Australia's aging population will increase the demand for services.

Government health costs are projected to rise 4.5 percentage points to represent 10.3% of GDP by 2044-45.⁵ Nearly half of this projected increase has been attributed to the effects of an ageing population. Data from the Australian Bureau of Statistics National Health Survey (NHS) suggests that, as mortality levels declined among older Australians, there may have been an increased incidence of chronic disease as people who would in earlier years have died of a heart attack or stroke survive, but often with a related ongoing ailment or chronic condition.

Comparing data for baby boomers aged 53 to 62 years at the 2007–08 NHS to the same age group at the 1989–90 survey (who represent the current generation of Australians aged 71 to 80 years) shows that rates of obesity, asthma, hearing loss and high cholesterol for baby boomers are double those of the previous generation. The diabetes rate has tripled, and the proportion of this age group with chronic health conditions – generally the most costly conditions to manage – is substantially higher than for the previous generation.⁶ While it is generally acknowledged that preventative health is more cost effective (and quality of life enhancing) than remedial treatment, the 'window' is narrowing for preventative interventions aimed at addressing the rising rate of chronic illnesses in the ageing baby boomer population.

The implications of an ageing population are also potentially significant for individuals and their families.

Chronic health conditions detract significantly from quality of life and wellbeing, reducing some people's ability to fully participate in socially, physically or financially rewarding activities. The existence of chronic health problems around retirement age can also reduce an individual's ability to contribute to the care of others in their family, such as their elderly parents.

Figure 6.3 Health status at mid-life: baby boomers compared to pre-war generation⁷

Health Indicators	Pre-war generation at Mid-life (53–62 years of age)	Baby Boomers at Mid-life (53–62 years of age)
	%	%
Obesity	12	26
Diabetes	3	9
Asthma	5	10
Hearing loss	8	17
Arthritis	26	33
Migraine	4	6
Back problems	6	9
Multiple conditions (≥3)	0.5	4
High cholesterol	8	14
Alcohol risk	11	15
Currently smoking	24	18
Emphysema/bronchitis	5	3
No private health cover	42	37

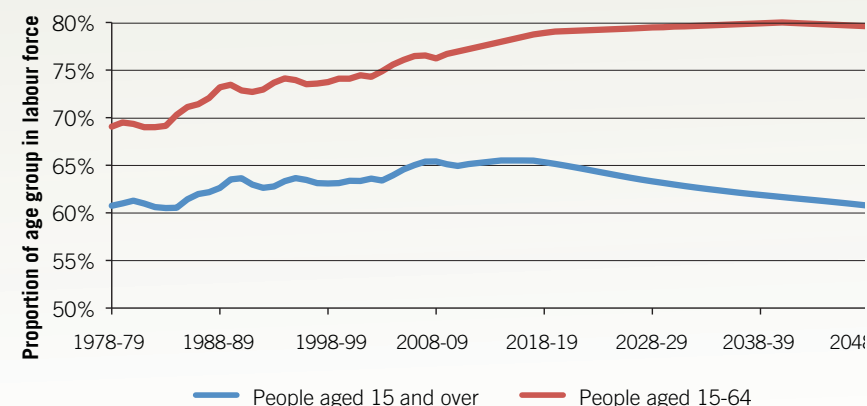
This ageing cohort are also subject to changing demands on their time and financial resources compared with previous generations of retirees, from caring for elderly parents to assisting their own children with housing costs or providing childcare for their grandchildren. This has implications for their expectations about quality of life as they age, as well as for their retirement savings.

As the population ages, a higher proportion of Australians will retire or reduce the extent of their participation in the workforce.

Being employed affects income, living standards, welfare dependency, social inclusion and social connectedness, all of which have a strong correlation with economic and social wellbeing.⁸

Between 2010 and 2050, the ‘dependency ratio’ is projected to decline each decade: from 5:1 in 2010 to 4:1 in 2020, 3.2:1 in 2030, 2.9:1 in 2040 and 2.7:1 in 2050.⁹ Over recent decades, the dominance of the baby boomers in the age structure has had a positive impact on participation rates because they have been in the working ages. However, as the figure below shows, participation rates will start to decline as the baby boomers retire.

Figure 6.4 Workforce participation rate, actual and projected, 1979 to 2050¹⁰



In the past decade, labour force participation rates for older Australians have increased, which may help in managing some of the issues associated with an ageing population.

Since 2001–02, labour force participation rates for 65 to 74 year olds have increased from 15% to 26% for men and 6% to 13% for women.¹¹ It has been estimated that increasing both the pension age and the age at which superannuation is accessible to 70 would increase total participation rates by 1.4%, raising economic growth by \$25 billion.¹² Whether achieved through such ‘compulsory’ measures or through incentives and supportive policies, increasing the continuing involvement of the baby boomer generation in the workforce will go some way to addressing the issues presented by an ageing population.

Aside from traditional employment, there are many other ways that senior Australians contribute to their families and the community. In a recent survey, 36% of households aged 50 and over gave money to family and 8% received money from family in the past year, with 90% of financial transfers going to children, mostly as gifts rather than loans.¹³ At a personal level, the relative financial, health and other circumstances of individuals can be expected to influence the flows of financial and practical assistance. With the rise in chronic health conditions in older generations discussed above, it is difficult to predict how trends in the provision of financial and practical support within families will evolve over time.

The baby boomer generation are not only the largest generation to enter the older ages in Australia; they are also the most educated, diverse and wealthy, and they have an unparalleled body of experience. Many of them have skills and knowledge with the potential to be of significant benefit to the broader workforce, society and economy. Developing innovative ways in which these assets can be best deployed to the benefit of individuals, their families and the wider community is an important priority in the coming decades.

Meeting the challenges of an ageing population

A combination of actions and interventions will be needed to manage Australia's ageing population.

There are no ‘silver bullets’ that will ‘solve’ Australia’s ageing problems. Plausible increases in fertility and net migration rates will have little impact on ageing trends.¹⁴ While skilled migration is often touted as an answer to an ageing population, a permanent solution would require a progressively larger migration intake each year, meaning any effect is temporary. In addition, every 50,000 new migrants have roughly half the impact on ageing trends than the previous 50,000. Immigration’s major impact on meeting the challenges associated with an ageing population is through the extent to which it can influence productivity.

There is general agreement that the timely introduction of a range of interventions is required. These could include:

- increasing the average age at retirement, in recognition of longer life expectancy – this would require addressing a number of issues, including reducing discrimination against older workers, lowering institutional barriers to transitioning from full time work to retirement and managing health issues in the workplace.
- directing more efforts towards increasing workforce participation among men and women of all ages.
- reducing the scale of intergenerational financial transfers required to support older Australians by increasing the ability of Australians of working age to accumulate resources and assets to support themselves in old age (such as through superannuation).
- an ongoing focus on improving the effectiveness, equity and efficiency of health and aged care services.

By considering these and other measures Australia will be better placed to manage the challenges of an ageing population and secure a more sustainable future.

QUESTIONS FOR THE FUTURE:

- Are there better ways for family and community systems to support older people, and to enable them to be independent and contributing to society?
- How can we best manage the significant budgetary pressures associated with an ageing population and a smaller proportion of people in the workforce?
- How do we manage population growth and demand for services in desired retirement locations?
- What additional contribution can baby boomers make to Australia's productivity and wellbeing and how may this be best facilitated?

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Images:

Sustainable housing in Lyneham, Dragi Markovic

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SUSTAINABLE CITIES

In brief...

- Australia's growing population will be settled largely in existing urban areas. Effective and timely strategic planning is needed to reduce the pressure on natural resources associated with the growth of these urban areas and to ensure that infrastructure and services meet the needs of the population.
- Development patterns in our outer urban areas have resulted in increased car dependence and travelling times, and a lack of local job opportunities for residents. Residents in outer urban areas also have lower access to services, such as health care, compared to those living in inner urban areas.
- Our major cities are home to 77% of the Australian population and much of our built infrastructure – they are heavily exposed to the impacts of climate change, including sea level rise.
- Collaboration between governments, industries and communities on the strategic planning and development of our cities – particularly in relation to economic growth and the provision of services and infrastructure – is critical to dealing effectively with these challenges.

Sustainable cities

Building sustainable and liveable cities as our population grows

While our cities are among the most liveable in the world, they lag behind on some aspects of sustainability.

Australia's cities rank among the best in the world on global indices of liveability. In the 2012 Economist Intelligence Unit's Liveability Index, Melbourne was rated as the world's most liveable city.¹ On the same measure, out of 140 world cities, Adelaide ranked fifth, Sydney seventh and Perth ninth.² While 'liveability' may mean different things to each of us, a liveable city is one that meets our physical, emotional and social needs. A liveable city is healthy, prosperous, clean, well designed and accessible. It is a city where everyone can safely and conveniently participate in all aspects of daily life and enjoy a sense of wellbeing.

As Australia's population grows, our challenge is to create cities that are liveable, competitive, productive, equitable and environmentally sustainable. The stability of Australia's cities, their functioning infrastructure, world-class amenities, education and healthcare, and low crime rates make them the envy of the world. At the same time, Australia's cities are lagging behind in some aspects of sustainability, particularly when it comes to energy consumption, car dependence and equity, with a stark and growing divide between the opportunities available to residents of the inner suburbs and those available to residents in outer urban areas.

Australia's cities have absorbed 80% of the population growth over the last 40 years.³

Our cities are home to a large and growing proportion of the population, with three quarters of Australians living in the nation's 18 major cities – those with over 100,000 people.⁴

This growth has taken place within a relatively small area, as urban development and other intensive land uses occupied only 0.4% of Australia's total land area in 2006 (see Chapter 16D *Land use*).

Cities are key contributors to the productivity, liveability and sustainability of society as they are home to a wide variety of services and the source of major cultural, social, economic and educational opportunities. Cities generate around 80% of our gross domestic product and employ 75% of Australia's workforce.⁵

Cities attract people and businesses to their commercial and cultural activities, a pulling power that increases with size, density and diversity. The last two decades have seen Australia's inner city areas cement their roles as financial, business, knowledge and cultural hubs. As noted in Chapter 5 *Sustainable growth and prosperity through innovation and investment*, these cities benefit not only from economies of scale, but also from the knowledge spillovers that flow when people and businesses work in close proximity.

CASE STUDY

Australia's global cities – the resurgence of Melbourne

The inner city areas of Sydney and Melbourne remain Australia's leading hubs for finance, business, knowledge and culture. These are 'global cities', with Sydney enjoying one of the world's strongest city brands and Melbourne rated as the world's most liveable city.

The resurgence of Melbourne has been supported by a transformation of its central business district as a living residential centre (see below). This has promoted strong growth in knowledge-intensive activities such as education and research, financial and business services, design and engineering services.

Equally important to Melbourne's emergence as a knowledge economy have been major commercial land developments such as Docklands, new precincts such as the Parkville medical research precinct and new infrastructure projects such as Federation Square and the Melbourne Convention and Exhibition Centre.

From the 1980s, Melbourne has reinvented itself as a vibrant city economy with an expanding professional services sector that has made it the engine room of Australia's economy in the 2000s, as illustrated in Figure 7.2.

Figure 7.1 Melbourne central business district as a living residential centre, 1983 and 2002⁶

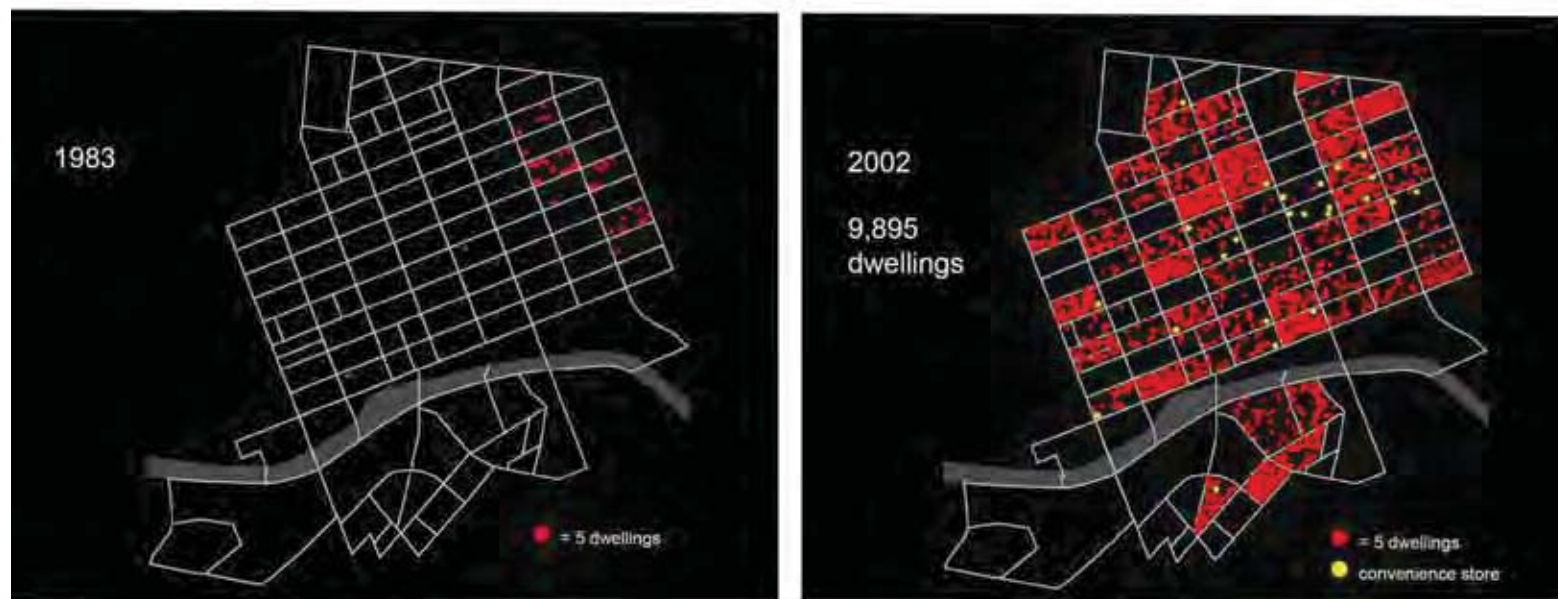
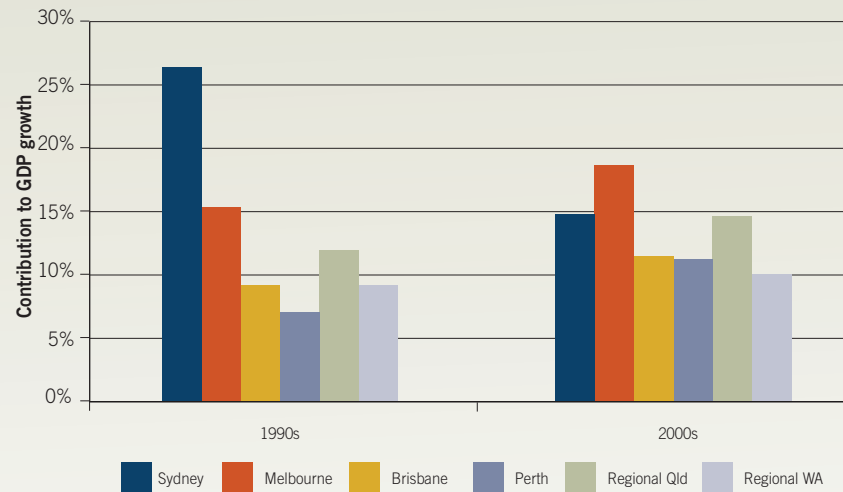


Figure 7.2 Contributions of Australian cities and regions to Gross Domestic Product growth, 1990s and 2000s⁷



The pattern of urban development in Australia has implications for our environment, as well as for social and economic wellbeing.

Continuing population growth in our cities represents a significant challenge, bringing with it increasing city sizes, greater population densities, increased pressures on natural assets, more congestion and greater demand for infrastructure and services.

The planning decisions that have shaped the current layout of our major cities, along with growing demand for housing and limited land availability in established urban areas, has led to significant expansion of cities through the development of greenfield areas on their edges.

The rapid outward growth of our cities presents significant environmental, social and economic issues. Historically, major settlements (now some of our largest cities) were located in fertile areas with mild climates and abundant natural resources. Food production close to the settlement was important to feed growing townships. As our major cities have grown, they have displaced agricultural activities and built over productive farming

land. This has had impacts on natural waterways and led to the loss, degradation or fragmentation of habitats for Australia's diverse plant and animal species.^a

Effective strategic planning of urban areas will be critical to managing the growth of our cities and addressing competing pressures.

Demographic changes have implications for housing supply

The ageing of the population will significantly impact the housing sector. The proportion of older households is predicted to grow from 1.6 to 3.2 million in the period 2008–2028.⁸ The number of single person households is also projected to grow, from 24% of households in 2006 to 30% in 2026.⁹ Contributing to this trend is the ageing population. In 2008, lone person households numbered 738,500 or 48% of older households.⁹

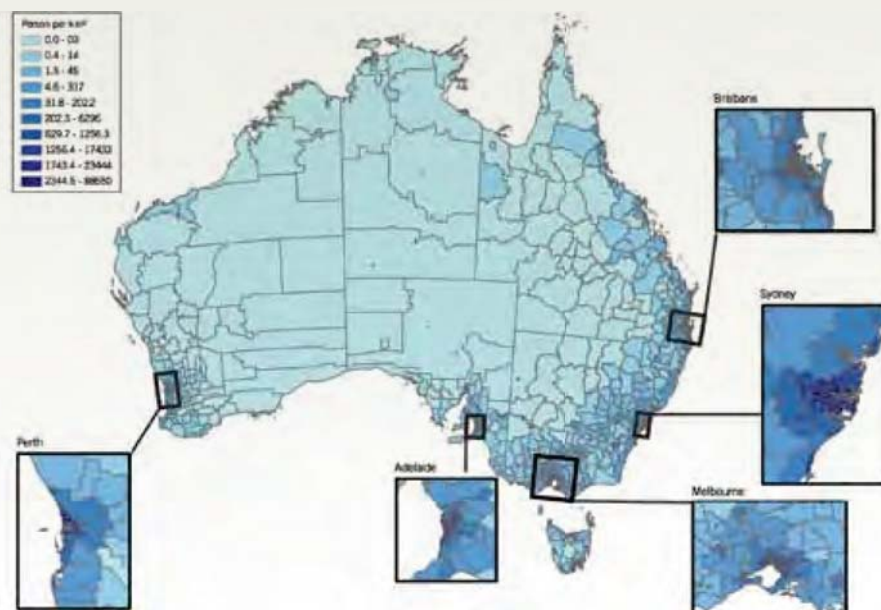
Adequate affordable housing includes the need for diverse housing types to meet the needs of changing household types and our ageing population. Housing diversity also assists in creating diverse communities by enabling a range of different household types with different incomes to live in the same neighbourhood.¹⁰

The challenge of increasing the supply of residential housing in Australia is not simply a matter of releasing more land and building more houses, particularly dwellings on greenfield sites. Housing stock must also be suited to the needs and the means of purchasers. For most regions it would be appropriate for there to be different housing options which offer a choice of dwelling size, tenure type and price. However, Australia may not be currently building the types of houses that will meet the needs of a changing Australian society.¹¹

Australian cities have relatively low population densities and are highly car dependent.

The population density of Australia's cities – the number of people living within a square kilometre – is lower than many cities in Europe and Asia, although it is comparable to or higher than many cities in North America and New Zealand. In 2010, the population density of Sydney was around 2,400 people per square kilometre.¹² By comparison, in 2013 London had an estimated 5,300 people per square kilometre and central Paris an estimated 3,800 people per square kilometre.¹³

Figure 7.3 Australia: population density, 2011¹⁴



Despite this relatively low population density, urban Australians experience daily traffic congestion and related issues, including higher business and freight costs. Increased congestion can adversely impact productivity, quality of life and the health of residents, as traffic movements and congestion are significant contributors to air pollution and greenhouse gas emissions.

Many urban residents rely on private motor vehicles to access employment, education and services.¹⁵ In 2011, 68% of people drove a car to get to

work¹⁶ and passenger car travel accounted for 72% of vehicle kilometres travelled.¹⁷ An average full time worker in Sydney travels six and a half hours each week, while a worker outside the NSW metropolitan area travels four hours per week.¹⁸

Reducing vehicle kilometres travelled in our cities will improve the liveability of our urban areas and contribute to improved population and environmental health.

Chapter 15C *Transport and Infrastructure* shows that, in metropolitan areas, the proportions of travel by car (approximately 85%) and urban public transport (approximately 11%) have remained steady over the past 30 years. This indicator also shows a plateau in total passenger kilometres travelled by car per capita in recent years, which was also related to a similar trend in greenhouse gas emissions from this car travel. These trends are likely to be related to increasing oil prices over this period, together with the impacts of the global financial crisis on household budgets. These factors appear to have combined to result in lower passenger travel and motorists purchasing smaller, more fuel efficient vehicles.¹⁹

Passenger vehicle kilometres are projected to increase by an average of 1.5% per year from 2011 to 2030, similar to the historical average.²⁰ The expected increase in passenger kilometres is driven by projected population growth and per capita travel, which in turn is driven by increasing income levels due to economic recovery.²¹

The passenger car fleet is projected to remain the biggest contributor to emissions from the Australian transport sector (around 47% of 2020 domestic transport output).²² However, emissions from heavy trucks and light commercial vehicles have been growing faster than emissions from passenger cars. Between 1990 and 2012, emissions from passenger cars increased by 19% to 42Mt; during the same period, emissions from heavy trucks and buses increased 65% to 19Mt, and from light commercial vehicles increased 77% to 13Mt²³. The increasing role of freight will also place extra strain on transport infrastructure, with growth in light commercial vehicles and heavy truck activity expected to grow faster than for private vehicles.²⁴

There is also growing evidence of the links between lack of access to transport and a range of social pressures, including feelings of isolation, lower feelings of wellbeing and higher chances of facing financial stress.²⁵ Other social and health impacts for people who spend many hours commuting each day include impacts on their psychological wellbeing and the quality of family relationships.²⁶

The role played by public transport (including heavy and light rail, and buses) varies across Australia's major cities. Perth has Australia's fastest and most frequent suburban train system, with major northern

and southern rail lines designed to provide an integrated 'rail-bus' link with regional bus services that have been redesigned to complement the new rail services.²⁷

While Sydney has Australia's highest usage rate and mode share of public transport (due to the large number of rail commuters), Brisbane's bus network carries more passengers per day on average than the city's train network.²⁸

CASE STUDY

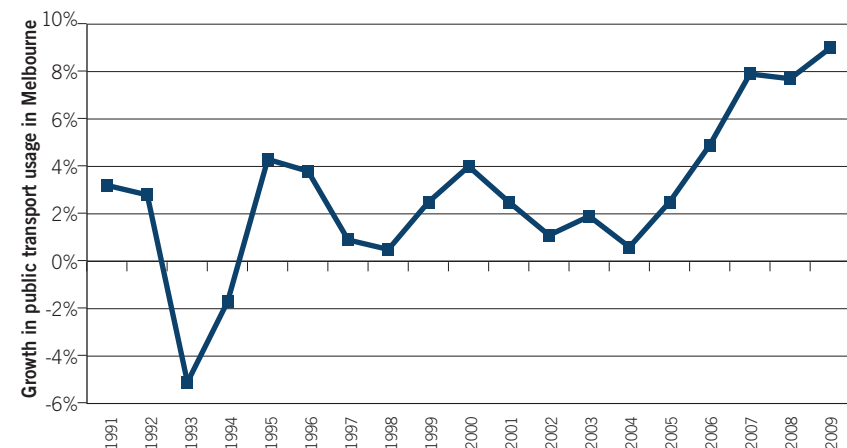
Increased public transport use in Melbourne

There have been some significant improvements in the use of public transport and other more sustainable transport modes within Melbourne's metropolitan area. Between 1998–99 and 2010–11, total metropolitan public transport patronage grew by 57%, with much of this growth occurring between 2003–04 and 2008–09.²⁹

This growth has been attributed to a number of key drivers, including strong population growth in Melbourne's outer urban areas and significant increases in petrol prices during the mid 2000s. Growth in central business district employment has also been identified as a key driver, given the predominantly radial nature of the city's train and tram networks.³⁰

A significant driver in the increased patronage of Melbourne's bus network (34% between 2005–06 and 2010–11) has been the introduction of SmartBus services and the Metropolitan Bus Improvement Program. The first SmartBus services were introduced in 2002–03 and are designed to complement Melbourne's radial train and tram network with cross-town and 'orbital' connections. These services have longer operating hours, higher service frequency and improved information at bus stops.³¹ The Metropolitan Bus Improvement Program increased the number and frequency of bus services.

Figure 7.4 Growth in public transport usage in Melbourne, 1991 to 2009³²



There is a growing divide between residents of inner and outer urban areas.

Outer urban developments extend further from existing urban infrastructure.³³ Local and state governments can find it difficult to meet the costs associated with the provision of adequate services and public transport. These services are often lacking when compared to those in established urban areas.³⁴

Recent studies indicate low levels of employment self sufficiency in many outer metropolitan growth areas (0.58 jobs per resident compared to a ratio of approximately one job for every resident for Australia's metropolitan areas in total), meaning residents in these outer areas spend more time each day travelling to and from work.³⁵

Many residents in outer urban areas have lower educational qualifications than residents of inner suburbs; for example, only 11% of residents living in areas covered by Melbourne's 'interface councils' (councils on the outskirts of Melbourne's urban area) hold a degree or higher qualification, compared with 24% of residents in areas covered by non-interface councils. This relative disadvantage grows when comparing access to health services: there are 11 hospital beds per 10,000 residents in the interface council municipalities, compared to 30 beds per 10,000 residents in the non-interface council areas.³⁶ The linkages between geographic location and disadvantage are discussed further in Chapter 12 *Inequality and Disadvantage*.

Our cities do well in many areas, but there are opportunities for improvement

Our cities perform well on a number of indicators.

Cities have a significant environmental impact in terms of resource consumption and associated waste generation, but there are a number of areas where Australian cities perform well internationally.

Urban air quality is generally very good, with concentrations of all pollutants usually falling well below our national limits.^b Residential per capita water consumption has decreased 35% over the past decade.^c This improvement has been driven by water efficiency innovations and behaviour change campaigns during drought years. Some Australian cities

are promoting high standards in areas such as emissions reduction, water use and green buildings. For example, the Sustainable Sydney 2030 plan outlines a green infrastructure master plan with trigeneration – the generation of electricity, heat and cooling from a single fuel source – renewable energy and water, and alternative waste treatment.³⁷

The Australian City Liveability Index notes that Adelaide has the highest proportion of residents who feel that their city has 'quality affordable housing' (59%) and 'good economic opportunity and quality of life' (59%) – demonstrating that competing objectives can be reconciled.³⁸

Brisbane's population increased from 1,714,320 in 2001 to 2,146,577 in 2011, a growth rate of 2.3%, well above the national average of 1.5%. Even with this rapid growth, the Australian City Liveability Index found that 68% of surveyed residents thought their city had 'quality urban design, recreational and cultural opportunities and amenity' and 74% agreed that the city had a 'quality natural environment'.³⁹

Challenges remain in improving the environmental impact of Australian cities. Although greenhouse gas emissions from electricity have recently begun to decline, energy consumption is high by world standards. The energy consumption of Australian households, excluding fuels used for transport, grew by 14% between 2000–01 and 2010–11.⁴⁰ Urban growth is likely to place ongoing pressure on urban energy networks to deliver reliable power supplies, although considerably more distributed electricity generation (such as solar photovoltaic systems) has been installed in Australia since 2001. Between 2001 and 2011, Renewable Energy Certificate data shows that the number of households installing solar energy units rose from 118 in 2001 to 85,550 in 2009, before sharply increasing to 639,803 in 2011.⁴¹ The number of Australian homes with solar photovoltaic systems exceeded one million in 2013.⁴²

There are many opportunities for greater efficiencies and better design to reduce the environmental impacts of our cities, improve economic performance and enhance community wellbeing.

Cities help to drive innovation through the co-location of services, knowledge and cultural activities, and this can be harnessed to improve the environmental performance of Australia's cities and improve quality of life for residents.

The introduction of ‘best practice’ accreditation tools for buildings, such as the Green Building Council of Australia’s ‘Green Star’ rating system and the ‘National Australian Built Environment Rating System’ (NABERS), together with the implementation of minimum standards for energy efficiency in buildings through the Building Code of Australia, has led to broad improvements in the performance efficiency of new and existing buildings over the past decade.

Many Australian cities are also witnessing a re-emergence of traditional community practices such as shared garden schemes and community markets, which provide an alternative to commercially produced food and promote social interaction and community cohesion.

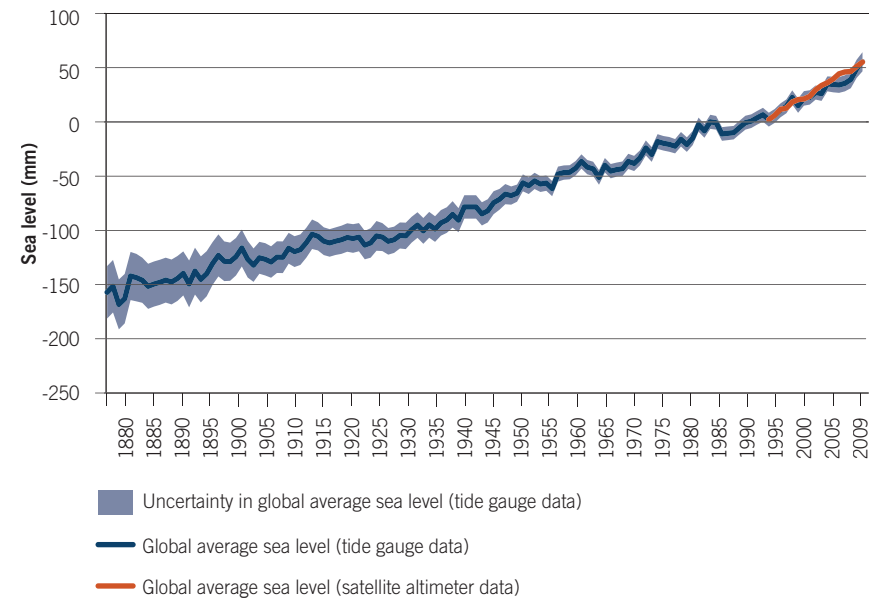
At the same time, the social elements of sustainability (which are rarely measured) can be enhanced through better urban design. Designing urban environments to promote cultural activities, sport, the arts, community gardens and other activities encourage people to interact and engage with their cities and build human and social capital. As the acclaimed urban design specialist and architect Jan Gehl has noted:

“First life, then spaces, then buildings: the other way around never works.”⁴³

Building sustainable local communities

Bowden Urban Village in South Australia is a ‘place making’ development initiative that has been driven by the policy and strategic objectives outlined in South Australia’s strategic and 30-year plans for Greater Adelaide.⁴⁴ Renewal SA – South Australia’s urban development organisation – has committed to 5 Star Green Star certified ratings or above across the entire development.

Figure 7.5 Global sea level change, 1880 to 2009⁴⁵



In 2012 the Green Building Council of Australia launched the pilot stage of Green Star – Communities, an independent, national rating tool to support the design and delivery of more sustainable, productive and liveable communities.⁴⁶ One development involved with Green Star – Communities, is Lend Lease’s Barangaroo South project on Sydney Harbour, which is planned to be Australia’s first large-scale carbon neutral community.

Building resilience and adapting to climate change must be a high priority for Australia's cities.

Along with rural and regional parts of our country, Australia's cities have experienced some devastating climate-related events in recent years, including floods and bushfires, and are not immune to future risks. Building resilience and capacity to adapt to existing and future climate impacts will be critical in reducing the vulnerability of Australia's cities to actual or expected climate change effects.

As shown in Chapter 14A *Climate*, sea level rise has increased from a global average of 1.7mm per year between 1900 and 2000 to 3.4mm per year between 2000 and 2009. Almost all of Australia's capital cities are located in coastal regions. Climate change adaptation must become an essential consideration for urban planning and development.

Most development decisions taken today have long term implications and paying for prevention upfront (for example, by investing in infrastructure to avoid the damaging effects of sea level rise or relocating essential infrastructure away from flood prone land) can avoid greater costs in the future: one dollar of prevention today can avoid as much as four dollars of post-disaster reconstruction expenditure.⁴⁷

The future of our cities depends on good governance and strategic planning, and smart investment in infrastructure.

The Council of Australian Governments (COAG) Reform Council's *Review of capital city strategic planning systems* found that "governments need to do more to plan better for economic development, land use and infrastructure in our cities".⁴⁸ This task is not an easy one and planners are under increasing pressure to accommodate a range of competing priorities in allocating urban land use, including economic and business objectives, amenity and community needs, and protection of the natural environment.⁴⁹ The task is made more complex by the allocation of funding responsibilities between different levels of government. Irrespective of whether infrastructure is funded by taxpayers, users or both, each infrastructure project is different and presents unique challenges.

Infrastructure delivery needs to be planned and managed effectively to support residents where they live and to facilitate ease of movement across our cities for those residents who work and access services outside their local areas.

QUESTIONS FOR THE FUTURE:

- How can we increase the density in our cities in a way that enhances our quality of life and preserves our choice of lifestyle?
- How can we create more sustainable and affordable buildings?
- How can we encourage the development of more mixed-use communities that have better access to services and public transport?
- How can we ensure the quality of the natural environment in our new urban developments?
- How can we reduce problems of congestion in our major cities?
- How can we make our cities more resilient to climate change and natural disasters?

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Notes

- (a) See Chapter 16D *Land Use* and Chapter 14C *Biodiversity and ecosystems*.
- (b) See Chapter 14B *Atmosphere*.
- (c) See Chapter 14D *Water*.

IMAGES

Brisbane skyline, Jenny Tomkins

Pedestrians on the streets of Melbourne's CBD, Alex Zuk

Early evening traffic on the streets of the Melbourne CBD, Alex Zuk



REGIONAL AUSTRALIA - ENSURING LIVEABLE, PROSPEROUS, SUSTAINABLE REGIONS

In brief...

- Regional areas are home to almost a third of the Australian population and make a vital contribution to our economy and society.
- People in regional areas are more likely to score lower than their city counterparts on a range of social and economic indicators, including health, education and wealth. Other indicators suggest that, on average, regional areas enjoy higher levels of community engagement and social capital than do cities.
- Regional industries such as mining, agriculture and tourism are vital to Australia's economic prosperity, but these industries – and the communities in which they operate – also face significant sustainability pressures.
- Regional Australia exhibits extraordinary demographic, social and environmental diversity. This diversity means that the sustainability challenges and opportunities facing regional areas are complex and differ markedly from one area to another.

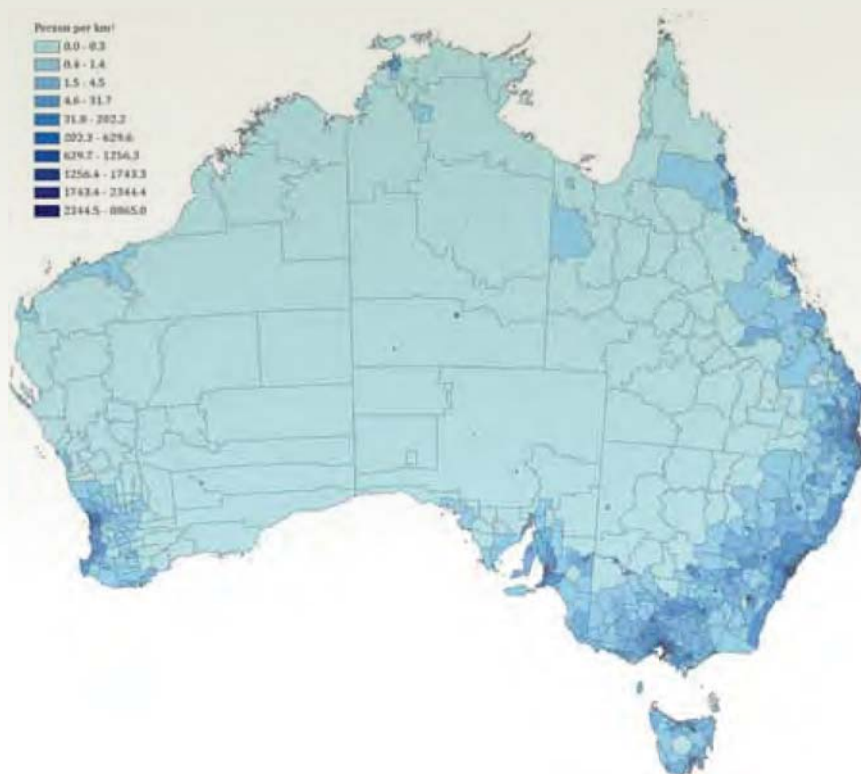
Regional Australia - ensuring liveable, prosperous, sustainable regions

Regional Australia's sustainability challenges

Australia's regions are home to around a third of our population. Diverse demographic trends raise a wide range of sustainability challenges.

Almost eight million Australians live in regional areas (outside our capital cities).¹ As shown in the figure below, this population is distributed unevenly throughout regional Australia, influenced by a range of demographic, environmental, economic and social factors.^a

Figure 8.1 Population distribution across Australia²

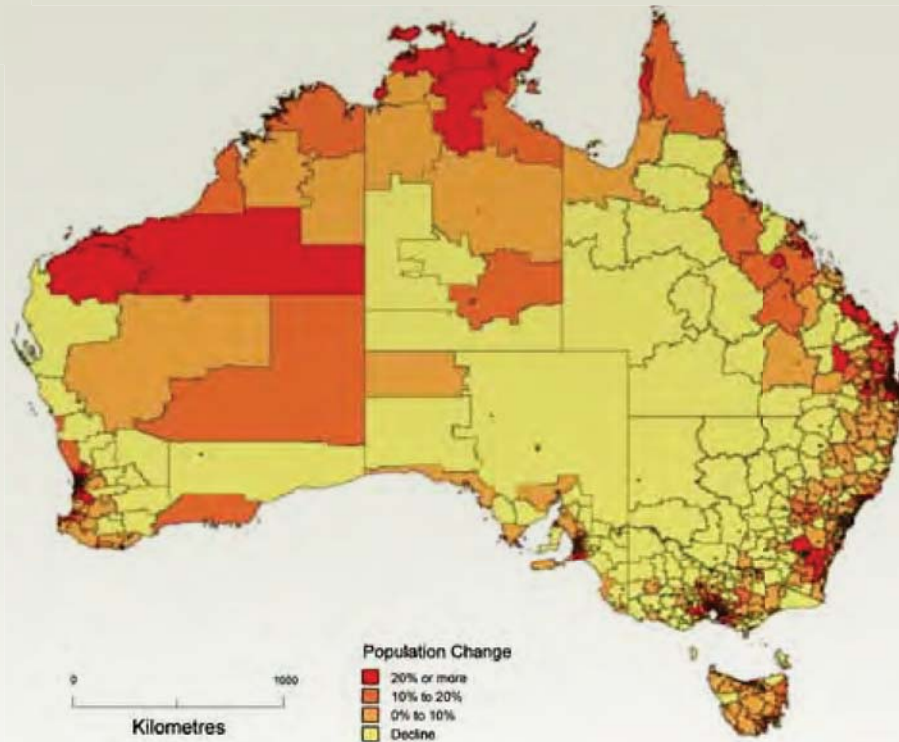


Many coastal areas saw significant growth over the ten years to June 2011, with large increases in population occurring in parts of Queensland's Gold (Pacific Pines – Gaven and Upper Coomera – Willow Vale both grew by 220%) and Sunshine Coasts, the area around Townsville (which grew by over 35,000 people or 25%) and south-west Western Australia.

By contrast, with drought and changes to industries, large population declines during this period were seen in some inland areas. Some of the largest proportional declines were in Coober Pedy and Outback South Australia with declines in population of over 25% over the period. In western New South Wales, the Narrabri Region (-20%, 1267 people), Bourke (-19%, 1,068 people) and Walgett – Lightning Ridge (-17%, 1,494) had the largest percentage declines. Mildura (-21%, 1021 people) and Gannawarra (-16%, 1207 people) in Victoria also had large declines.³

Some areas of regional Australia, particularly capital city satellites and some coastal regions, are struggling to accommodate growth and associated demands on infrastructure and services.⁴ For example, the 'sea change' phenomenon – increasing numbers of migrants from cities to coastal areas – is placing heavy pressures on many regional coastal communities.⁵

Figure 8.2 Population change in Australia 2001 to 2011, by Statistical Area 2 (SA2)⁵

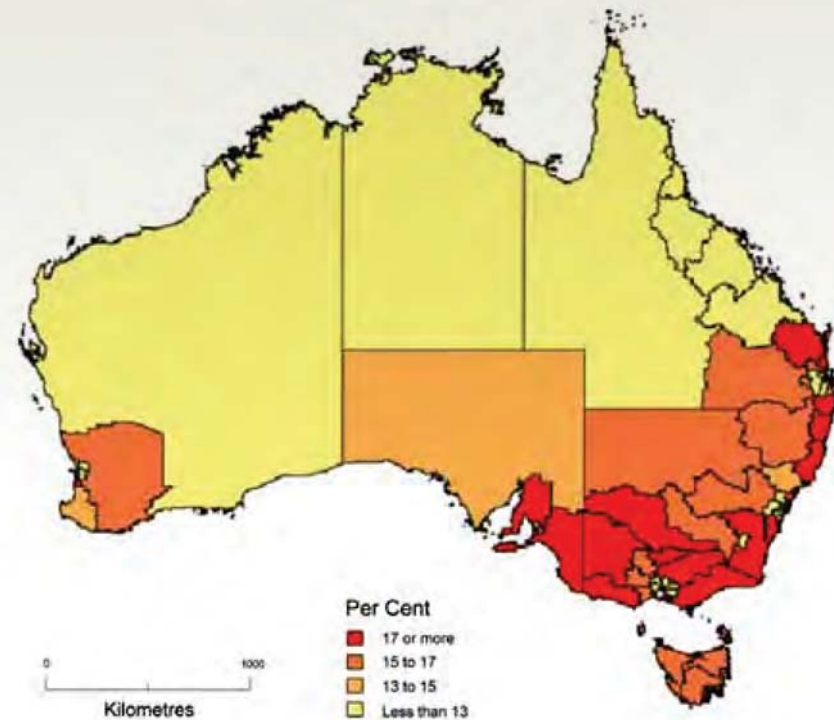


The trend towards increasing population in coastal areas has been driven partly by retirees relocating for lifestyle reasons. This skews the age structure, with some coastal areas having a very high proportion of people aged 65 years and over. Many areas have more than 20% of people aged 65 and over including the New South Wales Mid North Coast (24%), South Coast (22%), and Shoalhaven (23%), Victoria's Mornington Peninsula (21%) and Mandurah (20%) in Western Australia, compared with 13% in capital cities.⁷ This is driving a demand for health infrastructure and services in these regions, as well as impacting property prices and workforce capacity.

In contrast, some inland areas with smaller and, in some cases, declining populations are experiencing a different set of challenges. These include shortages in skilled workers and difficulties in accessing services (such as health and education facilities). Some factors that have been identified as barriers to attracting workers, such as negative perceptions about rural lifestyles and opportunities, have also contributed to a trend of young people departing rural areas.⁸

Employment opportunities are a major factor influencing the growth or decline in regional populations. In particular, people moving from outer regional and remote areas are most likely to cite economic factors as their reason for relocating. House prices are also highly dependent on the amount of jobs available within easy commuting distance.⁹

Figure 8.3 Population aged 65 years and over, 2011¹⁰



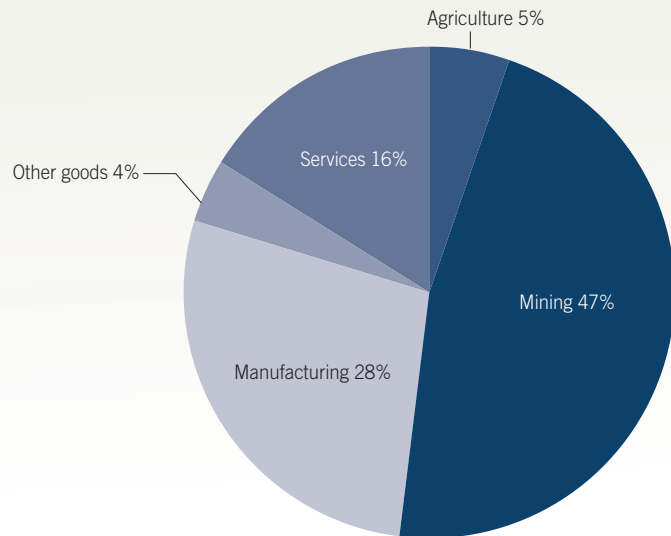
Improvements in technology and connectivity are likely to improve services in regional Australia where these can be provided remotely. This will include improved access to some medical services and educational opportunities.¹¹

Regional industries and sustainability

Regional Australia makes a significant contribution to our economic prosperity, with sectors such as mining and agriculture playing important roles.

The mining and agriculture sectors operate predominantly in regional Australia and are often closely linked with regional towns and communities. The mining sector generated around 47% of Australia's total exports of goods and services in 2011-12, with the agriculture sector contributing 5%.¹²

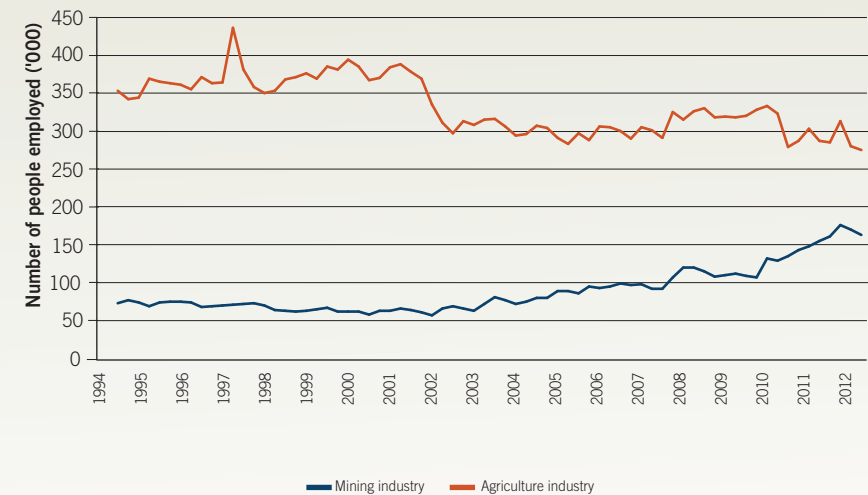
Figure 8.4 Share of exports, by industry of origin, 2011-12¹³



Mining is a significant employer in regional Australia; however, responses to labour shortages have resulted in pressures on local communities.

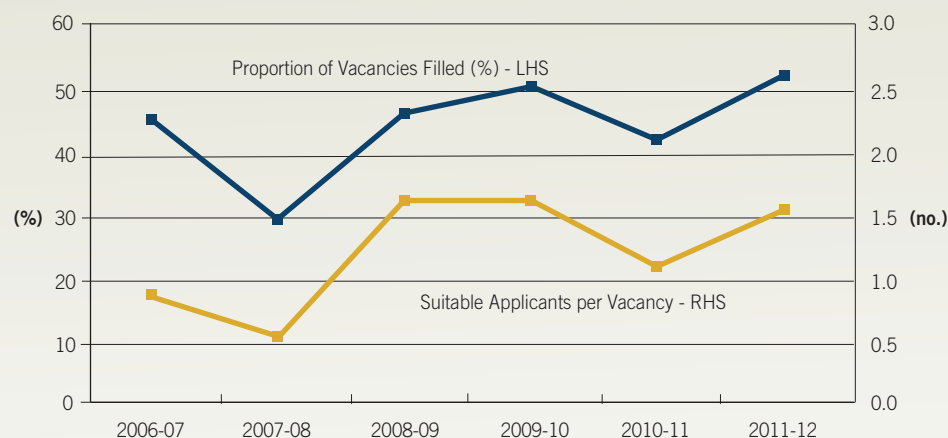
Between 2002 and 2012, the number of people employed in the mining industry in regional areas grew from approximately 55,000 to 153,000.¹⁴

Figure 8.5 Mining and agriculture employment in regional Australia 1995 to 2012¹⁵



The mining sector has experienced significant shortages of skilled workers, with vacancies in the resource sector among the most difficult to fill in 2011-12 with a relatively high proportion of applicants considered to be unsuitable.¹⁶ This has led to many mining operations becoming dependent on workers from outside the local area (so-called 'fly-in fly-out' workers) to fill labour shortages.¹⁷

Figure 8.6 Proportion of vacancies filled, resource sector occupations, 2006–07 to 2011–12¹⁸



Fly-in fly-out practices can create challenges in planning for and delivering adequate infrastructure and services for regional communities. Commonly identified concerns for communities that host fly-in fly-out workforces include:

- declining community image, identity and social cohesion, due to large influxes of non-resident workers
- negative impacts on community liveability, for example through declining community safety
- reduced engagement in community life.¹⁹

Fly-in fly-out practices also put pressure on community infrastructure in some mining communities. Often, existing infrastructure is inadequate to service both resident and non-resident populations, while current data collection practices do not reflect the transient population, with potential implications for ongoing levels of funding.²⁰

The agricultural sector is both an important contributor to Australia's economy and a source of jobs for many Australians in regional areas.

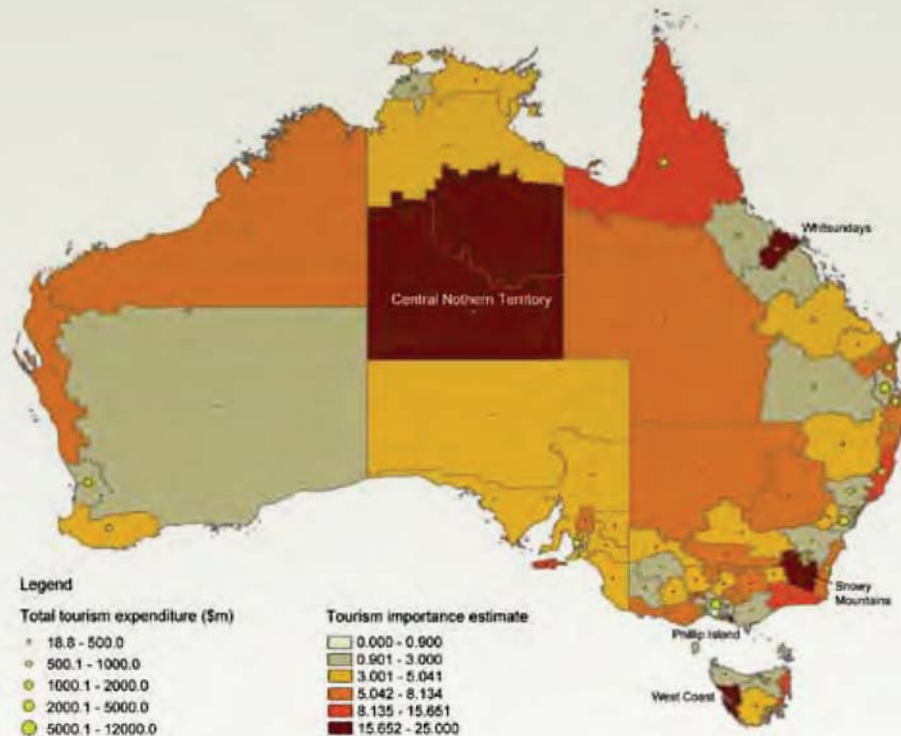
This sector has grown significantly in recent years: between 2009–10 and 2010–11, there was a 16% increase in agricultural production to a gross value of \$46 billion.²¹ Around 279,000 Australians were employed in agricultural jobs in the August quarter of 2012. In addition, almost all jobs in food production are located in regional Australia, which also contains about half of the nation's food processing and manufacturing jobs.²²

In recent times, the agricultural sector has experienced great pressure from changes in climate. Decreased water availability, poor water quality and high temperatures associated with climate change are likely to further negatively affect Australia's agricultural sector in the future.²³ Further discussion of these issues is included in Chapter 11 *Food and Agriculture*.

The tourism industry also makes important economic and social contributions in many parts of regional Australia, though like other sectors faces risks such as climate change.

Almost half (46%) of tourism expenditure in Australia is in regional areas, where the sector supports over 220,000 jobs.²⁴ Much of this expenditure is concentrated in regions such as the Gold Coast and tropical North Queensland. Nonetheless, tourism makes an important contribution to the economies of other communities with comparatively small tourism industries (such as the Whitsundays, Philip Island and central Northern Territory).²⁵

Figure 8.7 Economic importance and total tourism expenditure in 2007-2008²⁶



The tourism industry in Australia faces pressures including recovery from the global financial crisis in 2008, a lack of digital readiness and labour shortages.²⁷ Tourism in Australia is also likely to be affected by climate change, particularly given the focus of the industry's marketing on 'natural Australia'.²⁸

Regional communities face diverse sustainability challenges

Performance against social and health indicators is often lower for regional Australians than for their urban counterparts.

As shown in Chapter 13B *Health*, life expectancy is generally lower outside of our capital cities and tends to follow a strong socio-economic gradient.^b A number of health risk factors including smoking rates and obesity are higher in regional Australia than in the capital cities areas. Rural and remote areas generally also have more limited access to health care services.

Education indicators are generally lower in regional areas. Students in capital cities are more likely to meet national minimum standards (94%) than those outside the cities. This effect increases with increasing distance, with students in very remote areas much less likely to meet minimum standards (45%).

Indicators of community engagement suggest that regional communities enjoy higher levels of connectedness and social capital. Areas outside of capital cities have greater levels of community engagement, with a volunteering rate of 41% compared to 34%. Regional Australians are also more likely to participate in organised sport than their city counterparts (see Chapter 13C *Community Engagement*).

Regional communities face a diverse range of social, economic and demographic issues, which give rise to distinct sustainability challenges in different communities.

While some areas of regional Australia are increasing in population size and economic prosperity, other areas are facing issues of declining population and challenges in education and employment opportunities.

For some areas, increasing economic diversity could assist to drive growth and build resilience to changing economic conditions. More economic opportunities may generate faster growth as jobs, services and amenities attract people to settle in to regional areas.²⁹ However, this may not always be feasible for smaller towns or communities due to practical limitations associated with smaller populations.

QUESTIONS FOR THE FUTURE:

- How can we ensure our regions remain productive, prosperous and resilient in times of economic and demographic change?
- How do we build resilient communities that are able to prepare for and manage the growth and decline of their regional centres?
- How can we reduce the gap in social, economic and health outcomes between Australians living and working in regional areas and those in the cities?

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Notes

- (a) See Figure 20 in Chapter 6: Sustainable cities. More information on population distribution issues is included in Chapter 16A *Population*.
- (b) See also Australian Institute of Health and Welfare, viewed 9 April 2013, <http://www.aihw.gov.au/overweight-and-obesity/prevalence/>

IMAGES:

View of Townsville and Magnetic Island from Castle Hill, Mark Mohell
 Main street of Dalby in Queensland, Arthur Mostead
 Drought affected waterhole on property near Cudal, Michelle McAulay



CLIMATE CHANGE - IMPLICATIONS FOR AUSTRALIA'S SUSTAINABILITY

In brief...

- The climate is changing at global and local scales, making climate change one of the most significant sustainability challenges facing Australia.
- Per capita, Australia's greenhouse gas emissions are higher than any other developed country.
- Climate change will affect Australia's industry, infrastructure and ecosystems and will impact the physical and financial wellbeing of individuals and communities.
- Building resilience and our capacity to adapt to the impacts of climate change will be fundamental in maintaining wellbeing at national and community levels in the years ahead.

Climate Change - implications for Australia's sustainability

Climate change is one of the most significant sustainability challenges we face

Climate change is a long term and intergenerational concern, with consequences that extend across our economy, society and environment.

Climate change is not just an 'environmental' issue; it is an issue that has impacts across social, economic and environmental domains and all sectors of society. The climate we live in dictates to a large degree our quality of life and standard of living, the welfare and culture of communities, what people eat and drink (where it comes from and how much it costs), and the illnesses people may experience. These far-reaching implications mean that climate change must be a central consideration in our planning for the future.

Climate change will affect Australia's industry, infrastructure and ecosystems and will impact on the physical and financial wellbeing of individuals and communities

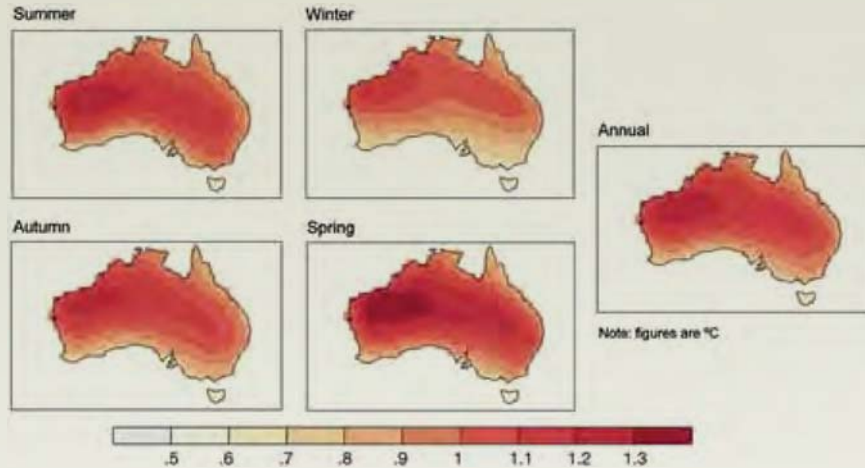
The choices we make today regarding greenhouse gas emissions and mitigation efforts will not only be to our own benefit; they will also shape the environment that future generations experience. Similarly, adaptations that we initiate today will determine the degree to which future generations are affected by a changing climate.

The climate is changing at global and local scales. These changes are set to continue over the coming decades, with major consequences for Australia.

There is strong evidence that the primary driver of climate change is the emission of greenhouse gases from human activity.¹ Increased concentration of greenhouse gases in the atmosphere traps heat, causing global temperatures to rise. Chapter 14A *Climate* shows how these global temperature increases are occurring in the Australian context. Importantly, climate change and the associated impacts may occur non-linearly or abruptly, which could see thresholds of coping capacity exceeded in short time periods.²

The 2012-13 summer served as a timely reminder of the conditions that can be expected with this climatic shift. It was the hottest summer that Australia has ever recorded, with a national average maximum of 35.7°C – 0.21°C above the previous record set in 1982-83 and 1.44°C above the 1961 to 1990 average.³ As illustrated in Figure 9.1, a significant warming trend is expected across Australia into the future.

Figure 9.1 Australia, predicted change in average temperature, to 2030⁴



In addition to rising average temperatures, climate change is expected to generate a range of other impacts including:

- changes in rainfall patterns
- greater variability and unpredictability in weather patterns
- more extreme hot, wet and dry events
- more frequent and more severe disasters such as fires, floods and storms
- rising sea levels
- acidification of oceans.

Australia's contribution to climate change

- In 2005, Australia emitted 28 tonnes carbon dioxide equivalents (t CO₂-e) of greenhouse gases per capita.⁵ This level of intensity is higher than any other developed country.
- By comparison, 2005 per capita greenhouse gas emissions in the United States were approximately 23 t CO₂-e and approximately 10.7 t CO₂-e in the United Kingdom, while the world average was 5.9 t CO₂-e per capita.⁶
- In 2011, Australia's net contribution to global greenhouse gas emissions (excluding emissions from wildfire) was 547 million tonnes CO₂-e.⁷ CO₂ accounts for the majority of greenhouse gases in Australia's inventory,⁸ with 383.5 million tonnes of CO₂ produced in 2010.⁹ Despite our high per-capita emissions, our emissions overall are significantly less than some of the world's larger economies such as China and the United States, which produced approximately 7.2 and 5.4 billion tonnes of CO₂ respectively in 2010.¹⁰
- Australia is on track to meet its Kyoto Protocol target of limiting average annual emissions between 2008 and 2012 to 108% of 1990 emissions.

Climate change impacts will be extensive and unprecedented

Variations in average temperature, rainfall and carbon dioxide concentrations, as well as the frequency and intensity of bushfires, are likely to reshape Australia's ecosystems.

The complexity of ecosystems and uncertainty of projected climatic changes make it difficult to determine exactly how Australia's natural environment will respond to climate change. It is clear, however, that climate change can be expected to affect the basic physical and chemical environment underpinning all life. We will see changes in the relative abundance of species, vegetation structure, distribution and range of species, and impact of invasive species, as well as genetic loss and the extinction of some species.¹¹

While ecosystems are dynamic and in a constant state of flux, the historically unprecedented rate at which the climate is changing may drive ecological imbalances and major structural shifts that could undermine critical ecosystem services as well as the cultural values we attach to biodiversity.¹²

Climatic shifts will have far reaching impacts on Australia's primary industries, changing what we are able to produce and where we can produce it.

Changes in average temperatures and rainfall, and an increasing incidence of extreme weather events are likely to reduce the quantity and quality of produce, as well as the reliability of production.¹³ The viability of certain industries may be threatened in some areas.¹⁴ Marginal production regions are some of the most vulnerable as they are less likely to have the adaptive capacity to remain viable in the face of climate change.¹⁵

Many of Australia's regional communities will face economic and social challenges as a result of climate change, potentially contributing to rural-urban migration as conditions for primary industries become more challenging.

Communities that are largely dependent on single industries face particular risks, especially where those industries are highly exposed to climate change, as is the case with agriculture and forestry.

Supporting the social and economic welfare of these communities is likely to be a key challenge in the future. Adaptation strategies such as planting of different forest types and transitioning to different land uses may be required.

Extreme weather conditions and inundation due to sea level rise threaten infrastructure.

Transport infrastructure – such as road, port and rail networks – is particularly susceptible to damage from extreme wet, dry, hot and cold conditions. The direct financial costs of potential damage to this vital infrastructure are substantial, however, indirect costs such as threat to human safety, the maintenance of critical supply lines and the commercial costs of delays greatly amplify the consequences of such damage.

The threat of inundation due to sea level rise is another significant risk for infrastructure. Under high-end scenario projections of a 1.1 metre rise in sea levels by 2100, approximately \$226 billion in commercial, industrial, civil and residential infrastructure in Australia could be under threat from inundation and erosion hazards.¹⁶

Decreasing precipitation and rising demand due to an increasing population may threaten the security of our water supplies.

Adaptation to diminishing water supplies will remain one of the key sustainability challenges for Australia and will require highly innovative approaches. Water security has been an area of considerable focus for governments across Australia. In addition to water conservation and enlargement of existing supplies, many governments are investing in less climate-dependant water sources including recycled water, stormwater harvesting, ground water, and desalination (with consideration for the environmental complexities of each source). Such measures will continue to be instrumental in Australia's adaptation to a drier climate.¹⁷

Increasing incidence and severity of natural disasters, as well as climatic extremes, will have financial, social and health implications for our communities and a disproportionate impact on some of our most vulnerable people.

Disasters such as bushfires, floods and drought cost Australia approximately \$1 billion per year on average.¹⁸ These costs are likely to rise with the increasing frequency and severity of such events in the future. These events can also lead to considerable mental health impacts including post traumatic stress, depression and anxiety.¹⁹

As average temperatures increase, heat related morbidity and mortality has the potential to rise.²⁰ Furthermore, air pollution and airborne allergens are expected to increase, driving up rates of respiratory illness such as asthma and lung cancer.²¹ Different sections of society will experience these impacts to greater degrees. For example, older generations are more susceptible to heat related illness.²²

Mitigation, adaptation and resilience

Effective mitigation and adaptation responses to build resilience to the impacts of climate change will be fundamental to Australia's future prosperity.

The resilience of Australia's economy, society and infrastructure to the effects of climate change will dictate our ability to prosper in the future

Strong international, national and local actions are needed to reduce greenhouse gas emissions and mitigate climate change. However, even with strong international action to reduce greenhouse gas emissions, some level of climate change is now unavoidable due to greenhouse gases already in the atmosphere. This means that adaptation strategies must form a significant component of our response and will be required across all sectors of society and the economy to manage the broad-ranging implications of climate change. Although there remains a lot of uncertainty around the future of Australia's climate and the impacts that will arise, uncertainty is not a reason to delay developing strategies for adapting to the impacts of climate change.

The resilience of Australia's economy, society and infrastructure to the effects of climate change will be a determining factor of our future prosperity. Resilience is not about preventing shocks and disturbances, but about maximising our ability to recover from them when they happen by ensuring that we have the flexibility and capacity for change.

A key priority for resilience building is diversification of our economy – ensuring that we do not have 'all our eggs in one basket'. For example, communities that are highly dependent on single industries such as agriculture or tourism often lack resilience, as any downturn in these industries can lead to the collapse of the community.

Australia's economy is most resilient when it is invested across a range of largely non-interrelated industries. While economic diversity should be an aspiration at regional levels as well as a national level, there are often practical limitations (such as limitations on physical, human and economic resources). Even where diversification across industries is not feasible, other adaptation and resilience building measures may be available. In the agriculture sector, for example, these may include transitioning to different crop types or using different genetic strains that are better suited to changing environmental conditions.

Efforts to build resilience to climate change across social, economic and environmental domains are likely to complement actions to deal with other sustainability challenges. For example, improvements in areas such as social connectedness, city planning and water efficiency will deliver multiple positive outcomes.

QUESTIONS FOR THE FUTURE:

- How can we build the resilience of our communities, environment and industries to the effects of climate change?
- What are the best ways for Australia to substantially reduce its greenhouse gas emissions and play its fair share in global emissions reductions?
- How can we make the most of the opportunities presented to us by a low-carbon future?
- How do we design climate change policies in a way that looks after the most vulnerable in our society?

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IMAGES

Dust storm near Mount Ebenezer, Allan Fox

Active fire front at the crossroads in Booderee National Park, Markeeta Freeman

Ice floes (sea ice) off Antarctica, McMorrow, Alison



REDUCING THE ENVIRONMENTAL IMPACT OF ECONOMIC GROWTH

In brief...

- Traditionally, economic growth has been highly resource-dependent, resulting in resource depletion and associated environmental and social impacts.
- In some sectors, Australia has demonstrated its ability to produce more with less, thereby reducing the resource intensiveness of our economy. However in general, economic growth in Australia is associated with the depletion of our natural capital stocks.
- One key mechanism for reducing the environmental impact of economic growth will be the integration of environmental considerations into business and public policy decision making. Most importantly, our decision making systems should:
 - account for the resources that are needed for the future;
 - consider how present operations may compromise the availability of these resources in the future; and
 - encourage stewardship of resources so that their quality is maintained.

Reducing the environmental impact of economic growth

Using and consuming our natural resources

Traditionally, economic growth has been highly resource-dependent, resulting in resource depletion and adverse environmental impacts.

Historically, economic development has been associated with a rapid rise in the use of natural resources such as energy, materials, water and land. These resources underpin human wellbeing and have been considered necessary for its improvement over time. As a result of growing global populations and increased economic activity, many natural resources are becoming less abundant relative to demand and some run the risk of critical scarcity in the near future.^a

Over the past 40 years, Australia has seen significant increases in population, together with economic growth that has brought associated improvements in living standards.

Between 1971 and 2011, the Australian population grew from 13.1 million to 22.3 million people, an average annual growth rate of 1.3%. Over the same period, real gross domestic product grew by an average of 3.3% per year.²

This growth has been associated with improved living standards and, on average, increased wealth. While there remain areas and groups that suffer from disadvantage, as a nation we are wealthier, better educated and can be expected to live longer than previous generations of Australians.

This growth and associated improvements have been accompanied by the use and consumption of natural resources.

As in most economies, economic growth in Australia in the 19th and 20th centuries was underpinned by the use, and in many cases depletion, of natural resources. This is illustrated by the high rates of natural resource consumption since European settlement – most notably, through land clearing and over-extraction of water resources.

Chapter 14C *Biodiversity and ecosystems* shows that 14% of pre-European ecosystems have been cleared, while a further 62% have been subject to varying degrees of disturbance. The vast majority of this clearing has been undertaken in eastern and south-western Australia and has been largely for agricultural purposes.

Inland water resources are another example of where Australia has drawn down on its natural capital to support economic growth. In particular, the Murray-Darling Basin has been under enormous stress over recent years, primarily as a result of past water allocations, which have at times reduced flows in major rivers such as the Snowy to just 1% of mean annual natural flow.³ In response to this decline, in 2012 the states, territories and Commonwealth governments agreed to the Murray-Darling Basin Plan, which provides a high level framework to manage the Murray-Darling Basin's water resources in a coordinated and sustainable way in collaboration with the community.

In addition to economic values, natural environmental systems provide a range of essential products and services that are essential for life and underpin wellbeing.

Some of these products and services include food, fibres, clean water, healthy and productive soils, medicines, protection against natural disasters, erosion control, carbon storage and timber products. The natural environment also provides recreational and aesthetic values.⁴

Without well-functioning ecosystems, the security of food and water supplies would be threatened; our ability to produce medicinal products would be reduced; the buffer capacity of the Australian landscape and seascape against climate change would be undermined; and the supply of essential materials and fibres for construction and clothing would be constrained.

Running down our natural capital risks serious economic and social implications and would undercut the wellbeing of future generations of Australians. A healthy natural environment in which biodiversity and functioning ecosystem processes are supported, is therefore an economic and social imperative.

For Australia to sustain the wellbeing of its population over the long term, we need to find ways of supporting economic growth without degradation of the environment and through wise stewardship of natural resources.

The imperative for economic growth needs to be balanced with an understanding that the wellbeing of current and future generations of Australians depends on the continued availability of natural assets of reasonable quantity and quality.

Reducing the resource intensity of our industries will be a critical step to ensuring the longevity of our natural resources and the sustained viability of our economy.

We are making improvements, but we need to do more

There have been significant improvements in the efficiency of water use over the past decade.

Over the past 10 years or so, Australia's agriculture sector has managed to increase the value of production while simultaneously decreasing water extraction.

Since 1950, most of eastern and south-western Australia (where most of Australia's population and agriculture are based) has become drier, including severe drought conditions throughout much of the 2000s. At the same time, demand for agricultural production has increased, driven by an increasing population and growing exports.

The gross value of irrigated agriculture increased from \$9.3 billion in 2003 to \$12.9 billion in 2011. During this same period, water use by the industry fell from 10,404 GL to 6,645 GL.⁵ While the increasing value of irrigated produce is partially influenced by increasing commodity prices over time (among many other factors), the lack of correlation between the two lines in Figure 10.1 indicates that the supply has not been constrained by reduced water use.

In many respects, these changes were driven by necessity and required new injections of capital into farm businesses as the extended drought during this period in southern Australia restricted water supplies. Nonetheless, the irrigated agriculture sector today is far more water efficient than a decade ago and provides an example of where we are working towards increasing economic growth without increasing environmental pressure.

Figure 10.1 Decoupling water consumption from production in the irrigated agriculture sector, 2003 to 2011⁶



It also demonstrates the importance of innovation to our continued economic growth. In this instance, when faced with a constraint (a lack of water), the management and regulatory structure of the agricultural sector responded, especially through the use of the water market and increased capital investment in on-farm and off-farm irrigation infrastructure, allowing continued growth through greater water efficiency.

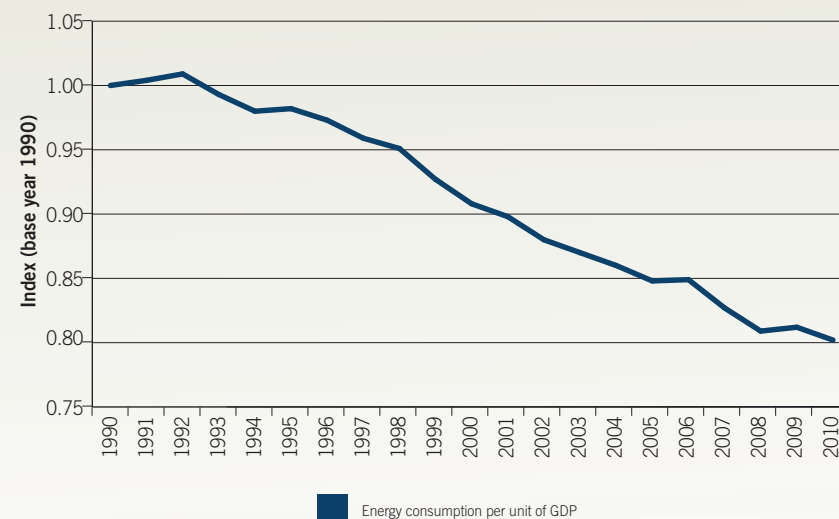
Overall, our economy is becoming more energy efficient; however, this is not occurring uniformly across all sectors.

There has been a long-term reduction in the energy intensity of the Australian economy (measured by comparing energy use to gross domestic product). Energy intensity has decreased by 1.3% on average each year between 1990 and 2010.⁷

These declines were mostly seen in the services (0.7% annual decrease), manufacturing (0.7%), transport (1.3%) and residential sectors (0.3%).

Reducing the intensity of energy use in our economy can have multiple benefits, including reducing costs to households and businesses, avoiding some greenhouse gas emissions and reducing other pressures on the environment associated with extraction of fuel resources and water use.

Figure 10.2 Energy intensity of the Australian economy, 1990 to 2010⁸



There have been significant differences in trends in energy intensity across sectors. While most sectors have experienced declining energy intensity, mining and agriculture have experienced annual increases of 2.3%^b and 1.1% respectively.⁹

Relative decoupling refers to increasing overall resource use (or waste production, as is the case with greenhouse gas emissions) despite the reduced resource intensity of production.

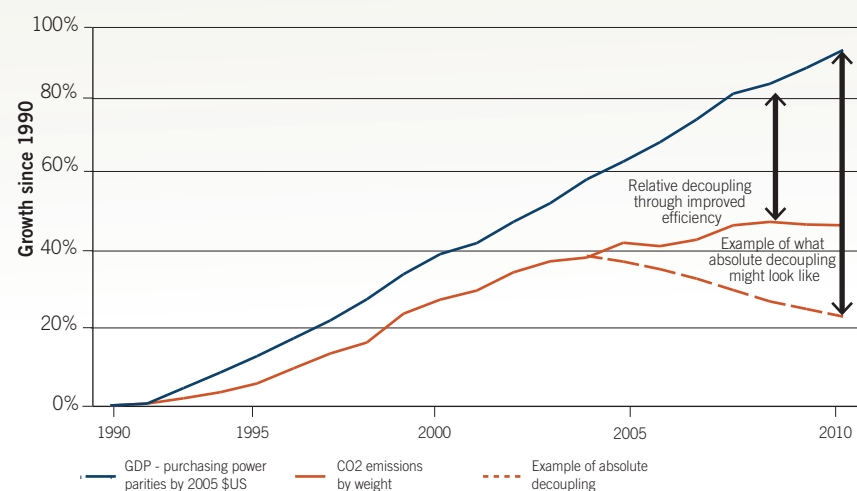
This is in contrast with the more desirable **absolute decoupling** (as seen in the agriculture example above), which refers to a net reduction in resource use while maintaining economic growth.

While the energy intensity of Australia's economy is generally improving, our net carbon dioxide (CO₂) emissions continue to rise. As such, there remain significant challenges in decoupling economic growth from greenhouse gas emissions.

Over the last two decades, Australia's economy as measured by GDP has grown by 94% in real terms, from US\$426 billion in 1990 to almost US\$825 billion in 2010.^c Over the same period, CO₂ emissions have grown by 47%, from 260 million tonnes in 1990 to 384 million tonnes in 2010. This means that Australia's economy now produces 24% less CO₂ per dollar of GDP than it did in 1990.¹⁰

However, while emissions per dollar of GDP have reduced, our net emissions are much higher than they were in 1990 and continue to rise. Figure 10.3 illustrates how this still leads to a net increase in environmental impact despite gains in efficiency. This is an example of *relative decoupling* as opposed to *absolute decoupling*.

Figure 10.3 Growth in Gross Domestic Product and carbon dioxide emissions in Australia, 1990 to 2010¹¹



Integrating environmental considerations into our decision making

A sustainable future requires not only gains in efficiency but also the integration of environmental considerations into business and public policy decision making.

The failure of our economic systems to value the natural environment has encouraged short-term economic growth based on the depletion of natural capital and without taking into account longer-term economic and social implications of this environmental degradation.¹²

Current modes of economic growth and ways of measuring societal progress need to be reconsidered so that they account for the resources that are needed for the future; consider how present operations may compromise future resource availability; and encourage stewardship of resources so that their quality is maintained.

The tendency to look to GDP as the principal measure of a nation's wellbeing is of particular concern in this regard. While GDP generally correlates with increasing incomes in many sectors, it can disguise significant underlying problems. GDP can continue to grow even while the state of the environment worsens and our social connections erode, providing no indication of the impending economic and social consequences. Recognition of the need to move away from GDP as a single measure of progress has driven a growing international discussion on broader based measures of progress and wellbeing.

Initiatives such as the *Inclusive Wealth Index* provide frameworks for attaching financial values to social and environmental services. This index, in addition to valuing non-monetary forms of capital, measures growth as a function of a country's net wealth across all types of capital.

Integrating environmental value into business and public policy decision making is an essential step towards sustainability. Governments and the private sector have the capacity to drive significant change and face imperatives to do so. Resource scarcity, declines in biodiversity and degradation of ecosystem services present tangible risks and opportunities. This is especially the case for institutions and businesses with significant community or client bases that are directly dependent on natural capital resources, including those operating in sectors such as fishing, agriculture and tourism. It is also vitally important to the future of communities that are reliant upon these industries, as well as those communities based on industries with large environmental footprints such as mining.¹³

Many businesses are already making this transition to a new way of thinking that recognises the value of the natural environment to their businesses. Increasing private sector support for the *Natural Capital Declaration* is a key indicator of this. The Natural Capital Declaration is a commitment by financial sector CEOs and companies to work towards integrating natural capital considerations into their financial products and services. Businesses are becoming signatories to this declaration not out of altruism, but through the understanding that it is in their commercial interests to prepare for and manage the future risks presented by environmental harm.

QUESTIONS FOR THE FUTURE:

- How do we use natural resources more efficiently to preserve our natural capital for future generations?
- How can we create incentives for business to integrate sustainability considerations into their decision-making processes?

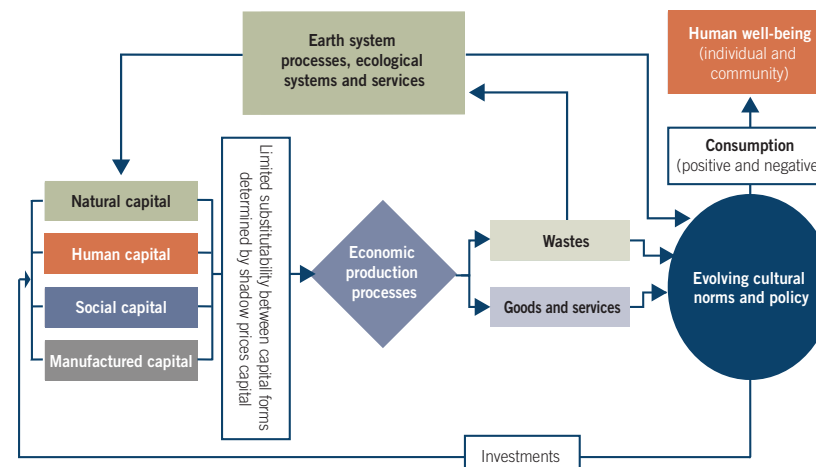
CASE STUDY

The Inclusive Wealth Index

The *Inclusive Wealth Index* (IWI) was developed by the United Nations Environment Programme (UNEP) together with the United Nations University International Human Dimensions Programme (IHDP) on Global Environmental Change.

The Index measures the wealth of nations based on an analysis of the capital assets of countries that are passed between generations and are critical to sustaining future needs. These assets include manufactured, human and natural capital. The Index indicates whether we are eroding the productive base that supports our ongoing wellbeing.

Figure 10.4 Exchanges between the productive base and human wellbeing¹⁴



The Index calculates the financial value of each form of capital by assessing its various components – for example, average rental prices of crop and pasture land, the economic value per tonne of marine biomass, and the expected economic value of the educational attainment of individuals.

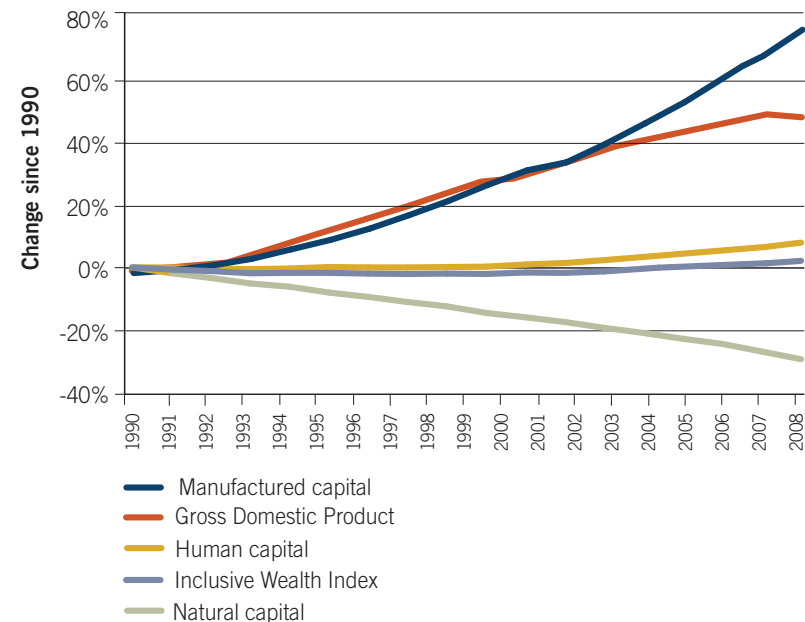


The Index has limitations, including its inability to account for types of capital that defy both measurement and substitution (for example, biodiversity and the availability of clean drinking water). However it can provide insights into the balances and trade-offs being made between different forms of capital. For example, it can provide an indication of the degree to which growth of one type of capital impacts the stocks of another.

Results for Australia for the period 1990 to 2008 indicate that while the per capita growth rate of our GDP was 47%, our growth rate under the Inclusive Wealth Index was only 2%. The significant difference between this Index and GDP could be explained by an estimated 27% per capita depreciation of our natural capital (as assessed using the IWI methodology). These trends pose a risk to future economic growth.¹⁵

Our low growth rate under the Index suggests that continued prosperity requires us to increase our investments, especially in natural capital stocks, through such means as increasing biodiversity conservation, improving water resources, increasing soil carbon, and ensuring the sustained viability of fish stocks.

Figure 10.5 Overall per capita changes in Inclusive Wealth Index, Gross Domestic Product, manufactured, human, and natural capital in Australia, 1990 to 2008¹⁶



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Notes

- (a) See for example United Nations Environment Programme (2011), *Decoupling natural resource use and environmental impacts from economic growth: A report of the Working Group on Decoupling to the International Resource Panel*
- (b) Energy intensity estimates for the mining sector do not include analysis of the structural effects in the sector due to a lack of sub-sector data. As a result of this data limitation, mining sector energy intensity information should be treated as a preliminary analysis only.
- (c) All US dollar figures are set to 2005 values.

IMAGES

Aerial views of the Kimberley Rangelands and coastline, Dragi Markovich
Wheat crop on field used for rice crop the previous season, Arthur Mostead
Heavy pollution billowing from the smoke stacks, Michelle McAuley



FOOD & AGRICULTURE – SUSTAINABLE PRODUCTION AND PRODUCTIVITY IN A CHANGING LANDSCAPE

In brief...

- Our food and agricultural sectors are important contributors to Australia's economy and society, especially in regional Australia.
- Several factors will shape our food and agriculture sectors into the future, including demographic change and changing consumption preferences within Australia and opportunities presented by the growing demand for agricultural produce globally, particularly from Asia.
- Australia faces a range of pressures on our natural resource base – particularly our soil and water resources – that need to be managed if agricultural production and food supply are to be maintained and improved into the future.
- The impacts of climate change also present major challenges to agricultural production in parts of Australia.
- Australia's agricultural know-how has the potential to make an important contribution to global food security as well as helping us adapt to existing and future challenges to food production in Australia.

Food & Agriculture

Our vital food and agricultural sectors

The food and agricultural sectors continue to be important contributors to Australia's economy and society.

The agricultural sector^a is an important contributor to Australia's society and economy and continues to grow in absolute terms, despite a recent decline relative to the rest of the national economy. The value added by the agricultural sector accounted for 2.4% of GDP in 2010–11 (down from 3.5% for most of the 1990s) and 306,700 persons were employed in the sector (down from 324,800 in 2009–10). The value of Australian farm exports has increased at an average of 5% per year over the past three decades.¹ Beyond their roles as sources of nutrition, food production and consumption, the food and agricultural sectors generate important employment opportunities, drive tourism activities, underpin regional economies and make up important parts of our society and culture.

The food and agricultural sectors play an important role in many regional communities across Australia.

The food and agriculture sectors make a strong contribution to regional employment, with 7.5% of jobs in regional Australia in agricultural production. This figure is significantly higher in some areas - for example, 23.9% of jobs in the Lower Murray in New South Wales and 29.9% in the Southern Wheat Belt in Western Australia are in the agriculture sector.² Further, over 90% of jobs in food production are located in regional Australia.³

CASE STUDY

Food Innovation Precincts

The Australian Government has committed to establishing up to 10 Industry Innovation Precincts, including one devoted to the food sector. The Food Precinct will bring together industry, government, universities and researchers and business along the food supply chain (primary producers, transport, processing, packaging, marketing and retail), with the aim of promoting growth for the sector through training, improved networking and collaboration, and innovation and productivity improvements.

The Food Precinct will encourage the sector to become more strategic and commercially targeted, and to develop the consumer insights needed to take up new opportunities and enter new markets. It will also aim to build the export readiness the sector needs to take advantage of growth opportunities for the industry, particularly in Asia.

The Food Precinct will be based in Melbourne, but linked nationally to existing networks in the sector. It will be governed by an industry-led board and include representatives from businesses, the research sector and other stakeholders.⁴

Factors shaping the future of food and agriculture

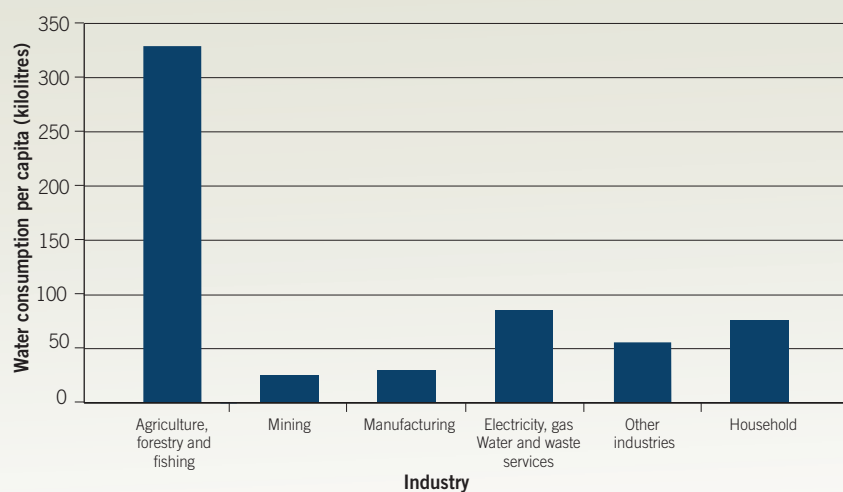
With responsibility for over half of the Australian landmass, the management techniques used by farmers have significant implications for the health of our environment and natural resources.

In 2011, 53% of land in Australia was used for agricultural purposes⁵ and – as Chapter 14D *Water* shows^b – the agriculture sector (including forestry and fishing) was the largest per capita consumer of water, accounting for 55% of Australia's water consumption (mostly for irrigation of crops and pastures).⁶

However, the same sector recorded the greatest decrease (57%) in per capita water consumption between 2001 and 2011.

Australian farmers have long recognised their role as stewards of the land and many are actively engaged in efforts to minimise environmental impacts and to use natural resources – such as water – more efficiently. The recently released *Blueprint for Australian Agriculture: 2013–2020*, an initiative of the National Farmers' Federation, notes the important role of farmers as stewards and sets goals for managing natural resources into the future.⁷

Figure 11.1 – Per capita water consumption in Australia, 2011¹⁰

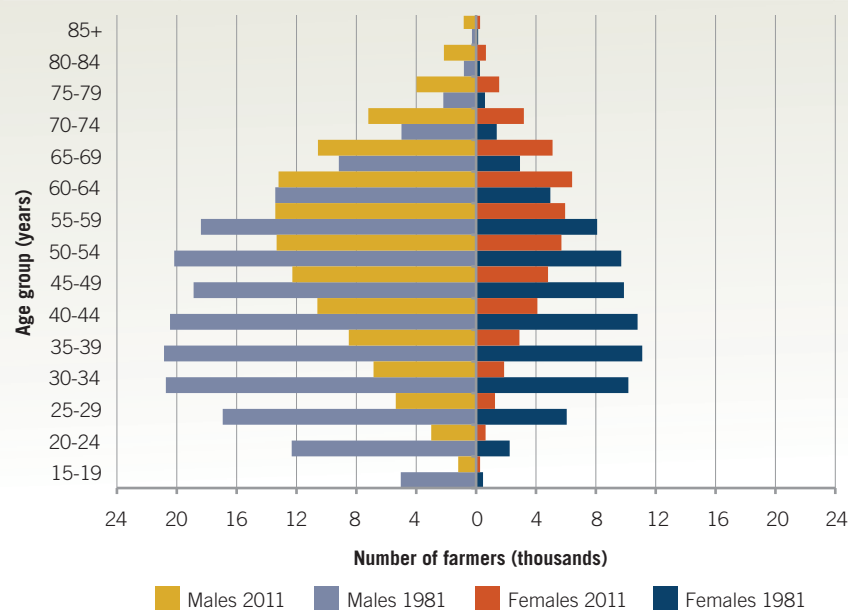


Tracking of trends in farmers' land management practices demonstrate that increasing numbers of farmers are adopting practices to improve productivity and deliver higher quality ecosystem services - for example, cleaner air and water, and better protected biodiversity - to the community beyond the farm gate. Such practices include reducing soil loss through wind and water erosion, and storing carbon.⁹

Australia's ageing population and other demographic factors are shaping our agricultural sector

The number of farmers in Australia has been declining for many decades, as small farms are bought by large-scale farming operations, the farming workforce ages and more people have moved to larger regional centres or cities.^c Over the 30 years to 2011, the number of farmers has declined by 40%.¹⁰ As a result, some regional communities that are heavily dependent on agriculture have experienced declining populations, with the generation aged in their 20s and 30s 'missing' from their communities and leaving resulting gaps in the local labour pool.¹¹ The number of university students studying agriculture subjects has been declining, which may lead to insufficient numbers of researchers and professionals in the field of agriculture in the future.

Figure 11.2 – Age profiles of Australian farmers, 1981 and 2011¹²



Improving the food production and supply chain to reduce food waste

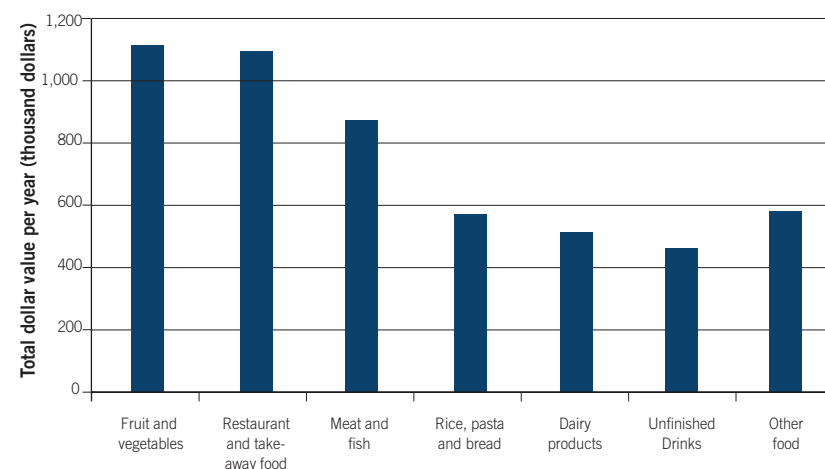
Food waste is a significant sustainability issue. Wasted food in landfills creates harmful greenhouse gases such as methane, with household food waste estimated to account for 33% of emissions from solid waste in landfill in 2004.¹³ It also means the energy and water used to produce, transport and supply the food has been wasted. Food is lost or wasted through the production and supply chain, from initial agricultural production through to final household consumption. In developed countries such as Australia, significant losses occur at the food consumption stage.¹⁴

Globally, it is estimated that roughly one-third of food is lost or wasted, which amounts to about 1.3 billion tonnes per year.¹⁵ In Australia, food waste constitutes 35% of municipal waste and 22% of commercial and industrial waste.

Households waste approximately 15% of the food they purchase per year,¹⁶ and it is estimated that food waste (packaged or in other forms) accounts for 73% of waste generated by supermarkets. This all amounts to an estimated 361 kilograms of food waste per person each year,¹⁷ with an estimated annual value of \$5.2 billion.¹⁸

Innovative Australian organisations – such as OzHarvest, FareShare and FoodBank – are taking action to address this problem through redistributing unused or excess food to disadvantaged Australians. In 2010–11, FoodBank distributed 24 million kilograms of donated food and groceries to more than 2,500 charities and community groups across Australia, providing around 32 million meals in total – or 88,000 meals a day.¹⁹

Figure 11.3 - Value of food wasted each year, by food type ²⁰



Such initiatives provide important social benefits, such as improved health and wellbeing outcomes for disadvantaged Australians and a greater sense of community engagement. They also benefit the environment through reducing waste to landfill and associated greenhouse gas emissions.²¹

Changing consumption patterns in Australia are also an emerging factor shaping our food and agricultural sectors.

Changing consumption patterns are driven by many factors including an ageing population, convenience considerations, food health and safety concerns, and ethical concerns about the treatment of animals and the environmental impacts of food production. These new consumption patterns drive changes in the types of food being produced and food production methods.

For example, while organic farming currently only accounts for an estimated 1% of retail turnover in Australia, growth has been significant and is anticipated to continue, with the organic food and farming industry experiencing an estimated 50% growth between 2008 and 2010.²² Similarly, industry estimates suggest that demand for Fair Trade produce has grown significantly, with retail sales of Fairtrade Certified products in Australia and New Zealand increasing by almost 200% between 2009 and 2010 to nearly \$150 million.²³

Australians are also eating more pre-prepared, processed and take-away foods, with corresponding increases in the number of people who are overweight, obese or who experience diet-related illnesses²⁴ – a trend that may continue to affect the type of food in demand into the future.

Some parts of our society face challenges in being able to access and afford healthy food.

Most Australians enjoy access to a diverse range of safe, affordable and nutritious food.²⁵ However, some Australians in regional and remote communities, or those on low incomes, may face challenges in being able to access and afford healthy food.²⁶ The prices of food and non-alcoholic beverages have risen in the last decade, although average incomes also increased during this period. Food price increases are felt more by low-income households – for instance, in 2009–10, food accounted for 19% of the expenditure on goods and services of low-income households, compared to 15% for high-income households.^d

Emerging opportunities for Australian food production and agriculture

Global trends in population change present opportunities for Australia's agriculture sector into the future.

Currently, Australia's food exports are estimated to contribute to the diets of about 60 million people - less than 1% of the world's population.^{26a}

By 2050, the world's population is expected to reach 9.1 billion and global demand for food to increase by 70% on its 2007 value.²⁷ The increase in food demand will be greatest in Asia, where demand is projected to double between 2007 and 2050, with China accounting for 43%, and India 13% of the global increase in food demand.²⁸

Globally, demand is expected to increase the most for vegetables and fruit, meat and cereals. Dairy products, meat and fish are projected to increase their proportion of the global food market to the greatest extent. In China, demand is expected to increase for meat, vegetables and fruit, and fish. Consequently, the composition of Australia's exports is expected to change through to 2050. For example, the share of meat in the total value of Australian food exports is predicted to increase from 48% to 52%.²⁹

Australia has a comparative advantage in the production of a number of these agricultural commodities and could benefit from our close proximity to Asia.³⁰ However, competition is likely to come from other key exporting nations and increased production from developing countries.

Increases in food production in Australia need to be managed carefully to avoid adverse environmental and social impacts.

Natural resources such as soil and water are critical to food production. Increasing agricultural production risks placing greater pressure on our natural resources (for example, impacts on biodiversity from potential land clearing) and will likely occur alongside expanding demand for these resources for other purposes, such as urban development. Access to adequate infrastructure will also be an important issue to consider – especially alongside competing uses for road, rail and port infrastructure.³¹

The state of Australia's natural resources raises a number of challenges for agricultural productivity. In particular, key indicators of soil condition, such as soil erosion, acidification and carbon dynamics, point to a decline in soil condition.³² Acidification affects about half of Australia's agriculturally productive soils. If not corrected it can continue until the soil is irreparably damaged. The severity and extent of acidification is increasing in many regions, due to inadequate treatment, the intensification of land management (maintaining or improving economic returns through increasing the concentrations of inputs, such as nutrients and energy, and management effort³³) or both.³⁴ Dryland salinity is also a major cause for concern in Australia. Further, water supplies in Australia have experienced periods of high stress in recent years, although recent rainfall and better water management have helped to reduce this stress.^e

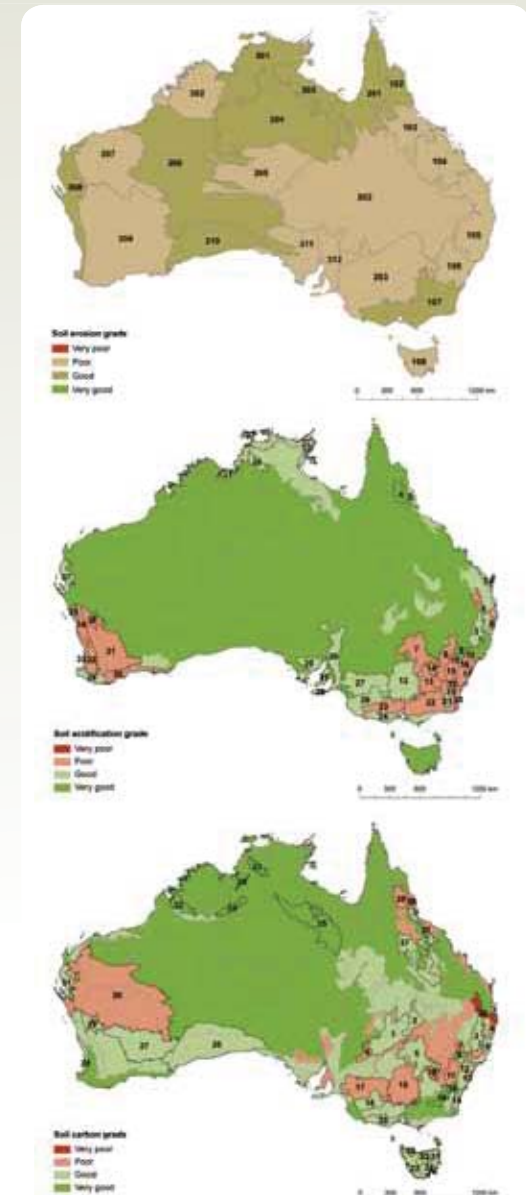
The long term sustainability of food production in Australia will depend on the effective and efficient management of our natural resources, particularly soil and water (see Figure 11.4).

Figure 11.4 – Maps showing soil erosion grade, acidification and carbon grade in Australia³⁵

Soil erosion from water and wind can compromise agricultural yields and returns. Soil erosion presents significant problems for a large proportion of the Australian landscape.

Soil acidification—which, if not corrected, can irreparably damage soils—affects about half of Australia's agriculturally productive soils.

Soil carbon stocks—central to maintaining soil health and ensuring food security—are low in many Australian agricultural systems.



The rise of aquaculture

Global population growth continues to drive growing demand for seafood.³⁶ However, many now agree that it is not possible to meet this growing demand through harvesting wild fish stocks, as 85% of the world's marine stocks are either fully exploited or overfished.³⁷ Aquaculture – an alternative to harvesting naturally occurring wild fish stock – may assist in meeting the growing demand for seafood. Indeed, aquaculture is the fastest growing food production system in the world.³⁸

In 2010–11, the gross value of production of Australian aquaculture was \$948 million, or 43% of the total value of Australian seafood production. In quantity terms, Australian aquaculture production for 2009–10 increased 5% over the previous year.⁴² Aquaculture also provides economic opportunities in regional Australia.

While Australian aquaculture is subject to strict environmental controls, aquaculture operations present several challenges including the costs of approval for specialised veterinary chemicals, disease control and costs associated with managing nutrient 'pollution' from food and fish waste. Many aquaculture operations also require significant amounts of wild fish to make fishmeal and fish oil, creating competition with other animal production sectors such as pigs and poultry, which are traditional users of these products.

Climate change challenges

The impacts of climate change present major challenges to agricultural production in Australia.

Climate change is expected to pose significant challenges to agricultural productivity through increasing temperatures, lower rainfall overall in parts of Australia and increasing incidence of extreme weather events (such as drought and floods).⁴⁰ Droughts already have an ongoing and pronounced affect on Australian agricultural enterprises and any increases in their frequency and intensity may severely affect the viability of agriculture operations in certain regions. There may also be indirect effects on agricultural production through changes in the incidence of diseases and pests, and increased rates of soil erosion and degradation.⁴¹

Uncertainties remain about the likely effects on particular regions and industries, with some models predicting an increase in agricultural productivity and others suggesting a substantial fall in productivity in many regions. However, there is growing consensus among climate scientists that the southern half of Australia is likely to become drier under the influence of higher global temperatures, with drier summers in the northern region with potential slight increases in annual rainfall.

As a result, some regions that are highly dependent on agriculture could experience considerable economic losses as a result of climate change. For example, some projections estimate that the productivity of wheat growing in the Western Australian wheat belt is expected to be 7% lower than it would be in the absence of climate change, in contrast to a 4% decline in the New South Wales region.^f However, adaptation to the impacts of climate change, including improved farming technologies and practices, could reduce the size of these losses.⁴² Changes in rainfall resulting from climate change are also expected to have a greater impact on the productivity of crop industries than livestock industries. It will be important to consider the impacts of climate change (including on key agricultural industries) in regional planning to support the wellbeing of these communities into the future.

Food supply and natural disasters: the Queensland floods

A crucial sustainability issue for all Australians is the extent to which our food supply chain is resilient in the event of a crisis or emergency.⁴³ For example, during the Queensland floods in December 2010–January 2011, Rockhampton (with a population around 75 000) was cut off by road, rail and air for two weeks, and Brisbane came within a day of running out of bread for its population. While there were no reported instances of communities going hungry, this was only “through massive effort on the part of both the food industry and authorities”⁴⁴ – for example, using vehicles from interstate, large amounts of voluntary overtime by trucking companies and employing alternative means of transporting food (such as barges).

The experience highlighted several issues that need to be addressed to build food supply chain resilience, including:

- loss of a number of food distribution centre facilities
- loss of a number of transport links to and between major cities
- fuel shortages
- workforce availability constraints
- extended disruption in access to key foods or inputs to foods produced overseas
- concurrent disaster events (for example, fires in one state and floods in another would mean another state’s resources – such as vehicles and emergency service personnel – may not be available)
- the need for greater understanding, especially among younger and socially vulnerable consumers, of alternative food sources and cooking methods.^g

Adapting to future challenges to food production and supply will depend on Australia’s agricultural know-how, which also has the potential to make a significant contribution to global food security.

Research, ingenuity and innovation have driven impressive productivity and efficiency improvements within Australian agriculture and helped to manage climate variability. Existing knowledge and continued innovation will be critical to improving the resilience of the Australian agricultural sector in the face of changing environmental conditions and the challenges presented by climate change. Innovation and investment in research and development will become increasingly important in the face of predicted increases in the occurrence of extreme weather events, and ongoing land and water constraints.⁴⁵

Australian agricultural research is well regarded internationally.⁴⁶ In Australia, public investment in agricultural research and development increased over the past 50 years, from \$131 million in 1952–53 (2006–07 dollars) to around \$778 million in 2006–07. The share of total agricultural research and development funded by the public sector has generally been more than 90%, although by 2007 this had decreased to around 80%.⁴⁷ However, agricultural research spending has been stagnating, such that “Revitalising investment in agricultural research and development will be important in efforts to lift Australia’s food output, which could play a role in improving food security in our region.”⁴⁸

Ultimately, “our most valuable assets to support food security in our region and the world are our knowledge of agricultural science, and the ingenuity our farmers have used to produce food on a continent fraught with environmental challenges”.⁴⁹

QUESTIONS FOR THE FUTURE:

- How can Australia best position itself to take advantage of emerging markets in the region while at the same time managing pressure on our resources?
- What are the most promising opportunities for Australia to improve the sustainability of our soil and water resources for future generations?
- How might Australia ensure its agricultural production systems and food supply chains are resilient to the impacts of climate change?
- What are the opportunities for Australia to contribute to global food security?

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Notes

- (a) In general, references to agriculture in this chapter follow the *Subdivision 01 Agriculture* of the Australia and New Zealand Standard Industrial Classification System (ANZIC), unless otherwise stated.
- (b) Chapter 16D *Land use* draws on data from the Australian Bureau of Agricultural and Resource Economics and Sciences, *Land Use of Australia, Version 4, 2005-06* (2010), which has not yet been released for 2011 but is broadly comparable.
- (c) See Chapter 16A *Population*.
- (d) Low-income households refers to households in the lowest quintile; high-income households refers to households in the highest quintile. Statistics from Australian Bureau of Statistics, *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat.no. 6530.0).
- (e) See Chapter 14D *Water*.
- (f) The projection is for a low rainfall scenario. Further information is available at: http://adl.brs.gov.au/data/warehouse/pe_abare99001733/ac07_Mar_a2.pdf
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- (h) 'Public investment' includes expenditure by Australian, state and territory governments, and research institutions and universities. Funds from research and development corporations (excluding grower levies) and other external funders for agriculture (excluding research in fisheries and forestry) are also included.

IMAGES

Volunteer at the Dapto Community Farm, Mark Mohell

Beef cattle grazing on a property near Cudal, Michelle McAulay

Fruit produce from the Adelaide Central Market, Mark Mohell



INEQUALITY AND DISADVANTAGE – IMPLICATIONS FOR WELLBEING AND SUSTAINABILITY

In brief...

- At each income level, real incomes have been increasing; however, the overall level of income inequality in Australia has also risen since the mid 1990s.
- Social exclusion rates declined over the past decade with a slight increase in marginal exclusion following the global financial crisis.

Inequality and disadvantage – implications for wellbeing and sustainability

Inequality and disadvantage in Australia

While Australians generally enjoy high levels of financial wealth and security compared to those in most other countries, the gap between rich and poor has been widening.

Australians enjoy a relatively high average level of material wellbeing compared with most other countries. Factors such as our rich natural environment, a society that values egalitarianism and inclusiveness, stable and effective institutions, and a strong economy mean that we perform well on many global measures.

Australia has experienced almost two decades of continuous economic growth and, on average, real incomes have been increasing – average household disposable income rose 57% between 1995 and 2010 (after inflation). Households at all points in the income distribution scale have gained, but some have gained proportionally more than others. For low-income households, average weekly disposable incomes rose 47%, from \$292 to \$429; for the highest income group, the rise was 67%, from \$1,022 to \$1,704. This means that the overall level of income inequality is higher than it was in the mid-1990s (Chapter 15A *Wealth and Income*).

Internationally, Australia is ranked 26th among OECD countries on one measure of income inequality – the Gini Coefficient.^a On this measure, income inequality increased over the ten years to 2007–08.

Household wealth is another measure of financial prosperity and security. In 2010, the national average household wealth was \$720,000, up 30% since 2004. The wealthiest 20% of the population held 62% of total household wealth, while the poorest 20% of households held just 1% of household wealth. Since 2004, the wealth of the first group had grown by 36%, while the latter group increased by only 10%. Wealth is strongly linked to age, peaking in early retirement. For many people, the family home is the main component of household wealth, followed by superannuation.

There will, of course, always be differences across society in terms of household income and wealth. The tax and transfers system is a pivotal mechanism for minimising the impact of economic hardship on vulnerable and disadvantaged groups. In 2012, the Australian Bureau of Statistics published a study on the effects of government taxes and benefits on the distribution of income among households.¹ The net effect of government benefits and taxes was to increase the average household income of the bottom 60% and decrease the income of the top 40%. For the lowest 20%, benefits and taxes raised their average private income of \$117 per week to a final equivalised income of \$641 (+550%). For the top 20%, the net effect was to lower their average incomes from \$2,216 per week to \$1,747 (-21%).

Inequality and disadvantage affects individuals, communities and our broader society and economy

Inequality and disadvantage can limit the capacity of individuals to engage in, and contribute to, society. This affects both individual and community wellbeing – now and into the future.

Sustainability is about ensuring that the wellbeing of current and future generations of Australians is maintained or improved over time. The objective of improving wellbeing is particularly important for those facing significant disadvantage. In addition to raising concerns about fairness, entrenched disadvantage acts as a brake on progress towards a more sustainable society. A society's capacity to improve the welfare of its most disadvantaged members depends on its ability to provide meaningful opportunities for these people to contribute to society – whether through paid work, volunteering, the generation of ideas and innovation, or in a multitude of other ways.

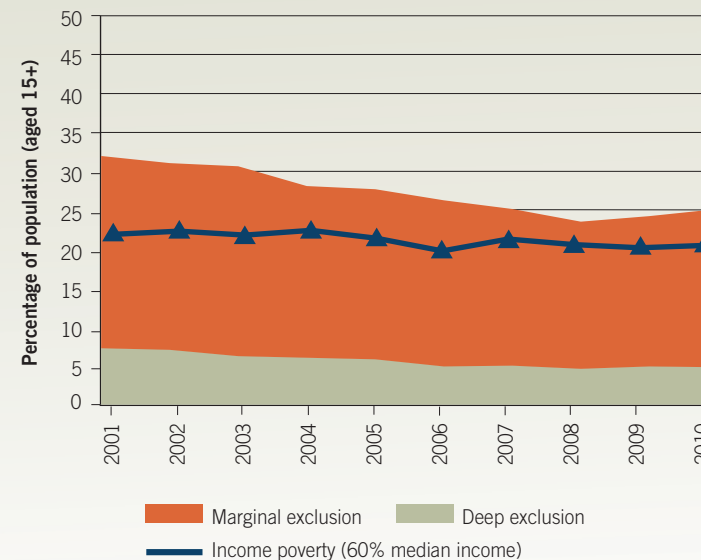
Similarly, for our children to experience at least the same level of wellbeing as we enjoy today, we need to provide them with the resources and opportunities to participate and to thrive; to learn, contribute to their communities, live in safe and healthy environments, and undertake meaningful work. However, not all Australian children have the same access to the resources or opportunities that will support and enhance their wellbeing into the future.

Economic disadvantage and associated financial stress can greatly diminish opportunities and capacities to participate in and contribute to society.

Social exclusion is a measure that goes beyond measuring income or consumption poverty to take into account factors such as material resources, employment, education and skills, health and disability, social connection, community and personal safety. One study by the Melbourne Institute of Applied Economic and Social Research and the Brotherhood of St Lawrence used 29 indicators across these domains to measure social exclusion, which was then categorised as either 'marginal' or 'deep' exclusion.²

During the period 2001 to 2010, income poverty remained relatively stable, but social exclusion measures steadily improved until 2008 (see Figure 12.1). Improvement in employment rates, in education levels and other community indicators have reduced measured levels of exclusion. The aftermath of the global financial crisis appears to have had surprisingly little impact on levels of social exclusion.³

Figure 12.1 Income poverty and social exclusion, 2001 to 2010^{3&b}



Chapter 15A *Wealth and Income* shows that in 2010, 16% of households were experiencing some financial stress, including having difficulty paying bills. Single parents with dependent children and single person households experience markedly higher rates of financial stress.

Employment provides both income and a sense of purpose, contributing to quality of life generally, as well as to living standards now and in the future (for example, through savings). Chapter 13D *Employment* shows that unemployment has declined from its peak of 11% during the early 1990s recession. Robust employment growth has kept unemployment below 6% for most of the subsequent years.

Meanwhile, the underemployment rate (Chapter 13D *Employment*) – where the underemployed are defined as those part-time employees who would like to work more hours – has been around 7% for most of the past two decades. Underemployment dropped down to around 6% just prior to the global financial crisis, which drove it up to just under 8% in 2009.

Unemployment and underemployment are more concentrated amongst a number of groups that are also at risk of social exclusion due to other factors. People are more likely to be unemployed for long periods of time (one year or more) if they are aged 15 to 24 or over 55, or have low educational qualifications (below Year 12).

Unemployment rates vary greatly across Australia, including differences within and between cities. In September 2012, more than half of the local areas recorded an unemployment rate of less than 5% while 9% of areas had an unemployment rate of 10% or more.

In order to improve individual and community wellbeing, we will need to provide opportunities for economic participation for disadvantaged Australians and provide the education and training necessary to support them in getting worthwhile jobs.

Barriers to securing employment, or enough hours of work, can include the availability of adequate and affordable child care, poor health and being discouraged from looking for work by factors such as age or having been unemployed for a long period. The Australian Bureau of Statistics recently reported that in September 2012 there were over 106,000 ‘discouraged job seekers’, 36% of whom believed they would be considered too old and 20% of whom believed there were no jobs in their locality or line of work.⁴

“Housing is an important resource that enables people to participate in society. A home provides people not just with shelter from the elements, but with facilities for cooking and self-care, privacy, and a secure base to enable the establishment of a daily routine. Those with stable housing are then able to focus on employment, building relationships and contributing to their local community. Therefore, affordable housing is an important element in developing an inclusive society.”⁵

For low income households, meeting housing costs can be a serious struggle which can compound other aspects of disadvantage.

Home ownership is often referred to as ‘the great Australian dream’, but for many lower income households the reality is that purchasing a home is financially challenging, and the financial stress of meeting mortgage or rental payments can compound or increase the risk of other forms of inequality and disadvantage.

As shown in Chapter 15B *Housing*, around one third of low income households reported being in rental stress or mortgage stress in 2010 (36% and 37% respectively), with the former indicator having remained fairly stable since 1998. However, behind the national average, geographic location can greatly influence the exposure to housing-related financial stress. In 2010, Sydney had the highest proportion of low income households in mortgage stress (49%), while the ACT had the lowest proportion (19%).

Risk factors for poor health are more prevalent amongst the more disadvantaged parts of society.

Good physical and mental health are important in being able to live a full, active and contributing life, while poor physical and mental health can severely impact on people's access to education, their ability to work and their social relationships. These are all factors that affect future productivity, health costs and wellbeing, and are relevant to any consideration of sustainability.

Smoking is a major cause of preventable ill health and death. As a single risk factor, smoking causes the largest burden of disease (8% in 2003) for the total Australian population.⁶ Chapter 13B *Health* shows that overall, the rate of people who currently smoke in Australia has declined from 28% in 1990 to 18% in 2012. Smoking rates are higher among the disadvantaged, rural people and the Aboriginal and Torres Strait Islander population. In 2007, the prevalence of smoking in Australia compared favourably to the OECD average (21%), but was broadly in line with comparable countries (such as New Zealand, Canada and the USA).⁷

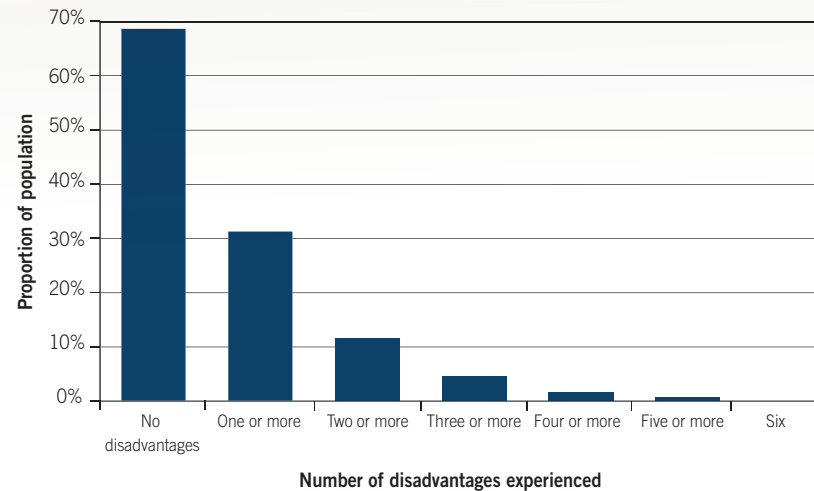
“...there are a small number of people experiencing multiple and entrenched disadvantage who are precluded from participating in the everyday activities of Australian society and it is these people that are at higher risk of being left behind, even in times of economic prosperity.”¹¹

In 2008, obesity was declared a national health priority area, due in part to the significant burden of disease (7.2% in 2003) it places on the Australian community.⁸ At an individual level, the health, wellbeing and lifestyle implications of being overweight or obese are significant. At a national level, rates of obesity have increased threefold between 1980 and 2012, from 9% to 28%. Chapter 13B *Health* shows that as with smoking, lower levels of socio-economic status correlate with higher rates of obesity.⁹ Outer regional and remote areas also exhibit higher levels of obesity. In 2007-08, the rate of obesity in Australia was nearly 40% higher than the OECD average (18%), after adjusting for different age structures.¹⁰

Multiple types of disadvantage can interact, leading to complex impacts on wellbeing that can be difficult to address.

In 2010, the proportion of the population aged 18-64 that were experiencing three or more of six key indicators of disadvantage was 5%, or around 640,000 people.^c Poor health and joblessness were the most common disadvantages experienced in 2006 and 2010.

Figure 12.2 Experience of multiple disadvantages, 2010¹²



Children in families with no employed parent are at greater risk of experiencing financial hardship, family stress and reduced social opportunities. These experiences have an impact on child development and wellbeing even at young ages.¹³ In 2011, almost half (48%) of children in one parent families were in a jobless family. Children in jobless families also tend to be quite young, with 17% of children aged 0 to 4 living in a jobless family, compared to 12% of children aged 10 to 14 years.¹⁴

Early childhood is a critical time for development. Studies show that children growing up in disadvantage are less likely to achieve their full potential. Chapter 13A *Education* shows that in 2012, 22% of children in their first year of school were considered to be developmentally vulnerable in at least one area, but in the most disadvantaged areas of Australia this figure is much higher – almost double the rate in the least disadvantaged areas. Children from lower socio-economic backgrounds were also more likely to have either established special needs or emerging developmental difficulties of concern.¹⁵

In order to support Australian children raised in poor families to keep up with their peers, there is a need to improve the accessibility and affordability of high quality early childhood education and care services. This is particularly true for indigenous families.

Australia has prioritised improvements in early childhood support, although significant challenges remain. Notably, Australia has a high rate of income poverty and inequality among children compared to many other wealthy countries, and a poor rating in terms of the proportion of three and four year olds enrolled in early education among OECD countries.^{15b} This indicates that there is still much work to do to support Australian children raised in poor families to keep up with their national and international peers. Whilst there has been significant recent investment in this important area, there remains an urgent need to improve the affordability and access to high quality early childhood education and care services – particularly for families in disadvantaged locations. These issues are of particular concern in regards to Aboriginal and Torres Strait Islander children - who are twice as likely to be at risk of delayed development than non-indigenous children (Chapter 13A *Education*).

“...a range of structural and personal factors...interact across the life course to underpin cycles of disadvantage. Key among these is the effect of patterns of disadvantage established in childhood and adolescence reverberating into adulthood. Socio-economic disadvantage, neglect and abuse in childhood can lead to behavioural and mental health issues in adolescence which can lead to early school leaving and poor educational attainment. Events in adulthood, such as losing a job or the onset of a severe mental illness, can trigger cycles of disadvantage in those who have not experienced disadvantage before.”¹⁶

A pathway out of disadvantage

A good education can provide a pathway out of disadvantage; however, learning outcomes can vary significantly depending on socio-economic status, increasing the risk of entrenched disadvantage.

By providing people with skills and knowledge, all forms of education can increase opportunities to obtain a good job, access information and services when needed, and become more actively involved in society. Education expands the life choices available to individuals and can also have flow on effects for the wellbeing of family members.

In 2012, 80% of Australians had achieved formal qualifications – Year 12, vocational or higher qualifications – which is 17% higher than in 1996 (Chapter 13A *Education*). The level of higher qualification attainment by 25 to 64 year olds has risen significantly from 42% in 2001 to 60% in 2012. While this rise in higher educational qualification rates is positive for society overall, it can contribute to a more competitive employment environment, disadvantaging the job prospects of those with lower qualification levels.

In 2010, people aged 20 to 64 years were less likely to be employed if they had not attained Year 12 than those who had (72% compared with 81%).¹⁵ In 2012, 86% of 20 to 24 year olds had completed Year 12 or had completed a basic vocational qualification at Certificate Level II or above.

However, young people from the most disadvantaged areas are much less likely to achieve these qualifications (74%), than those from the least disadvantaged areas (94%).

Young people who do not complete Year 12 are less likely to continue with further study or training and are less likely to be employed, which can limit their ability to gain work experience and develop the skills they need for the rest of their working lives. The proportion of 25 to 34 year olds who had at least completed upper secondary education in Australia (85%) was slightly above the OECD average (82%) in 2010.¹⁷

Young people are more likely to complete Year 12 if both their parents had attained Year 12, while those with a disability, or poor self assessed health are less likely to have completed Year 12.¹⁸ Aboriginal and Torres Strait Islander students, those from language backgrounds other than English and those living in geographically remote areas also have a statistically lower level of educational attainment. Between 2002 and 2008, the proportion of Aboriginal and Torres Strait Islander people attaining vocational or tertiary qualifications increased by 25%; however, there is still a significant gap between Indigenous (40%) and non-Indigenous (64%) Australians.¹⁹

QUESTIONS FOR THE FUTURE:

- How can we best ensure that vulnerable children get a good start in life?
- How can we create opportunities for people to escape long-term or intergenerational disadvantage?
- How do we ensure that the benefits of growth and prosperity are fairly shared?
- How can we provide opportunities for economic participation for disadvantaged Australians and provide the education and training necessary to support them in getting worthwhile jobs?

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- 6 Australian Institute of Health and Welfare (2007) *The Burden of Disease and Injury in Australia 2003*
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- 13 Gray, M and Baxter, J (2011) *Family joblessness and child wellbeing in Australia*
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- 15 Australian Bureau of Statistics, *Australian Social Trends, March 2011*, (cat no. 4102.0)
- 15b Organisation for Economic Co-operation and Development (2012) *Education at a Glance 2012*
- 16 Australian Social Inclusion Board (2012) *Breaking Cycles of Disadvantage*
- 17 Organisation for Economic Co-operation and Development (2012) *Education at a Glance 2012*
- 18 Australian Bureau of Statistics, *Australian Social Trends, Year 12 Attainment, Mar 2011* (cat no. 4102.0)
- 19 Australian Social Inclusion Board (2012) *Social Inclusion in Australia: How Australia is faring*, 2nd edition

Notes

- (a) The Gini coefficient is based on equivalised household disposable income, after taxes and transfers. See Chapter 15A, *Wealth and Income*, for a more detailed explanation.
- (b) The social exclusion measure used is based on 29 indicators from seven life domains: material resources, employment, education and skills, health and disability, social connection, community and personal safety.
- (c) The six indicators are: low income, no work, poor health, low education, feeling unsafe and low support. See Australian Social Inclusion Board (2012), *Social Inclusion in Australia: How Australia is faring*, 2nd edition, p.23.
- (d) The Council of Australian Governments (COAG) priority to 'ensure that by 2020 all children have the best start in life to create a better future for themselves and for the nation

IMAGES

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HOW WELL EDUCATED ARE WE?

Levels of educational attainment have been steadily rising and most children are performing well at school. While a good education provides a pathway out of disadvantage, on average education levels are much lower for those living in disadvantage.

A well-educated society has the capacity to be engaged and informed about issues of public importance. It has greater capacity to generate new ideas and to adapt skilfully to social, economic and environmental challenges.

A good education provides the skills, knowledge and values that expand our life choices and increase our productivity.



Education levels have been rising, particularly for women.

Educational attainment (qualifications)

In 2012, 79% of Australians aged 20 to 64 years had completed year 12^a or post-school vocational^b or higher education qualifications,^c rising from 60% in 1994. There has been a particularly strong increase in the achievement of post-school qualifications in the past decade, with 58% of adults aged 20 to 64 years holding a post-school vocational or higher education qualification in 2012, a rise from just 44% a decade earlier.

Figure 13A.1 Educational attainment, by highest qualification, 1994 to 2012¹

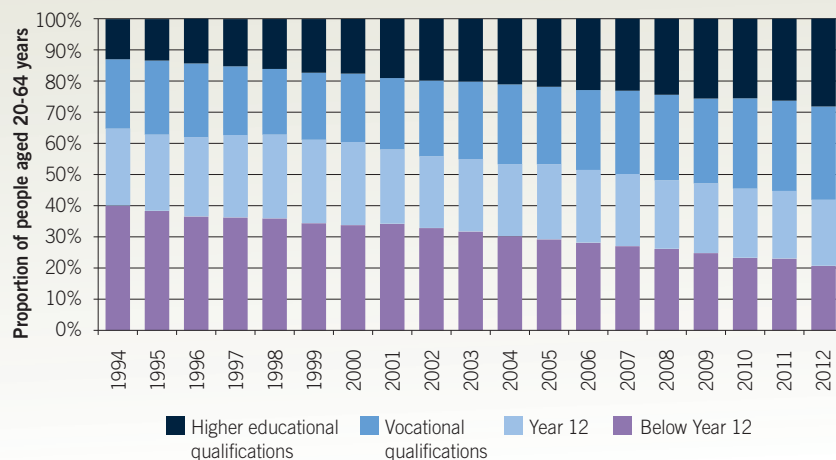
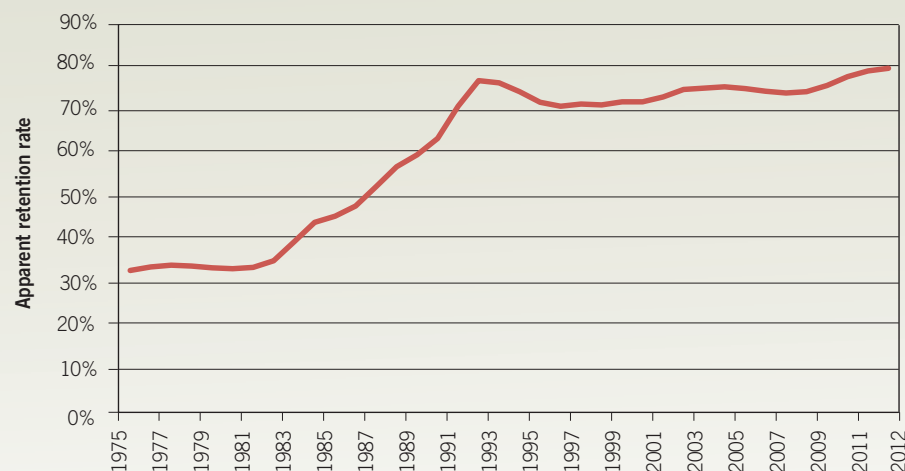
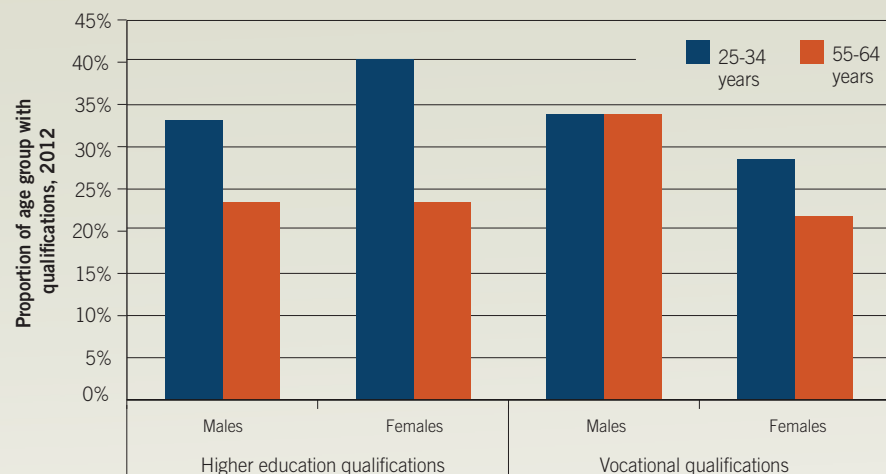


Figure 13A.2 Apparent retention rates, secondary students to year 12, 1975 to 2012²



The foundation for growth in post-school qualifications was a dramatic rise in the proportion of students who continued to year 12 during the 1980s. In the late 1970s around 35% of secondary students continued to year 12. By 1991, over 70% of students continued to year 12. Over the past two decades, the year 12 retention rate remained between 71% and 76%, before rising over the past few years to reach a historic high of 80% in 2012.

Figure 13A.3 Vocational and higher education qualifications, by gender and age, 2012³

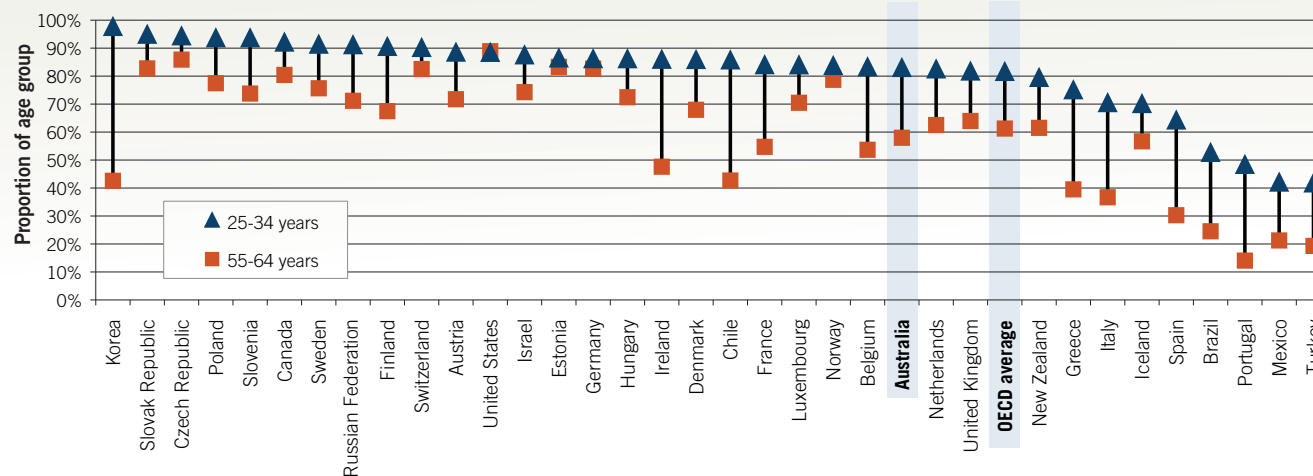


There has been strong growth in the proportion of people aged 20 to 64 years with higher education qualifications, at bachelor degree level or above, which more than doubled between 1994 (13%) and 2012 (28%). The growth in the proportion of women with higher education qualifications has been particularly strong, rising from 12% in 1994 to 30% in 2012 for women aged 20 to 64 years (compared with a rise from 13% to 26% for men).

There are differences in the type of qualifications held by men and women. In 2012, among people aged 25 to 34 years, more women (40%) than men (33%) had completed a bachelor degree or higher qualification. In the same age group, men (34%) were more likely to have vocational qualifications than women (27%).

Increasing educational attainment among younger generations can also be seen in international comparisons.^d Australia is slightly above average: the proportion of Australians with at least upper secondary education is slightly above average for people aged 25 to 34 years, in contrast to our below average ranking for people aged 55 to 64 years.

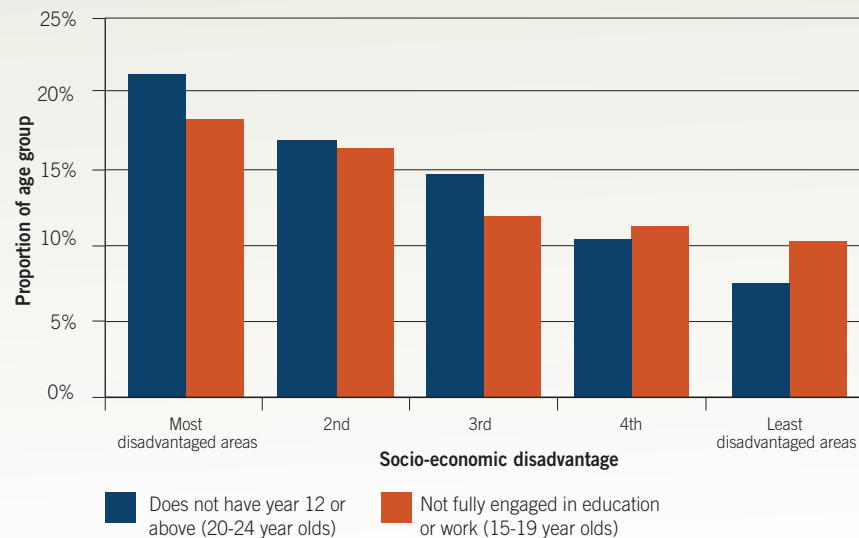
Figure 13A.4 Attained at least upper secondary education, international comparison, by age, 2009⁴



While Australia has done well in increasing educational attainment overall, some groups of students face greater challenges in obtaining educational qualifications, including students who are from socio-economically disadvantaged backgrounds, with disability, those living in geographically remote areas, or Aboriginal and Torres Strait Islander students.

In the most socio-economically disadvantaged areas of Australia, young people are less likely to have achieved year 12 or post-school qualifications, and they are less likely to be fully engaged in education or work than young people living in less disadvantaged areas.

Figure 13A.5 Educational attainment and engagement in education or work, by socio-economic disadvantage, 2012⁵



Socio-Economic Indexes for Areas (SEIFA)

Socio-Economic Indexes for Areas (SEIFA) is a product developed by the Australian Bureau of Statistics that provides measures of socio-economic conditions by geographic area. SEIFA ranks small areas across Australia according to relative socio-economic advantage and disadvantage, based on characteristics of people living in the area. The indexes are based on information from the five-yearly Census.

This report uses SEIFA in a number of places to explore how performance against various sustainability indicators is associated with differing levels of disadvantage.

SEIFA can be used to divide areas into five equal groups based on level of disadvantage. These groups are referred to as the 'most disadvantaged areas', 2nd, 3rd, 4th, and 'least disadvantaged areas'.

Reporting any difference in performance against relevant sustainability indicators between these groupings can help to illustrate whether there is any correlation between socio-economic disadvantage and the aspect of sustainability in question.

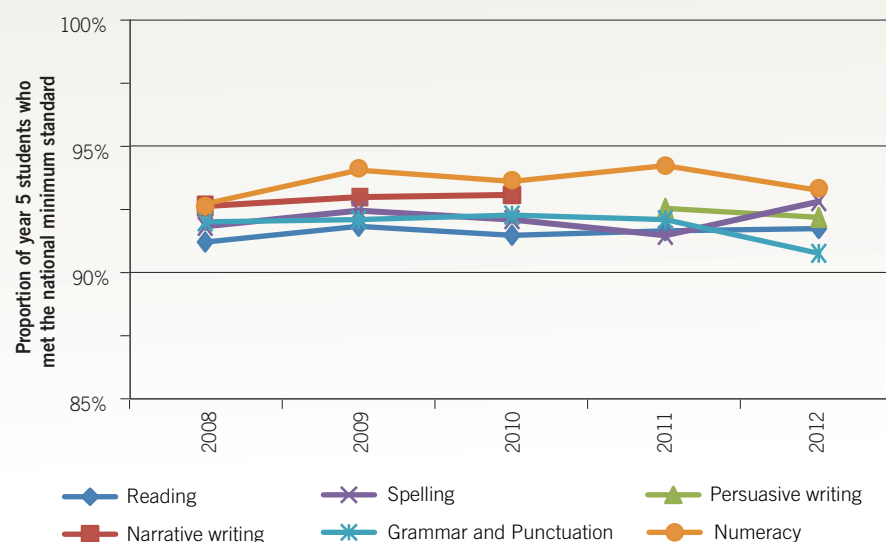
For more information go to: www.abs.gov.au

Almost all Year 5 students met national literacy and numeracy standards, but rates are much lower for students living in very remote areas.

Primary education (literacy and numeracy)

While the time series is too short to determine long term trends, the proportion of year 5^e students who met national minimum literacy and numeracy standards has been above 90% for each skill area since the National Assessment Program – Literacy and Numeracy (NAPLAN) testing began in 2008.

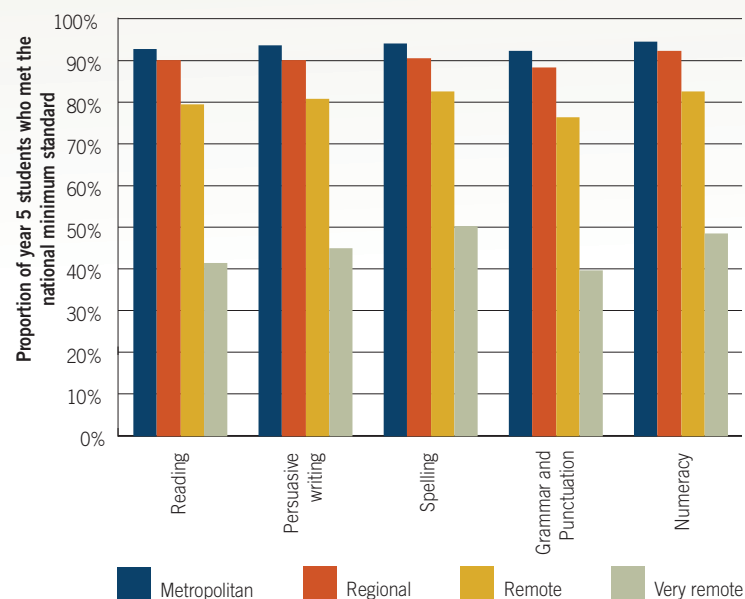
Figure 13A.6 Literacy and numeracy of year 5 students, 2008 to 2012⁶



Some groups of students are less likely to meet minimum standards. From 2008 to 2012, the proportion of Aboriginal and Torres Strait Islander year 5 students who met national minimum standards for each skill area was generally between 60% and 70%, significantly below the national average.

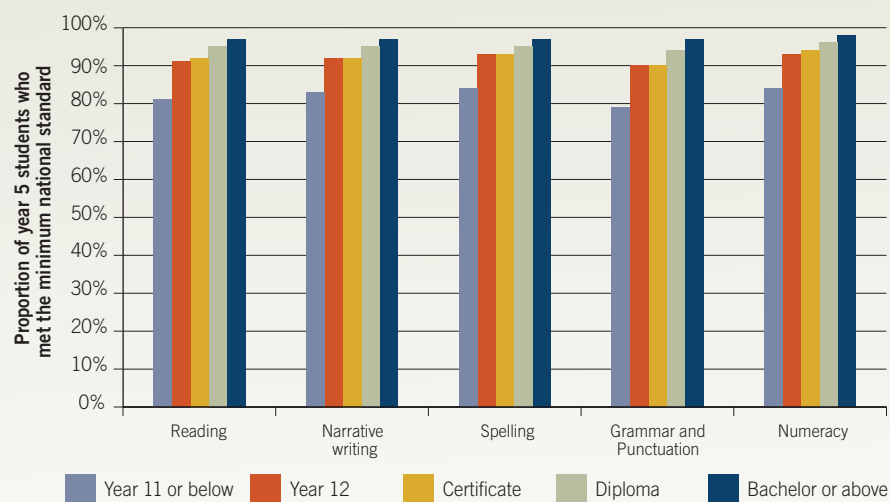
A greater proportion of Year 5 students in metropolitan areas met national minimum standards in 2012 (an average of 94% across the skills measured). Students in regional areas were close behind (91%), followed by students in remote areas (81%). Students in very remote areas were much less likely to meet national minimum standards (45%).

Figure 13A.7 Literacy and numeracy of 5 students, by remoteness, 2012⁷



The education level of parents is related to the educational performance of their children. Over 97% of students who had at least one parent with a bachelor degree met minimum standards in all skill areas. For students neither of whose parents had completed Year 12, less than 85% reached minimum standards.

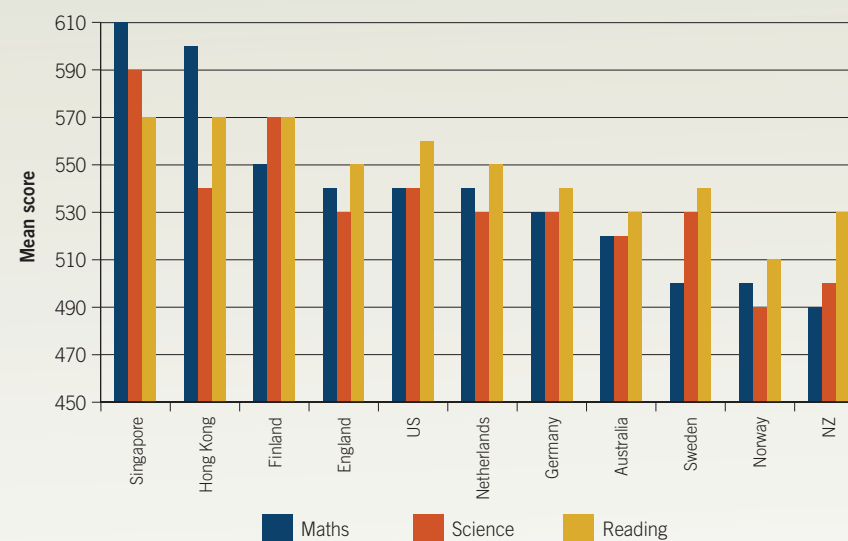
Figure 13A.8 Literacy and numeracy of Year 5 students, by parents' highest educational attainment, 2012⁸



In international comparisons of Year 4 performance in maths, science and reading in 2011, Australia lags significantly behind leading countries, including the United States of America and England.

Several neighbouring countries in our region such as Singapore and Taiwan are top-performing countries across all three domains. The Australian average was below the High International Benchmark for all three domains.

Figure 13A.9 Year 4 performance in maths, science and reading, international comparison, selected countries, 2011⁹

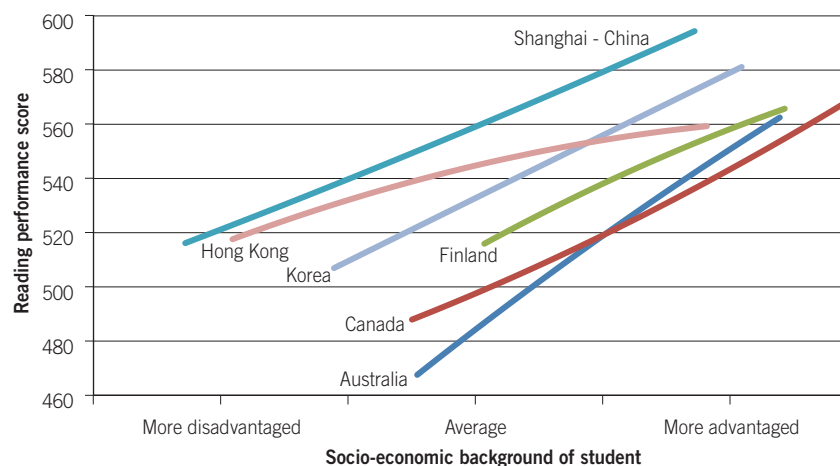


Equity in educational performance^f

For the 2009 Programme for International Student Assessment (PISA) cycle, despite being among the top-performing countries overall, Australia was classified as a country achieving only average equity in educational performance. This means that the link between student background and educational outcomes is more pronounced in Australia than in other comparable high-performing OECD countries. Significantly, five out of the six countries that outperformed Australia in the 2009 PISA assessment have educational systems with a higher degree of equity than Australia's. The figure below shows the relationship between PISA reading literacy scores and social background for Australia and these other high-performing countries. All have a lower social gradient than Australia (illustrated by a flatter line), which is indicative of a weaker relationship between the social background of students and their educational outcomes.

Although no country has been able to completely remove the impact of social background or circumstances on a student's performance in school—and it may not be realistic to aim to do so—it is clear that some countries are doing a better job of minimising these effects than Australia.

Figure 13A.10 Social gradients in PISA reading literacy by country, 2009¹⁰



One in five young Australian children are developmentally vulnerable, with much higher rates in the most socio-economically disadvantaged areas.

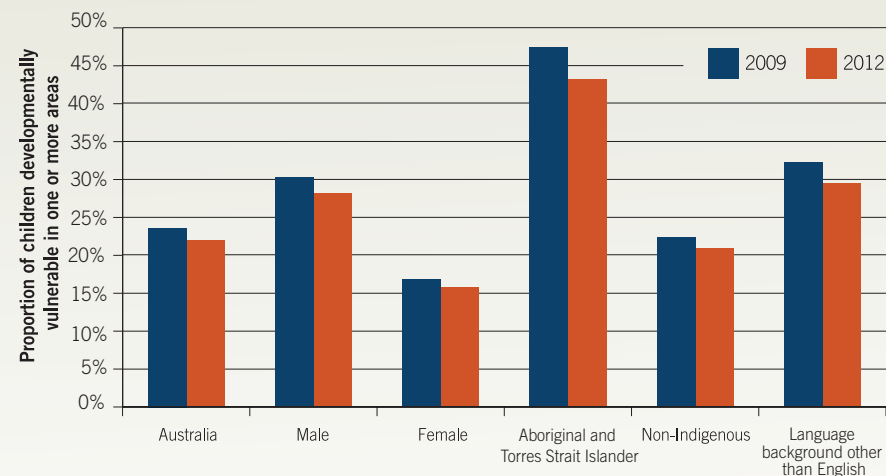
Early development

The Australian Early Developmental Index (AEDI), run nationally in 2009 and 2012, provides snapshots of young children's development in their first year of full-time school across five key areas: physical health and wellbeing, social competence, emotional maturity, language and cognitive skills (school-based), and communication skills and general knowledge. Using this index, communities where children are more likely to be developmentally vulnerable can be identified for targeted interventions.

In both 2009 and 2012, most children were on track and doing well in all five development areas. However, in 2012 22% of children were developmentally vulnerable^g in one or more areas and 11% were developmentally vulnerable in two or more areas. This marked an improvement since 2009 when 24% of children were developmentally vulnerable in one or more areas (12% in two or more areas).

The AEDI identified that some groups of children were more likely to be developmentally vulnerable, including boys (28% compared to 16% of girls) and Aboriginal and Torres Strait Islander children (43%). Both groups showed improvements since 2009.

Figure 13A.11 Early development, by socio-demographic characteristics, 2012¹¹



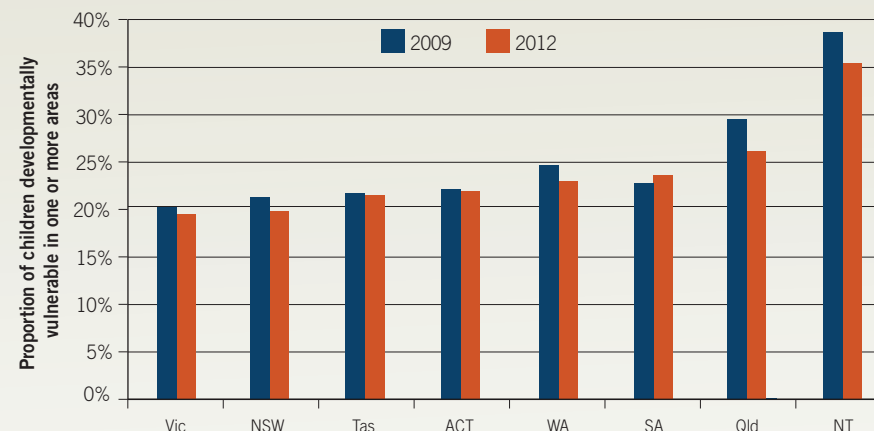
In the most socio-economically disadvantaged geographical areas in 2009, 32% of children were identified as developmentally vulnerable in one or more areas, compared with just 16% of children in least disadvantaged areas.

Figure 13A.12 Early development, by socio-economic disadvantage and remoteness, 2009¹¹



The Northern Territory had the highest percentage (36% in 2012) of children who were developmentally vulnerable. In all other states and territories, less than 30% of children were developmentally vulnerable. Victoria had the lowest proportion of developmentally vulnerable children (20%). Apart from South Australia, all states and territories showed improvements in vulnerability between 2009 and 2012. In Queensland in particular, the proportion of children who were developmentally vulnerable declined from 30% to 26%. Northern Territory and Western Australia also showed substantial improvement.

Figure 13A.13 Early development, by state and territory, 2009 and 2012¹²



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- 2 Australian Bureau of Statistics, *Schools, Australia* (cat. no. 4202.0) 1980 issue; Australian Bureau of Statistics, *Schools, Australia* (cat. no. 4221.0) 1985, 1990, 1995, 2000 and 2012 issues. The apparent retention rate is the number of school students in a designated level/year of education expressed as a percentage of their respective cohort group in a base year. Here, the base year is the commencement of secondary school and rates have been calculated for those who continued to year 12. In the absence of direct measurement, apparent measures based on aggregate enrolment data have been developed to provide indicative measurement of student engagement in secondary education. Care should be taken in interpreting apparent retention rates as they do not account for students repeating a year or migrating into or out of the relevant school student population.
- 3 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of Australian Bureau of Statistics, *Education and Work, Australia, May 2012* (cat. no. 6227.0)
- 4 Organisation for Economic Co-operation and Development, *Education at a Glance* (2011), Table A1.2a (www.oecd.org/edu/eag2011)
- 5 Australian Bureau of Statistics, unpublished data, *2012 Survey of Education and Work*. People who are not fully engaged in education or work fall into three main categories: those who are neither studying nor working; those who are studying part-time and not working; and those who are working part-time and not studying.
- 6 *Australian Curriculum, Assessment and Reporting Authority, National Assessment Program – Literacy and Numeracy National Report for 2012*
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- 8 Ibid.
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- 11 Australian Government (2013), *A Snapshot of Early Childhood Development in Australia 2012 — AEDI National Report*. For the AEDI, children are considered of language background other than English (LBOTE) if they speak a language other than English.
- 12 Centre for Community Child Health and Telethon Institute for Child Health Research, *A Snapshot of Early Childhood Development in Australia – AEDI National Report 2009 (Re-issue – March 2011)*

Notes

- (a) 'Year 12' includes Year 12 or equivalent or vocational qualifications at the Certificate II level. Prior to 2001, this group includes those who completed highest level of secondary school and basic vocational qualifications.
- (b) 'Vocational qualifications' includes qualifications at advanced diploma and diploma levels, and Certificates III-IV levels. To maintain a hierarchical structure to the level of educational attainment, Certificate I-II level qualifications have been excluded in this definition. Prior to 2001, this group includes qualification at undergraduate diploma, associate diploma and skilled vocational levels.
- (c) Higher education qualifications include qualifications at the Bachelor degree, Graduate Diploma and Graduate Certificate, and Postgraduate levels. Prior to 2001, this group includes qualifications at the Bachelor degree, Postgraduate diploma and Higher degree levels.
- (d) Based on attainment of at least upper secondary education, which is approximately equivalent to Year 12 or Certificate III level qualifications or above.
- (e) Year 5 student results are used here as a gauge of literacy and numeracy towards the end of primary education.
- (f) This section has been adapted from *Review of Funding for Schooling—Final Report*, December 2011 p.106–7.
- (g) Children who scored in the lowest 10% of children in one or more areas were classified as developmentally vulnerable.

IMAGES

The Mitchell Library reading room, State Library of New South Wales, Mohell, Mark

School students in the classroom learning about sustainability and recycling frameworks, Dragi Markovic

Other images from www.istockphoto.com



HOW IS OUR HEALTH?

Most Australians enjoy good health, with high life expectancy and self-reported good health, and dramatic reductions in smoking rates over the last decade. However, we also have rising levels of obesity and chronic diseases, and our health is influenced by our socio-economic status.

Good physical and mental health are important in being able to live a full, active and contributing life, while poor physical and mental health can have a severe impact on people's access to education, their ability to work and their social relationships.

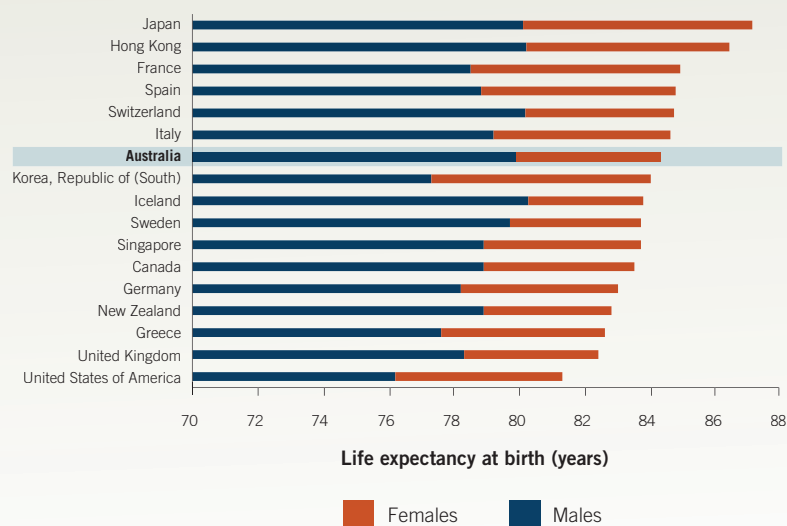
Healthy societies tend to be more productive, resilient and happy.



Australians have the fifth highest life expectancy at birth for males and the seventh highest for females.

Life expectancy at birth

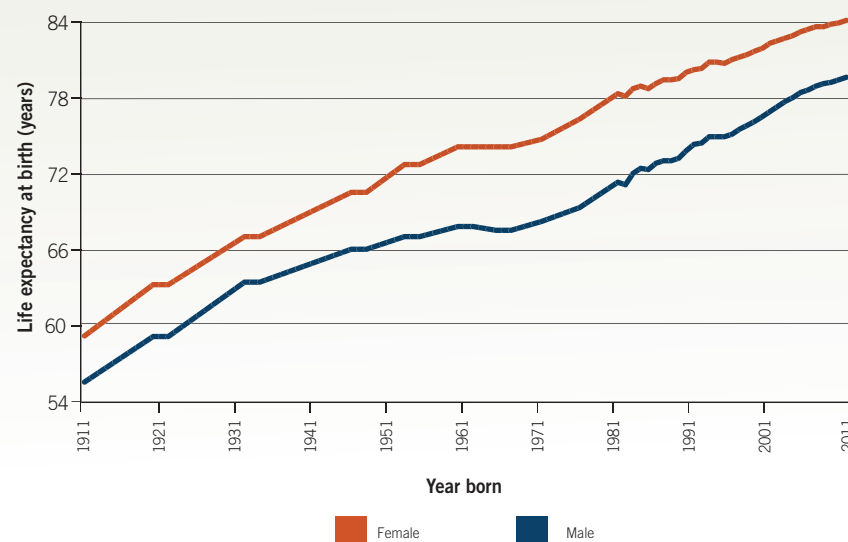
Figure 13B.1 International comparison of life expectancy at birth: selected countries, 2010¹



In 2011, a baby boy born in Australia could expect to live to 79.7 years of age (if the current age- and gender-specific patterns of mortality are maintained throughout his lifetime). A baby girl could expect to live to 84.2 years.

There has been a more or less continuous improvement in life expectancy over the last century. For most of the last century improvements occurred at young ages as infant and child mortality plummeted. More recently, this reflects improved access to health services, advances in medical technology, improved hygiene and living conditions, and reductions in some health risk factors such as smoking.

Figure 13B.2 Life expectancy at birth: by gender, 1911 to 2011^{2,3}



Life expectancy at age 50⁴

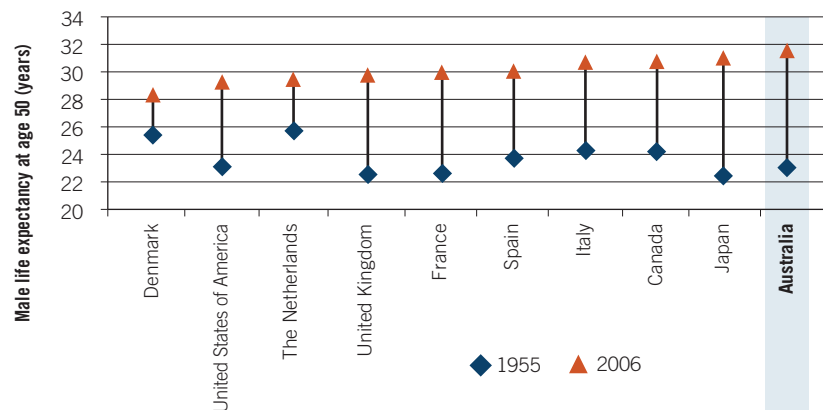
Since 1970 there has been a large increase in life expectancy at age 50. This is due to major medical advances and behavioural changes, including fewer people smoking, which have led to declining death rates from diseases of the circulatory system such as heart disease and stroke. On average, Australians aged 50 can now expect to live eight years longer than their counterparts 40 years ago. While this is good news, there are concerns about the rise of chronic disease as our population ages (for more details see Chapter 6: Planning for an ageing population).

Figure 13B.3 Life expectancy at age 50: 1901–10, 1970–72, 1981 and 2011³

Year	Males	Females
1901–10	21.2	23.7
1970–72	23.2	28.3
1981	25.2	30.8
2011	32.0	35.6

Data collected from a sample of countries around the world shows a general upward trend in life expectancy rates of 50 year old people over the last half century. Australia has achieved significant improvements in 50 year old life expectancy in comparison to other countries.

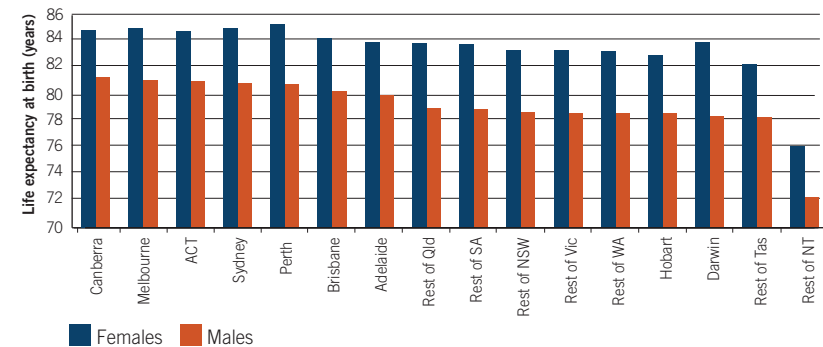
Figure 13B.4 Life expectancy at age 50: international comparisons, males, 1955 and 2006



There are differences in life expectancy across areas depending on socio-economic status

There are differences between geographic areas in the level of mortality as shown in the diagram below. Life expectancy is lower outside of the main cities. This may be due to a number of factors including access to services and differences in socio-economic status across regions.

Figure 13B.5 Life expectancy at birth: by place of usual residence and gender, 2011⁵



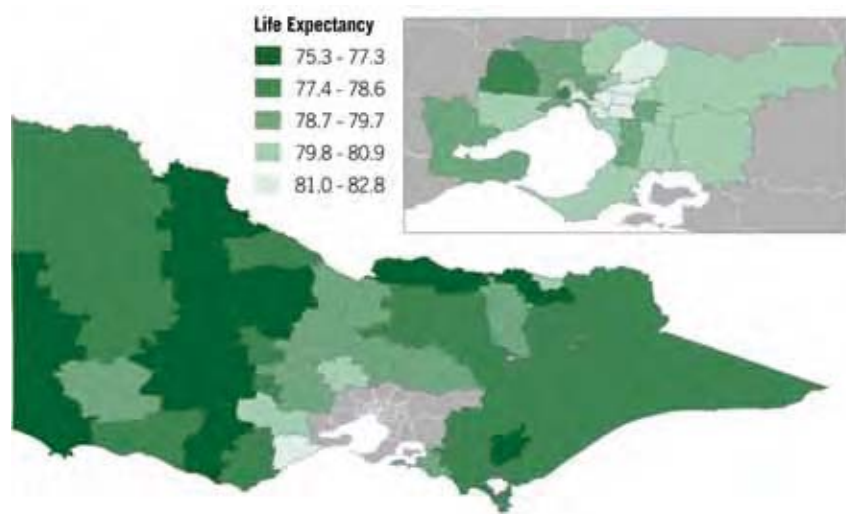
The largest differential is between Aboriginal and Torres Strait Islander people and non-Indigenous Australians. In 2005–2007, life expectancy at birth for Aboriginal and Torres Strait Islander males was 11.5 years lower than for non-Indigenous males and for females it was 9.7 years.⁶ Closing this gap is an important national priority.

Life expectancy in Victoria^a

Life expectancy at birth for Victorians is one of the highest in Australia. A boy born in Victoria in 2011 can expect to live 80.3 years, while girls can expect to live 84.4 years.

Yet within Victoria, life expectancy at birth varies substantially. Based on modelling by the Victorian Department of Health for the 2003-2007 period, the difference between the highest and lowest male life expectancy among local government areas (LGAs) is 7.5 years (Melbourne LGA 82.8 and Loddon LGA 75.3 years). The difference between the highest and lowest female life expectancy among LGAs is 7.3 years (Melbourne LGA 88.9 and Glenelg LGA 81.5 years).

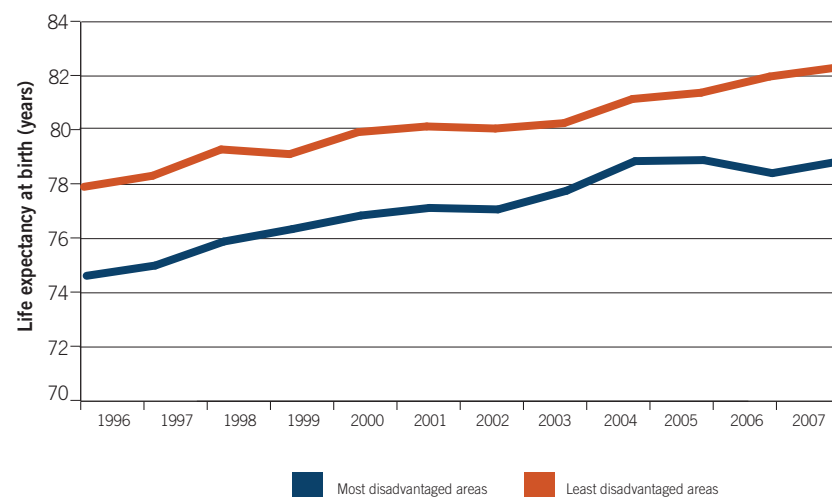
Figure 13B.6 Male life expectancy at birth: by LGA, Victoria, 2003 to 2007



Socio-economic status has an impact on life expectancy, with the life expectancy at birth of people living in the most disadvantaged areas substantially below that of people living in the least disadvantaged areas.



Figure 13B.7 Male life expectancy at birth: Victoria, by socio-economic disadvantage, 1996 to 2007

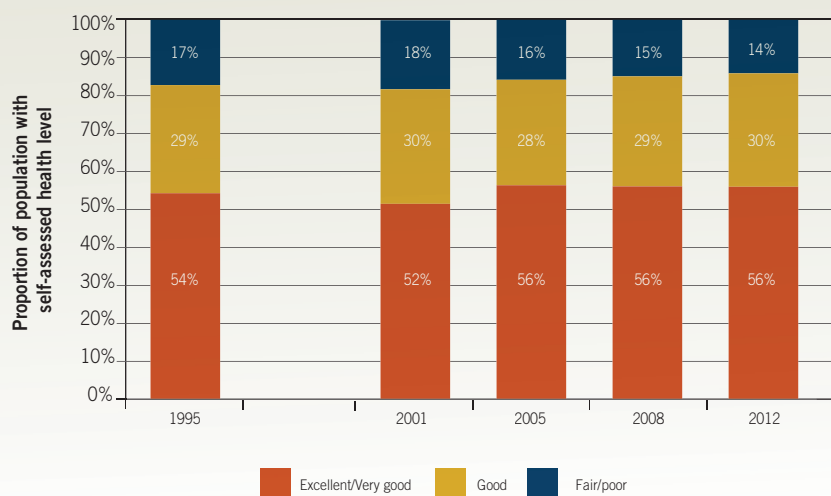


Most Australians report that they are in good health

Self-assessed health

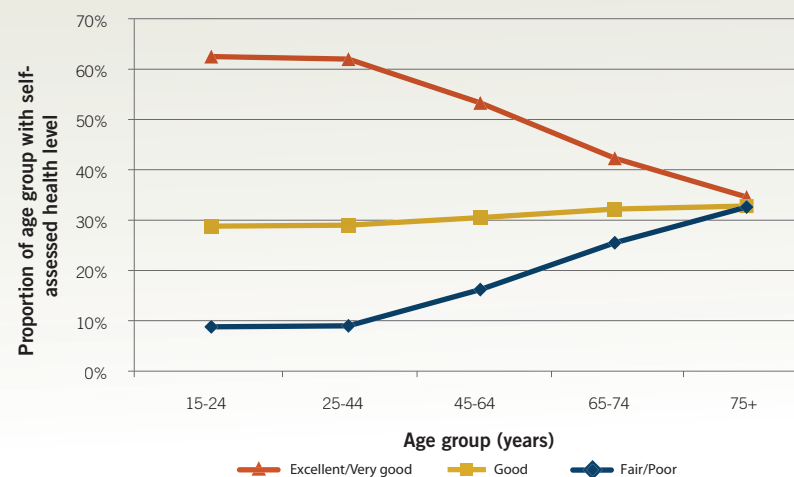
Australia is a relatively healthy nation.^b In keeping with this, over half (56%) of Australian adults rated their health as being excellent or very good in 2012.^{c, d} Another 30% rated their health as good. This rating has not changed greatly from 1995.

Figure 13B.8 Self-assessed health: by health status, 1995 to 2012⁷



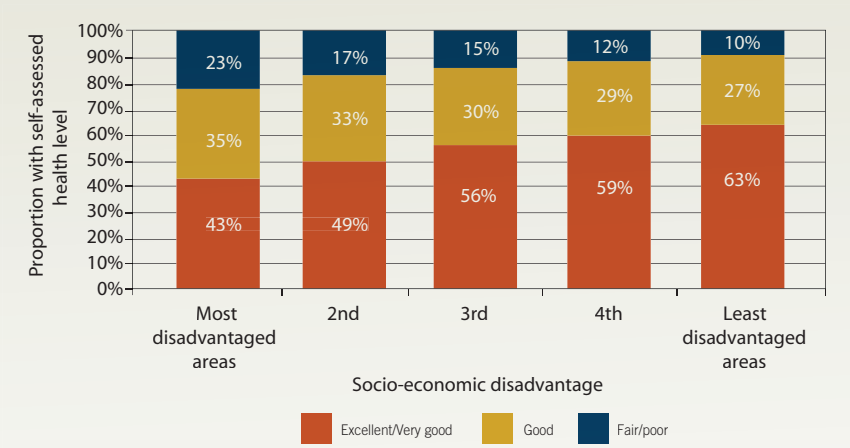
Physical health often declines with age. The Australian Bureau of Statistics *Australian Health Survey 2011–12* showed strong age patterns associated with many long term health conditions, particularly: arthritis, heart disease, kidney disease and Type 2 diabetes.⁸ This is reflected in how older people rate their health. In 2012, only 35% of people aged 75 or over rated their health as excellent or very good, compared to 63% of those aged 15 to 24 years.

Figure 13B.9 Self-assessed health: by age, 2012⁹



Some people are more likely to rate their health as fair or poor, including those who live in the most socio-economically disadvantaged areas (23%), and Aboriginal or Torres Strait Islander Australians (22% in 2008,¹⁰ with 44% rating their health as very good or excellent).

Figure 13B.10 Self-assessed health: by socio-economic disadvantage, 2012¹¹

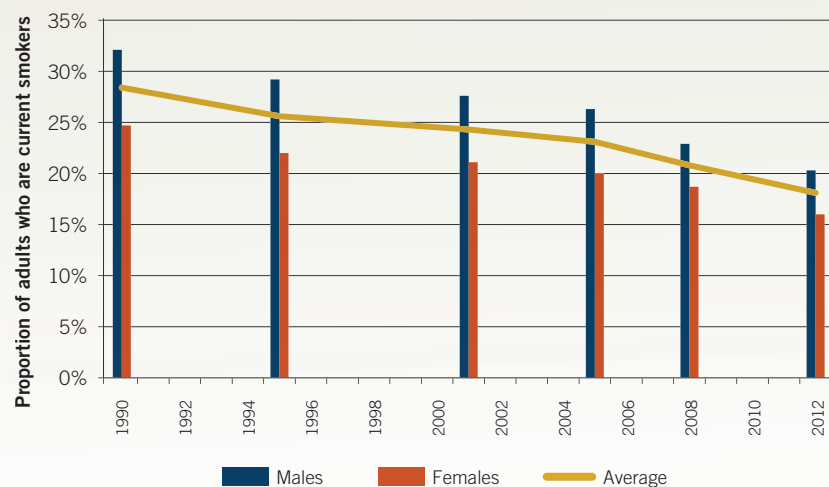


Smoking rates have decreased substantially over the last two decades.

Smoking

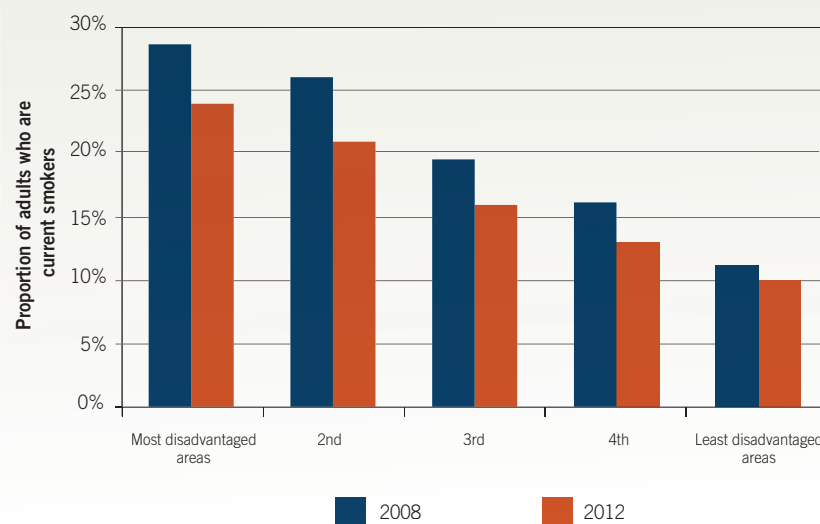
The proportion of adults aged 18 years and over who currently smoke^e has declined substantially from 28% in 1990 to 18% in 2012.

Figure 13B.11 Smoking: by gender, 1990 to 2012¹²



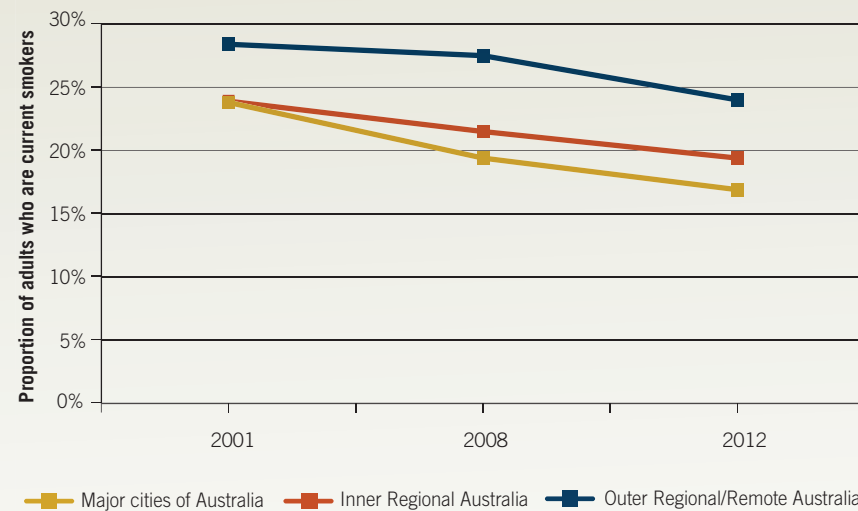
People living in the most disadvantaged areas are much more likely to be smokers than those living in the least disadvantaged areas. On a positive note, in the most disadvantaged areas smoking declined by almost five percentage points between 2008 and 2012.

Figure 13B.12 Smoking: by socio-economic disadvantage, 2008 and 2012¹³



In 2012, smoking rates were substantially higher for people living in outer regional and remote areas (24%) than in major cities (17%) and inner regional areas (19%). Over the past decade, smoking has declined more in major cities than in outer regional and remote areas.

Figure 13B.13 Smoking: by remoteness of region, 2001, 2008 and 2012¹⁴



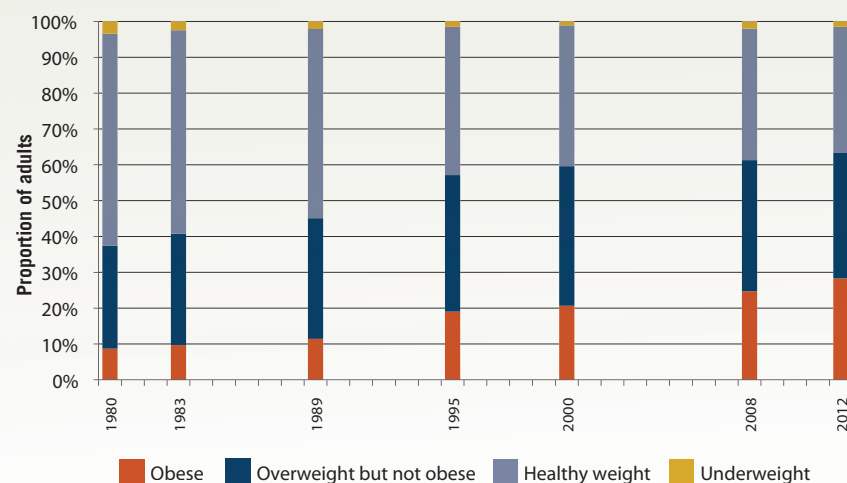
In 2008, almost half (45%) of Aboriginal and Torres Strait Islander people aged 18 years and over reported that they smoked daily. After adjusting for differences in age structure, this was more than twice the rate (19%) for non-Indigenous Australians.¹⁵

Obesity has increased greatly over the past three decades, with over a quarter of Australian adults now obese.

Obesity

Over four million adults (28%) were obese^f in 2012. Obesity has continually increased over past decades. The proportion of adults who are obese increased from 19% in 1995 to 28% in 2012.

Figure 13B.14 Obesity: Body Mass Index (BMI), 1980 to 2012¹⁶



In 2005, just under one third (31%) of Aboriginal and Torres Strait Islander people aged 18 and over were obese. After adjusting for differences in the age structure of the two populations, Aboriginal and Torres Strait Islander adults were twice as likely to be obese as non-Indigenous Australian adults.¹⁷

Rates of obesity are higher for people who live outside major cities, with rates tending to rise with the distance from the nearest major city. This is due to the socio-economic differences between these regions. Obesity rates are substantially higher for people who live in the most socio-economically disadvantaged areas of Australia (35%) than for people living in the least disadvantaged areas (22%).

Figure 13B.15 Obesity: by remoteness, 2012¹⁸

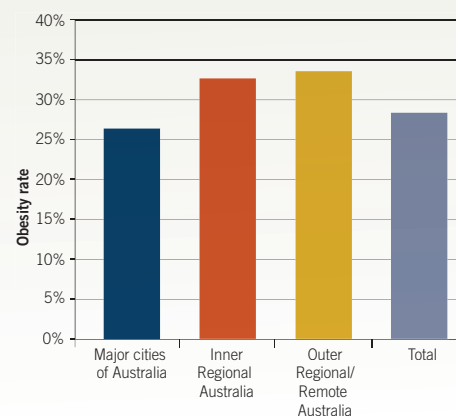
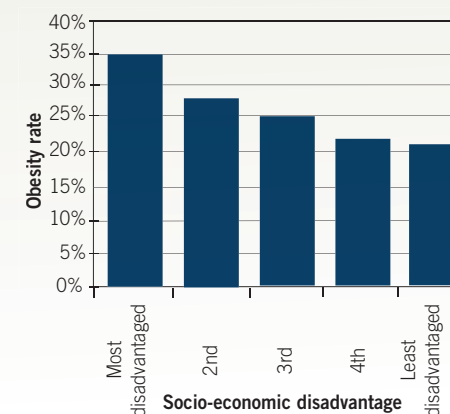


Figure 13B.16 Obesity: by socio-economic disadvantage, 2012¹⁹



Obesity in Sydney

Obesity rates vary greatly between and within regions and can be related to a variety of factors such as socio-economic disadvantage, the availability and cost of fast foods relative to fresh foods, access to safe places to exercise, availability of public transport and commuting times. The figure below shows obesity rates across Sydney in 2008, indicating distinctive differences between different parts of the city.

Figure 13B.17 Obesity rates: Sydney and surrounds, Obese males aged 18 years and over, rate per 100 males, 2008²⁰



13.3 - 17.2 20.0 - 20.8 22.0 - 26.1
17.3 - 19.9 20.9 - 21.9



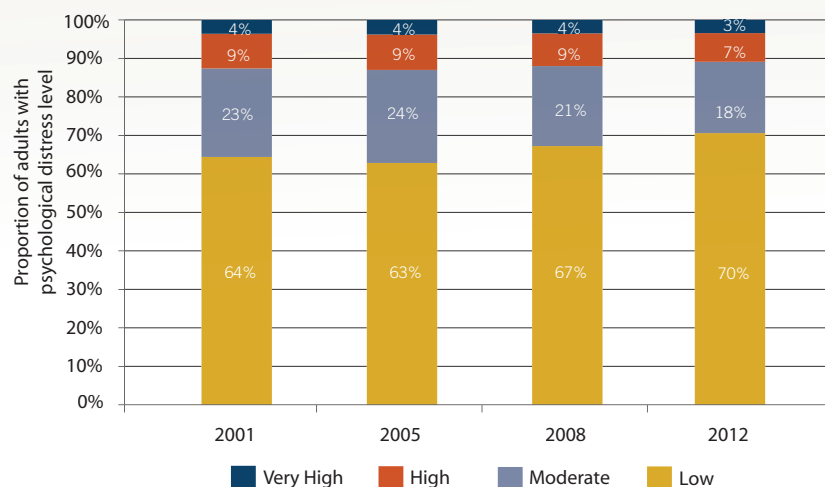
One in ten Australian adults experienced high or very high levels of psychological distress in 2012.

Mental health – social and emotional wellbeing

One way of detecting a possible mental illness is by measuring levels of psychological distress using a series of questions relating to feelings of nervousness, agitation, psychological fatigue and depression in the past 30 days. While not a diagnostic tool, having very high levels of psychological distress may signify a need for professional help. At a population level, rates of psychological distress can provide an indication of the extent of mental health and wellbeing in general and can be useful for estimating the need for mental health services.⁸

In 2012, 70% of Australians aged 18 years and over experienced a low level of psychological distress. In the same year 11% experienced high or very high levels of psychological distress, which has declined slightly from 13% in 2005 and 12% in 2008.

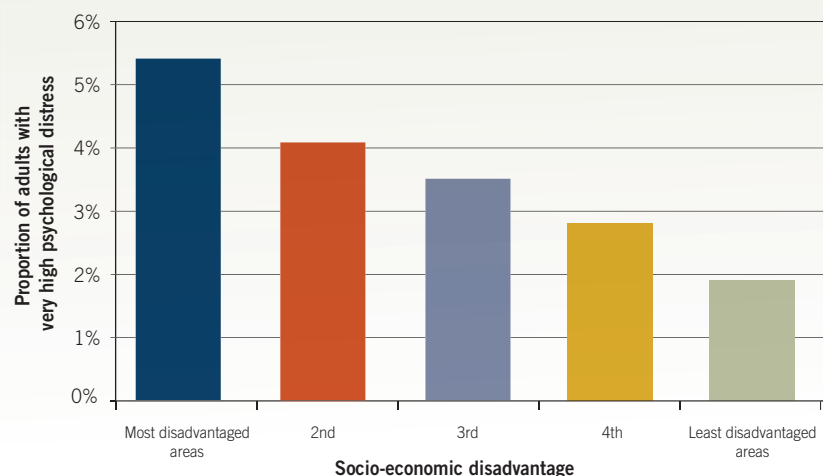
Figure 13B.18 Level of psychological distress: 2001 to 2012²¹



Women (13%) are more likely to have experienced high or very high levels of psychological distress than men (9%), and in general, high and very high

levels of psychological distress decrease slightly with age. People living in the most socio-economically disadvantaged areas were more likely to have high or very high levels of psychological distress (5.4% with very high distress in 2012) than people who lived in the least disadvantaged areas (1.9%).²² In 2008, over 30% of Aboriginal and Torres Strait Islander people aged 18 years and over had experienced high or very high levels of psychological distress – more than twice the rate for the general population (12%).²³

Figure 13B.19 Very high psychological distress: by socio-economic disadvantage, 2012²⁴



Prevalence of mental disorders

In 2007, 3.2 million (20%) Australians aged 16 to 85 years had symptoms of selected mental health disorders in the past year, including depressive episodes (4%), anxiety disorders (14%), and substance use disorders (5%).²⁵

In 2012, people with a disability or restrictive long-term health condition were also more likely to have experienced very high levels of psychological distress (8% compared with 3% of the general population).²⁶

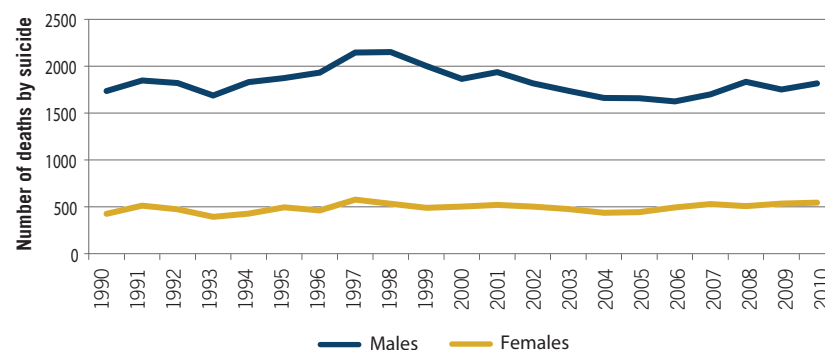
Past experiences – including experiences of homelessness, personal and financial stress – can be related to higher reported levels of psychological distress. Higher rates of psychological distress are also associated with lower levels of perceived quality of life. In 2007, 75% of people who perceived their quality of life to be unhappy or terrible had high or very high rates of psychological distress.²⁷

Suicide prevention in Australia^h

Suicide prevention is an important priority for the nation.

In Australia, there are more than 2,000 registered deaths from suicide each year. The number of suicide deaths recorded annually has remained relatively stable between 1990 and 2010, with a low in 1993 (2081) and the highest number in 1997 (2722).²⁸ In 2007, there were 65,300 estimated suicide attempts²⁹ and 368,100 people reported that they had serious thoughts about committing suicide in the past 12 months.³⁰

Figure 13B.20 Number of deaths by suicide, by gender, 1990 to 2010³¹



Men account for over three-quarters of all deaths by suicide.

More than 20% of all deaths for young people aged 15 to 35 years in Australia are by suicide. Suicide rates for Aboriginal and Torres Strait Islander people are about double that of non-Indigenous Australians.

Rates of suicide tend to be higher outside capital cities.

Part of the known risk for suicide is the impact of living with a mental health difficulty. Between 2001 and 2010, over half (56%) of the 4,932 suicide deaths that were recorded with a multiple cause of death (22% of all suicide deaths) included mental health and behavioural disorders as one of the causes.³²

Care needs to be taken in interpreting figures relating to suicide as the number of registered suicides tends to underestimate the actual number of suicides due to the sensitivity and complexity of determining suicide by coroners and by the Australian Bureau of Statistics.ⁱ In some cases suicides may be masked by road trauma and deaths that are declared accidental.

Australia has had a national approach to suicide prevention since 1995, when the first National Youth Suicide Prevention Strategy began.

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- 7 Australian Bureau of Statistics, *National Health Survey: Summary of Results, 1995 to 2007–08* (cat. no. 4364.0); Australian Bureau of Statistics, *Australian Health Survey: First Results, 2011–12* (cat. no. 4364.0.55.001).
- 8 Australian Bureau of Statistics, *Australian Health Survey: First Results, 2011–12* (cat. no. 4364.0.55.001). Also see Chapter 5 of this report.
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- 10 Australian Bureau of Statistics, *National Aboriginal and Torres Strait Islander Social Survey, 2008* (cat. no. 4714.0).
- 11 Australian Bureau of Statistics, unpublished data from the *Australian Health Survey, 2011–12*
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- 17 Latest available data is from the Australian Bureau of Statistics, *National Aboriginal and Torres Strait Islander Health Survey, 2008*, as reported in ABS, *Overweight and Obesity – Aboriginal and Torres Strait Islander people: A snapshot, 2004–05* (cat. no. 4722.0.55.006). Note that in the 2004–05 NATSIHS and NHS, self-reported height and weight measurements were collected. An option to have height and weight measured was provided in some remote areas.
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- 19 Australian Bureau of Statistics, *Australian Health Survey: First Results, 2011–12* (cat. no. 4364.0.55.001)
- 20 Public Health Information Development Unit, The University of Adelaide, *A Social Health Atlas of Australia, 2010, Local Government Area (LGA) data, NSW*. Estimates are a synthetic prediction based on data from the Australian Bureau of Statistics, *National Health Survey, 2007–08*.
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- 22 Australian Bureau of Statistics, *National Health Survey, 2007–08* as reported in Australian Bureau of Statistics, *Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, 2007–08* (cat. no. 4817.0.55.001).
- 23 Latest available data is from the Australian Bureau of Statistics, *National Aboriginal and Torres Strait Islander Health Survey, 2008*
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- 28 Australian Bureau of Statistics, *Suicides Australia*, (cat. no. 3309) 1921 to 1988, 1994 to 2004 and 2010 issues
- 29 Australian Bureau of Statistics, *National Survey of Mental Health and Wellbeing 2007* as reported in National Mental Health Commission, *A Contributing Life: the 2012 national report card on mental health and suicide prevention*
- 30 Australian Bureau of Statistics, *National Survey of Mental Health and Wellbeing: Summary of Results, 2007* (cat. no. 4326.0)
- 31 Australian Bureau of Statistics, *Suicides Australia*, (cat. no. 3309) 1921 to 1988, 1994 to 2004 and 2010 issues
- 32 Australian Bureau of Statistics, *Suicides Australia, 2010* (cat. no. 3309)

Notes

- (a) This case study is adapted from Department of Health, Victoria, *Health status of Victorians*, Life expectancy at birth: Tables & Charts 2007.
- (b) See Australian Institute of Health and Welfare (AIHW), *Australia's health 2012*.
- (c) The way we assess our health in general can be a reflection of how healthy and happy we feel relative to other people.
- (d) Throughout this theme, all data from the Australian Health Survey, referred to as '2012', was collected from March 2011 to March 2012. Data from the National Health Survey referred to as '2005' was collected from August 2004 to June 2005; '2008' was collected from August 2007 to June 2008.
- (e) This refers to the extent to which a respondent was smoking at the time of interview and to regular smoking of tobacco. Almost all current smokers were daily smokers (90% in 2012) who reported at the time of interview that they regularly smoked one or more cigarettes, cigars or pipes per day. Other current smokers (10%) reported that they smoked less frequently than daily.
- (f) Based on measured Body Mass Index. Adults with a BMI of 30 or more are classed as obese.
- (g) The Kessler Psychological Distress Scale (K10) is a simple measure of psychological distress based on a series of 10 questions designed to measure non-specific psychological distress. See Australian Bureau of Statistics, *Information Paper: Use of the Kessler Psychological Distress Scale in ABS Health Surveys, 2007–08* (cat. no. 4817.0.55.001).
- (h) This section has been adapted from 'Preventing suicide: effective interventions' in *A Contributing Life: the 2012 national report card on mental health and suicide prevention*, National Mental Health Commission, Canberra, pp.127–141.
- (i) Care needs to be taken in interpreting figures relating to suicide. A death is coded to suicide if a coroner determined the death to be the result of intentional self-harm and the case is closed. In addition, ABS mortality coders may initially code an open case death to suicide if there is sufficient information on the National Coroners Information System (NCIS) to consider the death to be due to intentional self-harm. Information that would support a determination of suicide includes indications by the person that they intended to take their own life, the presence of a suicide note, or knowledge of previous suicide attempts. The number of deaths by suicide is expected to increase as data is subjected to the revisions process. To improve the quality of mortality coding, all coroner certified deaths registered after January 1 2006 are now subject to a revisions process. The ABS investigates cases remaining open on the NCIS, at 12 and 24 months after initial processing. As 12 or 24 months have passed since initial processing, many coronial cases will be closed, with the coroner having determined the underlying cause of death and allowing the ABS to code a more specific cause of death. Where a case remains open ABS mortality coders may use additional information from police reports, toxicology reports, autopsy reports and coroners' findings to assign a more specific cause of death to these open cases. These processes will affect the data reported here for the number of suicide deaths in 2010 and 2011; data for 2006 to 2009 have been revised and finalised.

IMAGES

All images from www.istockphoto.com



HOW STRONG ARE OUR SOCIAL AND COMMUNITY CONNECTIONS?

Many Australians actively participate in their communities, particularly in regional areas, and participation has generally been increasing over time.

However, participation is lower for people living in disadvantage and participation in organised sport has declined. People with disability may also face significant barriers to becoming engaged and connecting with their communities.

The foundation of society is the complex network of connections and relationships between people, which are built up and strengthened through participation in and engagement with our communities.

A cohesive and inclusive society with well-functioning institutions will be more capable of innovating and adapting to face challenges.

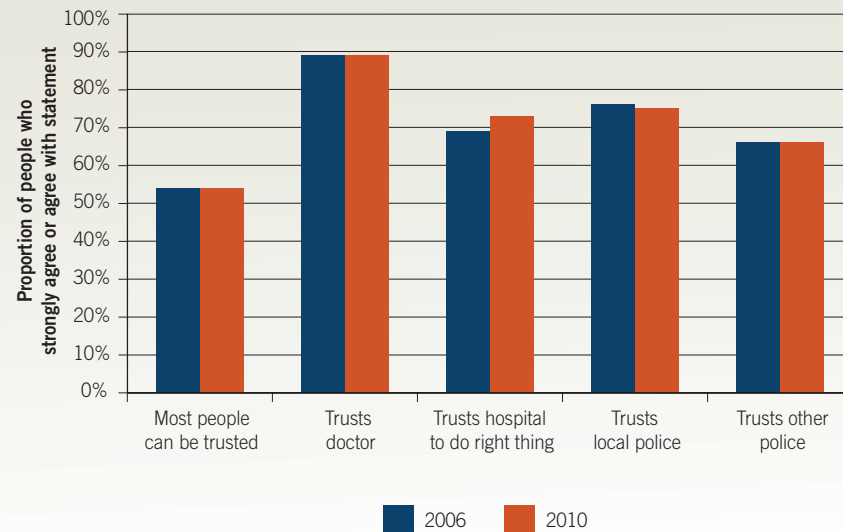


Half of Australians agree that most people can be trusted, but trust in our doctors and our local police is much higher.

Levels of trust

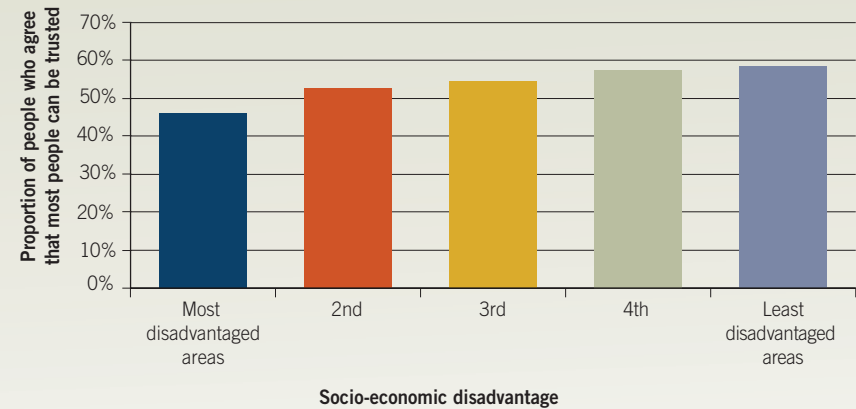
In 2010, around half (54%) of people aged 18 years or over felt that 'most people' could be trusted.^a They were more likely to trust their doctor (89%), followed by local police (75%) and hospitals (73%).

Figure 13C.1 Levels of trust, 2006 and 2010¹



Trust is lower amongst those who live in socio-economically disadvantaged areas: 46% of people who live in the most disadvantaged areas agreed that most people can be trusted, compared with 58% of those in the least disadvantaged areas.

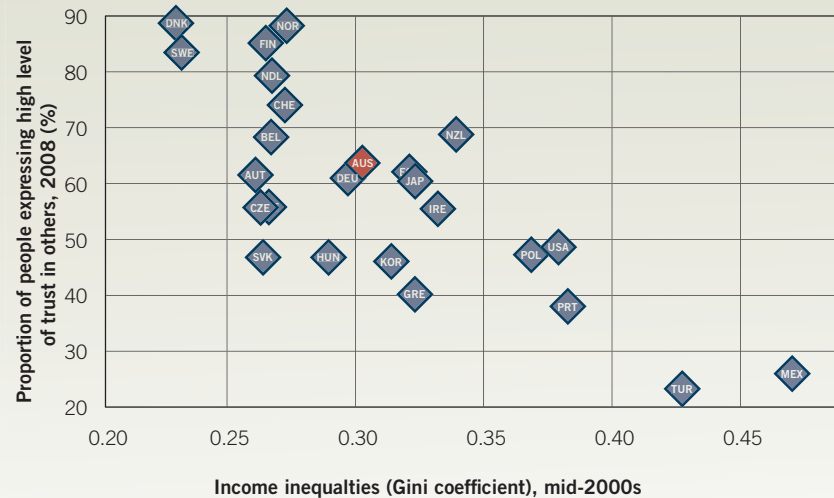
Figure 13C.2 Levels of trust, by socio-economic disadvantage, 2010²



Young people and people who have experienced violation of their trust, such as victims of crime, tend to report lower levels of trust.

Internationally, levels of trust tend to be higher in richer countries and where incomes are distributed equally. In line with our relatively high wealth and income inequality, Australians express levels of trust that are slightly above the OECD average. People living in the Nordic countries express particularly high levels of trust.

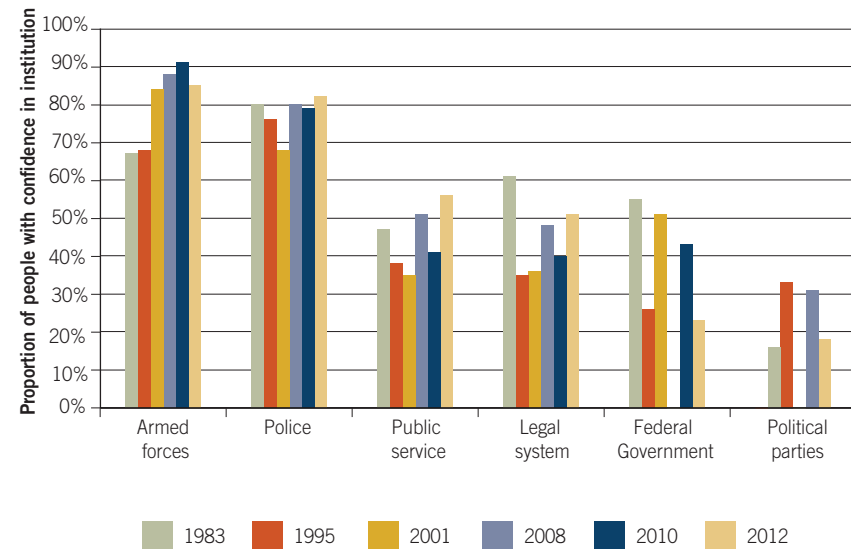
Figure 13C.3 International comparison of levels of trust, by income inequality, 2008³



Confidence in public institutions

In 2012, the ANUpoll explored public opinions on confidence in a range of public institutions. ANUpoll also presented similar information from several historical opinion polls to provide an indication of how these perceptions have changed over time. Public confidence in the armed forces and the police has remained consistently high over time. In contrast, confidence in the federal government and political parties is much lower and more variable over time.

Figure 13C.4 Confidence in institutions, by type of institution, 1983 to 2012⁴

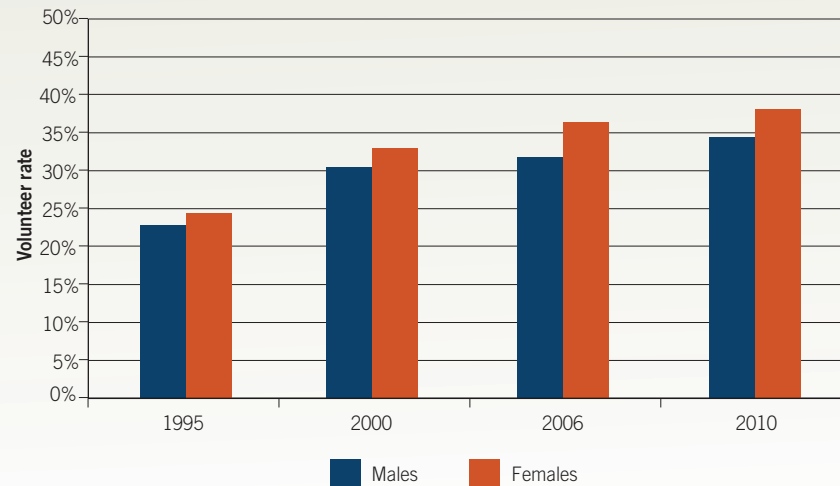


The proportion of Australians who volunteer has increased steadily.

Volunteering

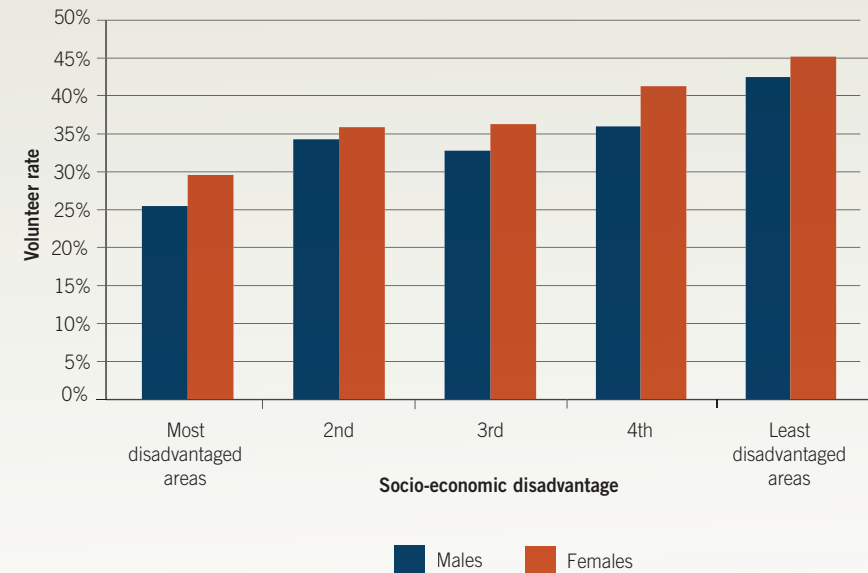
In 2010, 6.1 million people aged 18 years and over volunteered by willingly giving unpaid help, in the form of time, service or skills, to or through an organisation or group at least once a year. The volunteer^b rate has increased substantially from 24% in 1995 to 36% in 2010.

Figure 13C.5 Volunteering, by gender, 1995 to 2010⁵



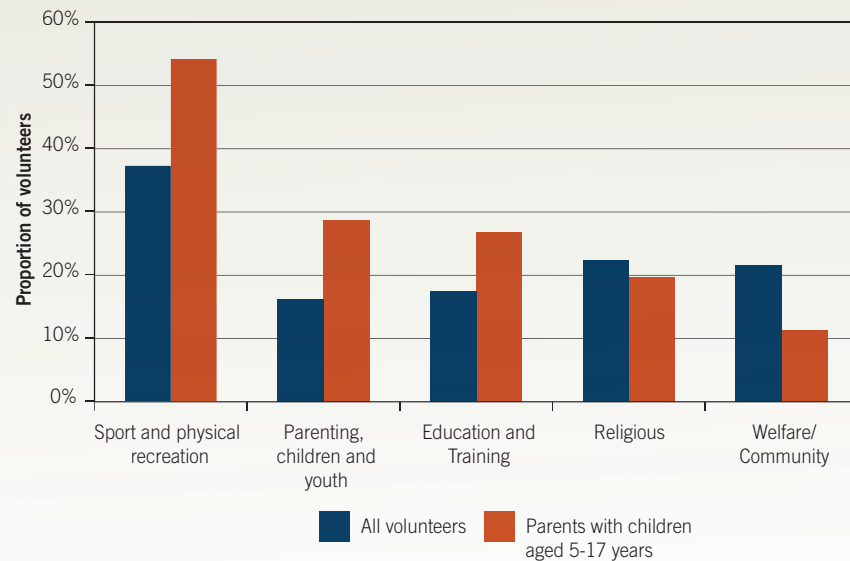
Reflecting their family commitments, couples with dependent children aged five to 17 years have particularly high volunteer rates (55%). People are also more likely to volunteer if they are aged 35 to 65; are employed either full-time (38%) or part-time (44%); or have higher educational qualifications. Volunteer rates are also higher for people living in the least socio-economically disadvantaged areas.

Figure 13C.6 Volunteering, by gender and socio-economic disadvantage, 2010⁶



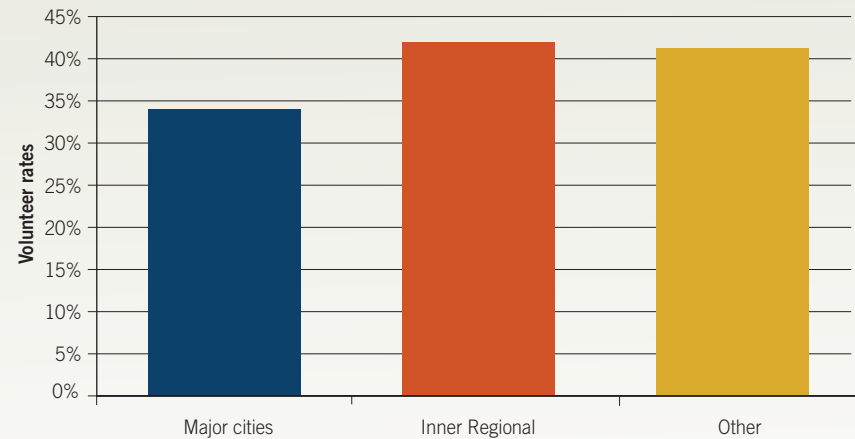
Sport and physical recreation organisations were the most common type of organisation^c for which people volunteered (37% of volunteers), particularly for fathers of children aged five to 17 years (63%). Volunteering for religious organisations (22%), welfare/community organisations (22%), education and training organisations (18%) and parenting, children and youth organisations (16%) was also common.

Figure 13C.7 Volunteering, by common organisation types, 2010⁷



Volunteer rates vary greatly across Australia, with higher rates in areas outside the major cities. In 2010, over 40% of people living outside major cities volunteered, compared with 34% in the major cities. The 2011 Census indicates that even within cities, the rates vary substantially, with lower rates among people living in the inner city areas.

Figure 13C.8 Volunteering, by region, 2010⁸



Volunteers are more likely to agree that most people can be trusted (62%) and more likely to report higher levels of self-assessed health status and of overall life satisfaction than the general population.⁹

There was a small rise in attendance at cultural activities and events between 1995 and 2010.

Cultural activity attendance

The proportion of people who attended at least one cultural venue or event in the last 12 months increased slightly from 83% in 1995 to 86% in 2010.

Attendance rates for cultural venues and events were highest in the Australian Capital Territory (93%) and the Northern Territory (91%), while rates were lowest in New South Wales (83%) and Tasmania (84%).

Figure 13C.9 Cultural activity attendance, 1995 to 2010¹⁰

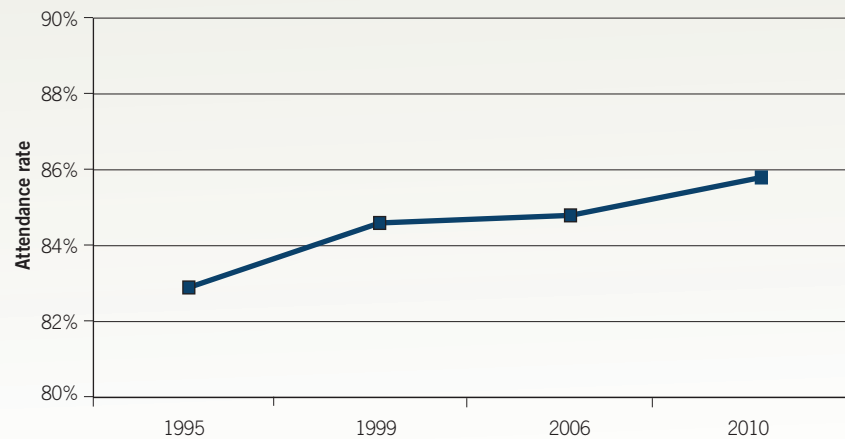
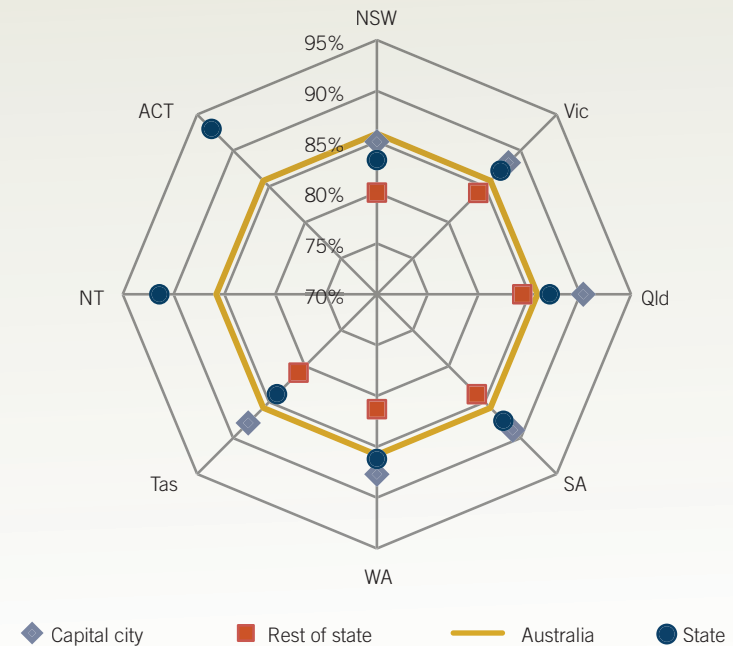


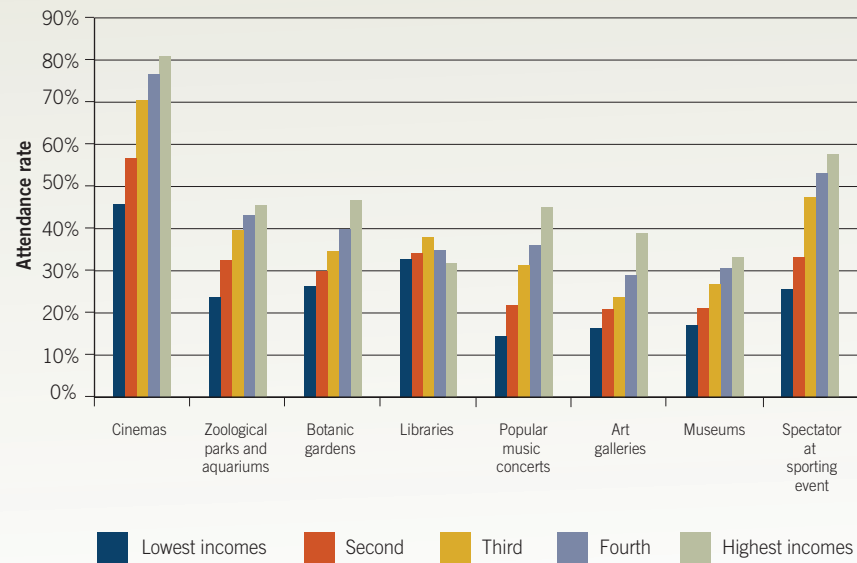
Figure 13C.10 Cultural activity attendance, by state/territory and capital city/rest of state, 2010¹¹



Going to the movies was the most popular cultural activity for Australians in 2010 (67%). Also popular were performing arts events (52%), including popular music concerts, theatre performances and musicals and operas.

Attendance rates are substantially higher for people with higher household incomes^d and are also higher for those living in the least socio-economically disadvantaged areas (86% compared with 77% in the most disadvantaged areas). An exception to this is visits to libraries, which are similar for those with low and high household incomes.

Figure 13C.11 Cultural activity attendance, by common activities and household income, 2010¹²



In addition to cultural events, 43% of Australians connect with others in their community by being a spectator at a sporting event.

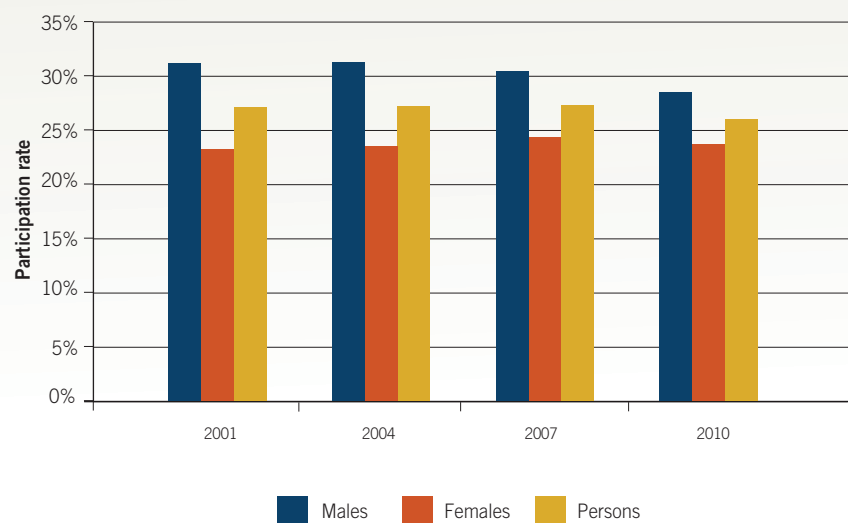
Organised sport participation has declined slightly over the last decade, due to a decrease in men's participation.

Participation in organised sport

In 2010, 26% of people aged 15 years and over were involved in organised sport^e or physical activities, either in playing roles (22%) or in non-playing roles^f (9%) as coaches, referees and umpires, scorers, medical support and in administrative roles.

The participation rate was slightly lower than in 2001 (27%) due to a decline in the proportion of men participating in organised sport between 2001 and 2010 (from 31% to 29%). Despite this, men were still more likely to be involved than women, whose participation rates remained steady over the decade (around 24%).

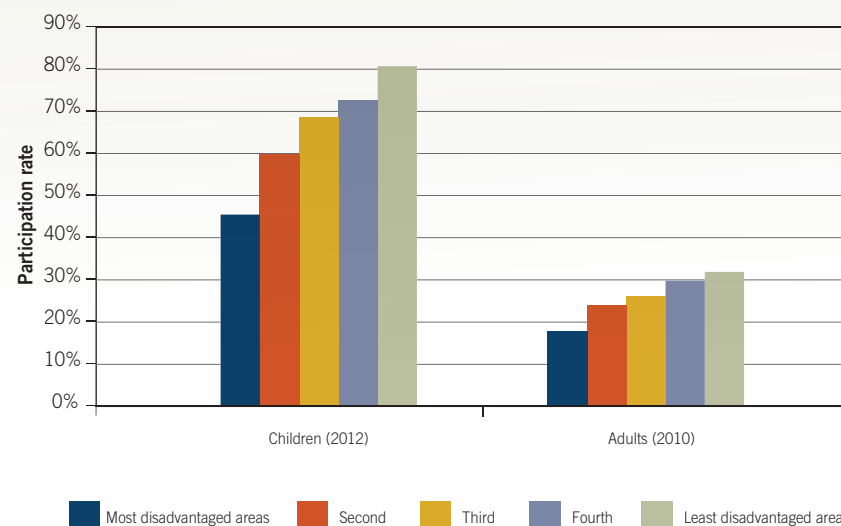
Figure 13C.12 Participation in sport, by gender, 2001 to 2010¹³



People living in Victoria outside Melbourne were most likely to have participated in organised sport (34%). People living in Sydney had the lowest participation rate (22%).

People living in the most socio-economically disadvantaged areas were much less likely to participate in organised sport than those that lived in the least disadvantaged areas. This is particularly notable for children aged five to 14. Children living in the most disadvantaged areas had participation rates^g (45%) that were almost half those of children living in the least disadvantaged areas (81%). This could be because of a number of factors including a lack of facilities, a shortage of groups willing to organise events or the costs of participating.

Figure 13C.13 Participation in organised sport, adults and children, by socio-economic disadvantage¹⁴



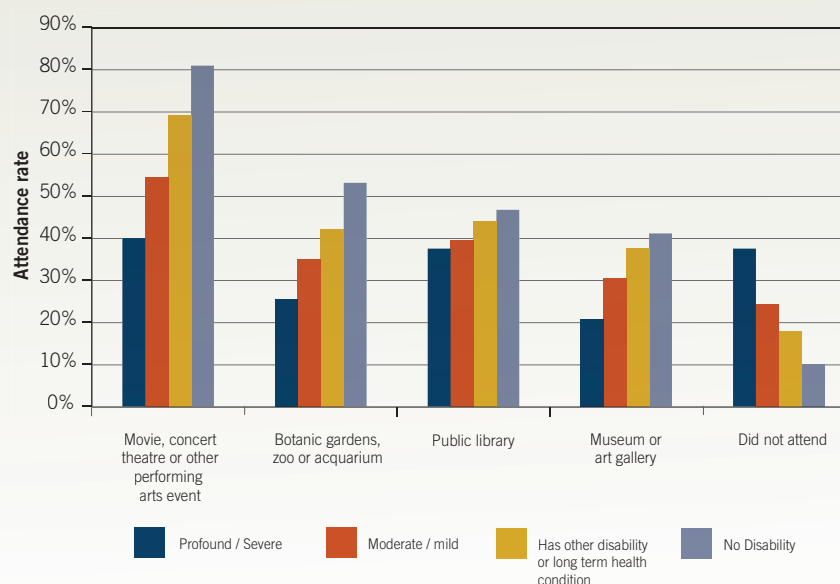
Attendance at cultural activities and community events is lower for people with disability.

Community engagement by persons with disability

Four million Australians (19%) reported having a disability in 2009.¹⁵ People with disability have lower rates of social and community participation than people without disability. Contributing to this may be social barriers such as attitudes and discrimination, physical barriers from inaccessible structures and public spaces, or financial barriers.

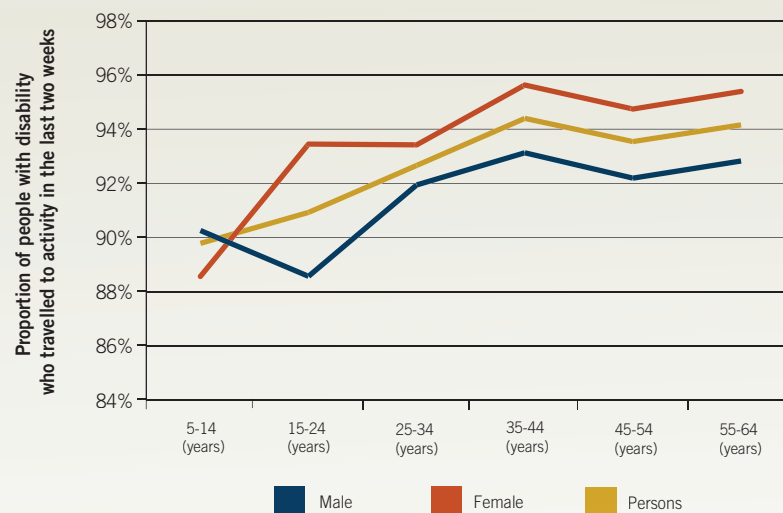
In 2010, 62% of people with profound or severe disability had attended at least one common cultural venue or event in the previous 12 months, compared with 90% of people without disability. Although going to the cinema is the most popular activity for many Australians, less than 40% of people with severe or profound disability went to the cinema, compared to almost 70% for the general population. The difference in attendance rates was smallest for libraries, with 38% of people with profound or severe disability attending, compared with 47% of people with no disability.

Figure 13C.14 Attendance at cultural venues and events, by disability status, 2010¹⁶



In 2009, 93% of people with disability had travelled to a social or community event in the last two weeks. This was the same level as in 1998 (93%) and slightly lower than the rate in 2003 (97%).¹⁷

Figure 13C.15 Travel to social or community activities by people with disability, by age and gender, 2009¹⁸



In 2009, 37,000 people with disability reported that they do not leave their homes at all. Another 1.1 million people indicated that they were not getting out as often as they would like, with the most common reasons given being their disability or health condition (45%), and the cost of going out (10%).¹⁹

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- 2 Australian Bureau of Statistics, unpublished data from *General Social Survey 2010*
- 3 Organisation for Economic Co-operation and Development (2011), *Society at a Glance 2011: OECD Social Indicators* from ESS (European Social Survey); ISSP (International Social Survey Programme); Organisation for Economic Co-operation and Development, *Growing Unequal? Income Distribution and Poverty in OECD Countries*
- 4 Australian National University, *Perceptions of corruption and ethical conduct*, ANUPoll October 2012
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- 9 Australian Bureau of Statistics, *General Social Survey, 2010* as published in Australian Bureau of Statistics, *Volunteers in Sport, Australia, 2010* (cat. no. 4440.0.55.001)
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- 11 Australian Bureau of Statistics, *Attendance at Selected Cultural Venues and Events, 2009–10* (cat. no. 4114.0). “2010” refers data collected in 2009–10.
- 12 Australian Bureau of Statistics, *Attendance at Selected Cultural Venues and Events, 2009–10* (cat. no. 4114.0); Australian Bureau of Statistics, *Spectator Attendance at Sporting Events, 2009–10* (cat. no. 4174.0). Being a spectator at sporting events is included for comparative purposes. Attendance at this type of event is not included in the estimates of people who attended at least one cultural venue or event in the last 12 months. “2010” refers data collected in 2009–10.
- 13 Australian Bureau of Statistics, *Involvement in Organised Sport and Physical Activity* (cat. no. 6285.0) 2001, 2004, 2007 and 2010 issues
- 14 Australian Bureau of Statistics, unpublished data from *Monthly Population Survey April 2010: Involvement in Organised Sport and Physical Activity Survey*; Australian Bureau of Statistics, unpublished data from *Survey of Children's Participation in Cultural and Leisure Activities, 2012*
- 15 Australian Bureau of Statistics, *Survey of Disability, Ageing and Carers, Australia: Summary of Findings, 2009* (cat. no. 4430.0)
- 16 Australian Bureau of Statistics, unpublished data from *General Social Survey, 2010*
- 17 Australian Bureau of Statistics, *Survey of Disability, Ageing and Carers 2009 and 2003* unpublished data, as published in Productivity Commission, *National Agreement performance reporting: National Disability Agreement 2010–11* (2011); Australian Bureau of Statistics, *Survey of Disability, Ageing and Carers 1998* unpublished data.
- 18 Australian Bureau of Statistics, *Survey of Disability, Ageing and Carers 2009* unpublished data, as published in Productivity Commission (2011) *National Agreement performance reporting: National Disability Agreement 2010–11*
- 19 Australian Bureau of Statistics, *Survey of Disability, Ageing and Carers, 2009* as published in Australian Bureau of Statistics, ‘Getting out of the House’ in *Social Participation of People with a Disability, 2011* (cat. no. 4439.0)

Notes

- (a) People were asked how much they agreed that ‘most people’, your doctor, hospitals, local and non-local police could be trusted to do the right thing.
- (b) A volunteer is someone who willingly gave unpaid help, in the form of time, service or skills, to or through an organisation or group in the 12 months prior to the survey. The term ‘willingly given’ excludes work such as: the Work for the Dole Program or Community Work under Mutual Obligation; work experience/part of an unpaid work trial; work under a Community Service Order; a student placement; or emergency work during an industrial dispute. For more details, see Australian Bureau of Statistics, ‘Appendix: Changes between surveys’ in *Voluntary Work, Australia, 2006* (cat. no. 4441.0).
- (c) Volunteers may volunteer for more than one type of organisation.
- (d) Based on household equivalised income quintiles.
- (e) Organised sport and physical activities are arranged through recreation clubs, sporting or non-sporting associations, or a wide variety of other arrangements. This could include participation as part of organised sporting teams, dance classes, group fitness classes at a gym or events organised by one’s employer.
- (f) Some people participate in both playing and non-playing roles, so estimates do not add to total.
- (g) Children’s participation is in playing roles only.

IMAGES

Melbourne Cricket Ground, Mark Munro

Volunteers from the Milton Landcare Group in action, Georgia Curry

Other images from www.istockphoto.com



HOW IS OUR WORKING LIFE?

With strong economic growth and demographic changes, Australia has experienced relatively high employment, including record participation rates and low unemployment, avoiding the recessions and associated high levels of unemployment seen in many countries during the global financial crisis.

Australia has one of the highest proportions of part-time workers in the world. Yet, a relatively high proportion of full-time workers work very long hours.

Having a job is a way that people can directly contribute to the productivity and sustainability of the economy. Our jobs provide us with an important source of income, as well as a sense of purpose, connection and identity that are important for our personal wellbeing, and can also provide benefits to the community and wider society.



While unemployment rates are at historically low levels, underemployment rates are rising.

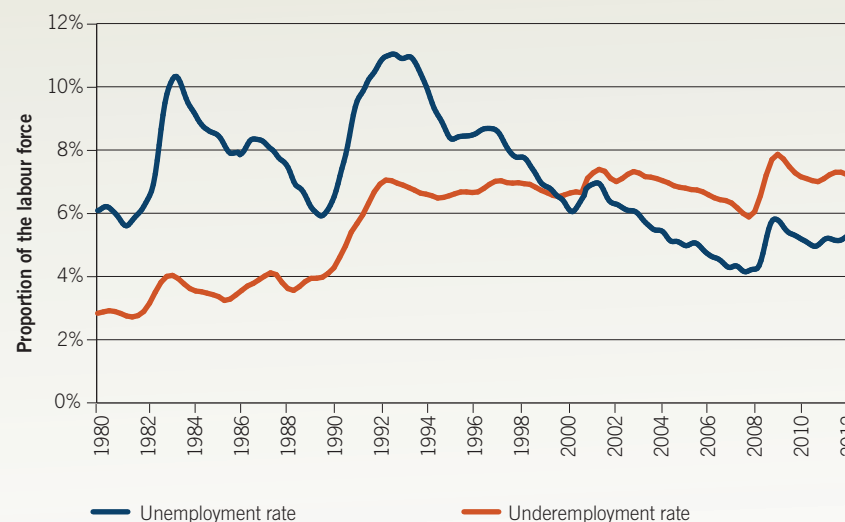
Unemployment rate and underemployment rate

The unemployment rate declined over much of the past two decades from a peak of just over 11% in the aftermath of the recession of the early 1990s.^a Due to strong and continuous economic growth, Australia has had low unemployment rates for the past decade. The unemployment rate declined to a low of 4.0% in February 2008. Following the global financial crisis, the unemployment rate rose to a peak of 5.9% in June 2009. Since 2010, the unemployment rate has fluctuated between 4.9% and 5.5%.

The underemployment rate comprises people who are working part-time^b and would like to work more hours and people who usually work full-time^c but have been working part-time for economic reasons (such as insufficient work being available). The underemployment rate rose substantially in the early 1990s, partially due to the rising proportion of people working part-time over the period. The underemployment rate has been around 7% since the mid-1990s.

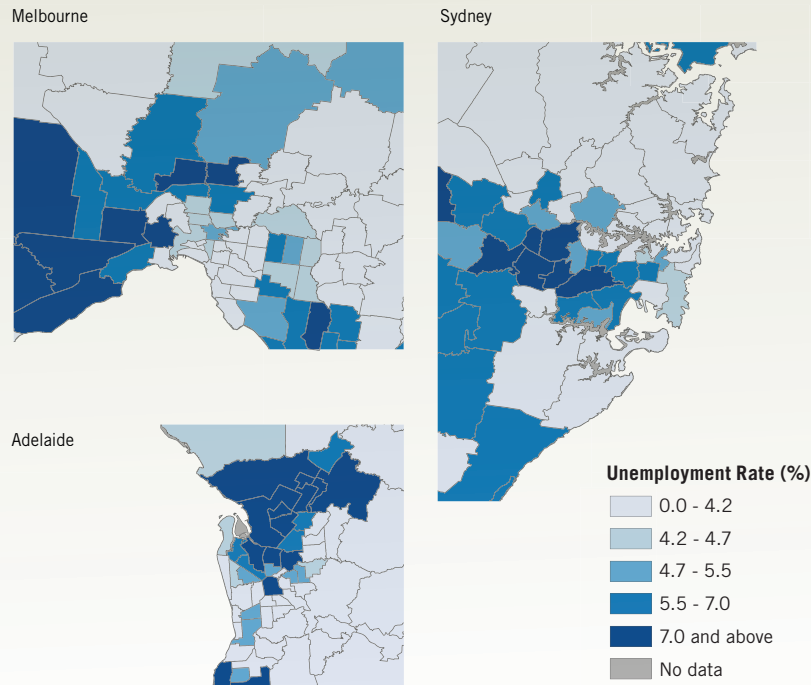
Although men make up a relatively small proportion of people who are employed part-time, they are more likely than women to report that they would like to work more hours.

Figure 13D.1 Underemployment and unemployment: trend, 1980 to 2012¹



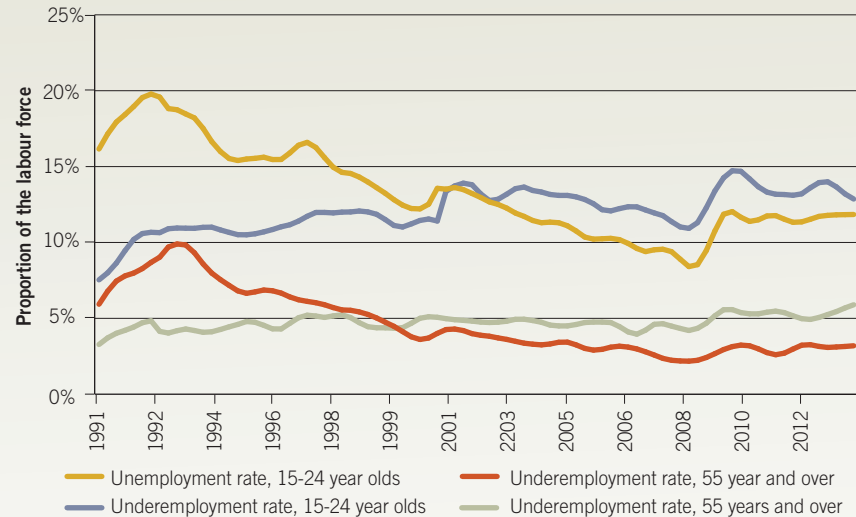
Unemployment rates vary greatly across Australia, including large differences within cities. In September 2012, more than half of local areas^d recorded an unemployment rate of less than 5%. In contrast 9% of areas had an unemployment rate of 10% or more.

Figure 13D.2 Unemployment rate, by Statistical Local Areas, September 2012²



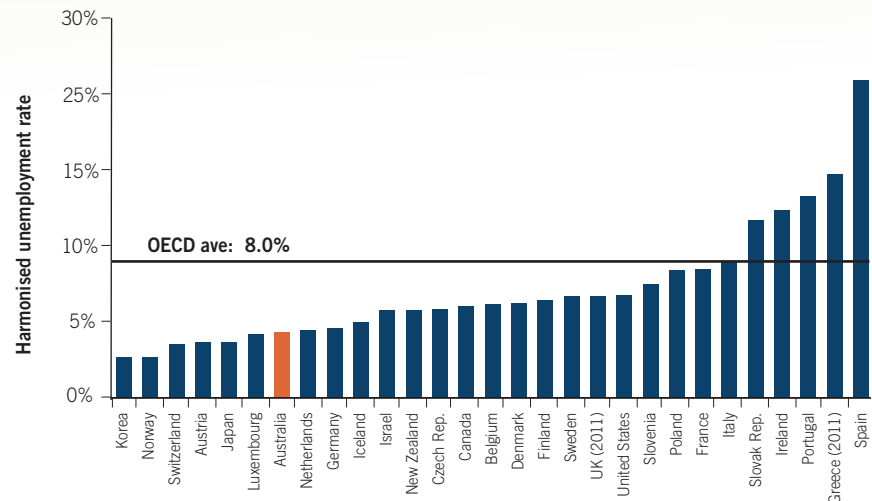
Most people are unemployed for short periods of time. However, people are more likely to be unemployed for long periods (more than a year) if they are young (aged 15 to 24 years) or aged over 55 years, have low educational qualifications (have not attained Year 12 or above) or lost their last job rather than leaving voluntarily. Amongst the long term unemployed, the most commonly stated difficulties in finding a job were because of their health or disability, or because there were too many applicants for the available jobs.

Figure 13D.3 Unemployment and underemployment rates: by selected age group, trend, 1991 to 2013³



Australia's harmonised unemployment rate in 2012 (5.2%) was relatively low compared with the average for OECD countries (8.0%).

Figure 13D.4 Hours worked: international comparison of unemployment rates, 2012⁴



Overemployment^e

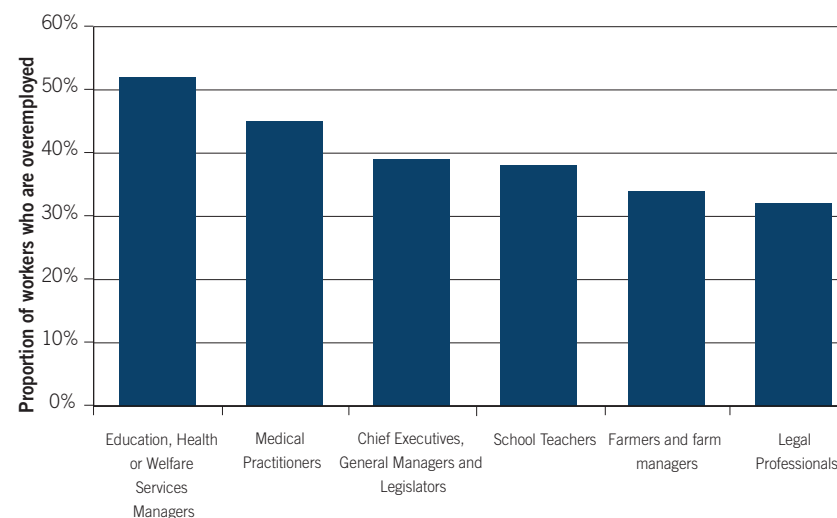
Most Australians work their preferred number of hours each week. However, there are many workers who are underemployed or – at the other end of the spectrum – workers who would prefer to work fewer hours per week (taking into account how that would affect their incomes): ‘the overemployed’.

In 2007, around two-thirds (65%) of workers aged 15 years and over felt they were working close to their preferred number of hours. While 1.4 million workers (14%) wanted to work more hours, about 2.2 million (21%) preferred to be working fewer hours.

In 2007, most overemployed workers (89%) usually worked full-time, although a significant proportion (11%) usually worked part-time. Generally though, the more hours usually worked, the more likely people were to be overemployed. For people who usually worked at least 60 hours a week, 51% were overemployed and – on average – this group would have preferred to be working 42 hours a week.

Spending too much time working may cause work/life imbalance, the effects of which include fatigue, stress and burnout, and relationship breakdown. However, people may work more hours than they would prefer for many reasons apart from financial remuneration. For example, some jobs that offer stimulation, prestige and autonomy may not be available on a part-time basis and, in some circumstances, long working hours may represent an investment that enhances prospects for career development. Labour shortages or traditions of long working hours may also contribute to overemployment.

Figure 13D.5 Overemployment rates, selected occupations, 2007



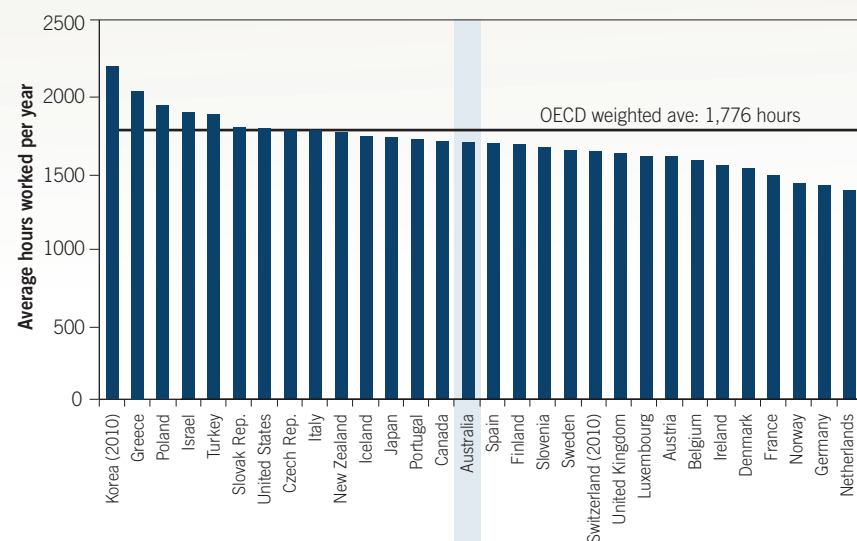
Hours worked are declining with increasing part-time work and recent declines in working very long hours.

Hours worked

Average hours worked by all employed people have declined over the past few decades, particularly due to increases in part-time work, from 35.3 hours in 1980 to 32 hours in 2012.

Australia has one of the highest rates of people working part-time. In 2011, 25% of employed Australians worked part time. Among OECD countries, only the Netherlands (37%), Switzerland (26%) and Ireland (26%) had higher rates.⁵ On average, Australians work less hours per year (1693 in 2011) than the OECD average (1776), including the US (1787), Canada (1702) and New Zealand (1762).

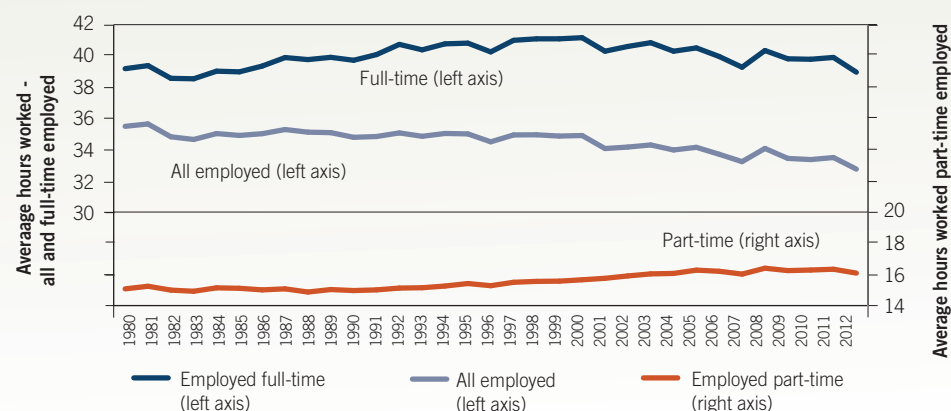
Figure 13D.6 International comparison of average annual hours worked, 2011^{5a}



Between 2000 and 2012, average hours worked per week by full-time workers declined from 41.3 to 38.8. This marked a reversal in trends seen in previous decades of increasing hours worked.

Between 1990 and 2012, average hours worked by part-time workers increased by 9% (from 14.8 to 16.1 hours).

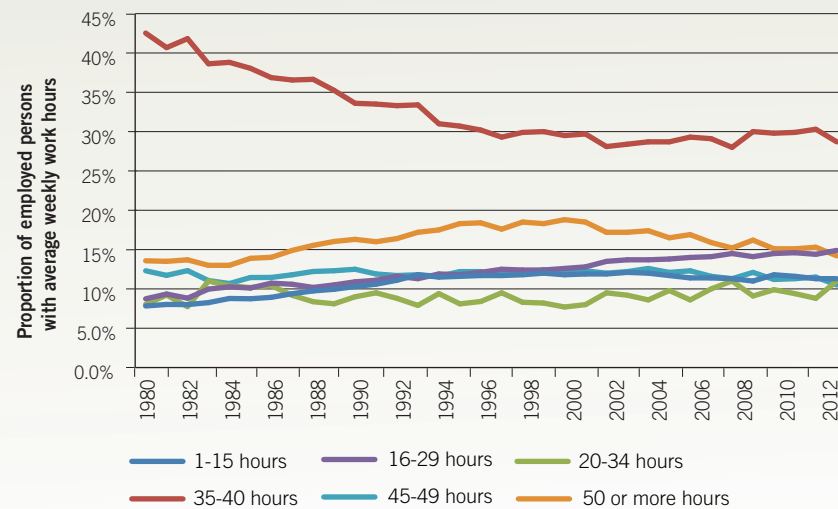
Figure 13D.7 Full-time and part-time average hours worked per week, 1980 to 2012⁶



Just under one third of workers work 35 to 40 hours a week. While this proportion has been fairly constant since the early 1990s, it was much higher in previous decades. For example, in 1979, 43% of employed people worked 35 to 40 hours a week.

In the 1980s and 1990s, there was strong growth in the proportion of workers who worked very long hours (50 hours or more per week), rising from 13% in 1983 to 19% in 1999. However, this trend has reversed over the past decade, although the rate (14% in 2012) is still much higher than the OECD average (9%).

Figure 13D.8 Employment by average hours worked per week, 1980 to 2012⁷

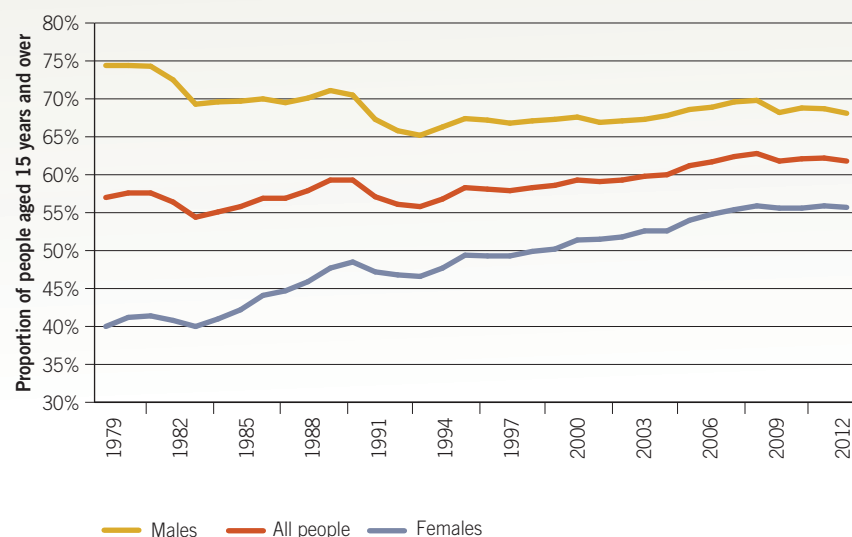


The proportion of people employed has reached historically high levels. However, it is expected to decline as the population ages.

Employment to population ratio

The employment to population ratio has risen strongly from 54% in 1983 to a peak of 63% in 2008. In 2012 the ratio was slightly lower at 62%. Two main drivers of the rise in employment over past decades have been the increase in the proportion of women employed (from 41% in 1982 to 56% in 2008) and in the proportion of people aged 55 years and over who are employed (from 22% to 34%). Partially offsetting this has been the decline in employment rates of men aged 15–59.

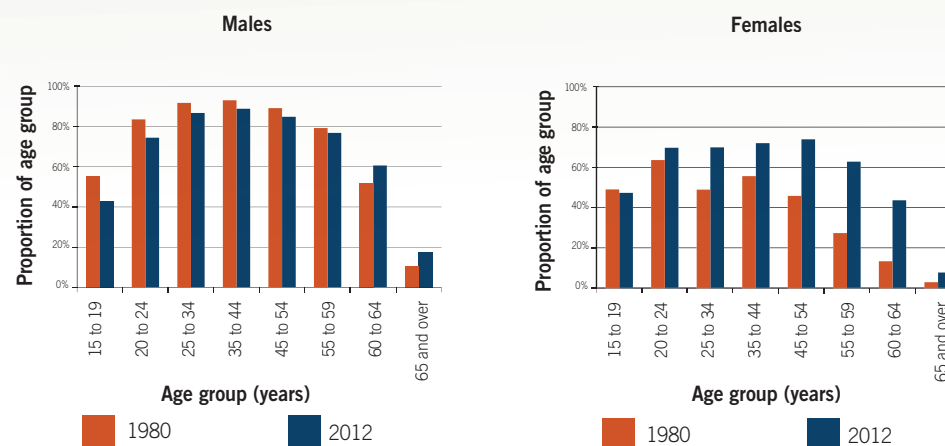
Figure 13D.9 Employment to population ratio, by gender, 1980 to 2012⁸



Between 1980 and 2012, there have been substantial changes to the employment patterns of men and women. The proportion of men who are employed has declined – particularly in the ‘peak working ages’ of 25 to 54 years (from 92% in 1980 to 87% in 2012). The decline is even greater for full-time employment: from 89% in 1980 to 79% in 2012.

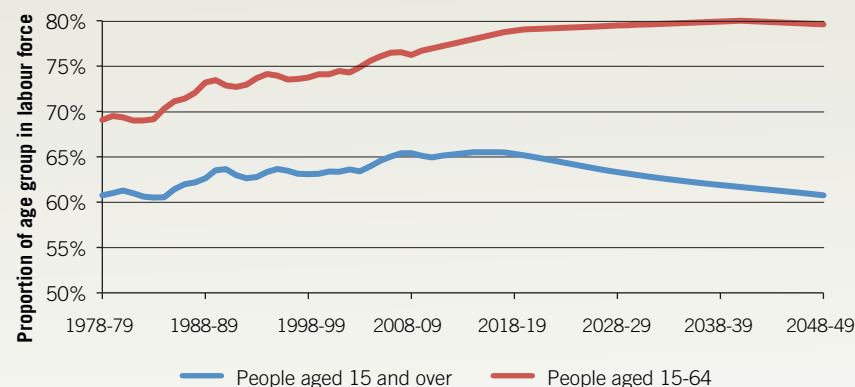
In contrast, the proportion of women who are employed continuously increased between 1980 and 2008, and has since remained steady. For women aged 25 to 54, full-time employment has increased from 29% in 1980 to 42% in 2012 (49% and 72% respectively for all employment). The proportion of employed women aged 55-64 years has more than doubled between 1980 and 2012 – increasing from 21% to 54%.

Figure 13D.10 Employment to population ratio: by age and gender, 1980 and 2012⁹



Over the next decade, the proportion of the population aged 65 years and over is expected to increase rapidly as the large baby boomer cohort enters this age group. As this cohort retires, the employment to population ratio is expected to decline over the next 40 years – even if employment for people under 65 years continues to grow.

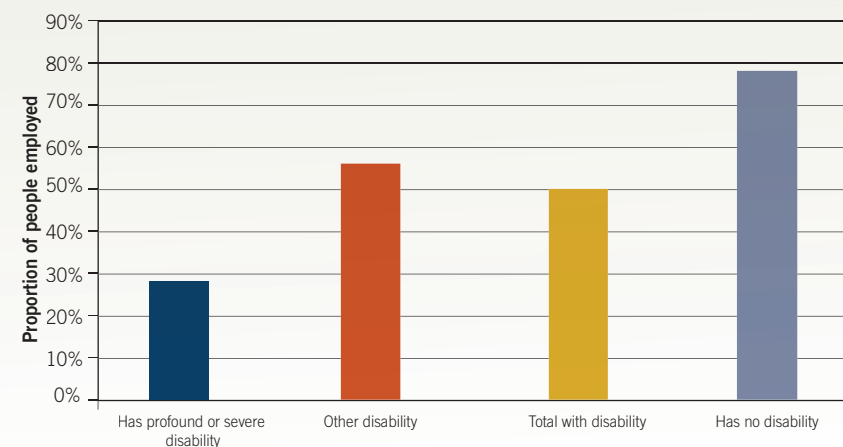
Figure 13D.11 Labour force participation rates, historical and projected trends, 1979 to 2049¹⁰



While the overall employment to population ratios rise, some groups of people still face particular barriers to being employed.

- For people aged 15 to 64 years with a disability, 50% were employed in 2009. This ratio was only 28% for those with a severe or profound disability.¹¹
- Amongst Aboriginal and Torres Strait people the ratio was 48% in 2011, and was substantially lower in remote areas (43%) than in major cities (54%).¹²
- 57% of lone mothers with dependent children were employed in 2011 – although employment tends to increase with the age of the youngest child.¹³

Figure 13D.12 Employment and labour force participation, by disability status, 2009¹⁴



References

- 1 Australian Bureau of Statistics, *Labour Force, Australia, Feb 2013* (cat. no. 6202.0)
- 2 Australian Government Department of Education, Employment and Workplace Relations, *Small Area Labour Markets*, September quarter 2012
- 3 Australian Bureau of Statistics, *Labour Force, Australia, Feb 2013* (cat. no. 6202.0). Quarterly unemployment rates have been derived by DSEWPac based on the underutilisation and underemployment rates.
- 4 Organisation for Economic Co-operation and Development, Short-term Labour Market Statistics: Harmonised Unemployment Rates (HURs), viewed April 2013. The OECD harmonises unemployment rates for 34 member countries to account for methodological differences in labour force estimates across countries.
- 5 Organisation for Economic Co-operation and Development, *Employment Outlook 2012, Compare your country tables*.
- 5a Ibid.
- 6 Australian Government Department of Sustainability, Environment, Water, Population and Communities, analysis (annual averages) of Australian Bureau of Statistics, *Labour Force, Australia, Detailed – Electronic Delivery, Dec 2012* (cat. no. 6291.0.55.001)
- 7 Australian Government Department of Sustainability, Environment, Water, Population and Communities, analysis (annual averages) of Australian Bureau of Statistics, *Labour Force, Australia, Detailed – Electronic Delivery, Nov 2012* (cat. no. 6291.0.55.001)
- 8 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis (annual averages) of Australian Bureau of Statistics, *Labour Force, Australia, Detailed – Electronic Delivery, Dec 2012* (cat. no. 6291.0.55.001)
- 9 Australian Bureau of Statistics, *Labour Force, Australia, Detailed – Electronic Delivery, Dec 2012* (cat. no. 6291.0.55.001)
- 10 Replicated from Treasury Intergenerational Report (2010) *Australia to 2050: Future Challenges*, using Australian Bureau of Statistics, *Labour Force, Australia, Detailed – Electronic Delivery, Dec 2012* (cat. no. 6291.0.55.001) and Treasury projections
- 11 Australian Bureau of Statistics, *2009 Survey of Disability, Ageing and Carers in SCRGSP 2011, National Agreement Performance Information, 2010-11: National Disability Agreement*, Productivity Commission
- 12 Australian Bureau of Statistics, *Labour Force Characteristics of Aboriginal and Torres Strait Islander Australians, Estimates from the Labour Force Survey, 2011* (cat. no. 6287.0)
- 13 Australian Bureau of Statistics, *Labour Force Australia: Labour Force Status and Other Characteristics of Families, June 2011* (cat. no. 6224.0.55.001)
- 14 Australian Bureau of Statistics, *2009 Survey of Disability, Ageing and Carers in SCRGSP 2011, National Agreement Performance Information, 2010-11: National Disability Agreement*, Productivity Commission

Notes

- (a) The unemployment rate includes people who were not employed and were *actively seeking work* and were *available* to start work if it was offered. Figures provided in text for the unemployment rate are the monthly seasonally adjusted estimates. For underemployment, estimates are annual averages.
- (b) Part-time workers usually work fewer than 35 hours a week and either did so during the reference week or were not at work during the reference week.
- (c) Full-time workers are employed people who usually worked 35 hours or more a week (in all jobs) and those who, although usually working fewer than 35 hours a week, worked 35 hours or more during the reference week.
- (d) Based on Statistical Local Areas. For more details, see Australian Bureau of Statistics, *Australian Standard Geographical Classification (ASGC), July 2011* (cat. no. 1216.0).
- (e) This section is adapted from Australian Bureau of Statistics 'Overemployment' in *Australian Social Trends, June 2011* (cat. no. 4102.0) using data from the ABS 2007 Survey of Employment Arrangements, Retirement and Superannuation (SEARS).

IMAGES

Pedestrians on the streets of Melbourne's CBD, Alex Zuk

Team member from Goulburn Valley Water at their desk, John Baker



HOW SAFE ARE OUR COMMUNITIES?

Australia has relatively low rates of crime, but this is not matched by our perceptions. Many people – particularly women and older people – feel unsafe walking in their local area after dark.

Crime and the fear, stress and anxiety it causes can impact on our wellbeing, behaviour and our relationships with others.

High crime rates and feeling unsafe can undermine the sustainability of our communities, eroding neighbourhood trust and cohesion.



Over one million people were victims of physical or threatened assault in 2012.

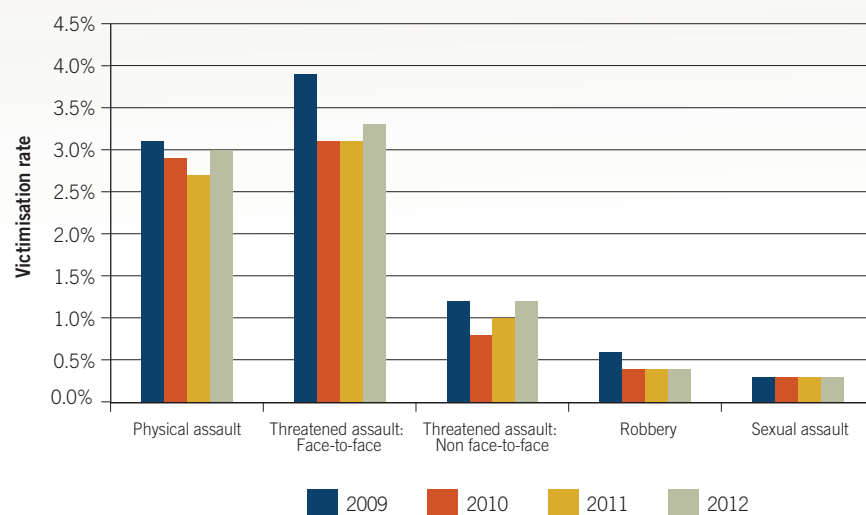
Incidence of personal crime

In 2012, 539,800 people aged 15 years and over (3%) were victims of physical assault and 667,700 people (3.7%) were threatened^a with assault. Of the victims of physical assault, 26% experienced three or more incidents in the previous year.

Over half of the victims of physical assault believed that alcohol and/or other substances contributed to the assault. Only around half (49%) of physical assault victims had reported the most recent incident to police.

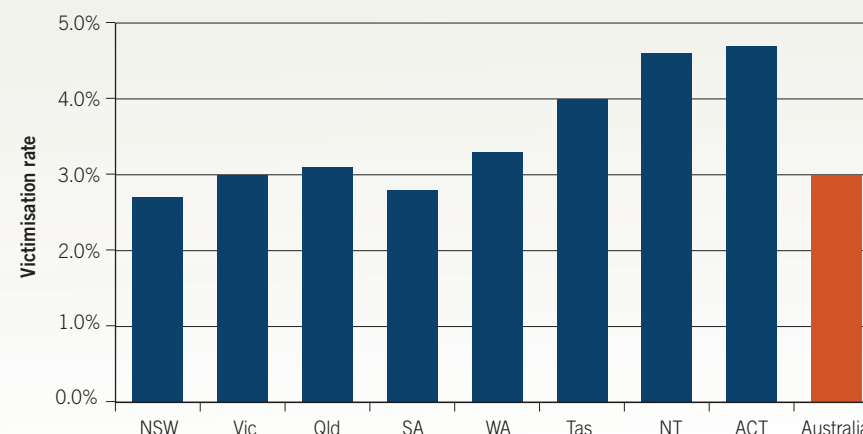
Men were more likely to be victims of assault, accounting for 59% of assault victims. However, women are much more likely to be victims of sexual assault (85% of sexual assault victims were women).

Figure 13E.1 Incidence of personal crime: victimisation rate for selected crimes, 2009 to 2012¹

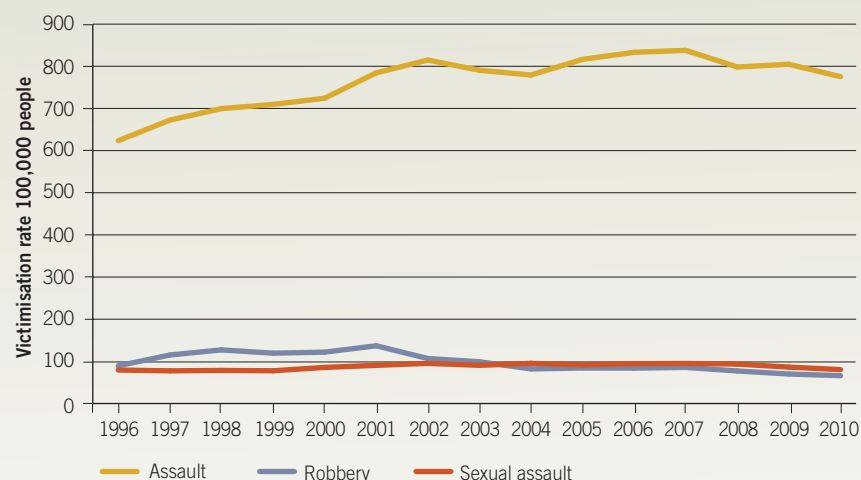


Victimisation rates varied greatly between states. In 2012, people in the Australian Capital Territory (4.7%) and the Northern Territory (4.6%) reported much higher rates of physical assault than people in New South Wales (2.7%) and South Australia (2.8%). Victimisation rates also tend to be higher outside the capital cities (3.3%).

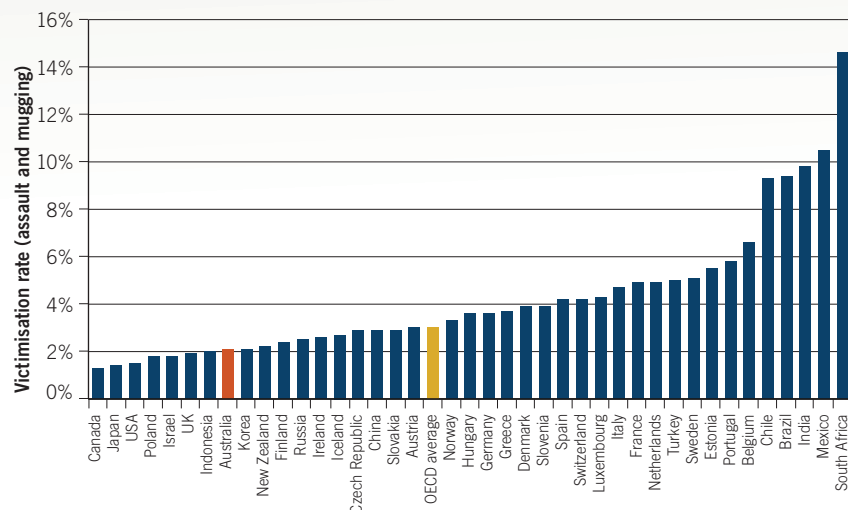
Figure 13E.2 Incidence of personal crime: physical assault victimisation rate, by state and territory, 2012²



These victimisation rates are based on direct reports from people about their experiences of crime, regardless of whether the particular crime was reported to police. Complementary data on crimes recorded by police suggest that incidents of assault have been relatively steady since 2001, after rising between 1996 and 2001. However, changes in reported crimes may be influenced by changes in the reporting of particular crimes or because of particular police strategies and changes in operational focus.

Figure 13E.3 Incidence of personal crimes: recorded crime rates, 1996 to 2010³

Compared to other OECD countries, Australia has relatively low rates of assault, well below the OECD average in 2010.

Figure 13E.4 Incidence of personal crimes: international comparison of assault rates, 2010⁴

Domestic violence^b

Measuring domestic violence in the community is a complex task that is affected by respondents' capacity and/or willingness to share information about traumatic events. Internationally, data on household violence tends to be scattered, unsystematic and difficult to compare due to the influence of cultural biases and interpretations.

Yet, partner violence is one of the most common forms of violence against women, and can affect the wellbeing of those who experience it, as well as having an impact on their families, communities and society as a whole.

In 2005, the Australian Bureau of Statistics undertook the *Personal Safety Survey* which collected information from people aged 18 and over about their experiences of violence since the age of 15 years.

In 2005, an estimated 1.3 million women (17%) had experienced partner violence since the age of 15 years. For 114,400 women, the most recent incident had occurred within the last 12 months and 2.1% (160,100) of women had experienced violence by their current partner.

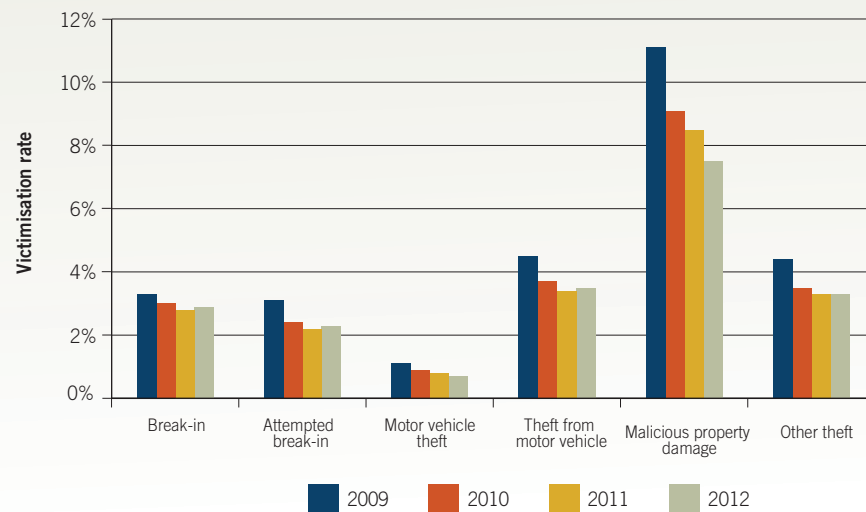
Fewer households are experiencing property crimes.

Incidence of household crime

In 2012, 3% of households (249,800) were victims of a break-in to their homes and 8% were victims of malicious property damage.

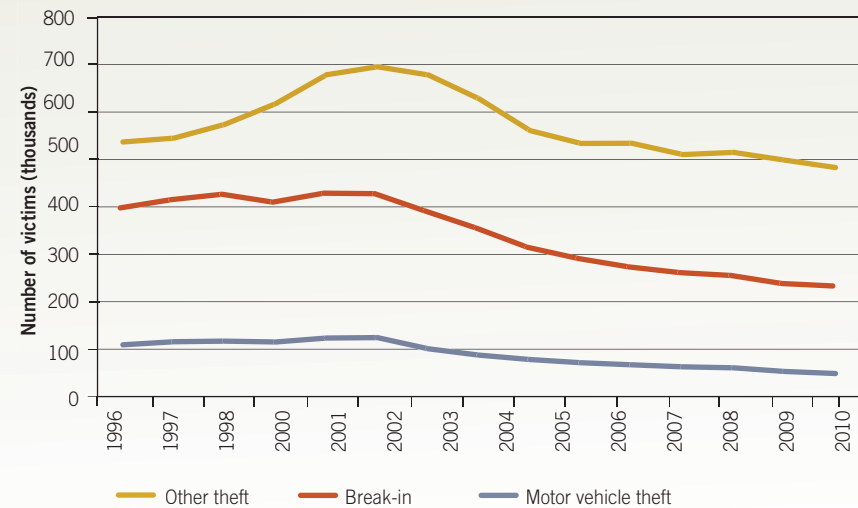
Between 2009 and 2012, there has been a drop in the proportion of households experiencing all forms of household crimes.^c

Figure 13E.5 Incidence of household crime: victimisation rate for selected crimes, 2009 to 2012⁵



Many household crimes are not reported to police, with the exceptions of break-in and motor vehicle theft where a police report may be required for insurance purposes. Yet, complementary data on crimes recorded by police also indicate that the number of victims of household crimes has been declining over the past decade.

Figure 13E.6 Selected household crimes: recorded crime rates, 1996 to 2010⁶



Less than half of people feel safe walking in their local area after dark.

Feelings of safety

In 2010, less than half (48%) of adults reported feeling safe or very safe walking in their local area after dark. Most people felt safer at home, with 85% of adults reporting feeling safe or very safe at home after dark.

Women generally reported feeling less safe than men. Only 29% of women reported feeling safe or very safe walking in their local area after dark, compared to 68% of men. Older people, particularly those aged 75 years and over, were also less likely to feel safe.

Figure 13E.7 Feelings of safety: by age and gender, 2010⁷

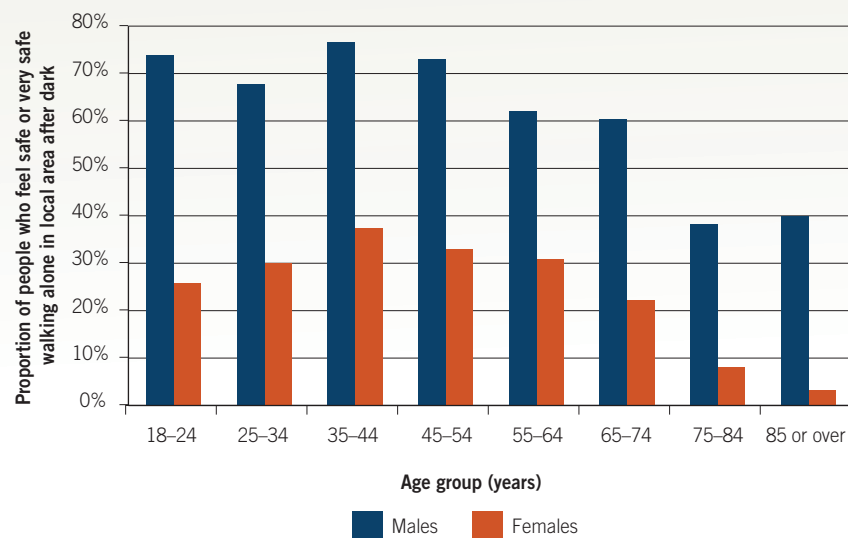
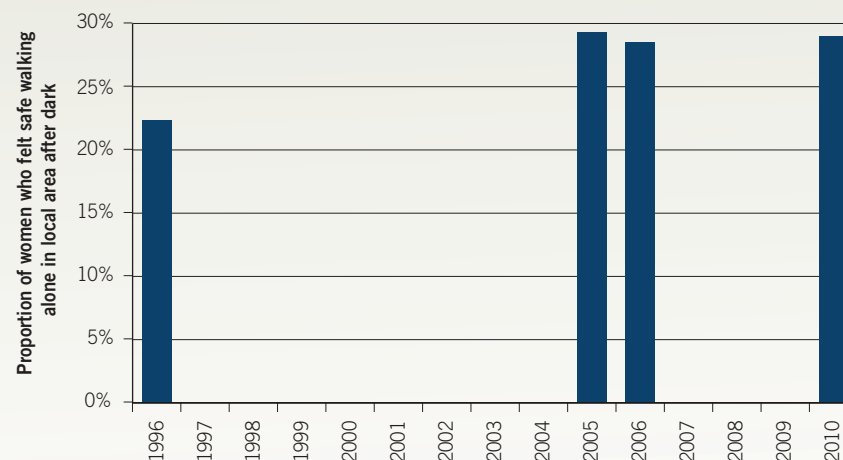
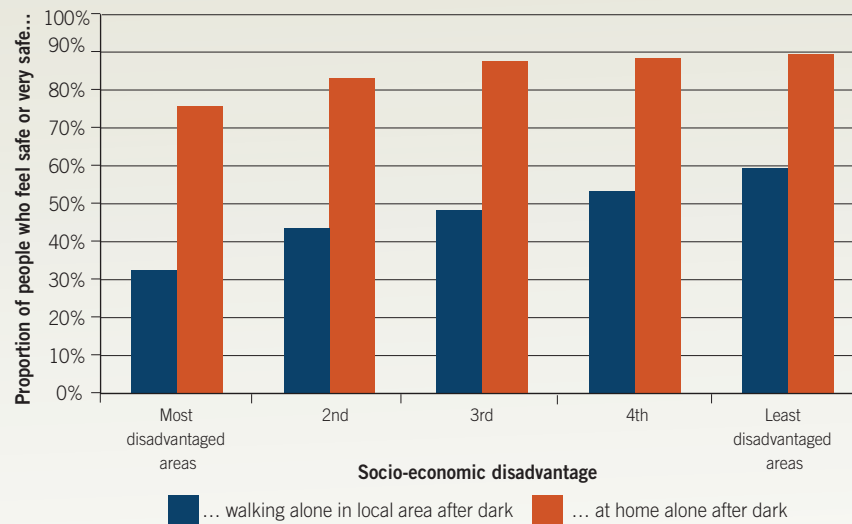


Figure 13E.8 Feelings of safety: women who feel safe walking alone in local area after dark, 1996 to 2010⁸



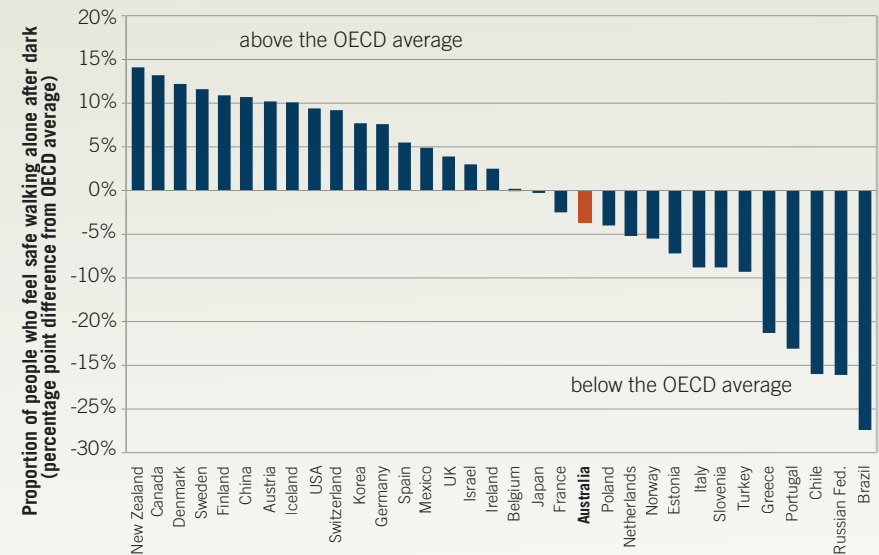
The area we live in can have a large impact on our feelings of safety. For people living in the most socio-economically disadvantaged areas, only a third (33%) reported feeling safe while walking in their area after dark – compared with 59% of people in the least disadvantaged areas.

Figure 13E.9 Feelings of safety: by socio-economic disadvantage, 2010⁹



In comparison with the OECD average, fewer people in Australia feel safe when walking alone at night in the city or area where they live.

Figure 13E.10 Feelings of safety: international comparison, 2010¹⁰



References

- 1 Australian Bureau of Statistics, *Crime Victimisation, Australia* (cat. no. 4530.0), 2008–09 to 2011–12 issues. Data from this survey is collected over the financial year. All time points related to this survey refer to the year ending 30 June.
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Notes

- (a) Threatened assault may occur face-to-face or via non face-to-face methods (such as email and social media).
- (b) This section is adapted from Australian Bureau of Statistics 'Women's Experience of Partner Violence' in *Australian Social Trends, June 2011* (cat. no. 4102.0) and Australian Bureau of Statistics, *Personal Safety, Australia, 2005* (cat. no. 4906.0).
- (c) Household crime includes break-in, attempted break-in, motor vehicle theft, theft from a motor vehicle, incident of malicious property damage or other type of theft not previously covered by the other types of crime categories, in which a household is considered to be the victim of the crime. Other theft includes theft of property (money or goods) left in a public place, from a yard or garden, or a vehicle not owned by a household member.

IMAGES

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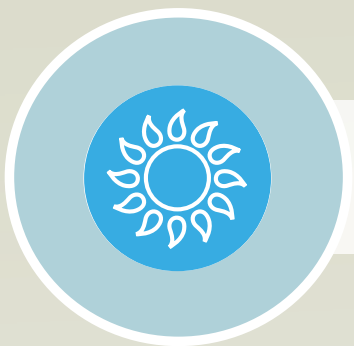


HOW IS OUR CLIMATE CHANGING?

Our climate continues to warm. Australian per capita emissions of carbon dioxide are amongst the highest in the world, meaning we make a disproportionately high contribution to global warming.

Major changes in the climate are expected to cause extreme weather events, damaging infrastructure and preventing society from functioning as usual. Natural systems may be changed irreparably, putting at risk the environmental support structures on which our economy and society depend.

We know maintaining environmental health is important for Australians and for sustainability – the challenge is how to measure environmental health so that we can ensure we are achieving our goals.



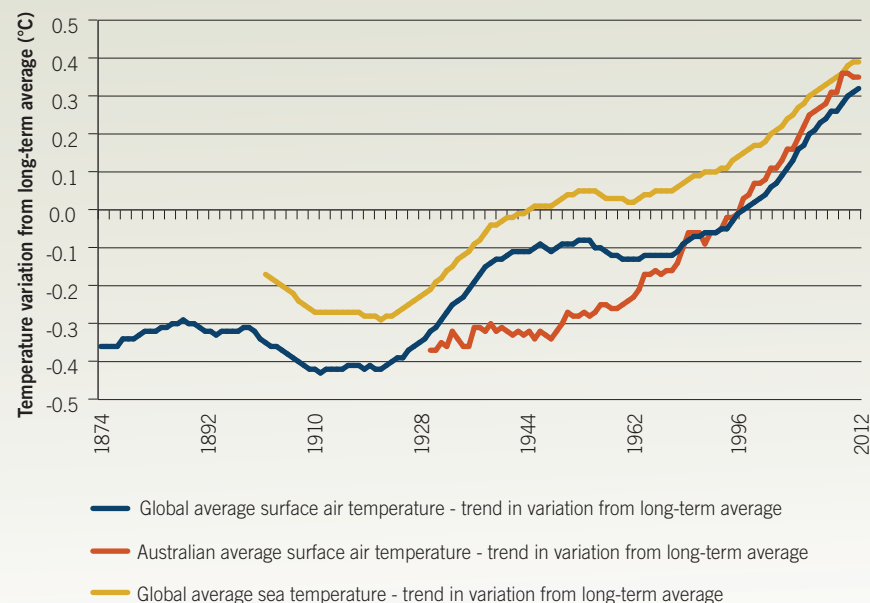
The climate is changing: both average temperatures and sea levels continue to rise.

Observed climate change

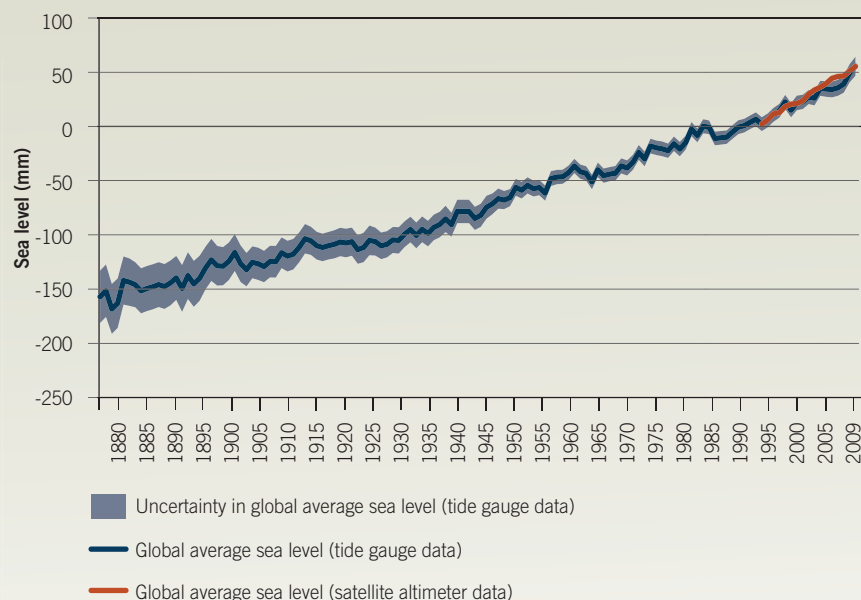
Average air temperatures in Australia have risen by 0.9°C since 1910. Since 1950, temperatures have risen by 0.13°C per decade, which is above the trend over the twentieth century as a whole (0.09°C per decade). Each decade has been warmer than the previous decade since the 1950s. Australian air temperature warming trends are similar to global air temperature warming trends.¹

Between 1961 and 2003, the atmosphere only trapped approximately 3% of the total heat absorbed by the Earth and its atmosphere. Oceans absorbed almost 90%, land absorbed 5% and the remainder was absorbed by glaciers and ice.² Accordingly, changes in sea temperature are important for detecting changes in climate. The global sea temperature has increased by approximately 0.06°C per decade since the beginning of the twentieth century.³

Figure 14A.1 Trends in temperature variation from long-term average, 1874 to 2012⁴



Along with average air and sea temperatures, the rate of sea level rise is also increasing. Globally, the average rate of sea level rise increased from an average of 1.7mm per year between 1900 and 2000 to 3.4mm per year between 2000 and 2009.⁵

Figure 14A.2 Global sea level change, 1880 to 2009⁶

This rise is caused by the expansion of oceans as they warm; the addition of water to the ocean from melting glaciers, ice caps and ice sheets; and changes in the level of seabeds relative to land.⁷

Rates of sea level rise are not uniform around the globe and vary from year to year. Since 1993, the rates of sea level rise in waters to the north and northwest of Australia have been 7 mm to 11 mm per year (two to three times the global average). Rates of sea level rise on the central east and southern coasts of the continent are generally similar to the global average.⁸ These variations are at least in part a result of natural variability; however, they highlight that the impacts of sea level rise are likely to be experienced differently at various points around the Australian coastline.

Changes in our climate since the middle of the twentieth century are very likely to be due to increased greenhouse gas concentrations from human activities.⁹

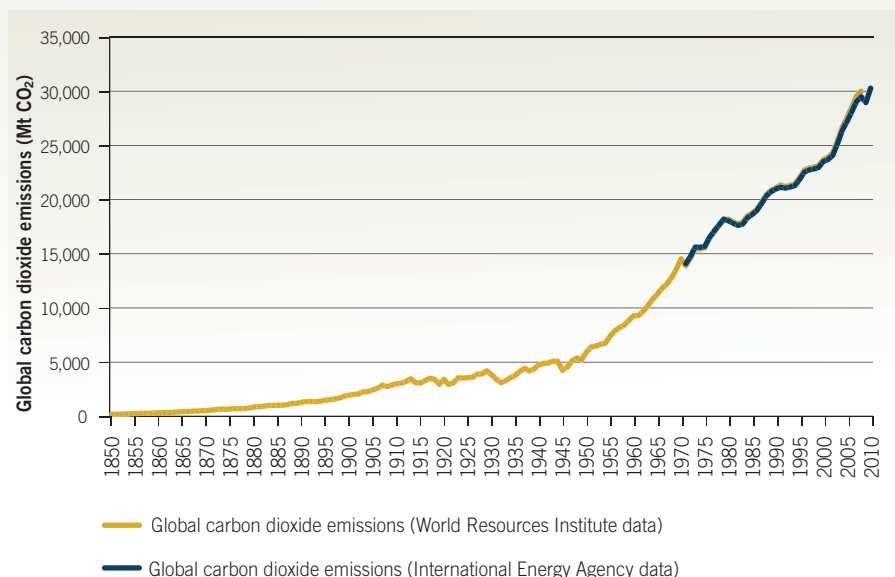
Global emissions of greenhouse gases continue to grow exponentially. Per capita, Australia's emissions of greenhouse gases are amongst the highest in the world.

Greenhouse gas emissions

Globally, annual emissions of greenhouse gases are estimated to have risen from approximately 200 million tonnes of carbon dioxide equivalent (Mt CO₂-e) in 1850 to 37,810 Mt CO₂-e in 2005.¹⁰ Most of this rise (85%) occurred between 1950 and the present. Greenhouse gases included in this total are carbon dioxide, methane, nitrous oxide, perfluorocarbons, hydrofluorocarbons and sulfur hexafluoride.

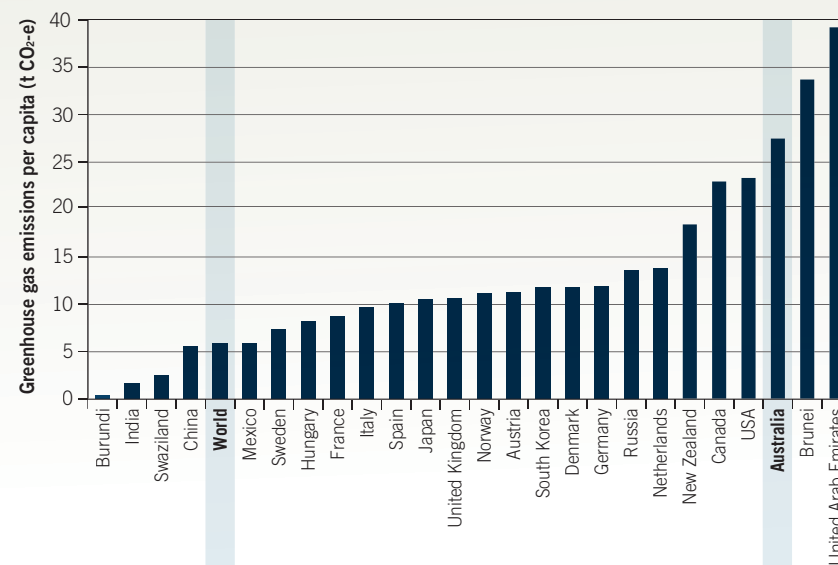
Considering carbon dioxide only (as a longer data series is available and carbon dioxide emissions make up a large proportion of total greenhouse gas emissions – 73% by carbon dioxide equivalent in 2005¹¹), global emissions increased from 198 Mt CO₂ in 1850 to 30,276 Mt CO₂ in 2010.¹²

Figure 14A.3 Global annual carbon dioxide emissions, 1850 to 2010¹³



Australia is one of the top ten greenhouse gas emitting countries in the world on a per capita basis. In 2012, 25 t CO₂-e was emitted per capita.¹⁴ Comparing 2005 emissions data, we emitted more greenhouse gas per capita (28 t CO₂-e per capita) than any other developed country.¹⁵ Per capita greenhouse gas emissions for the United States in 2005 were 23 t CO₂-e, and the world average was 6 t CO₂-e per capita.

Figure 14A.4 International comparison of greenhouse gas emissions per capita for selected countries, 2005¹⁶

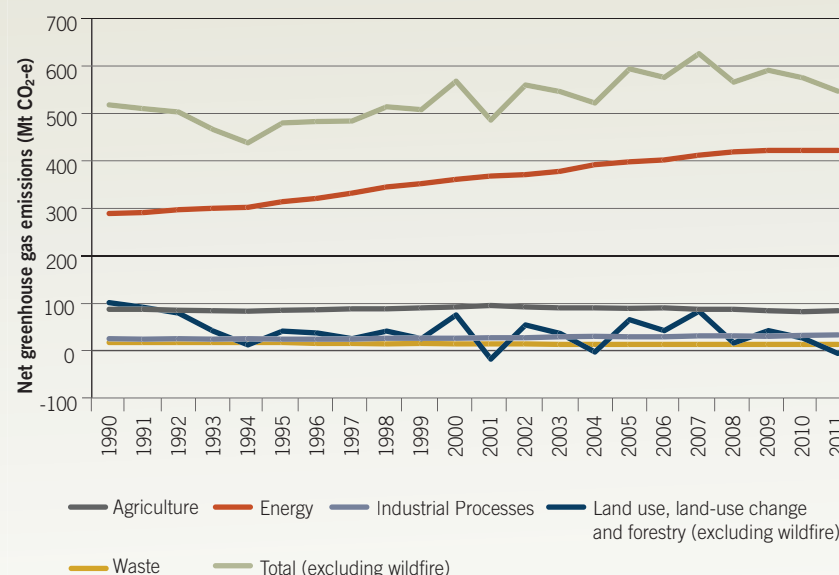


Australia's net greenhouse gas emissions (excluding emissions from wildfire) grew by 5% between 1990 and 2011, from 518 to 547 Mt CO₂-e.¹⁷ The main driver of this emissions growth was an increase in emissions from the energy sector (by 46% since 1990, from 290 to 422 Mt CO₂-e), though energy sector emissions have reached a plateau in recent years, remaining steady from 2009 to 2011 at 422 Mt CO₂-e. Emissions from the industrial processes sector have also increased (by 35% since 1990, from 25 to 33 Mt CO₂-e). Declines in emissions were recorded for the land use, land-use change and forestry sector excluding wildfire (by 106% since 1990 to a net absorption of 6 Mt CO₂-e), the waste sector (by 27% to 13 Mt CO₂-e), and the agriculture sector (by 3% to 84 Mt CO₂-e).

Between the peak in Australian net greenhouse gas emissions in 2007 and 2011, emissions (excluding emissions from wildfire) decreased by 13%.¹⁸ The major factor in this reduction was a decrease in emissions from the land use, land-use change and forestry sector of 107%. A smaller 3% decrease in emissions from the agriculture sector and a 1% decrease in emissions from the waste sector also contributed.

Over the period 1990 to 2011, combustion of fossil fuels contributed 348 Mt CO₂ per year to greenhouse gas emissions.¹⁹ Further, Australia's exports of fossil fuels accounted for an additional 513 Mt CO₂ per year in global emissions, approximately one and a half times domestic fossil fuel emissions. In 2010, emissions from exports of fossil fuels grew to two and a half times domestic fossil fuel emissions, due to increased energy exports.

Figure 14A.5 Australia's net greenhouse gas emissions, by sector, 1990 to 2011²⁰



Australia is on track to meet its Kyoto Protocol target of limiting annual emissions averaged over the 2008 to 2012 period to 108% of 1990 emissions. Latest calculations indicate that we averaged 105% of 1990 emissions each year over the five year period.²¹

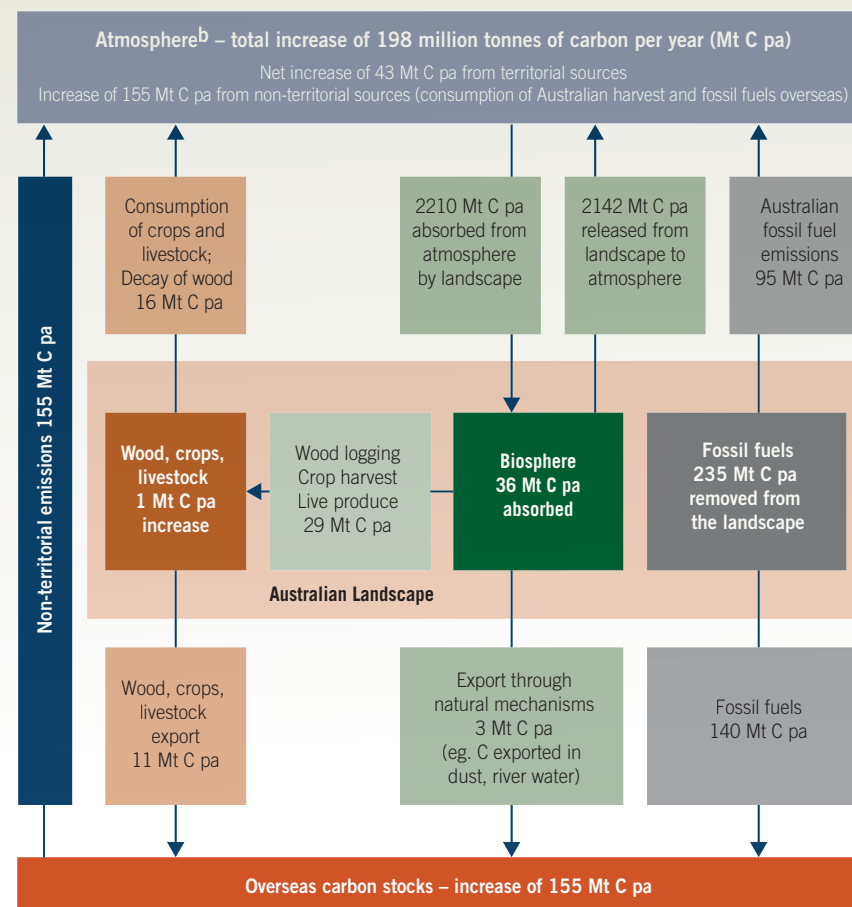
The Australian landscape captured about 69% of domestic emissions each year between 1990 and 2011. However, storage of this 69% is often not permanent.

Carbon stored in the landscape

In the natural carbon cycle, emissions of the greenhouse gas carbon dioxide (CO₂) are balanced by absorptions of CO₂. Emissions released by human activity (such as the burning of fossil fuels and changes in land use) have a strong and unbalanced effect on this natural balance of carbon^a between the landscape, atmosphere, water and the earth. This imbalance has driven dramatic increases in atmospheric concentrations of CO₂ since 1750.²²

In Australia, the average yearly capture of emissions by natural processes in our landscape over the period 1990 to 2011 is estimated to have been 77 million tonnes (Mt) of carbon (±29 Mt).²³ This is equivalent to the capture and storage of about 69% (±25%) of the carbon emitted by burning fossil fuels and net deforestation each year. Natural capture of fossil fuel and deforestation emissions in Australia was roughly twice the global proportion, mainly because we have a comparatively large area of land available to capture and store emissions.

Figure 14A.6 Summary of the Australian territorial carbon budget, averaged for the period 1990 to 2011²⁴



The amount of carbon captured by natural processes varies greatly with land use and climate (more carbon is captured in wet years as vegetation grows faster). In other words, over a run of wet years carbon will accumulate, but storage is not permanent: much may then be lost to the atmosphere during subsequent drought periods.

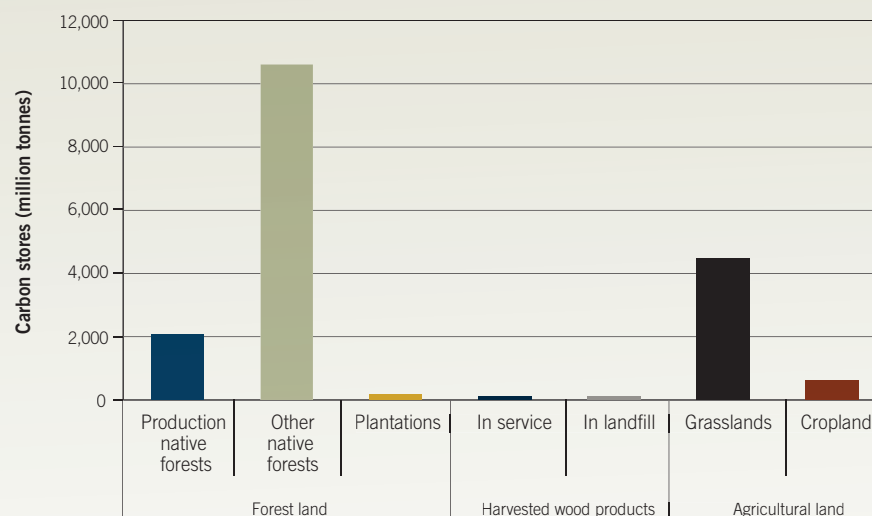
A total stock of approximately 13,067 Mt of carbon (Mt C) was held in Australia's forests and wood products at the end of 2010. Almost all this carbon (12,841 Mt, 98%) is stored in forests, with 226 Mt (2%) stored in harvested wood products.

Carbon stocks in Australia's forests declined by approximately 91 Mt C in the period from 2001 to 2005, driven by natural disturbances such as wildfire (particularly in 2003) and forest clearing. Over the period 2006 to 2010, forest carbon stocks recovered by 10 Mt C as forests recovered following wildfires and less area was affected by forest clearing and wildfire. Between 2001 and 2010, therefore, the stock of carbon in forests decreased by an estimated 81 Mt C (0.6%), but these figures should be interpreted with caution, as longer time frames than one decade are needed to properly assess long-term trends in carbon stocks in Australia's forests.²⁵

Agricultural land stored an estimated 5,090 Mt C in 2010, with 4,481 Mt C of this (88%) stored in grasslands and 609 Mt C (12%) stored in croplands.

Collectively, the 18,157 Mt C stored in Australia's forests, harvested wood products and agricultural land in 2010 held the equivalent of approximately 117 years' worth of Australian greenhouse gas emissions at 2010 levels.

Figure 14A.7 Carbon stored in vegetation, by vegetation type, 2010²⁶



Soil stores large amounts of carbon, which is central to maintaining soil health and supporting food production.²⁷ Soil carbon stocks are low in many Australian agricultural systems. Conversion from native vegetation to agricultural land uses typically reduces soil carbon by 20 to 70%.²⁸ This reduction is often associated with declining soil health and significant emissions of greenhouse gases. It is generally acknowledged that improved land management can increase soil carbon stocks and have a significant impact on national and global emissions.²⁹

Overall, we are using less energy to produce products and services, though the agriculture and mining sectors are using more.

Energy intensity

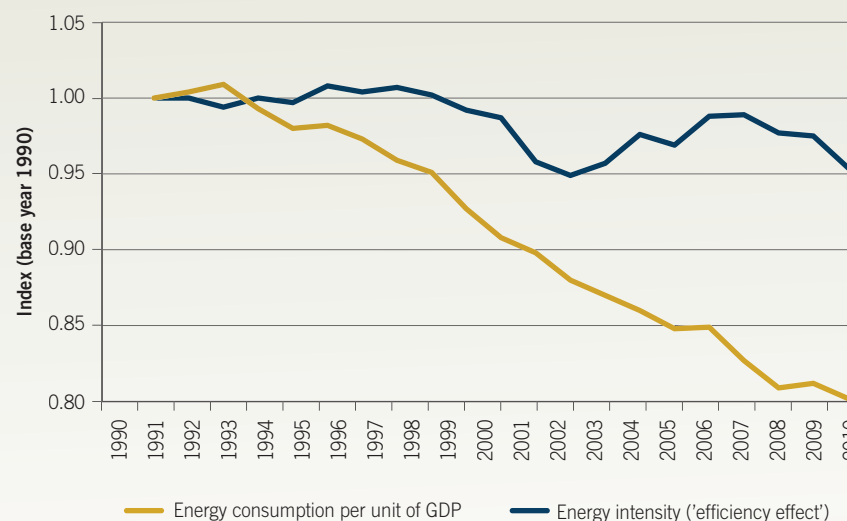
Changes in energy consumption are caused mainly by three factors: changes in the level of economic activity (the 'activity effect'), changes in the mix of economic activities or products produced (the 'structural effect'), and changes in energy intensity (the 'efficiency effect').

Energy intensity refers to the amount of energy consumed in the production of each unit of economic output. Energy intensity shows change in the energy efficiency of the economy excluding the 'activity effect' and the 'structural effect'. Reductions in energy intensity are associated with lower greenhouse gas emissions and energy costs, and improved energy security.³⁰

Because 96% of Australia's net energy consumption comes from fossil fuel combustion,³¹ decreasing our energy intensity is vital to reduce greenhouse gas emissions and improve energy security.

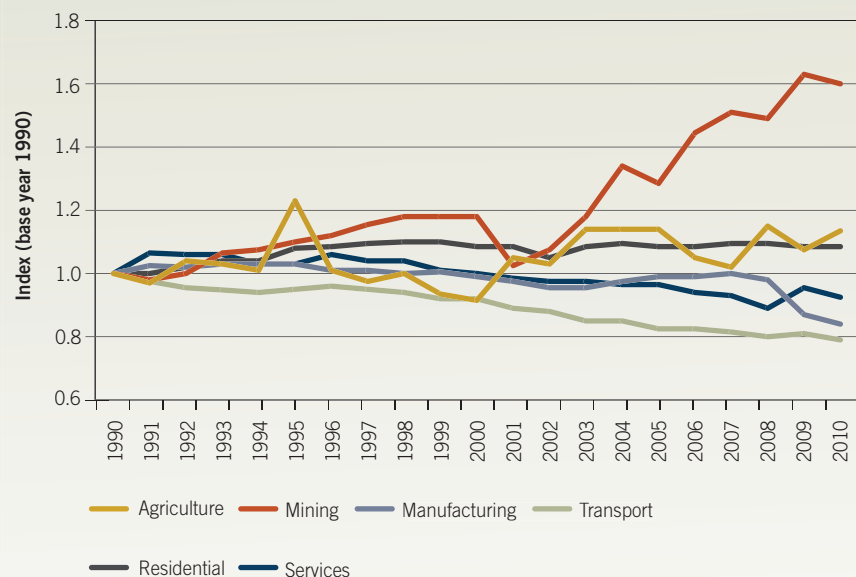
Total energy consumption per unit of GDP decreased by approximately 20% between 1990 and 2010. This was largely caused by a shift within the economy from energy-intensive manufacturing to the services sector. When excluding these structural effects, energy intensity decreased by approximately 4% over the same period, or an average of 0.2% each year.³²

Figure 14A.8 Energy efficiency of the economy: overall, and excluding changes in activity and structure, 1990 to 2010³³



The main sources of the decline in energy intensity for the Australian economy between 1990 and 2010 were declines in energy intensity in the services (0.7% annual decrease), manufacturing (also 0.7%), transport (1.3%) and residential sectors (0.3%).³⁴ In contrast, energy intensity increased over the past two decades in the mining (2.3% annual increase)^c and agriculture sectors (1.1%).

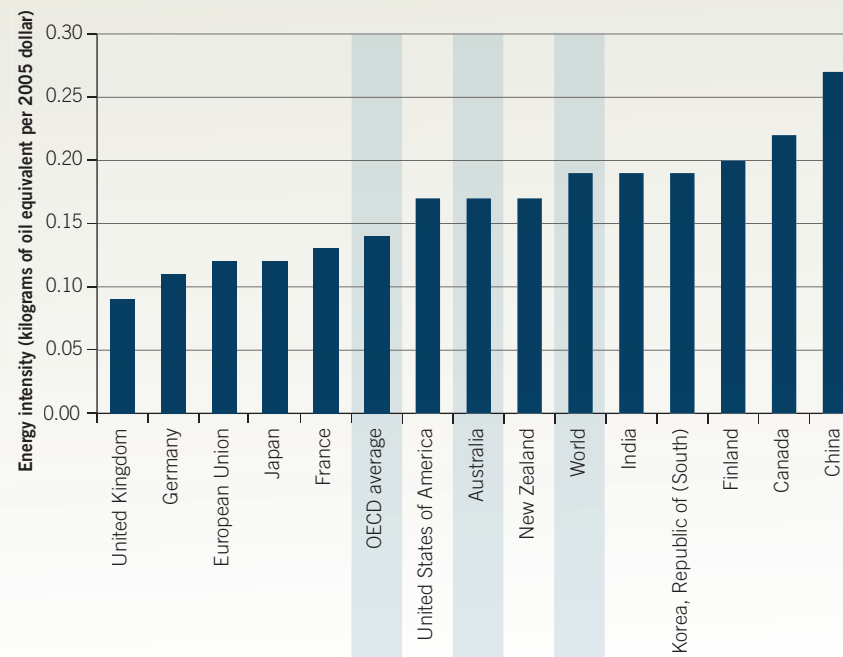
The trend of increasing energy intensity (decreasing energy efficiency) in the mining sector is associated with more exploration activity and the exploitation of increasingly deeper and lower grade ores.³⁵ The sharp rise in liquefied natural gas production as a proportion of mining has also contributed to the increase in recent years.

Figure 14A.9 Energy intensity, by sector, 1990 to 2010³⁶

To put each sector's change in energy intensity into perspective, the transport and manufacturing sectors together accounted for more than two-thirds of energy consumption in Australia in 2010 (36% and 31% of total final energy consumption respectively).³⁷ The mining sector was responsible for 13% of final energy consumption, residential 11%, services 7% and agriculture 2%.

Australia's energy intensity (0.17 kilograms of oil equivalent consumed per 2005 US dollar of GDP (koe\$)) was equal to that of the United States and New Zealand.³⁸ It is lower than the energy intensity of the world overall

(0.19koe\$), China (0.27koe\$) and Canada (0.22koe\$), but higher than that of the OECD (0.14koe\$), Japan (0.12koe\$), Germany (0.11koe\$) and the United Kingdom (0.09koe\$). The improvements in Australia's energy intensity outlined above have been smaller than those observed in many other OECD countries.³⁹

Figure 14A.10 Energy intensity: international comparison, 2011⁴⁰

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- 40 Enerdata (2012) *Global Energy Statistical Yearbook 2012*, available at <http://yearbook.enerdata.net/>. Energy intensity is calculated by Enerdata using the ratio of primary energy consumption (measured in kilograms of oil equivalent) to Gross Domestic Product (measured in constant US dollars at purchasing power parities).

Notes

- (a) While carbon in the atmosphere is measured as the greenhouse gas carbon dioxide (CO2), carbon stored in the landscape – including vegetation and fossil fuels – is measured as carbon (C). An approximate conversion from a mass of carbon to a mass of carbon dioxide can be made by multiplying figures by 11 then dividing by three.
- (b) Note that carbon in the atmosphere is free to move out of Australian territory and may then remain in the atmosphere or be absorbed into another country's carbon stocks or into the ocean. Oceans are at present the largest absorber of carbon from the atmosphere (Khatiwala S, Primeau F and Hall T (2009) 'Reconstruction of the history of anthropogenic CO2 concentrations in the ocean' 462 *Nature* 346, available at <http://www.nature.com/nature/journal/v462/n7271/full/nature08526.html>)
- (c) Energy intensity estimates for the mining sector do not include analysis of the structural effects in the mining sector due to a lack of sub-sector data. As a result of this data limitation, mining sector energy intensity information should be treated as a preliminary analysis only.

IMAGES

Aerial view of the Russell River area, Andy Heaney

Iceberg off Antarctica, Alison McMorrow

Other images from www.istockphoto.com



HOW IS OUR AIR QUALITY?

While air quality in Australia cities is generally very good, there are some areas which experience poor air quality.

Clean air is necessary for the health of people, plants and animals.



In general, air quality has remained consistently very good over the past 15 years in most parts of Australia. However, in some areas air quality has been variable.

Ambient air quality

Air quality is monitored by tracking concentrations of selected pollutants in the atmosphere. Each pollutant has specific effects on human health, mostly relating to the respiratory and cardiovascular systems. These effects range from the irritation of airways to death depending on the pollutant and the concentration.¹

Major sources of pollutants are motor vehicle emissions, industry emissions, wood-burning heater emissions and dust.²

Using the air quality index^a (AQI), direct comparisons can be made between the various pollutants and periods over which they are reported.^b

Between 1995 and 2011, air quality has remained consistently very good in all Australian capital cities.³ In each capital city region airshed, averages of pollutant concentrations fell well below the relevant national compliance standards for all years reported between 1995 and 2011.

Average air quality indices in an airshed should be read with caution, as poor air quality is often experienced in particular areas within airsheds when pollutant concentrations increase due to factors such as a lack of wind (to blow pollutants away), high levels of motor vehicle traffic or industrial activity, or bushfire.

Individual averages over time of specific pollutant concentrations provide information on aspects of usual air quality in an airshed for a particular year. In 2010, individual averages were generally within the 'very good' category for all capital cities.⁴

For one pollutant, particulate matter with a diameter smaller than 2.5 micrometres (PM_{2.5}), which currently has an *advisory* reporting standard only,^c average air quality has generally only been fair. This is attributed to a range of factors including smoke from wood fires, bushfires, controlled hazard-reduction burning and vehicle emissions, depending on the location.⁵

Figure 14B.1 Ambient air quality: change over time, by selected airsheds, 1995 to 2011⁶

Airshed	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Sydney					18	22	28	32	29	28	25	25	23	22	24	22	*
Melbourne	16	16	18	16	16	15	15	16	27	23	25	27	25	25	24	23	23
South-east Queensland	29	19	19	27	25	27	26	28	20	23	21	21	20	20	24	21	21
Adelaide								17	16	15	18	17	18	17	17	22	*
Perth					29	28	29	30	26	25	28	26	26	23	24	25	24
Hobart (inferred)^						12	13	11	11	11	11	24	25	24	24	24	*
Darwin (inferred)^										40	33	30	28	33	33	27	*
Canberra					26	22	25	23	21	33	32	33	32	33	29	28	27
Lower Hunter, NSW							27	29	24	26	25	24	22	22	26	22	*
Illawarra, NSW							23	26	25	24	23	23	22	20	23	19	*
Latrobe Valley, Victoria	13	12	13	13	13	14	14	18	17	16	17	18	19	16	15	16	16
Townsville, Queensland								0	0	17	14	15	13	15	15	14	17
Spencer Gulf, SA								36	28	27	28	22	35	31	30	24	*

Key:

Air quality	Very good			Good	Fair	Poor	Very poor
AQI score	0 – 11	12 – 22	23 – 33	34 – 66	67 – 100	101 – 149	150+

Figure 14B.2 Average pollutant concentrations, by selected airsheds, 2010⁷

Pollutant measured and averaging period	Sydney	Melbourne	South-east Queensland	Adelaide	Perth	Hobart	Darwin	Canberra	Lower Hunter, NSW	Illawarra, NSW	Latrobe Valley, VIC	Townsville, Queensland	Spencer Gulf, SA
Carbon dioxide 8 hours	5	3	4	1	2	NM#	NM	5	3	6	NM	NM	NM
Nitrogen dioxide 1 hour	16	14	11	12	13	NM	NM	16	14	12	12	9	NM
Nitrogen dioxide 1 year	31	26	22	19	19	NM	NM	27	28	20	23	17	NM
Ozone 1 hour	30	25	27	28	32	NM	NM	28	30	29	24	25	NM
Ozone 4 hours	36	30	32	34	39	NM	NM	33	35	34	28	30	NM
Sulfur dioxide 1 hour	1	2	1	1	2	NM	NM	NM	2	1	2	1	12
Sulfur dioxide 1 day	1	0	1	0	1	NM	NM	NM	1	0	1	0	4
Sulfur dioxide 1 year	2	5	5	1	5	NM	NM	NM	5	5	10	3	35
Particulate matter 10 micrometres or less 1 day	28	33	26	29	32	24	23	18	33	29	31	27	25
Particulate matter 2.5 micrometres or less 1 day	19	24	18	28	30	21	23	18	19	17	NM	NM	NM
Particulate matter 2.5 micrometres or less 1 year	68	88	79	94	103	89	79	84	66	63	NM	NM	NM
Lead 1 year	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	42

Key:

Air quality	Very good				Good	Fair	Poor	Very poor
AQI score	0 – 11	12 – 22	23 – 33	34 – 66	67 – 100	101 – 149	150+	

CASE STUDY

Lead levels in Port Pirie

Before the Australian phase-out of leaded petrol in 1993, the *National Environment Protection (Ambient Air Quality) Measure* (NEPM) standard for atmospheric lead concentrations was regularly exceeded in urban environments.⁸

However, by 2001, lead levels in urban areas had declined well below the NEPM standard, to the point where monitoring was stopped in most parts of Australia.⁹

The improvement in lead levels was a positive development, as lead is known to have adverse effects on children's development of memory and motor skills, even at low levels.¹⁰

Figure 14B.3 Decline in average lead levels in Australia, 1991 to 2001¹¹

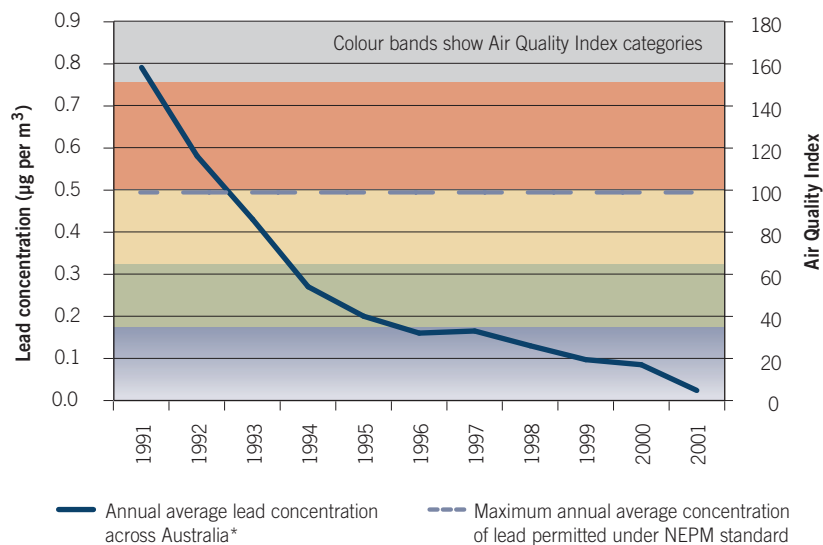
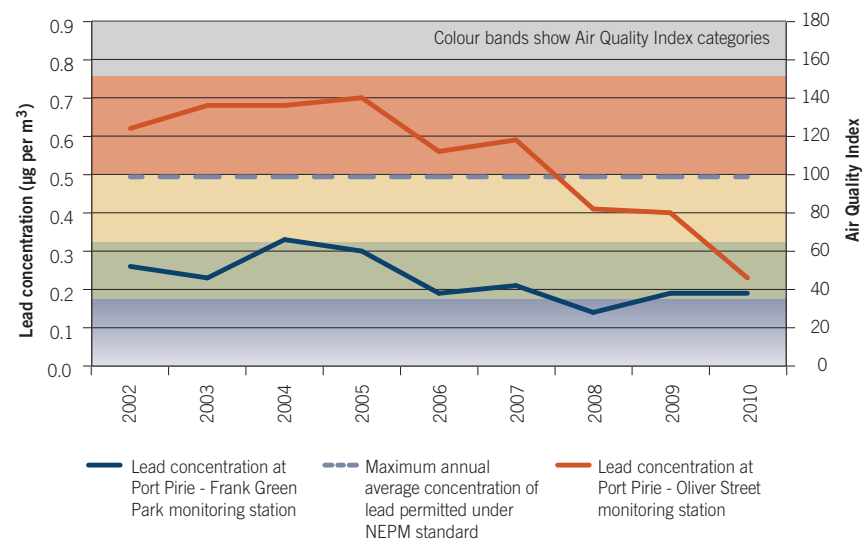


Figure 14B.4 Lead concentration at Port Pirie air quality monitoring stations, 2002 to 2010¹²



Lead monitoring is still carried out in areas with major industrial sources of lead, because concentrations in these places still exceed the NEPM standard at times.

Port Pirie, home to one of the world's largest primary lead smelters,¹³ is one such town. Until 2007, concentrations of lead in the air of some parts of Port Pirie still exceeded the NEPM standard concentration.¹⁴



References

- 1 Environment Protection and Heritage Council (2010) *Expansion of the multi-city mortality and morbidity study – Executive summary and summary report*, available at <http://www.ephc.gov.au/taxonomy/term/20>
- 2 Ibid; Australian Government Department of Sustainability, Environment, Water, Population and Communities (2010) *State of the Air in Australia 1999–2008*, available at <http://www.environment.gov.au/atmosphere/publications/state-of-the-air/>
- 3 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of state and territory reports (averages and indexing) under the National Environment Protection (Ambient Air Quality) Measure, 2002 to 2009 reports available at <http://www.ephc.gov.au/taxonomy/term/34>, 2010 reports available at <http://www.scew.gov.au/nepms/reports.html#aaq-annual>, 2011 reports available on state and territory environment agency websites.
- 4 Ibid.
- 5 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of state and territory reports (averages and indexing) under the National Environment Protection (Ambient Air Quality) Measure, 2002 to 2009 reports available at <http://www.ephc.gov.au/taxonomy/term/34>, 2010 reports available at <http://www.scew.gov.au/nepms/reports.html#aaq-annual>, 2011 reports available on state and territory environment agency websites.
- 6 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of state and territory reports (averages and indexing) under the National Environment Protection (Ambient Air Quality) Measure, 2002 to 2009 reports available at <http://www.ephc.gov.au/taxonomy/term/34>, 2010 reports available at <http://www.scew.gov.au/nepms/reports.html#aaq-annual>, 2011 reports available on state and territory environment agency websites. The figures presented in this table are the averaged Air Quality Indices of median concentrations for all measured pollutants. ^ As Hobart and Darwin measure only the pollutants PM10 and PM2.5 (which tend to have higher AQIs than other pollutants), average AQI values for these cities are skewed upward. To account for this, AQI of previously recorded average concentrations for other pollutants have been included in averages, giving 'inferred' average AQI figures that may be more meaningfully compared to other capital cities. * At the time of publication, 2011 reports had not been published by the NSW, SA, Tasmanian and NT agencies.
- 7 Ibid. # 'NM' denotes that the pollutant was not measured because previous monitoring determined concentrations were consistently well below the NEPM standard and that further monitoring was therefore unnecessary.
- 8 Australian Government Department of Sustainability, Environment, Water, Population and Communities (2010) *State of the Air in Australia 1999–2008*, available at <http://www.environment.gov.au/atmosphere/publications/state-of-the-air/>, p.148
- 9 Ibid.
- 10 Australian Government Department of Environment and Heritage (2005) *Lead (Pb): air quality fact sheet*, available at <http://www.environment.gov.au/atmosphere/airquality/publications/leadfs.html>
- 11 Australian Government Department of Sustainability, Environment, Water, Population and Communities (2010) *State of the Air in Australia 1999–2008*, available at <http://www.environment.gov.au/atmosphere/publications/state-of-the-air/>, p.149. *Lead concentrations are an average of 16 urban sites across Australia.
- 12 South Australian Environment Protection Authority (2011) *Air Monitoring Report for South Australia 2010*, available at <http://www.scew.gov.au/nepms/reports.html#aaq-annual>
- 13 Nystar (2013) *Port Pirie Smelter fact sheet*, available at <http://www.nystar.com/operations/Pages/smelting.aspx>
- 14 South Australian Environment Protection Authority (2011) *Air Monitoring Report for South Australia 2010*, available at <http://www.scew.gov.au/nepms/reports.html#aaq-annual>

Notes

- (a) The Air Quality Index is calculated by dividing pollutant concentrations by standards for maximum allowable concentrations set in the *National Environment Protection (Ambient Air Quality) Measure* (the 'NEPM'; available at <http://www.comlaw.gov.au/Details/C2004H03935>) and multiplying by 100. Maximum allowable concentrations were determined for each pollutant with reference to studies on the effects of the pollutant on human health.
- (b) Pollutant concentrations are averaged over specific lengths of time ('averaging periods'). For example, ozone is measured over two averaging periods: one hour and four hours. Multiple averaging periods are tracked for some pollutants because some of the effects of pollutants on human health can occur after short-term exposure to high concentrations, while other effects can occur after longer periods of sustained exposure to lower pollutant concentrations.
- (c) The NEPM standard for PM_{2.5} is advisory only, as further research was needed on its effect on health at the time the NEPM was made.

IMAGES

Crepuscular rays at Pyengana, Margaret Brown

Air pollution at the Shell Oil Refinery, Alex Zuk



ARE OUR NATIVE ECOSYSTEMS HEALTHY?

While some native ecosystems are largely untouched and well protected, many more have been permanently changed, particularly in and around areas of human settlement. Declines in population size, geographic range and genetic diversity are being seen among a wide range of species across all groups of plants, animals and other forms of life.

Native ecosystems provide services vital for human life, such as oxygen production, air and water purification, storage of carbon dioxide and production of resources. They also have spiritual, aesthetic and recreational value that adds to our quality of life. If ecosystems are altered or removed, these values and services will have to be found elsewhere or foregone.



A clear picture of ecosystem health cannot be drawn at present. Native vegetation extent has declined by 14% since 1750 and another 62% is subject to varying degrees of disturbance. In agricultural regions and around urban development, habitat has often been fragmented or removed entirely.

Extent of native vegetation

The condition of ecosystems is dependent on the condition of their individual parts such as native vegetation, animals, water quality, soil quality and air quality. Reflecting the large number of factors and the complexity of measuring their health, definitive data on ecosystem condition is not currently available. However, using data on the extent of native vegetation as a proxy, a basic picture of ecosystem condition can be drawn.

Native vegetation condition varies greatly across the country and is very difficult to measure over large areas. However, the condition of much native vegetation is likely to be deteriorating, particularly in areas with intensive land-use pressures such as grazing.¹

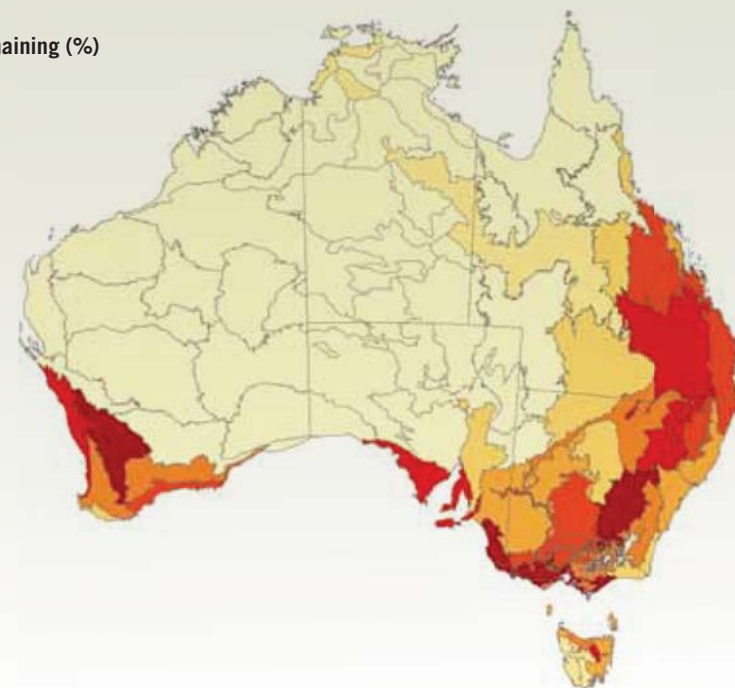
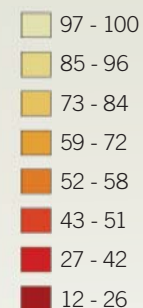
The condition of native vegetation depends on a number of factors, including extreme variations in weather, current and historical land management practices, and fire events and regimes. In general, vegetation condition deteriorates as the extent remaining gets smaller. Therefore, the extent of native vegetation provides an indication of native vegetation condition.

Since European settlement, approximately 105 million hectares (14%) of Australia's native vegetation have been cleared. Most of this cleared land is now used for agriculture. A further 62% of the area of native vegetation is subject to varying degrees of disturbance.

The greatest areas of vegetation loss since European settlement are inland from the east coast and in the far south-west of Australia. Many of the biological regions^a in these parts of the country have less than a quarter of pre-European settlement native vegetation remaining.

Figure 14C.1 Native vegetation remaining: proportion, by biological region, 2012²

Vegetation Remaining (%)



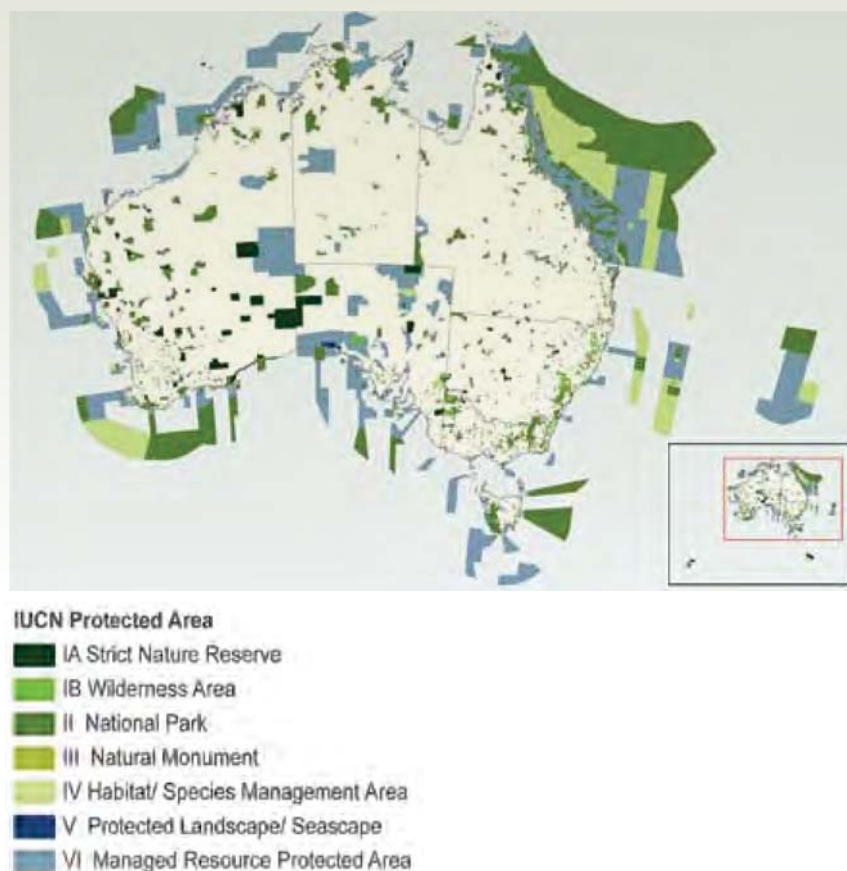
Currently, the extent of native vegetation is steady. For forests^b (one type of vegetation), the annual rate of loss (in mapped intensive-use areas) over the decade to 2010 averaged 1.1 million hectares. This loss was offset by forest expansion averaging one million hectares annually. Between 2007 and 2010, the area of forest regrowth surpassed the area of deforestation, meaning that there was a small net gain of forest in Australia for the first time since the early 1990s. However, regrowth vegetation and its environmental values are generally different from the vegetation that has been cleared.³

Some Australian ecosystems are well protected, but many have little or no special protection.

Ecosystem protection (protected areas)

In early 2013, terrestrial protected areas covered around 103 million hectares (m ha) (13%) of Australia's landmass. Marine protected areas covered 317 m ha (37%) of Australia's seas.

Figure 14C.2 Protected areas: location and IUCN category, 2013⁴



Australia is working towards the target of having 17% of the continent under protected area management by 2020. To reach this target, approximately 27.4 million additional hectares of land need to be protected.

Each biological region^a is a unique landscape containing unique species of wildlife, so a further target has been set to ensure that at least 10% of each biological region will be under protected area management by 2020. This requires the protection of 21 million additional hectares of land and nine million additional hectares of sea.

Of the 89 terrestrial biological regions in Australia, 35 have less than 10% of their area protected while one region has no area protected at all. Six of the 41 marine biological regions have less than 10% of their area protected, while one (Christmas Island Province) has no area protected at all. The distribution of areas protected is shown above.

Sixty per cent of the terrestrial area protected in Australia is protected as International Union for Conservation of Nature Category I-IV protected area.^c The remaining 40% is protected as Category V or VI areas, which allows for human use of the protected area (e.g. for ecotourism) and use of natural resources respectively. Forty nine per cent of marine protected area is protected as Category V or VI.

Based on 2010 data (since which Australia has declared new protected marine and terrestrial areas), Australia had the largest marine area protected in the world (26 m ha) and the sixth largest area of protected land (81 m ha), behind Brazil (224 m ha), China (156 m ha), Russian Federation (153 m ha), the United States of America (116 m ha), and Greenland (87 m ha).

Figure 14C.3 Protected areas: proportion of each biological region protected, 2013⁵

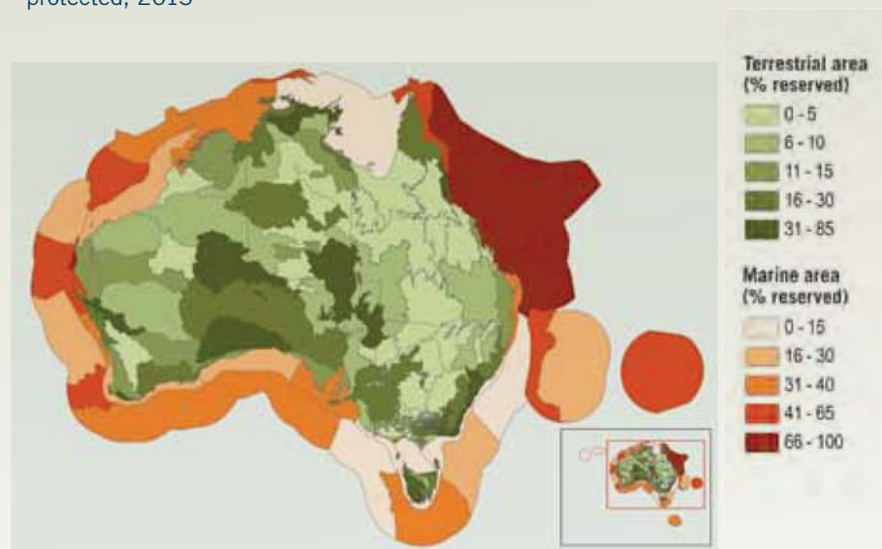
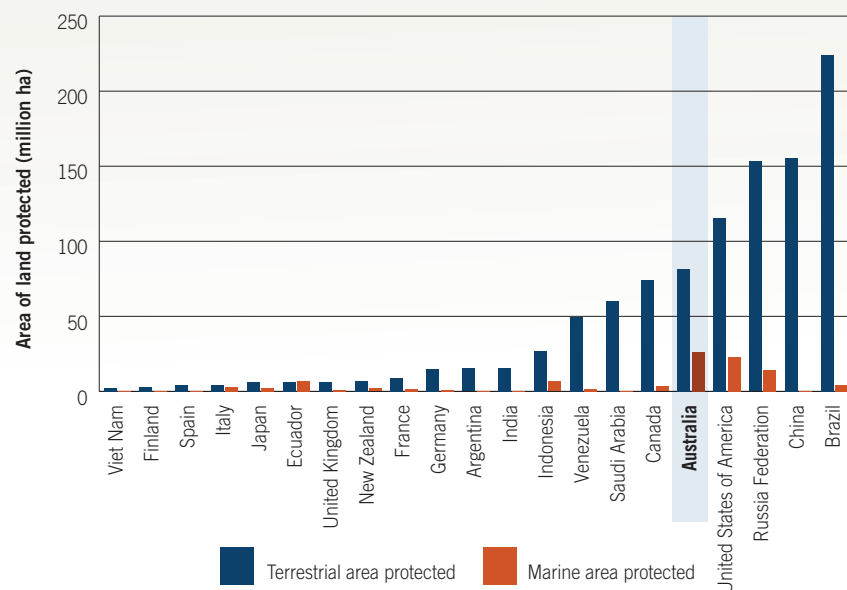
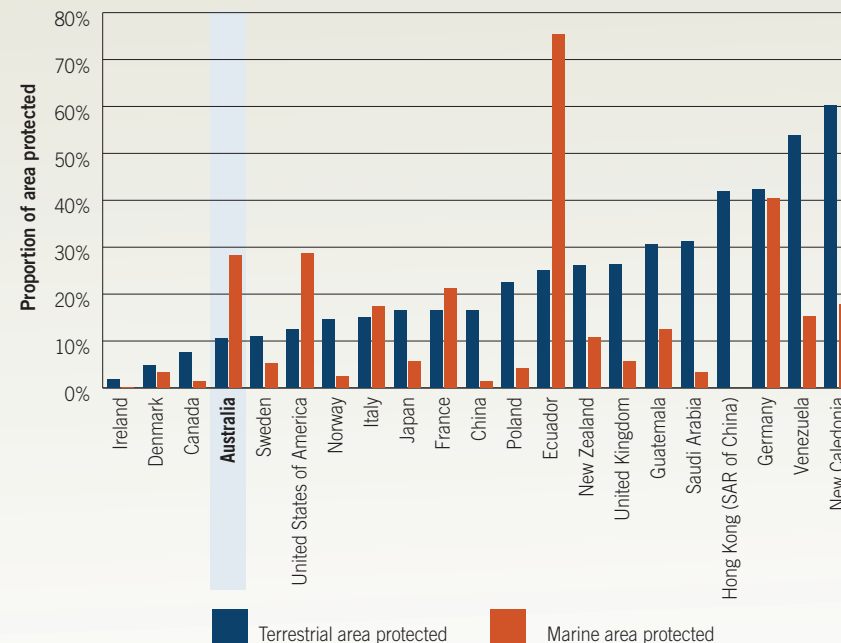


Figure 14C.4 Protected areas: international comparison of area protected, 2010⁶



When countries are ranked by the proportion of their territory protected in 2010, Australia is near the middle for terrestrial areas and in the top 10% for marine areas.

Figure 14C.5 Protected areas: international comparison of proportion of area protected, 2010⁷



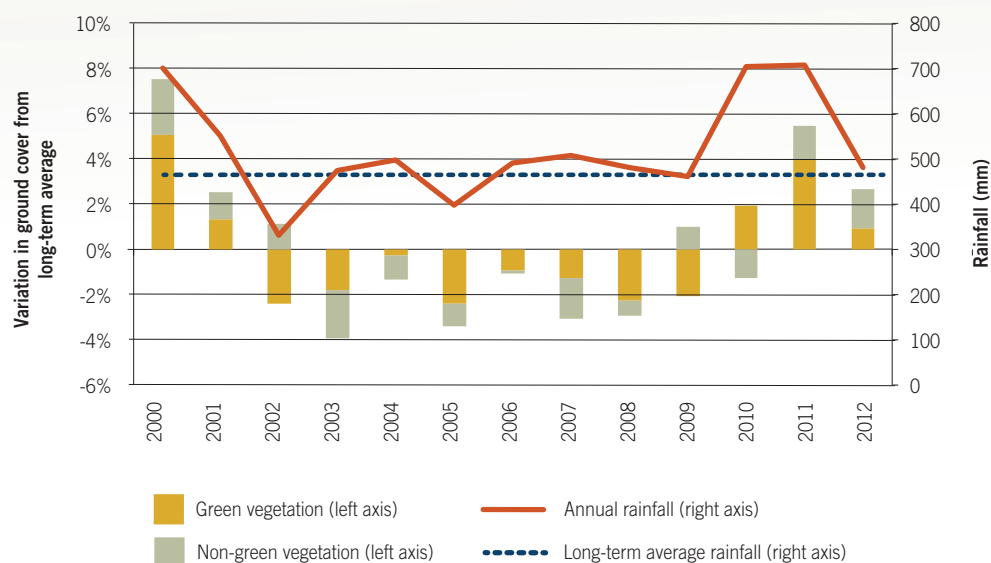
Levels of ground cover were higher in 2012 than the long-term average due in part to increased rainfall.

Ground cover

Ground cover^d, or vegetation covering the surface of the soil, reduces wind and water erosion, supports plant and animal life and aids storage of carbon. Ground cover is affected by weather, land management and soil condition.

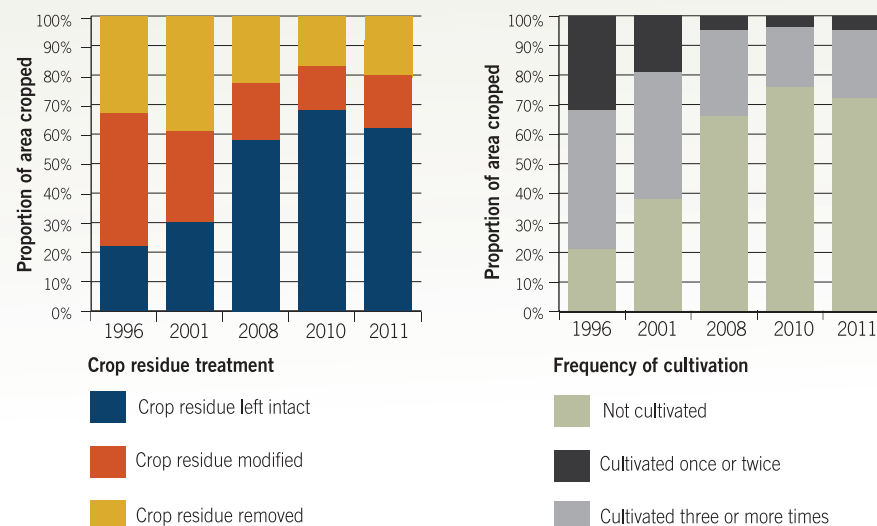
Across Australia, there was more vegetation and less bare soil in 2012 than the long-term average (2000 to 2012) due in part to higher than average rainfall in 2011 and the first half of 2012. This increased cover suggests reduced potential for soil erosion and increased productivity of the land. Between 2002 and 2009, less vegetation cover than average was recorded, coinciding with dry and warm conditions across much of Australia.

Figure 14C.6 Ground cover: variation in cover from long-term average, 2000–2012⁸



Where land is grazed, stocking rates can be adjusted to maintain ground cover. In cropping areas, ground cover is maintained by leaving crop residues intact rather than modifying or removing residues, and cultivating areas less frequently to retain soil structure. Since 1995, land used to grow crops has increasingly been managed using these practices to retain ground cover.

Figure 14C.7 Managing ground cover where cropped: change in cultivation and crop residue treatment practices, 1996 to 2011⁹



Australia's Biodiversity

Information on Australia's biodiversity is limited and suffers from a lack of consistent national reporting. In general, the ability to report on trends in the conservation status of species and ecological communities is poor, with the best available data being for the extent of native vegetation as reported above.¹⁰ The Australian Government's Sustainability Indicators are those for which good, nationally-consistent information is available. While Native Vegetation Extent, Protected Areas and Ground Cover are good proxies for understanding the health of ecosystems, the status of species and ecological communities is a major data gap.

Threatened species are listed under legislated processes in each state and territory and the Commonwealth. Changes in numbers of listed species must be interpreted with caution. Often changes are due to improvements in information on species: between 2002 and 2007, 46% of the 119 changes to the status of flora and fauna listed under the Commonwealth process were due to improved knowledge rather than an actual change in ecosystem or species health or populations. Further, total numbers of threatened species reflect the overall number of species in a group – this means that while many species of plants are listed as threatened, this partly reflects that there are many more known species of plants than there are mammals, for example.

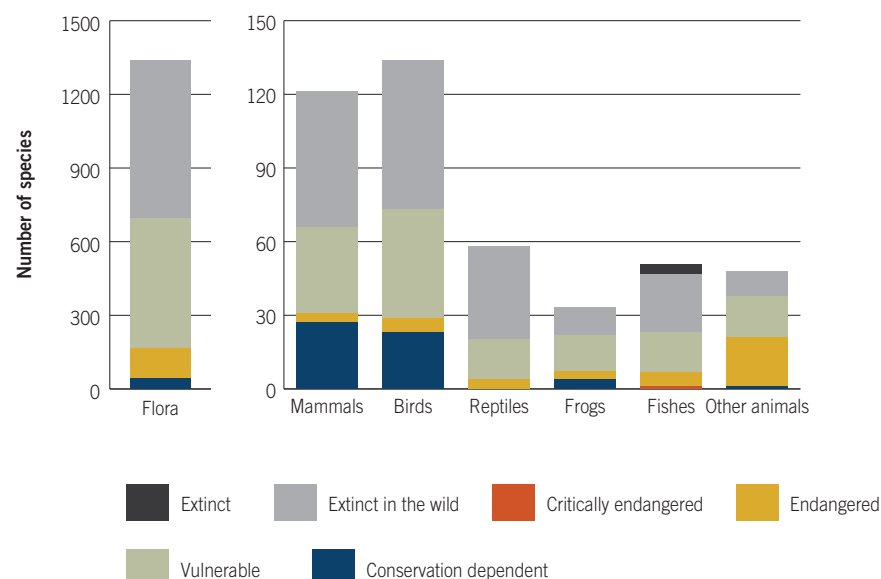
At the time of writing, 1340 species of plants and 445 species of animals were listed on the national threatened species list.

Seventy-three species of animals are listed as invasive pests in Australia. The highest concentration of these is along the eastern seaboard, coincident with human settlement. Many of these species are widespread, with significant populations, and are responsible for large amounts of land



degradation as well as inhibiting ecosystem function and competing with native animal populations. For plants, 20 species are recognised by state and territory governments as Weeds of National Significance with a further 28 identified as having the potential to become significant threats.¹²

Figure 14C.8 Species on the national threatened species list, 2013¹









Successive State of the Environment reports have identified the difficulty with accessing accurate, nationally consistent environmental data. The 2011 State of the Environment report addressed this issue by consulting with a range of relevant experts where data was limited. From this and what quantitative information was available, report cards were produced to provide assessments of condition and trends. These were then peer-reviewed. With few exceptions, all biodiversity indicators considered by this process were assessed to be in a poor to very poor state, with deteriorating trends. An extract of this report card is presented below.

Figure 14C.9 State and Trends of Biodiversity, State of the Environment Report 2011¹³

Component	Summary of state and trends	Assessment grade				Confidence	
		Very Poor	Poor	Good	Very Good	In grade	In trend
Terrestrial ecosystem (native vegetation) extent	Northern and central Australia: Native vegetation largely intact throughout much of this area (with a degree of modification in rangelands and high levels of clearing in 1997-2005 in some parts of north-east Queensland and the Northern Territory)			—		●	◐
	Southern, eastern and south-western Australia: Historical losses most apparent in these areas (especially eucalypt woodlands, eucalypt open forest, and mallee woodlands and shrublands). Rates of loss are declining but loss still exceeds gains in many areas		↘			●	●
Terrestrial ecosystem (native vegetation) quality	Remote areas and areas where agricultural and urban development have been minimal: Even in areas where vegetation is largely intact there are suggestions of some declining quality			↘		◐	◐
	Agricultural regions and around urban development: Very limited wide-scale data in all states and nationally, but strong evidence of decline from case studies in agricultural regions and around urban development		↘			◐	◐
Terrestrial plant species	High altitude, remote and/or very dry parts of Australia: Plant species appear to be largely secure (although all have been affected to some degree by human-induced pressures and most are potentially susceptible to effects of climate change), but there are examples of threatened or declining communities and species			—		●	◐
	Areas most suitable for urban development and/or agriculture: There have been substantial historical effects of human activities on plant species. Some pressures are ongoing and the legacies of land clearing will cause declines for some decades. Woodland and grassland species are most at risk		↘			◐	◐
Terrestrial animals-mammals	Declines in a large proportion of species across taxa in all states. Particular concern about mammals in northern Australia. Data collection is still too inadequate in all states and nationally to make a confident statement about which groups are secure and which are not	↘				◐	◐
Terrestrial animals-birds	Relatively resilient historically but threatened species make up a large proportion of known species in some areas. Large fluctuation in numbers over the past decade due to climate variation. Several states raise concerns about recent declines, especially in forests and woodlands, and the potential for legacy effects from past pressures that have not yet been seen		↘			◐	◐
Terrestrial animals- reptiles	Very limited data, but concerns have been raised about ongoing decline, including in grasslands and woodlands		↘			◐	◐
Terrestrial animals-amphibians	Surveyor information is very limited but research consistently points towards major declines in many areas		↘			◐	◐
Aquatic species and ecosystems	Northern and Central Australia: Much of northern and central Australian freshwater ecosystems appear to be in good condition			—		●	◐
	Southern, eastern and south-western Australia: Information on wetlands is limited but there is good evidence of losses and poor health of rivers in large areas of south-eastern and south-western Australia. Freshwater ecosystems appear to be in a poor and declining state in areas that have been heavily developed for agriculture		↘			◐	◐
Marine species and ecosystems	Overall: Marine biodiversity is in good condition			—		◐	◐
	In a few areas: Nationally there are a number of coastal places and areas on the continental shelf and upper slope where the condition of some biodiversity is very poor, as a result of the effects of specific human activities	↘				◐	◐

Key:

Recent Trends		 Improving	 Stable	 Deteriorating	 Unclear	Confidence	 Adequate high	 Limited evidence
Grades	Very Good	The vast majority of taxa appear to have good prospects for long-term survival and any declines are limited in spatial extent and severity and are unlikely to threaten future viability of taxa.						
	Good	Most taxa appear to have good prospects for long-term survival, although a small proportion have suffered declines that might threaten long-term survival.						
	Poor	A significant proportion of taxa have suffered declines across most or all of Australia that potentially threaten their long-term persistence.						
	Very Poor	A large proportion of taxa have suffered declines across most or all of Australia.						

References

- 1 State of the Environment Committee (2011) *Australia State of the Environment 2011*
- 2 Australian Government Department of Sustainability, Environment, Water, Population and Communities, National Vegetation Information System data
- 3 State of the Environment 2006 Committee (2006) *Australia state of the environment 2006*
- 4 Australian Government Department of Sustainability, Environment, Water, Population and Communities (2013) *Collaborative Australia Protected Area Database*
- 5 Australian Government Department of Sustainability, Environment, Water, Population and Communities (2013) *Collaborative Australia Protected Area Database*
- 6 International Union for Conservation of Nature and the United Nations Environment Programme World Conservation Monitoring Centre (2011) *The World Database on Protected Areas*
- 7 Ibid.
- 8 Australian Bureau of Agricultural and Resource Economics and Sciences (2012) *MODIS fractional cover metrics version 2.2*, National Computational Infrastructure, Canberra <https://remote-sensing.nci.org.au/u39/public/html>. Note: The anomalies for each cover fraction (photosynthetic vegetation, non-photosynthetic vegetation and bare soil) are calculated by subtracting the long-term mean (2000 to 2012) from the annual mean for each fraction. The anomaly is the difference in percentage cover. This analysis has been completed using the MODIS-derived vegetation fractional cover (version 2.2).
- 9 Australian Bureau of Statistics, Australian Bureau of Statistics, *Land Management and Farming in Australia* (cat. no. 4627.0) 2007–08 to 2009–10 issues; Australian Bureau of Statistics, *Agricultural Commodities, Australia* (cat. no. 7121.0) 1995–96 to 2000–01 issues. Note: The percentage of area prepared by no cultivation, one or two cultivations and three or more cultivations is calculated as a percentage of the sum of these three areas. The percentage area with crop residue left intact, crop residue modified and crop residue removed is calculated as a percentage of the sum of these three areas (except in 2000–01 when there were four crop residue management categories, so percentages are of the sum of the four areas).
- 10 Australian Government Department of Environment, Water, Heritage and the Arts (2008) *Assessment of Australia's terrestrial biodiversity 2008*
- 11 State of the Environment Committee (2011) *Australia State of the Environment 2011*
- 12 Australian Government Department of Sustainability, Environment, Water, Population and Communities, Species Profile and Threats Database, viewed 14 March 2013. Note: species include terrestrial and marine species, and species on Australian external territories.
- 13 State of the Environment Committee (2011) *Australia State of the Environment 2011*

Notes

- (a) Biological regions refer to Interim Biogeographic Regionalisation for Australia 7.0 bioregions (for terrestrial areas) or Integrated Marine and Coastal Regionalisation of Australia 4.0 provincial bioregions (for marine areas). The IBRA classification uses common climate, geology, landform, native vegetation and species information to divide Australia into 89 geographically distinct terrestrial bioregions. The 42 marine bioregions in the IMCRA classification were defined using biogeographic patterns in distributions of demersal fish (fish that live and feed on or near the bottom of the sea).
- (b) Data for deforestation and regrowth is calculated for the purposes of reporting under the Kyoto Protocol and therefore may include some non-native forest.
- (c) The International Union for Conservation of Nature has developed categories used to classify protected areas:
 - Category Ia (Strict Nature Reserve) is applied to areas set aside to protect biodiversity, geological and/or geomorphic features where human visitation, use and impacts are strictly controlled and limited.
 - Category Ib (Wilderness Area) areas are large unmodified or slightly modified areas, retaining their natural character and influence without permanent or significant human habitation, which are protected and managed to preserve their natural condition.
 - Category II (National Park) denotes large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area. These areas allow environmentally and culturally compatible spiritual, scientific, educational, and recreational use.
 - Category III (National Monument or Feature) areas are set aside to protect a specific natural monument which can be a landform, sea mount, submarine cavern or geological feature (e.g. a cave or a grove).
 - Category IV (Habitat/Species Management Area) areas aim to protect particular species or habitats and management of the area reflects this priority.
 - Category V (Protected Landscape/Seascape) is applied to areas where the interaction of people and nature over time has produced an area of distinct character with significant, ecological, biological, cultural and scenic value and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its values.
 - Category VI (Protected area with sustainable use of natural resources) areas conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and this natural resource use is seen as one of the main aims of the area.
- (d) Ground cover is measured as the amount of living (green), dry and dead (non-green) vegetation covering the soil surface. Monitoring ground cover can show changes in the condition of Australia's soil and land resources.

IMAGES

Loss of vegetation and erosion due to feral grazing animals on Phillip Island, Peter Coyne

Birdlife on the lagoon, Nick Rains



HOW ARE OUR WATER SUPPLIES AND QUALITY?

Water quality varies greatly across Australia. Water supplies have experienced periods of high stress in recent years, but recent rainfall and better management have helped to reduce this stress.

Fresh water is a vital input for our social and economic systems, and also underpins ecosystem health. Water quality and availability is under pressure from changes to the climate and human land use.



There is limited reliable and nationally consistent data on water quality in Australia. Available data shows that water quality varies greatly across Australia, but is particularly poor in south-western WA and parts of the Murray-Darling Basin.

Water quality^a

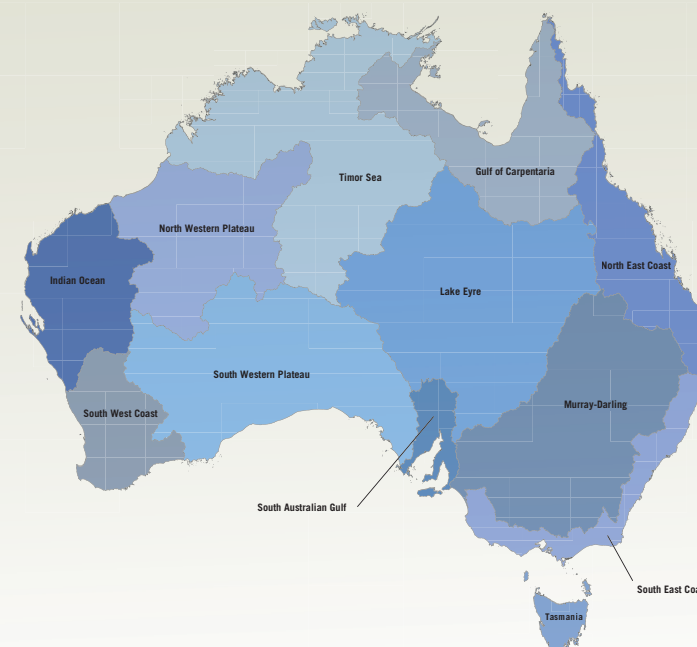
‘Water quality’ often has a broad definition. Based on the availability of nationally consistent data, water quality is confined in this report to selected physical and chemical parameters (concentrations of the nutrients phosphorus and nitrogen, acidity, salinity and turbidity).

Each of these parameters causes particular effects. Elevated nutrient concentrations in water bodies can lead to eutrophication, algal blooms and weed growth. Both high and low acidity (alkaline and acidic water) can be toxic to aquatic organisms. High salinity levels in fresh water bodies leave water unsuitable for human and animal consumption or agricultural use, and can be toxic to aquatic organisms. Turbidity can prevent light from travelling through water, slowing plant growth or killing aquatic organisms.¹

Water quality is affected by many factors, including water flow^b and a range of land use and land management factors.^c Complex interactions between water bodies, the landscape and climate (which are not fully understood) also impact water quality. Natural water flow is highly variable in Australian waterways. In many places, natural flows are altered by dams and weirs, diversion or extraction of water, levees and the abstraction of groundwater. In general, increased diversions and extractions correlate with declining river health. In about 80% of the river lengths assessed in a 2005 report, water flow was modified to some degree from its natural state.²

Considering physical and chemical properties at a national scale, nutrient and suspended sediment concentrations are higher than before European settlement in more than 90% of river lengths assessed. Exceedances of guidelines^d for each of turbidity, salinity, acidity and the nutrients nitrogen and phosphorus were recorded in parts of all drainage divisions^e over the period from 2000 to 2010.³

Figure 14D.1 Australian drainage divisions⁴



Information on physical and chemical properties across most of northern Australia (in the **Gulf of Carpentaria**, **Timor Sea** and **North-western Plateau** drainage divisions) is very limited. Available data suggest that nutrient concentrations may have been high in some areas of the **North-east Coast** drainage division between 2000 and 2010.

Physical and chemical property measurements varied greatly within the North-east Coast drainage division. There was generally less compliance with guidelines for nitrogen and phosphorus concentrations than for other properties.

Physical and chemical property measurements in the **Murray-Darling Basin** show high variability in water quality within the Basin. Most measurements of turbidity and nutrient concentrations exceeded water quality guidelines between 2000 and 2010, particularly in the north of the Basin, while instances of high salinity concentrations were less widespread, but common in the east of the drainage division. Exceedances of guidelines for acidity were less severe and occurred mostly in the north-east part of the basin.

Nutrient concentrations and salinity have been major problems for the **South-west Coast** drainage division over the last decade. Salinity is likely to be caused in part by inherent characteristics of the area combined with human influence (particularly the effects of land clearing).

Most physical and chemical property measurements were within water quality guidelines in the **Tasmania** drainage division. Areas in the north and east of Tasmania experienced higher incidences of exceedances of guidelines for nutrient concentrations.

Compliance with physical and chemical property guidelines between 2000 and 2010 was generally good in the **South-east Coast** drainage division. However, exceedances of salinity and acidity guidelines were common in western Victoria; exceedances of nitrogen guidelines were common in central Victoria; and exceedances of phosphorus guidelines were common in Gippsland. Less data was available in the parts of the drainage division in New South Wales and South Australian territory.

In the **South Australian Gulf** drainage division, turbidity and acidity measurements across the division over the period 2000 to 2010 were generally compliant with guidelines. Salinity, nitrogen and phosphorus concentrations recorded more exceedances, particularly in the south-east of the division.

CASE STUDY

River health in the Murray-Darling Basin

To date, thorough analysis of river health in many parts of Australia has not been carried out. The Murray-Darling Basin is an exception, with consistent reports on the health of river ecosystems across the whole Basin available.



The Murray-Darling Basin is one of the world's largest drainage systems, with a catchment area of more than one million square kilometres. The Basin accounts for 70% of irrigated agriculture in Australia and more than 40% of the gross value of agricultural production.⁵ The main rivers in the Basin are the Darling River (2,740 km) and the Murray River (2,530 km).

Most of the Basin is arid or semi-arid, and most of its flow comes from a small region near the headwaters of the Murray River. While total run-off averages about 32,553 gigalitres per year, just 5,100 gigalitres per year reaches the sea.⁶ Over the decade to late 2010, a sustained drought affected the region, causing severe stress to natural river environments, agricultural systems and rural communities in the region. Since then, heavy rain has restored river flows.

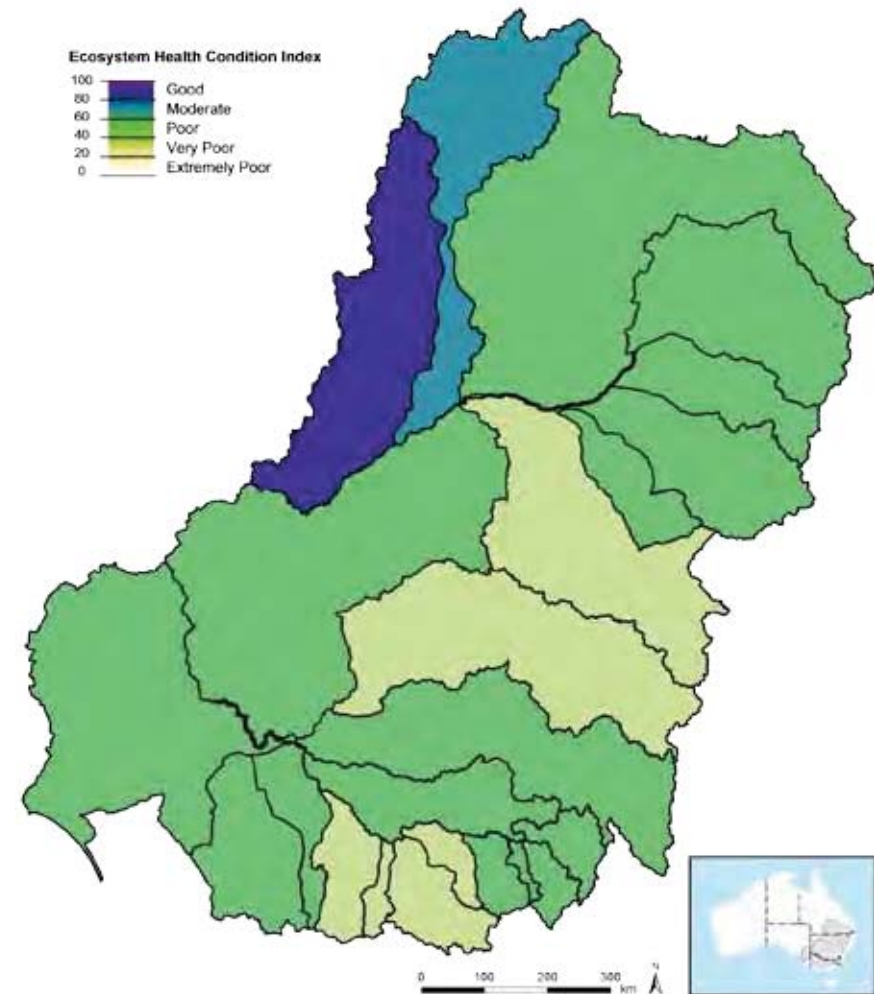
An assessment of the health of river ecosystems in the Murray-Darling Basin between 2008 and 2010 analysed data on fish, macroinvertebrates, vegetation, physical form and hydrology.^f Based on this analysis, the assessment reported ecosystem health as good, moderate, poor, very poor or extremely poor for each of the 23 river valleys (each divided into one to six zones generally defined by altitude). Increased rainfall since 2010 means that it is likely that the health of river ecosystems in the Murray-Darling Basin has improved since data for the assessment was collected.

Overall, the ecosystem in only one river valley (the Paroo valley) was found to be in good health. Ecosystem health in the Warrego valley was rated as moderate. The ecosystems in a further 15 valleys (Castlereagh, Condamine, Darling, Border Rivers, Gwydir, Lower Murray, Central Murray, Upper Murray, Namoi, Ovens, Wimmera, Avoca, Kiewa, Mitta Mitta and Murrumbidgee) were rated as being in poor health. Ecosystem health in the remaining six valleys (Campaspe, Loddon, Broken, Goulburn, Lachlan and Macquarie) was rated as very poor.

Northern valleys (in the Darling River catchment) were generally in better health than southern valleys (in the River Murray catchment).



Figure 14D.2 Ecosystem health in the Murray-Darling Basin, by valleys and valley zones, 2008 to 2010⁷



Fish condition was good in the Paroo valley.⁸ Fish in two other valleys (Condamine and Border Rivers) were in moderate condition. In these three valleys, a high proportion of the fish communities were native species. In the twelve valleys rated very poor or extremely poor, more than half the fish biomass was made up of introduced species.

There were substantial differences in the condition of macroinvertebrate communities between southern and northern valleys.⁹ Macroinvertebrate communities in the northern region are more frequently in good condition. Throughout the basin, macroinvertebrate communities tended to be in better health in montane, upland and slopes zones than in lowland zones.

For vegetation, a marked difference in riverine vegetation condition was evident between the northern and southern valleys of the Basin.¹⁰ Average condition in northern valleys was found to be moderate, while in southern valleys, average condition was poor.

The physical form of 11 valleys in the Murray-Darling Basin was rated as moderate.¹¹ In the other 12 valleys, physical form condition was good. Human impacts on physical form are widespread across the basin – of the 1,385 sites surveyed, channels had become simplified at 63% of sites, channels had become enlarged at 53% of sites, and channel volume had contracted at 21% of sites.

Over the entire Basin, 56% of the length of main stems of rivers was rated as being in poor, very poor or extremely poor hydrological condition.¹² Ten valleys were in good condition, seven in moderate condition and five were in poor condition, however, there was variation in condition within each valley and zone.

Figure 14D.3 Ecosystem health of Murray-Darling Basin valleys, by component, 2008 to 2010¹³

Valley	Ecosystem health	Fish	Macroinvertebrates	Vegetation	Physical form	Hydrology
Paroo	G	G	G	G	G	G
Warrego	M	P	G	G	G	G
Castlereagh	P	VP	M	G	G	G
Condamine	P	M	M	G	M	M
Darling	P	P	P	G	M	M
Border rivers	P	M	M	P	M	G
Lower Murray	P	P	M	P	M	VP
Ovens	P	P	M	P	G	G
Gwydir	P	P	M	M	M	P
Central Murray	P	VP	P	G	M	P
Upper Murray	P	EP	G	M	G	P
Wimmera	P	P	M	P	G	M
Namoi	P	VP	M	P	M	G
Kiewa	P	EP	G	P	G	G
Mitta Mitta	P	EP	G	M	G	G
Avoca	P	VP	M	P	M	G
Murrumbidgee	P	EP	M	M	G	P
Campaspe	VP	VP	M	EP	M	M
Loddon	VP	VP	M	EP	M	M
Goulburn	VP	EP	P	P	G	P
Macquarie	VP	EP	M	M	M	M
Broken	VP	EP	G	VP	G	G
Lachlan	VP	EP	M	P	G	M

Key	G – Good	M – Moderate	P – Poor	VP – Very poor	EP – Extremely poor

The volume of water consumed per capita has fallen dramatically over the last decade, with notable improvements in the efficiency of water use in many sectors.

Water consumption per capita

Water consumption per capita halved between 2001 and 2011, from 1,118 kilolitres^g (kL) to 597kL per capita. Total water consumption also declined over the same period by 39%, from 21,703 gigitalitres^h (GL) in 2001 to 13,337GL in 2011.

The agriculture, forestry and fisheries sector used the most water per capita (329kL or approximately 55% of water consumption) in 2011. However, the same sector recorded the greatest decrease (57%) in per capita water consumption between 2001 and 2011.

Sectors recording large reductions in per capita water consumption were households (by 35% to 76kL) and the electricity, gas, water and waste services sector (by 33% to 84kL).

Figure 14D.4 Water consumption per capita: by sector, 2001 to 2011¹⁴

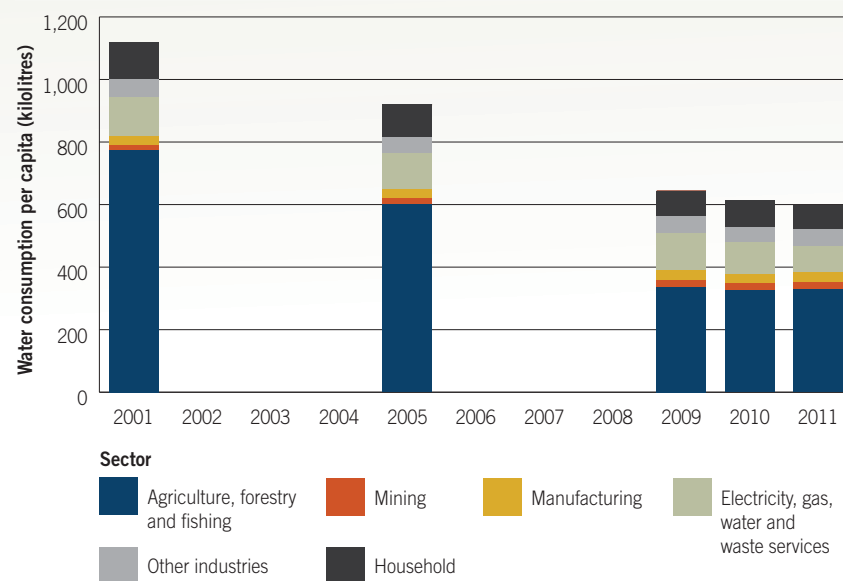
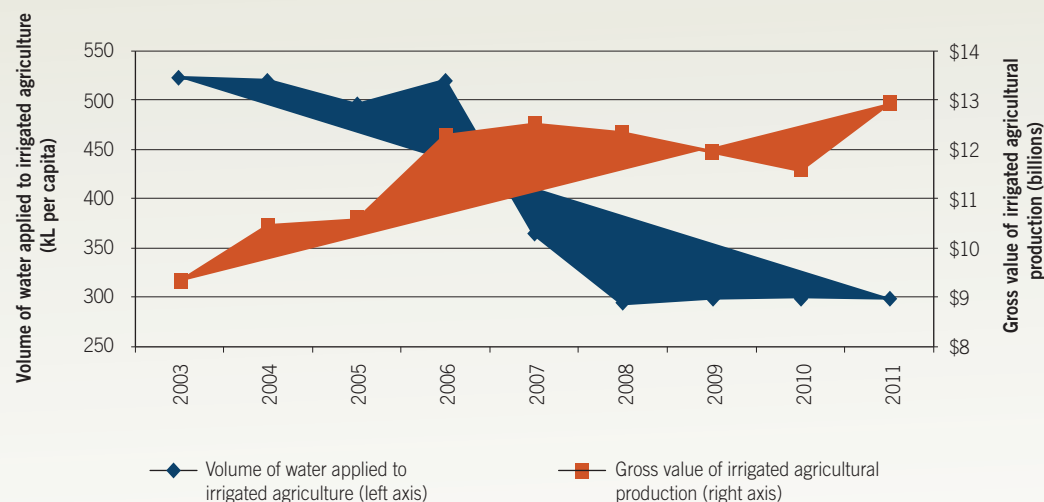


Figure 14D.5 Decoupling consumption from production in the irrigated agriculture sector, 2003 to 2011¹⁵



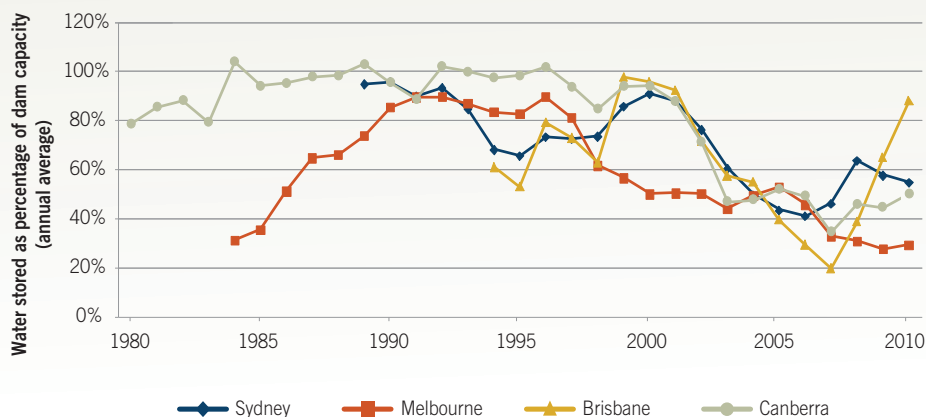
In the irrigated agriculture sub-sector, water use declined from 523kL per capita in 2003 to 298kL per capita in 2011, while the gross value of irrigated agricultural production rose from \$9.3 billion to \$12.9 billion. The concurrent decrease in water consumption and increase in production value is an example of successful delinking of economic growth from increased resource use ('decoupling'). Some of the decreased water consumption was achieved through increased capital investment in on-farm irrigation infrastructure.

Enough water was available overall to meet demands between 2009 and 2011 in all regions measured except Perth.

Water availability to meet demandⁱ

Rainfall in Australia varies greatly over the continent, and is influenced by seasonal and climate factors. Traditionally, water availability to meet demand has been measured by tracking changes in water storage, and water use has been restricted where there is danger of storages being exhausted. Because of the lack of rainfall over a decade commencing in the late 1990s, in many places storages were nearly exhausted by the mid-2000s.

Figure 14D.6 Capital city water storage levels, 1980 to 2010¹⁶



Monitoring change in surface water storage levels only provides some of the information necessary to determine whether enough water is available to meet demand. Much water used by humans is extracted directly from waterways or ground water reserves. By tracking water allocation and use within a region, a more complete picture of the amount of water available to meet demand can be drawn.

In 2011, five of six metropolitan regions and both rural regions measured had positive 'closing net water assets'.^j This means that collectively these regions had water left over after all allocations had been taken into account.

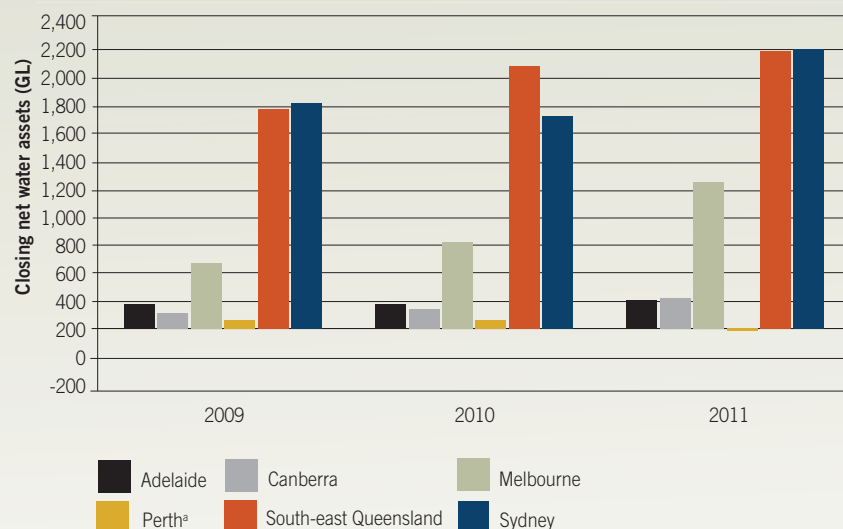
However, closing net water asset totals for a region may obscure individual water stores that do not have enough water to meet demands. This concealment can be due to other water stores in the region holding excess water and the inclusion of some water assets that are not suitable for irrigation or domestic supply but serve recreational and environmental purposes.

While an increase in net water assets can be regarded generally as a positive outcome, closing net water assets are affected by numerous factors. Increases may be caused by high rainfall allowing the storage of more water or a reduction in water liabilities for the year.

Between 2009 and 2011,^k closing net water assets increased in five of the six metropolitan regions measured, in part due to above average rainfall.

Perth was the only measured region that recorded a decrease in water remaining after all demands were met between 2009 and 2011, partly because of below average rainfall. The negative net water assets figure for Perth in 2011 was due to the fact that groundwater assets were not included in totals (as they have not yet been quantified for aquifers in the region), while groundwater liabilities were included.

Figure 14D.7 Closing net water assets, by metropolitan regions measured, 2009 to 2011¹⁷

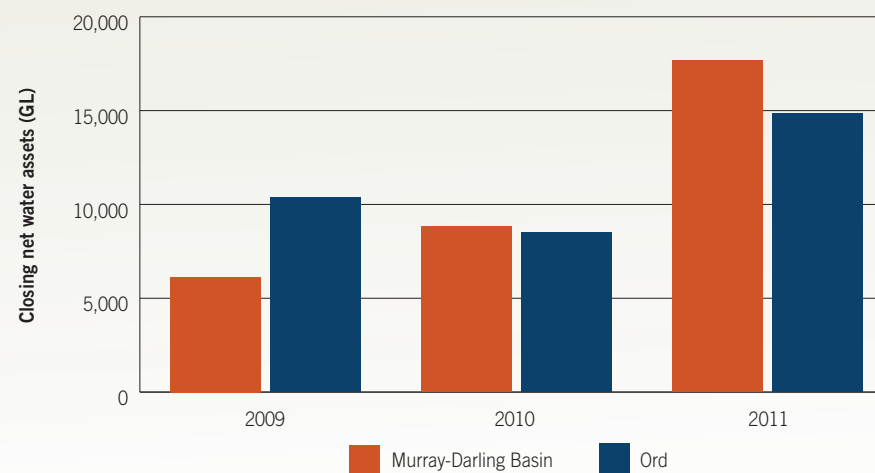


In rural regions measured, the greatest increase in closing net water assets occurred in the Murray-Darling Basin between 2009 and 2011 – from 6,134GL to 17,673GL – due in part to higher than average rainfall. The Ord region recorded a decrease from 10,382GL in 2009 to 8,515GL in 2010 before increasing to 14,841GL in 2011.

For South-east Queensland, the Sydney, Melbourne and Canberra regions in 2011, closing net water assets were much greater than total water use, showing that overall water use is not a significant drain on those regions water resources. However, amalgamation of this data to the regional level may obscure areas in which water use exceeded net water assets, causing strain on the natural water system.

In Adelaide, closing net water assets were slightly higher than total water use, while in Perth, closing net water assets were substantially less than total water use, likely because not all groundwater asset figures were available for inclusion.

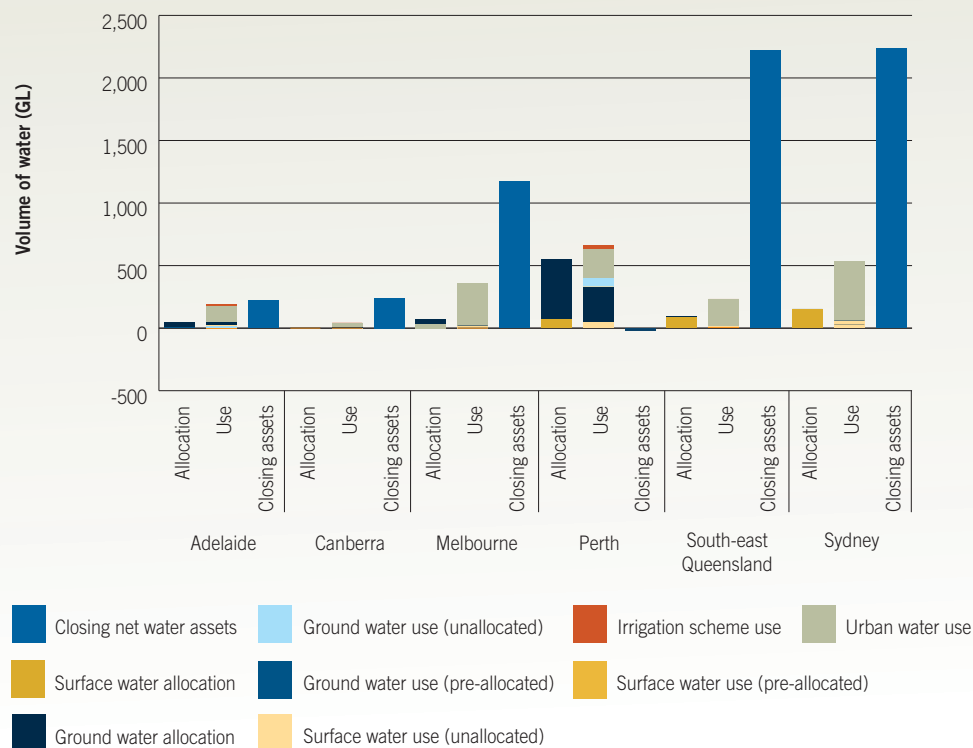
Figure 14D.8 Closing net water assets, by rural regions measured, 2009 to 2011¹⁸



Urban water use made up a major part of total water use for most metropolitan regions in 2011. In the Melbourne and Canberra regions, it accounted for 95% of all water use, 94% in South-east Queensland, 89% in the Sydney region, and 66% in Adelaide. In the Perth region, urban water comprised only 36% of the total water used. Other water uses included 22% for agriculture (non-irrigation scheme), 11% for parks, gardens and recreation, 8% for industry and power generation, and 3% for mining. A further 10% was non-allocated groundwater use.

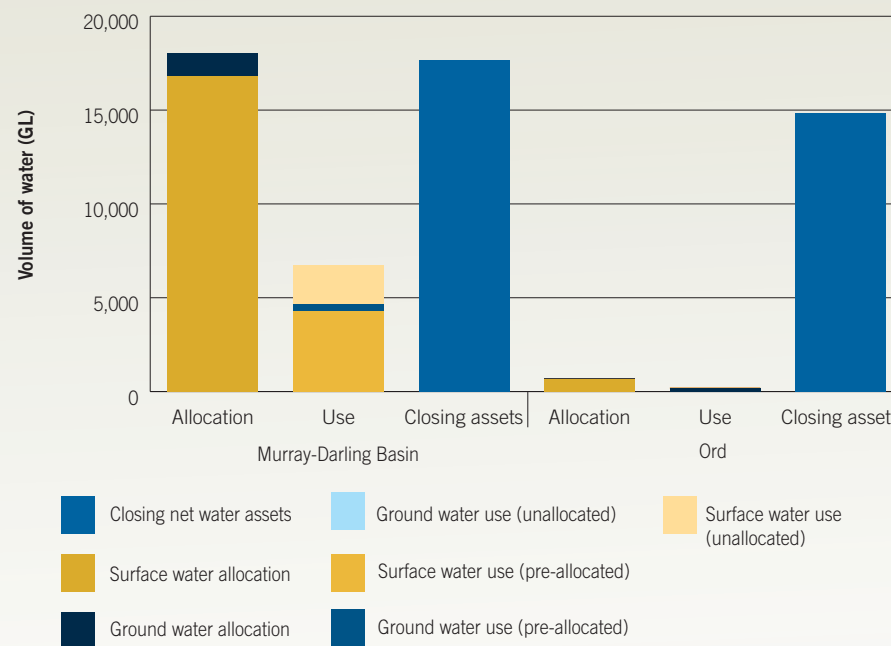
Excluding urban water use (which is not pre-allocated in metropolitan regions) generally little to no water use takes place without allocation. This means that where allocations are set so that natural water flows are not adversely impacted, human water use is more likely to be sustainable.

Figure 14D.9 Water availability to meet demand: allocation, use, and closing net water assets, by urban regions measured, 2011¹⁹



In both of the rural regions measured, water use was well below allocations. For the Murray-Darling Basin the total volume of water allocated (18,031 GL) was slightly more than closing net water assets. Approximately two-thirds (11,519 GL) of the allocations were allocated during the 2011 water account year. In the Ord region, both allocations and water use were a small fraction of closing net water assets (4.7% and 1.2% respectively).

Figure 14D.10 Water availability to meet demand: allocation, use, and closing net water assets, by rural regions measured, 2011²⁰



References

- 1 Sinclair Knight Merz (2011) *National Water Quality Assessment 2011*
- 2 National Water Commission (2005) *Australian Water Resources 2005*
- 3 Sinclair Knight Merz (2011) *National Water Quality Assessment 2011*
- 4 Bureau of Meteorology
- 5 Murray-Darling Basin Authority (2012) *Sustainable Rivers Audit 2: The ecological health of rivers in the Murray-Darling Basin at the end of the Millennium Drought (2008-2010) Summary*, p.6
- 6 Ibid, p.10
- 7 Ibid, p.27
- 8 Ibid, p.28
- 9 Ibid, p.32
- 10 Ibid, p.36
- 11 Ibid, p.40
- 12 Ibid, p.44
- 13 Ibid, p.25
- 14 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of Australian Bureau of Statistics, *Water Account, Australia 2000 to 2011* (cat. no. 4610.0) and Australian Bureau of Statistics, *Regional Population Growth, Australia December 2011* (cat. no. 3218.0)
- 15 Australian Bureau of Statistics, *Value of Agricultural Commodities Produced, Australia 2002 to 2011* (cat. no. 7503.0)
- 16 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of Bureau of Meteorology, *Australian Water Resources Assessment 2010* (2011). Note: The opening of the Thomson Dam in May 1983 and its gradual filling over subsequent years is likely the reason why storage levels for Melbourne were comparatively low in the mid-1980s.
- 17 Bureau of Meteorology, *National Water Accounts 2011*. Note: A negative figure means that water liabilities exceeded water assets. It should also be noted that groundwater assets are not included in Perth totals, as they have not yet been quantified for aquifers in the region; however, groundwater liabilities are included. If included, groundwater assets would increase the closing net water assets figure.
- 18 Ibid. Note: Murray-Darling Basin water asset figures do not include water assets in the Great Artesian Basin.
- 19 Ibid. Note: Use volumes may be higher than allocation volumes because use includes several non-allocated components (such as urban use, some irrigation use, riparian rights to access water on or next to one's property, and unregulated water use).
- 20 Ibid. Note: Use volumes may be higher than allocation volumes because use includes several non-allocated components (such as urban use, some irrigation use, riparian rights to access water on or next to one's property, and unregulated water use).

Notes

- (a) General note: Water quality data in Australia is collected by each state and territory. Data collection frequency and methods differ among jurisdictions, and the coverage of sampling varies among regions. The Indian Ocean, North-western Plateau, South-western Plateau, Timor Sea and Lake Eyre drainage division each have little to no data collection. Further, the natural boundaries of drainage divisions intersect multiple jurisdictions; meaning that data collected using different methods must be brought into alignment before water quality can be examined over the whole of a drainage division. There is also a general lack of monitoring data on groundwater quality except in places with localised concerns. These factors combined make it hard to assemble a clear picture of water quality across Australia.
- (b) Water flow, or streamflow, refers to the pattern of water flow through rivers, and is a major determinant of water quality and the condition of inland waters.
- (c) See, for example, the list in Schedule 10 of the *Basin Plan 2012*, available at <http://download.mdba.gov.au/Basin-Plan/Basin-Plan-Nov2012.pdf>
- (d) Guidelines refers to the Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand, *Australian and New Zealand guidelines for fresh and marine water quality* (2000); and the Queensland Department of Environment and resource Management, *Queensland water quality guidelines* (version 3, 2009).
- (e) Drainage divisions are representations of the catchments of major surface water drainage systems, generally made up of a number of river basins.
- (f) Macroinvertebrates are bottom-dwelling invertebrates visible to the naked eye. They form a major component of aquatic biodiversity and are food for fish and other fauna. Physical form refers to the condition of the river channel (including river banks and river beds) and floodplains. The physical form of rivers governs the type, abundance, diversity and availability of physical habitat, and influences the transfer of energy and organisms in the riverine landscape. Hydrology measures aspects of the water flow including volume, variability, extreme flow events and seasonality. Flow influences virtually every facet of a river ecosystem, transporting materials, driving the form of the environment, and sustaining aquatic and terrestrial organisms in both river channels and floodplains.
- (g) One kilolitre (kL) is equal to 1,000 litres.
- (h) One gigalitre (GL) is equal to 1,000,000,000 litres.
- (i) Where not specifically referenced, the source for this indicator is: Bureau of Meteorology, *National Water Accounts 2011*
- (j) The National Water Accounts use an accounting framework to track water assets and liabilities in eight regions. 'Closing net water assets' are the excess of water assets in a region at the end of a reporting period after deducting all water liabilities.
- (k) National Water Accounts have been kept since 2010. The 2010 account records opening net water assets, which is equal to closing net water assets for 2009.

IMAGES

Punt taking vehicles across the Murray River at Waikerie, Chris Alston

Irrigation release at the Hume Dam, Trevor Ierino

Other images from www.istockphoto.com

Case study - Low water levels in the Paroo River in the Nocoleche Nature Reserve, Bruce Gray



HOW MUCH DO WE WASTE?

Though much of our waste is recycled, in many areas there is scope to use more of our waste material productively.

Waste disposed to landfill has high costs for our society, from pollution and infrastructure costs to the need to find replacement resources. By reducing waste and increasing recycling rates, we can lessen our impact on the environment while saving money and conserving resources.



Though more waste was disposed to landfill in 2009 than in 2007, per capita levels remained constant at 1,030kg.

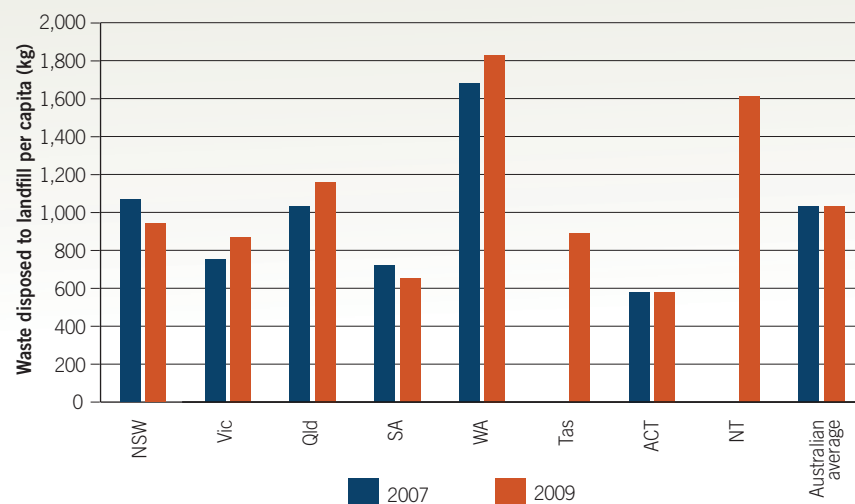
Waste disposal to landfill^a

In 2009, 47 million tonnes (Mt) of waste was generated in Australia, an increase of 3 Mt from 2007.^b Of this, 23 Mt was disposed to landfill (48%). This is equivalent to 1,030kg of waste disposed to landfill per person.

Municipal waste^c contributed 8 Mt (36%) of the waste disposed to landfill in 2009, while the remaining 15 Mt came from the commercial and industrial, and construction and demolition sectors.

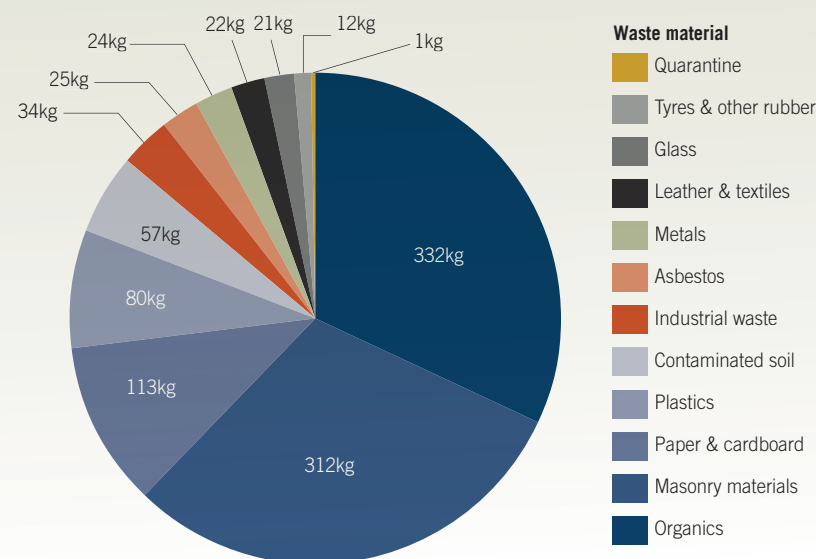
Western Australia (1,830kg), the Northern Territory (1,610kg) and Queensland (1,160kg) disposed of more waste to landfill per capita than the national average in 2009.

Figure 14E.1 Waste disposed to landfill per capita, by state/territory, 2007 and 2009¹



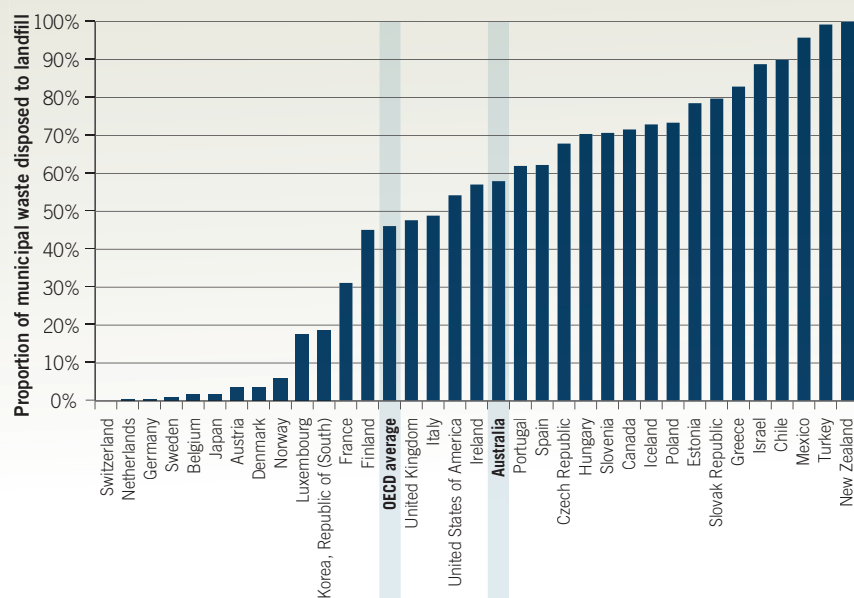
The types of material that made up most of the average 1,030kg of waste disposed to landfill per capita in 2009 were organics (332kg), masonry materials (312kg), paper and cardboard (112kg), and plastics (80kg).

Figure 14E.2 Waste disposed to landfill per capita, by material, 2009²



Considering municipal waste only, Australia disposed of more waste to landfill (58%) than the OECD average (46%) in 2010. The country with the lowest proportion of waste disposed to landfill was Switzerland (0.0%), closely followed by Germany and the Netherlands (0.4%).

Figure 14E.3 International comparison of the proportion of municipal waste disposed to landfill, 2010³



CASE STUDY

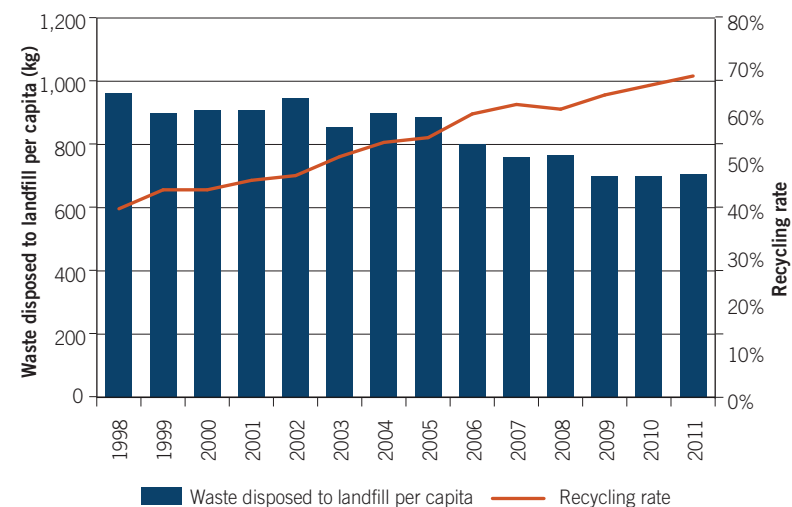
Waste and recycling in Victoria

Victorians are reducing the amount of waste they generate per capita, and increasing their recycling rate.

Between 1998 and 2011, the amount of waste disposed of to landfill in Victoria decreased from 4.4 Mt to 3.9 Mt. Over the same period, the volume of waste disposed to landfill per capita dropped from approximately 961 kg to 706 kg.⁴

The proportion of waste that was recycled^d increased from 40% in 1998 to 68% in 2011.

Figure 14E.4 Waste and recycling in Victoria, 1998 to 2011⁵



Just over half of waste was recycled in 2009, a slight decline from 2007 levels.

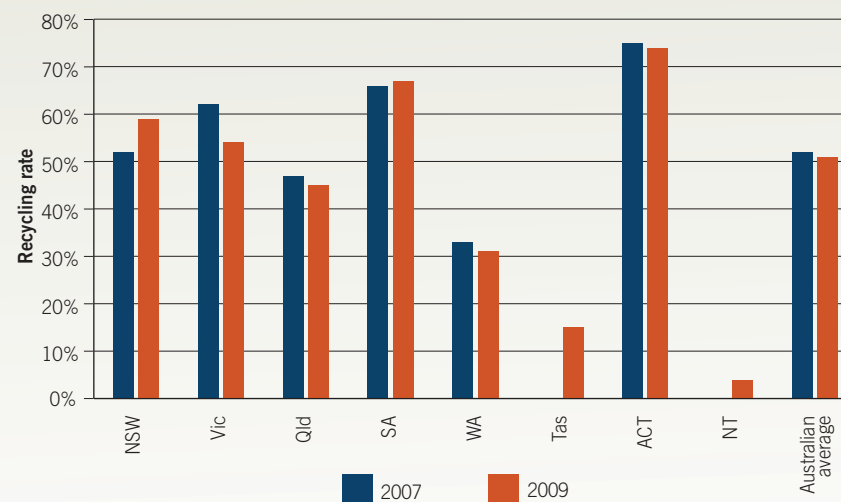
Recycling rate^d

The proportion of waste generated that was recycled (the 'recycling rate') decreased slightly between 2007 (52%) and 2009 (51%).^e

Approximately 41% of municipal waste^f and 55% of commercial, industrial, construction and demolition waste was recycled in 2009.

In 2009, the Australian Capital Territory recycled the greatest proportion of its waste (74%), followed by South Australia (67%). The lowest recycling rates occurred in Western Australia (31%), Tasmania (15%) and the Northern Territory (4%). These figures remained largely unchanged from 2007 levels (where figures are available).

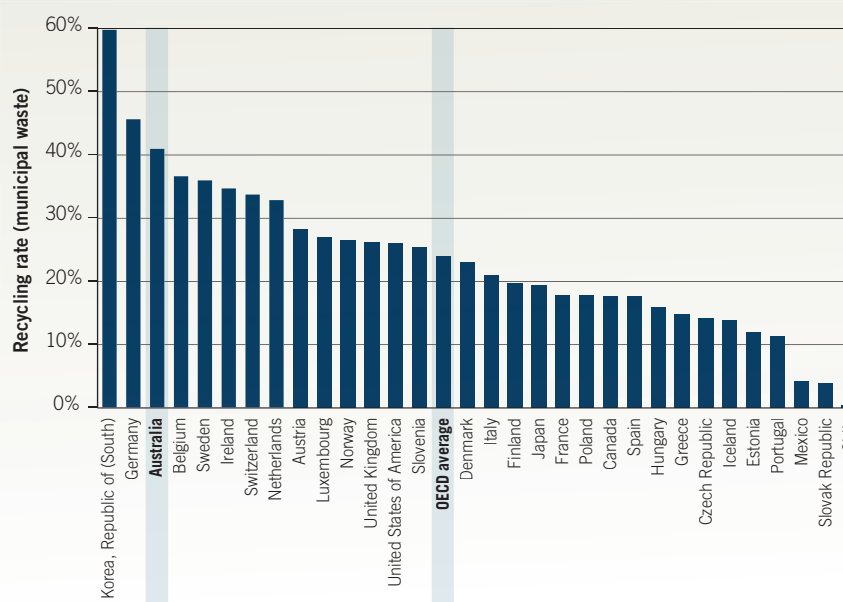
Figure 14E.5 Recycling rate, by state/territory, 2007 and 2009⁶



In 2009, just under half (49%) of waste produced was not recycled. There may be scope to use more of this waste material productively. While most households report that they recycle or reuse paper, cardboard or newspapers (95% of households), glass (93%), plastic bottles or containers (93%), cans (91%) and plastic bags (85%), significantly less households recycle food scraps or waste (48%) and electronic equipment (25%).⁷

For municipal waste only, Australia had the third highest recycling rate (41%) amongst OECD countries in 2010. The country with the highest recycling rate was Korea, which recycles 60% of its municipal waste, followed by Germany (46%).

Figure 14E.6 International comparison of recycling rates for municipal waste, 2010⁸



Many countries also make use of their waste by creating energy from waste incineration. In Australia, approximately 1% of municipal waste generated is used for this form of energy recovery, compared to the OECD average of 19% and a maximum of 54% in Denmark.

References

- 1 Sources: Heritage and the Arts (2010) *National Waste Report*, available at <http://www.environment.gov.au/wastepolicy/publications/national-waste-report.html>; Hyder Consulting, *Waste and recycling in Australia* (2011), a report prepared for DSEWPaC, available at <http://www.environment.gov.au/wastepolicy/publications/waste-recycling2011.html>. No figures are available for the 2007 financial year for Tasmania and the Northern Territory because data is available only for part of the state/territory.
- 2 Hyder Consulting (2011) *Waste and recycling in Australia*, a report prepared for Australian Government Department of Sustainability, Environment, Water, Population and Communities, available at <http://www.environment.gov.au/wastepolicy/publications/waste-recycling2011.html>
- 3 Organisation for Economic Co-operation and Development, 'OECD.Stat Waste data', retrieved March 2013, available at <http://stats.oecd.org/Index.aspx?DataSetCode=WASTE>. All data is for 2010, except for Japan and Canada data (2008) and Australia, Chile, Iceland, Korea and the UK (2009). Data for the Czech Republic and Denmark are national estimates. The OECD average is an estimate based on partial data.
- 4 EcoRecycle Victoria, *Annual Report*, 2001 to 2004–05 issues, available at <http://www.sustainability.vic.gov.au/www/html/1822-publications---a-b.asp>; Sustainability Victoria, *Victorian Recycling Industries Annual Survey*, 2004–05 to 2009–10 issues, available at <http://www.sustainability.vic.gov.au/www/html/1822-publications---a-b.asp>; Sustainability Victoria, *Towards Zero Waste Report 2010–11*, available at <http://www.sustainability.vic.gov.au/www/html/1344-towards-zero-waste.asp>.
- 5 Ibid. All years are financial years (i.e. 2009 should be read as 2008–09).
- 6 Environment Protection and Heritage Council and the Department of Environment, Water, Heritage and the Arts (2010) *National Waste Report*, available at <http://www.environment.gov.au/wastepolicy/publications/national-waste-report.html>; Hyder Consulting, *Waste and recycling in Australia* (2011), a report prepared for Australian Government Department of Sustainability, Environment, Water, Population and Communities, available at <http://www.environment.gov.au/wastepolicy/publications/waste-recycling2011.html>. No figures are available for the 2007 financial year for Tasmania and the Northern Territory because data is available only for part of the state/territory.
- 7 Australian Bureau of Statistics, *Environmental Issues: Waste Management, Transport and Motor Vehicle Usage, Mar 2012* (cat. no. 4602.0.55.002), available at <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4602.0.55.002Main+Features1Mar%202012>.
- 8 Organisation for Economic Co-operation and Development, 'OECD.Stat Waste data', retrieved March 2013, available at <http://stats.oecd.org/Index.aspx?DataSetCode=WASTE>. All data is for 2010 except for Japan and Canada data (2008) and Australia, Chile, Iceland, Korea, and the UK (2009). Data for the Czech Republic and Denmark are national estimates. The Ireland figure is an estimated value. The OECD average is an estimate based on partial data.

Notes

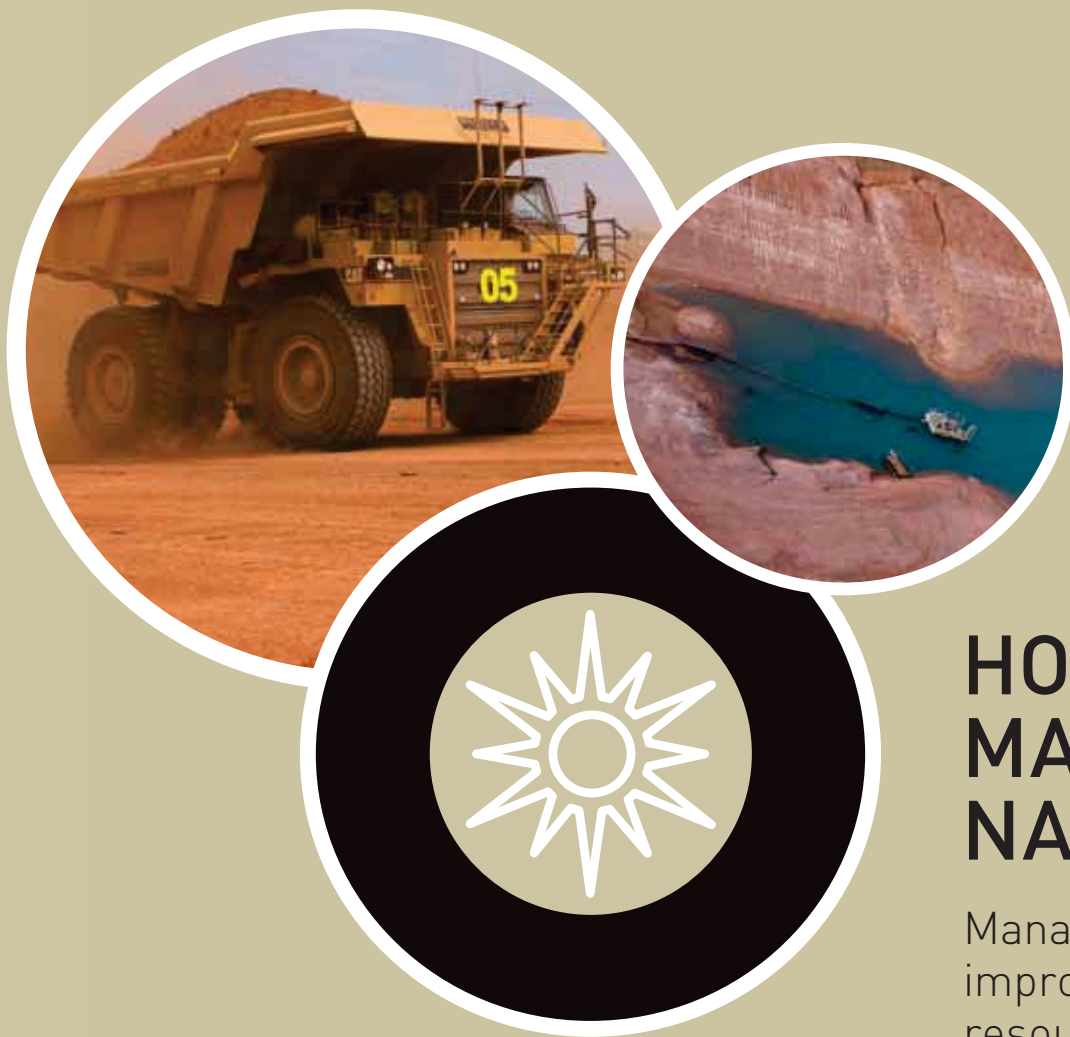
- (a) Where not specifically referenced, text in this indicator is based upon the following sources:
 - Environment Protection and Heritage Council and the Department of Environment, Water, Heritage and the Arts, *National Waste Report* (2010), available at <http://www.environment.gov.au/wastepolicy/publications/national-waste-report.html>
 - Hyder Consulting, *Waste and recycling in Australia* (2011), a report prepared for DSEWPaC, available at <http://www.environment.gov.au/wastepolicy/publications/waste-recycling2011.html>.
 - Organisation for Economic Co-operation and Development, 'OECD.Stat Waste data', retrieved March 2013, available at <http://stats.oecd.org/Index.aspx?DataSetCode=WASTE>. All years are financial years (i.e. 2009 should be read as 2008–09) except for OECD data, which may vary by country.
- (b) National waste data compilation only began recently due to previous inconsistencies in data collection between and within states and territories.
- (c) Municipal solid waste is waste produced primarily by households and council facilities, and includes biodegradable material, recyclable materials such as bottles, paper, cardboard and aluminium cans, and a wide range of non-degradable material including paint, appliances, old furniture and household lighting.
- (d) Recycling rates were calculated using the proportion of waste generated that was recovered for reprocessing.
- (e) Where not specifically referenced, text in this indicator is based upon the following sources:
 - Environment Protection and Heritage Council and the Department of Environment, Water, Heritage and the Arts, *National Waste Report* (2010), available at <http://www.environment.gov.au/wastepolicy/publications/national-waste-report.html>.
 - Hyder Consulting, *Waste and recycling in Australia* (2011), a report prepared for DSEWPaC, available at <http://www.environment.gov.au/wastepolicy/publications/waste-recycling2011.html>.
 - Organisation for Economic Co-operation and Development, 'OECD.Stat Waste data', retrieved March 2013, available at <http://stats.oecd.org/Index.aspx?DataSetCode=WASTE>. All years are financial years (i.e. 2009 should be read as 2008–09), except OECD data, which may vary by country.
- (f) National waste data compilation only began recently due to previous inconsistency in data collection between and within states and territories.

IMAGES

Mini skip for recycling used building material, Mark Mohell

Infoactiv & Apple Inc sustainable e-Waste management program in action in Canberra, Dragi Markovic

Other images from www.istockphoto.com



HOW WELL ARE WE MANAGING OUR NATURAL RESOURCES?

Management of our natural resources has improved in recent years, but some natural resources still suffer from overexploitation.

We depend on natural resources for food, to make things and for power. Many resources are finite or can be exhausted if consumed too quickly. By managing natural resources sensibly, we can draw upon them now to live well while keeping enough in reserve for the future.



A national assessment of 150 stocks of 49 key fish species classified 98 of the stocks as 'sustainable' in 2010. In Commonwealth fisheries (which constitute about 29% of the volume of Australia's wild fish catch), the proportion of stocks classified as 'overfished' has decreased since 2004.

Fish stocks

National reporting on fish stock status

Within the Australian Exclusive Economic Zone (EEZ), marine fisheries and the wild fish stocks on which they are based are managed by eight Commonwealth, state and territory governments.^a Fish stocks are the relatively discrete populations of a fish species, usually in a given geographical area and with little or no interbreeding with other stocks of the same species. Some stocks of fish span more than one jurisdiction, making it a challenge to evaluate the stock's status.^b

In 2012, all eight jurisdictions with marine fisheries collaborated to produce national stock status assessments based on data up to 2010.¹ The stocks of 49 key fish species^c were assessed, collectively representing over 70% of the annual commercial catch volume and over 80% of the value of all wild-caught fish in 2010 in Australia.² The status of these fish stocks was assessed using a nationally agreed framework that examined whether the abundance of fish ('biomass') in each stock and the level of harvest from each stock were sustainable. In total, 150 fish stocks^d were assessed across the 49 key species.

While an assessment of the sustainability of certain fish stocks is presented here, the broader ecological effects of fishing, such as bycatch (the incidental catch of non-targeted species), are not currently assessed nationally.

In 2010, of the 150 stocks assessed, 98 (65% of the stocks assessed) were classified as 'sustainable' stocks. This means that the stock biomass was at a level sufficient to ensure that, on average, natural regrowth of the

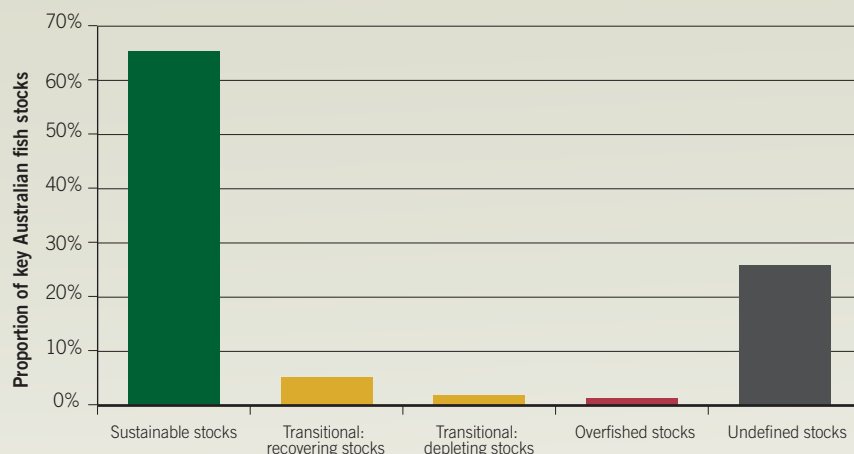
stock is not significantly reduced and that fishing pressure is adequately controlled to avoid significant risk to natural regrowth of the stock.^e Approximately 91% (109,801 tonnes (t)) of the total catch of the 49 key species assessed was taken from these 'sustainable' stocks.

Two stocks (1% of the stocks assessed), Southern Bluefin Tuna and School Shark, were classified as 'overfished'. This means that the natural regrowth of these stocks was significantly reduced in 2010 and, while management measures were in place, there had not yet been measureable signs of stock recovery.^f Approximately 4% (4,291 tonnes (t)) of the total catch of the key 49 species assessed was from these two 'overfished' stocks.

Eight stocks (5% of the stocks assessed) were deemed 'transitional: recovering'. The natural regrowth of these stocks was significantly reduced in 2010, but management measures had been put in place to aid stock recovery, and recovery was occurring.^g Approximately 1% (901 t) of the total catch from the 49 key species assessed was taken from transitional: recovering stocks.

Fishing pressure on three stocks was assessed as too great and moving the stocks towards significantly reduced natural regrowth, but the biomass was not yet at that point ('transitional: depleting stocks').^h Around 1% (802 t) of the total catch of the key 49 species assessed was from transitional: depleting stocks.

Not enough information was available to determine the status of the remaining 39 stocks (26% of the stocks assessed). Approximately 5,438 t (5% of the total catch from the 49 key species assessed) was taken from these undefined stocks.

Figure 14F.1 Status of 150 key Australian fish stocks, 2010³

Commonwealth reporting on fish stock status

While stock status reporting at the national level has only occurred once to date, stock status reporting has been conducted regularly since 1992 for stocks managed or jointly managed by the Australian Government. In 2011, Commonwealth fisheries accounted for around 29% of the total catch and 24% of the value from Australian wild-capture fisheries (not including aquaculture).⁴

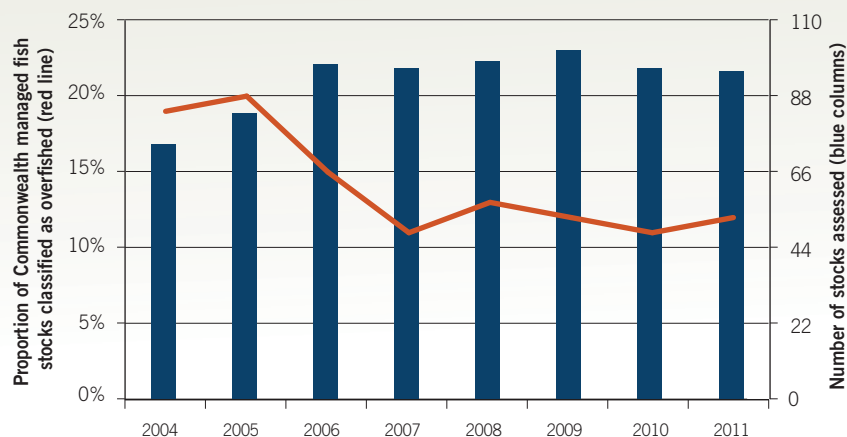
Commonwealth reports currently record both whether a stock is overfished (based on comparatively low biomass) or subject to overfishing (fishing pressure is too high). This means that the definition of 'overfished' in Commonwealth reports differs from that used in the national assessment of key fish stocks.ⁱ

The proportion of Commonwealth fish stocks classified as overfished has been reported since 2004. The longer series of data allows the presentation of trends in overfished Commonwealth stocks (which is not yet possible on a national basis).

Between 2004 and 2011, the proportion of 'overfished' Commonwealth managed fish stocks decreased from 19% (14 of 74 stocks assessed) to 12% (11 of 95 stocks assessed).⁵

While the number of Commonwealth managed stocks assessed as overfished gives an indication of the current state of fish stocks, it provides limited assistance in assessing the effectiveness of current management arrangements aimed at avoiding overfishing and aiding recovery of overfished stocks. Biological constraints (such as the rate of reproduction of a species), together with management of fishing pressure, influence the time required for stock recovery. In 2011, only six of the 95 (6%) Commonwealth fish stocks assessed were considered to be subject to overfishing.

The status of 77 Commonwealth managed fish stocks (81% of the stocks assessed) was assessed to be 'not overfished', and the status of 12 stocks (13% of the stocks assessed) was 'uncertain'

Figure 14F.2 Overfished Commonwealth managed fish stocks, 2004 to 2011⁶

Timber harvests from native forests have been within defined ‘sustainable levels’ over the past two decades, while plantation timber harvests have been below ‘projected harvests’.

Timber resources

The main wood products produced from native forest and plantation harvests are sawlogs, veneer logs and pulpwood.^j

States and territories calculate sustainable yield levels (‘sustainable levels’) for the harvest of high-quality sawlogs from public multiple-use native forests^k for five-year periods. These ‘sustainable levels’ are designed to show the amount of timber that can be removed each year while ensuring the function of the forest system is maintained and the flow of wood products continues indefinitely.

‘Sustainable levels’ are calculated based on the net area of public multiple-use forest available for harvest after areas unavailable for economic, environmental and other reasons have been excluded. These reasons include forest type and age, standing timber volumes, terrain, accessibility, timber growth and yield, recreational use, water values and special protection for biodiversity.

There is considerable debate on whether sustainable yield level calculations accurately reflect the full range of environmental, social and economic values,⁷ given the technical difficulties and imprecision of measuring many of the values,⁸ and uncertainties and risks.⁹

‘Sustainable levels’ are calculated as a total sawlog take at the jurisdiction level, and do not provide information on the sustainability of harvests of a particular species or from a particular area within a jurisdiction. Sustainable levels are not calculated for wood production in native forest on private land.

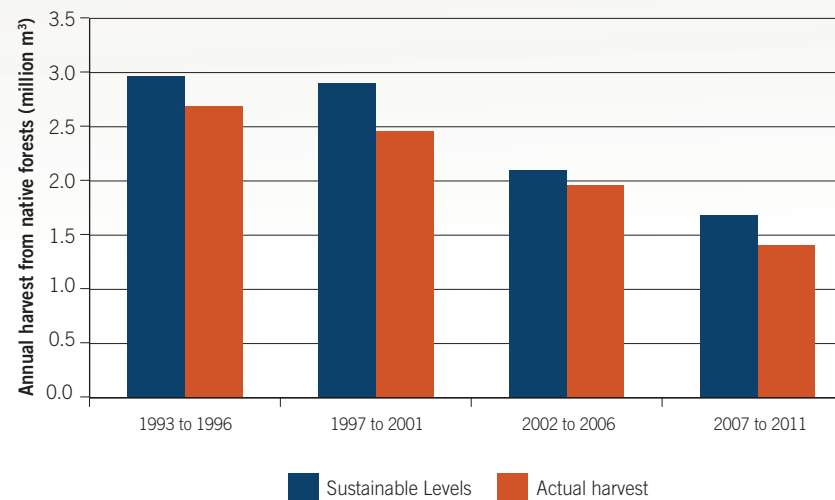
‘Sustainable levels’ have decreased by almost 50% nationally over the past two decades, from 2.96 million cubic metres per year (million m³ per year) between 1993 and 1996 to 1.68 million m³ per year between 2007 and 2011. Average ‘sustainable levels’ declined in all jurisdictions except Tasmania between the 1997 to 2001 and 2002 to 2006 periods. The main reason for this decrease is the reduction of the public multiple-

use native forest area from which timber can be harvested, as areas of forest are reserved for conservation and removed from production. Other reasons include the development of codes of practice by state and territory governments requiring changed forest practices, along with better modelling that takes changed growth rates into account.

The actual harvest levels of high-quality sawlogs from multiple-use public native forests over each of the reporting periods have been less than the calculated ‘sustainable levels’.

Harvesting from public multiple-use native forests has ceased in the Australian Capital Territory, the Northern Territory and South Australia. Harvesting still takes place in Victoria, New South Wales, Tasmania, Queensland and Western Australia.

Figure 14F.3 Native forest high-quality sawlog harvests: ‘sustainable levels’ and actual harvests, 1993–96 to 2007–11¹⁰



For plantation timber, projections of the total volume of timber available for harvest are based on forecasts made by plantation owners and managers for their own planning purposes ('projected harvests'). Plantations are considered to be well managed where actual harvests are less than the projected volume of timber available, as this means that trees planned for harvesting in future years are not removed early.

Softwood harvests remained approximately constant at an average of 14.1 million m³ per year from 2000 to 2009, less than 'projected harvests'.

Figure 14F.4 Softwood plantation timber harvests, projected and actual, 2000–04 to 2005–09¹¹

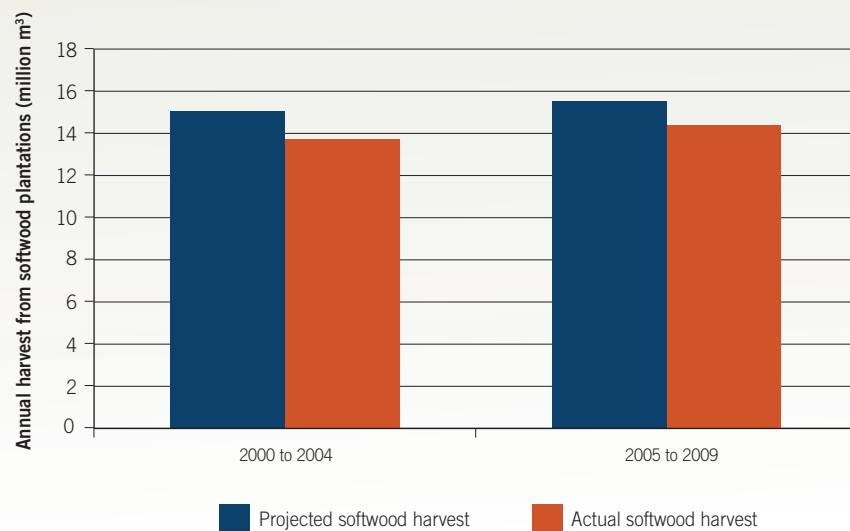
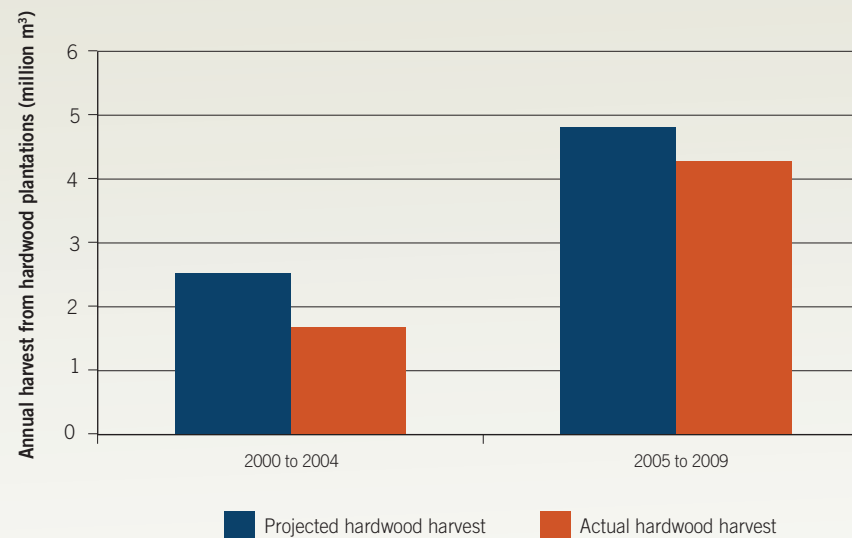


Figure 14F.5 Hardwood plantation timber harvests, projected and actual, 2000–04 to 2005–09¹²



Hardwood plantation harvests rose over the last decade from an average of 1.7 million m³ between 2000 and 2004, to 4.3 million m³ between 2005 and 2009 as more hardwood plantations came into production. In both periods, actual harvests of hardwood plantation timber were less than 'projected harvests'.

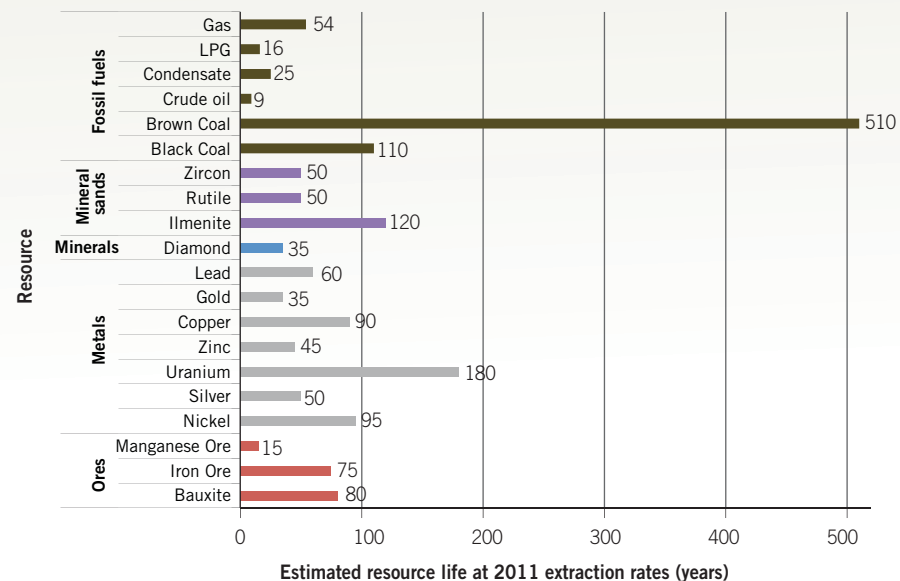
In most cases, Australia's major known mineral and fossil fuel resources will last for several decades at current extraction rates.

Mineral and fossil fuel resources

Comparing the volume of mineral and fossil fuel resources that can be extracted economically to current extraction rates gives an estimate of the life of each resource. Resource life can increase as known deposits become profitable to mine, more deposits are found or the rate of extraction of the resource decreases.

According to 2011 data, brown coal has by far the longest estimated resource life (ERL) at 510 years, followed by uranium (180), ilmenite (120), nickel (110) and copper (95). Resources with ERL of 20 years or less included crude oil (nine years), manganese ore (15) and liquid petroleum gas (16).

Figure 14F.6 Estimated life of selected resources, 2011¹³

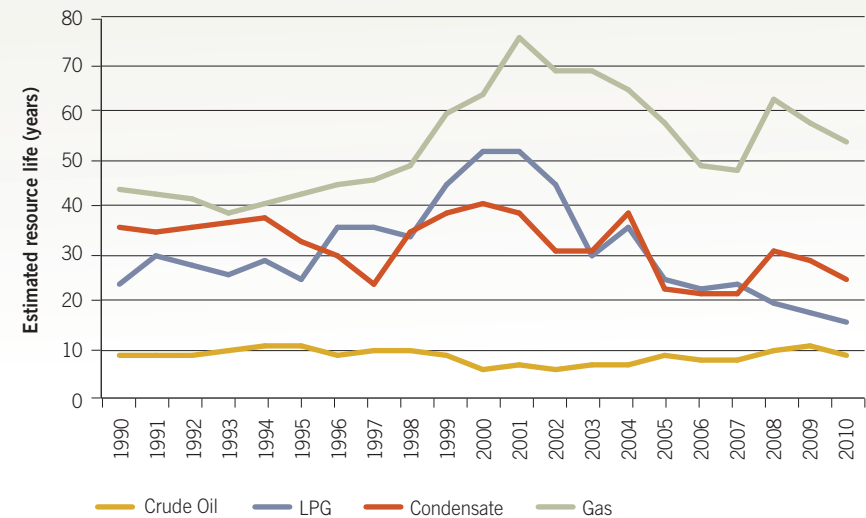


The ERL of the following commodities increased during 2011: lead and silver (both by 10 years), and diamond, gold, rutile and uranium (all by five years).

The ERL of bauxite, manganese ore and zinc remained constant during 2011, while the ERL of iron ore and ilmenite decreased by 10 years, and the ERL of nickel declined by 25 years.

In 2011, the ERL decreased for all fossil fuels except black coal (increase of 20 years) and brown coal (increase of 15 years). Crude oil and liquid petroleum gas ERL decreased by two years each, while ERLs for condensate and gas both decreased by four years.

Figure 14F.7 Estimated life of selected fossil fuels, 1990 to 2010¹⁴



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- 1 Flood, M, Stobutzki, I, Andrews, J, Begg, G, Fletcher, W, Gardner, C, Kemp, J, Moore, A, O'Brien, A, Quinn, R, Roach, J, Rowling, K, Sainsbury, K, Saunders, T, Ward, T and Winning, M (eds.) (2012) Fisheries Research and Development Corporation, *Status of key Australian fish stocks reports 2012*
- 2 Australian Bureau of Agricultural and Resource Economics and Sciences (2011) *Australian fisheries statistics 2010*. Figures relate to the 2009–10 financial year.
- 3 Flood, M, Stobutzki, I, Andrews, J, Begg, G, Fletcher, W, Gardner, C, Kemp, J, Moore, A, O'Brien, A, Quinn, R, Roach, J, Rowling, K, Sainsbury, K, Saunders, T, Ward, T and Winning, M (eds.) (2012) Fisheries Research and Development Corporation, *Status of key Australian fish stocks reports 2012*
- 4 Skirtun M, Sahlqvist P, Curtotti R and Hobsbawn P, Australian Bureau of Agricultural and Resource Economics and Sciences (2012) *Australian fisheries statistics 2011*
- 5 Woodhams, J, Viera, S and Stobutzki, I (eds) (2012) Australian Bureau of Agricultural and Resource Economics and Sciences, *Fisheries status reports 2011*. Note that interpretation of the change in proportion over time needs to take into consideration the changes in numbers of stocks assessed annually.
- 6 Ibid. Note that interpretation of the change in proportion over time needs to take into consideration the changes in numbers of stocks assessed annually.
- 7 See, for example, Ferguson, I (2007) 'Integrating Wood Production Within Sustainable Forest Management: An Australian Viewpoint' 24 *Journal of Sustainable Forestry* 19; Lindenmayer, David 'Integrating wildlife conservation and wood production in Victorian montane ash forests' in Lindenmayer, DB and Franklin, JF (eds.) (2003) *Towards Forest Sustainability*
- 8 Ferguson, I (2007) 'Integrating Wood Production Within Sustainable Forest Management: An Australian Viewpoint' 24 *Journal of Sustainable Forestry* 19; Ferguson, IS (1998) 'Valuing different forest uses' in Bureau of Agricultural and Resource Economics, *Proceedings Outlook 98. Commodity markets and resource management, Volume 3*; Lindenmayer, DB and Laurance WF, 'A history of hubris – Cautionary lessons in ecologically sustainable forest management' (2012) 151 *Biological Conservation* 11
- 9 Ferguson, I et al (2003) *Calculating sustained yield for the Forest Management Plan (2004-2013): stage 3 report*, Report for the Conservation Commission of Western Australia by the Independent Panel; Ferguson, I (2007) 'Integrating Wood Production Within Sustainable Forest Management: An Australian Viewpoint' 24 *Journal of Sustainable Forestry* 19. A case in point is the analysis of the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement, which found that inadequate risk buffers had been used in assessing high-quality sawlog supply: see Independent Verification Group (2012) *Capstone Report – Final report on the work of the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement*.
- 10 Montreal Implementation Group for Australia (2008) *Australia's State of the Forests Report 2008*, Australian Bureau of Agricultural and Resource Economics and Sciences, data prepared for *Australia's State of the Forests Report 2013*. Note: Data is for high-quality sawlogs from public multiple-use native forests; a small proportion of these high-quality sawlogs is used for the production of sliced veneer. Figures for 'Sustainable level' and 'Actual harvest' presented are aggregations of data from Victoria, Tasmania, Queensland, New South Wales and Western Australia. They may obscure harvesting above or below the sustainable level in one or more jurisdictions in any one year.
- 11 & 12 Australian Bureau of Agricultural and Resource Economics and Sciences, *Australian forest and wood products statistics, September and December quarters 2011* (2012) (actual data); Ferguson, I et al, *Plantations of Australia – Wood Availability 2001–2044* (2002) (forecast data 2000–2004); Parsons, M, Frakes, I, Gavran, M, *Australia's Plantation Log Supply 2005–2049* (2007) (forecast data 2005–2009). Data is for sawlogs and pulplogs combined; sliced and rotary-peeled veneers are generally derived from logs in the sawlog category.
- 13 Geoscience Australia, *Australia's Identified Mineral Resources 2012*. The estimated resource life for Gas, LPG, Condensate and Crude oil is for 2010, and has been calculated at 2010 extraction rates.
- 14 Geoscience Australia (2010) *Oil and Gas Resources of Australia 2010*

Notes

- (a) In general, state and territory fisheries extend to a distance of three nautical miles (5.6 km) from the coast. Commonwealth fisheries extend from three nautical miles to the edge of the Exclusive Economic Zone, 200 nautical miles (370 km) from the coast.
- (b) Fishery status reports of various forms are produced by most jurisdictions, covering the key fish stocks they manage. These jurisdictional reports use differing terminology and reference points to classify fish stocks. This reflects the different regulatory requirements in each jurisdiction and can make understanding stock status at a national level a complex exercise.
- (c) Nationally, Australian fisheries commercially harvest over 600 species of wild-caught fish.
- (d) In the national reports, the term 'stock' is used generically in reference to three levels of stock status assessment: biological stocks, management units and populations assessed at the jurisdiction level. Many species are found in more than one stock.
- (e) In the national reports, the definition of a 'sustainable' stock is a stock for which biomass is at a level sufficient to ensure

that, on average, future levels of recruitment are adequate (i.e. not recruitment overfished) and for which fishing pressure is adequately controlled to avoid the stock becoming recruitment overfished.

- (f) In the national reports, the definition of an 'overfished' stock is a stock that is recruitment overfished and current management is not adequate to recover the stock or where adequate management measures have been put in place, but have not yet resulted in measureable improvements.
- (g) In the national reports, the definition of a 'transitional: recovering' stock is a stock that is recovering – biomass is recruitment overfished, but management measures are in place to promote stock recovery, and recovery is occurring.
- (h) In the national reports, the definition of a 'transitional: depleting' stock is a stock that is deteriorating – biomass not yet recruitment overfished, but fishing pressure is too high and moving the stock in the direction of becoming recruitment overfished.
- (i) In the Commonwealth fishery status reports, 'overfished' is defined as a fish stock with a biomass below the biomass limit reference point. The biomass limit reference point is defined as the point beyond which the risk to the stock is regarded as unacceptably high. Whilst this language differs from that used in national reports, it is equivalent to the biomass being at a level sufficient to ensure that, on average, future levels of recruitment are adequate (i.e. not recruitment overfished). A

comparison of the two definitions (taken from the *Fishery status reports 2011*) is presented in the table below:

Commonwealth <i>Fishery status reports</i>				National <i>Status of key Australian fish stocks reports</i>
Size of fish stock (biomass)		Fishing pressure (mortality)		Stock status
Not overfished	+	Not subject to overfishing	=	Sustainable
Overfished	+	Not subject to overfishing	=	↑ Transitional: recovering [^]
Not overfished	+	Subject to overfishing	=	↓ Transitional: depleting
Overfished	+	Subject to overfishing	=	Overfished [#]
Uncertain	OR	Uncertain	=	Undefined

[^] For a stock to be considered transitional:recovering in the national reports, there must also be evidence that the biomass is recovering (i.e. increasing). [#] If the Commonwealth reports classify a stock as overfished and not subject to overfishing but there is no evidence that biomass is recovering, it would be considered as overfished in the national reports rather than 'transitional:recovering'.

- (j) 'Sawlog' refers to the part of a tree stem that will be processed to produce timber sawn into particular sizes and can be contrasted with those parts of the tree stem that are designated 'veneer logs' or 'pulpwood'. Sawlogs are generally greater in diameter, straighter and have a lower knot frequency. 'High-quality sawlog' is one of the categories of sawlog. 'Veneer logs' refers to logs used to manufacture veneers, either rotary-peeled or sliced. A veneer log is used to produce thin slices of wood, glued and assembled in stacks or pressed onto core panels (typically wood, particleboard or medium-density fibreboard), to produce flat panels. Veneer logs can be drawn from the sawlog or pulplog categories. 'Pulpwood' refers to timber used to manufacture wood pulp for paper production or paper products. Years relating to native sawlog harvest are financial years. Years relating to plantation sawlog harvest are calendar years.
- (k) Public multiple-use native forests are the major source of native forest timber.

IMAGES

Heavy machinery at the Rio Tinto mine site at Weipa, Dragi Markovic

Gulf of Carpentaria coastline from the air, Dragi Markovic

Other images from www.istockphoto.com



HOW ARE WE SHARING OUR PROSPERITY?

Average incomes are increasing; however, the gap between rich and poor is growing.

Societies with a large gap between high and low income households are more likely to have higher levels of health and social problems, lower educational performance, less trust, higher rates of crime and less innovation.¹



Disposable incomes are increasing; however, a much greater increase for high income households has seen inequality grow.

Income disparity

Average household weekly disposable income rose 57% between 1995 and 2010, after taking inflation into account.

For low income households, average weekly disposable income increased over this period by 47%, from \$292 to \$429.

Households in the highest income group experienced the greatest increase in average weekly disposable income (67%), from \$1,022 to \$1,704.

Figure 15A.1 Household disposable income, by income group, 1995 to 2010²

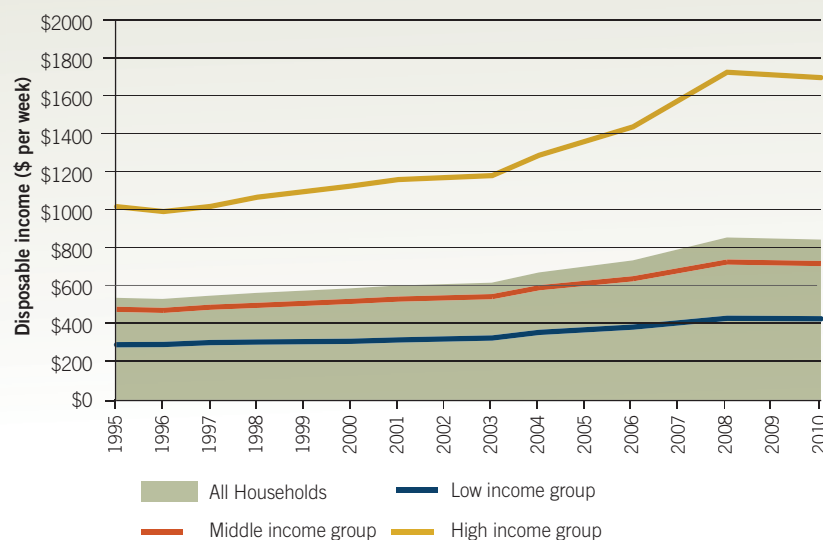
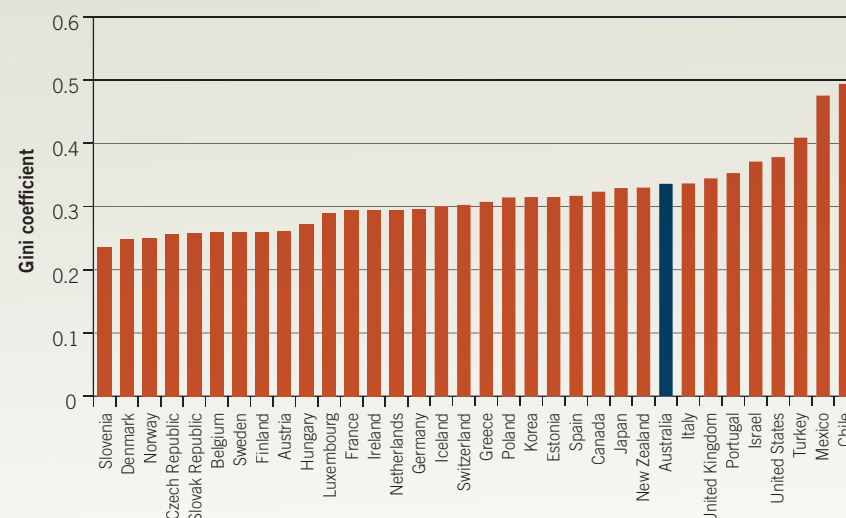


Figure 15A.2 Gini coefficient level, countries ranked from low to high inequality, late 2000s³



A summary of income distribution is also given by the Gini coefficient, a single statistical measure of the degree of income inequality.⁴ The Gini coefficient lies between 0 and 1, with perfect equality at zero and income inequality increasing as the Gini coefficient approaches 1. In 1997–98, the Gini coefficient for Australia was 0.303 compared with 0.331 in 2007–08. Income inequality is high in Australia by international comparisons, along with many other developed countries. Australia is ranked 26th amongst OECD countries. However, Australia has had considerably higher levels of real income growth including for low income groups, than that seen in other OECD countries.

Average household wealth has increased; however, the richest households hold an increasingly large share.

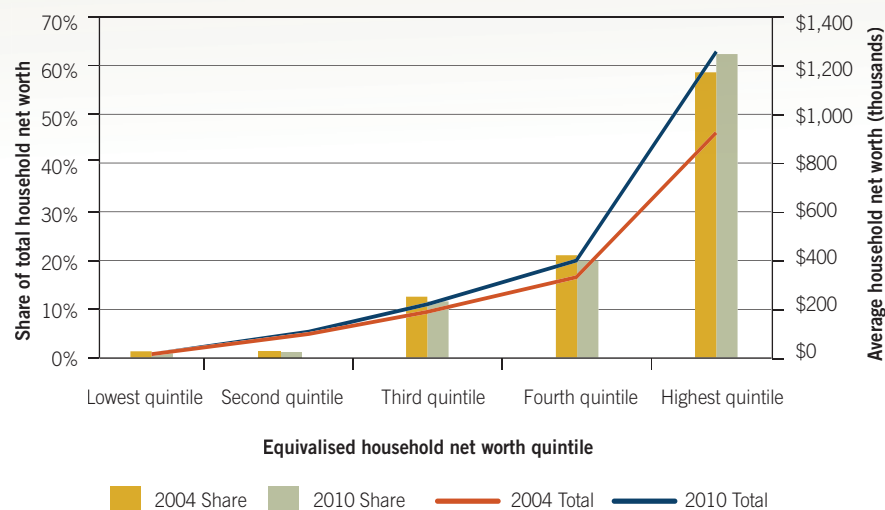
Household net worth

In 2010, Australian households had an average net worth of \$720,000. This was 30% higher (taking inflation into account) than in 2004 (\$555,000). Sixty nine per cent of households own their own home outright or with a mortgage. For many of these households, the home is their main asset. Net equity in home ownership accounted for 41% of total household wealth. Superannuation was the next largest component of household wealth (16%), followed by property other than the family home (14%).

The large proportion of household net worth accounted for by home equity means that changes in household net worth are largely attributable to changes in equity in home ownership.

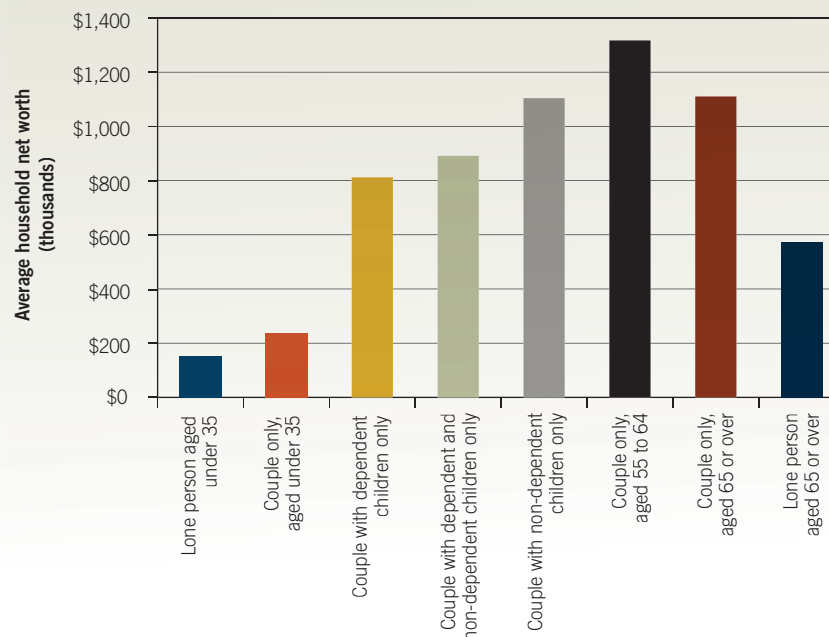
The wealthiest 20% of households held 62% of the total household net worth in 2010, with an average of \$1.2 million per household. This was a 36% increase from 2004.

Figure 15A.3 Household net worth and share of total net worth, by quintiles, 2004 and 2010⁵



In contrast, the poorest 20% of households held only 1% of total household net worth in 2010, with an average of \$32,000 per household. Average net worth of these households increased by 10% from 2004.

Figure 15A.4 Household net worth: by household composition, 2010⁶



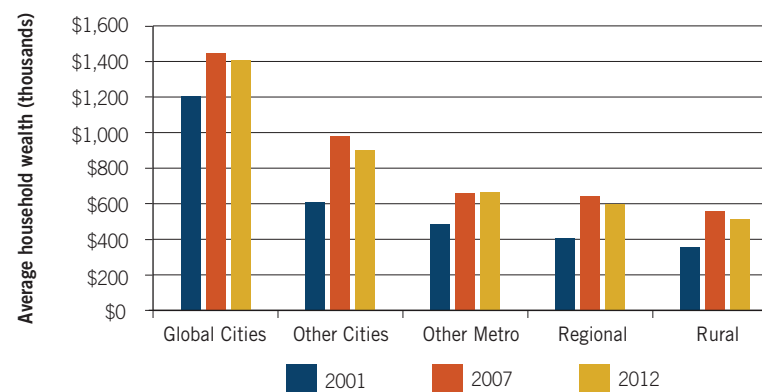
Wealth tends to be accumulated gradually during a person's working life and then utilised during retirement. Young people living alone had the lowest household wealth (\$151,000). Couples aged 55 to 64 had the highest average wealth of \$1.3 million.

Geographic discrepancy in average household wealth^b

There is significant discrepancy in average household wealth between those who live in inner city areas of large cities and those who live in other areas, particularly regional and rural areas.

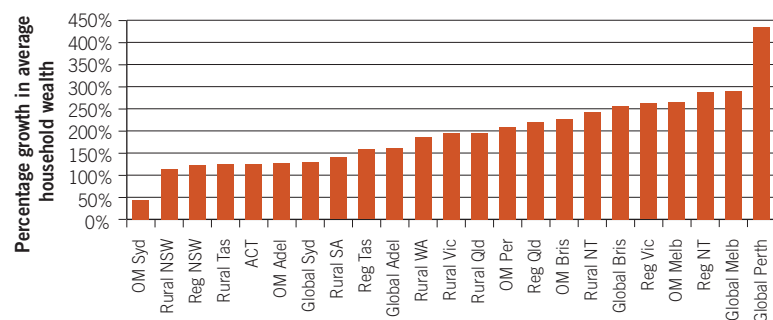


Figure 15A.5 Average household wealth, by location, 2001, 2007 and 2012^c



While average household wealth is highest in inner Sydney, growth has slowed significantly compared to other capitals, particularly Perth, Melbourne and Darwin.

Figure 15A.6 Average household wealth, by region, growth from 2001 to 2012

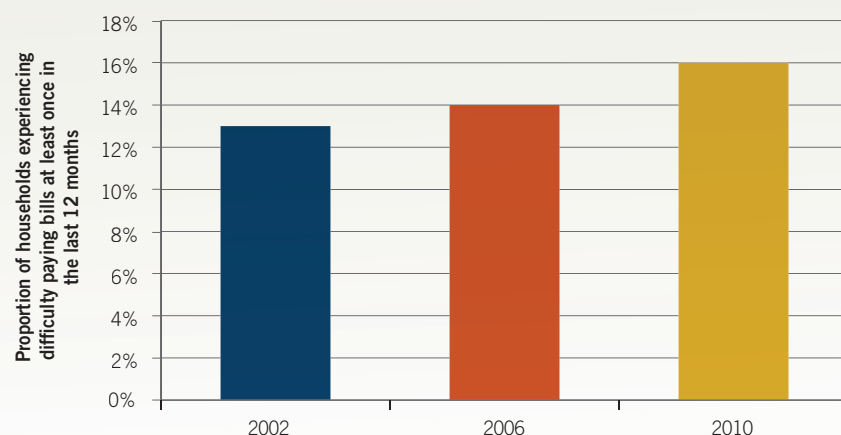


The proportion of households that reported experiencing financial stress increased from 2002 to 2010, by which time 16% of households reported difficulty in paying bills.

Financial stress

Sixteen per cent of households reported experiencing difficulty in paying bills in 2010, an increase of 3% from 2002.

Figure 15A.7 Households with difficulty paying bills, 2002 to 2010⁷

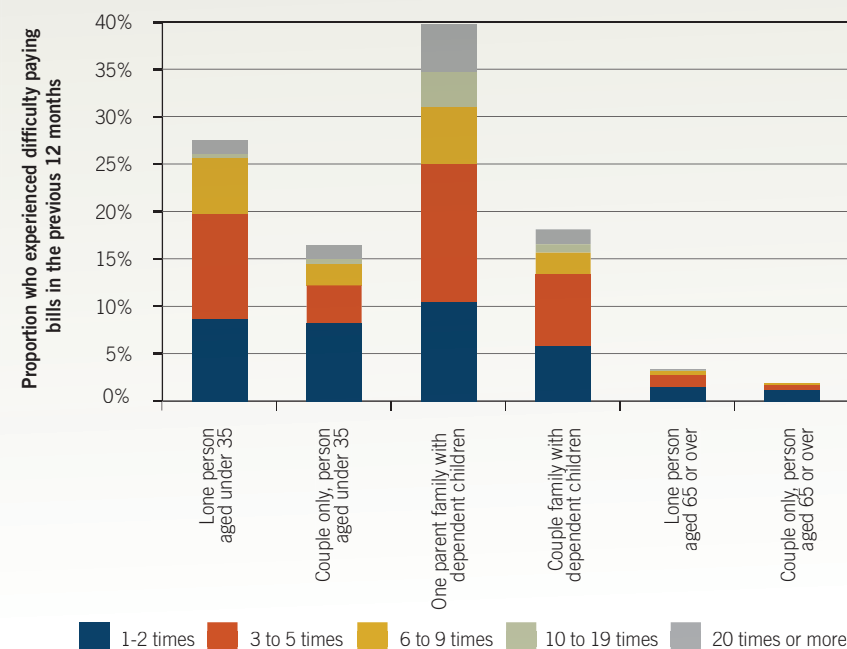


In 2010, over one-fifth of all households with the lowest 40% of incomes reported difficulties paying bills, compared with 7% of households with the highest 20% of incomes.

For households reporting difficulty in paying bills, it is rarely a 'once-off' experience: 87% experienced difficulty paying bills two or more times in 2010.

Household composition can affect the likelihood of experiencing financial stress, with more single parents and young people living alone reporting that they had difficulties paying bills.

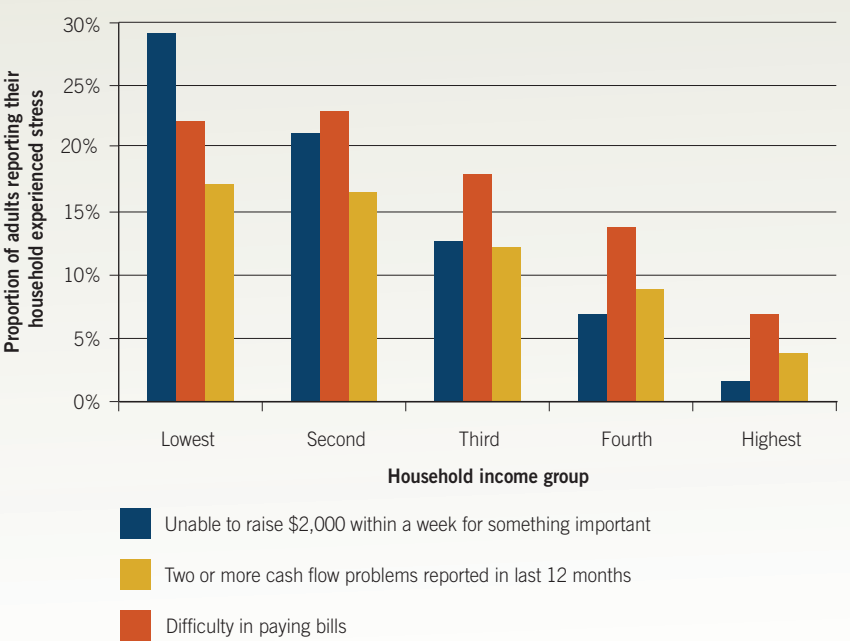
Figure 15A.8 Difficulty paying bills by selected household compositions, 2010⁸



In 2010, 11% of adults reported that their household had two or more cash flow problems in the 12 months prior to interview. Additionally, more people reported that their household was unable to pay bills on time, such as electricity, gas, telephone or car registration bills, and that they had to pawn something to raise cash than in 2006.

The reporting of financial stress does not necessarily imply that a household has low income. Some high income households report experiencing financial stress. Nevertheless, comparing the income characteristics of those experiencing financial stress shows that low income households were less likely than people in other households to be able to raise money quickly for something important and more likely to report that their household had experienced multiple cash flow problems in the last 12 months.

Figure 15A.9 Experience of financial stress, by type and household income, 2010⁹



References

- 1 Wilkinson, R and Pickett (2009) K, *The Spirit Level: Why More Equal Societies Almost Always Do Better*. See also: Rowlingson, Karen (2011) *Does income inequality cause health and social problems?*
- 2 Australian Bureau of Statistics, Household Income and Income distribution, Australia, 2009-10 (cat. no. 6523.0), Australian Bureau of Statistics, Measures of Australia's Progress, 2010 (cat. no. 1370.55.001) *High income group*: Refers to the 20% of people in the 9th and 10th deciles after being ranked from lowest to highest, by their equivalised disposable household income. *Middle income group*: Refers to the 20% of people in the fifth and sixth income deciles after being ranked from lowest to highest, by their equivalised disposable household income. *Low income group*: Refers to the 20% of people in the second and third lowest income deciles after being ranked from lowest to highest, by their equivalised disposable household income. Changes in the high income group from 2004 onwards should be interpreted with some caution as changes in data collection methods had a larger impact on income at the higher end of the income distribution. Time points related to this survey refer to the year ending 30 June. Estimates have been interpolated for 1999, 2002, 2005, 2007 and 2009.
- 3 Organisation for Economic Co-operation and Development, OECD Factbook 2011: Economic, Environmental and Social Statistics
- 4 Productivity Commission (March 2013) *'Trends is The Destruction of Income in Australia'*
- 5 Australian Bureau of Statistics, *Household Wealth and Wealth Distribution, Australia, 2009-10* (cat. no. 6554.0). Time points related to this survey refer to the year ending 30 June.
- 6 Ibid. Household composition age brackets refer to the age of the respondent to the survey. Both persons in the couple are not necessarily in that age bracket.
- 7 Australian Bureau of Statistics, *General Social Survey: Summary Results, Australia, 2010* (cat. no. 4159.0)
- 8 Ibid.
- 9 Ibid.

Notes

- (a) The Gini coefficient is based on equivalised household disposable income, after taxes and transfers. The Gini coefficient is defined as the area between the Lorenz curve (which plots cumulative shares of the population, from the poorest to the richest, against the cumulative share of income that they receive) and the 45° line, taken as a ratio of the whole triangle. The values of the Gini coefficient range between 0, in the case of 'perfect equality' (i.e. each share of the population gets the same share of income), and 1, in the case of 'perfect inequality' (i.e. all income goes to the individual with the highest income).
- (b) This case study has been adapted from *State of the Regions Report 2012-13: Rethinking Regional Development*, prepared by National Economics and published by the Australian Local Government Association. All wealth and debt estimates in this indicator are benchmarked back to the Australian Bureau of Statistics' *Australian National Accounts – Financial Accounts* and national ABS estimates for dwelling stock and the value of unincorporated business assets.
- (c) Global Cities: Sydney, Melbourne; Other Cities: Brisbane, Perth Adelaide; Regional Cities: Newcastle, Wollongong, Geelong, Sunshine Coast, Townsville, Canberra, Darwin, Hobart; Other Metro (OM): suburbs of major cities

IMAGES

Case study image, Alex Zuk

Other images from www.istockphoto.com



DO WE HAVE ENOUGH HOUSING TO MEET OUR NEEDS?

Housing supply is not keeping pace with demand and over one third of low income families are in rental or mortgage stress.

Housing provides shelter and a secure base from which people can participate in community life and the workforce. Housing makes an important contribution to economic efficiency, productivity growth, the liveability of our cities and the wellbeing of society.

Rising housing costs particularly affect people buying their first house. Housing costs also affect households' capacity to save, their consumption and location choices, vulnerability to unemployment, and a variety of other dimensions of people's quality of life.



Nationally, the gap between underlying housing demand and houses available continues to increase, with an estimated shortfall of 228,000 dwellings in 2011.

Housing supply

The gap between underlying demand for housing and net housing supply increased by an estimated 28,000 dwellings in 2011, reaching a cumulative shortfall of 228,000 since 2001. In effect, this means that an additional 228,000 dwellings should have been built to maintain living arrangements in 2011 as they were in 2001.

Figure 15B.1 Housing supply: gap between net supply and underlying demand, 2002 to 2011¹

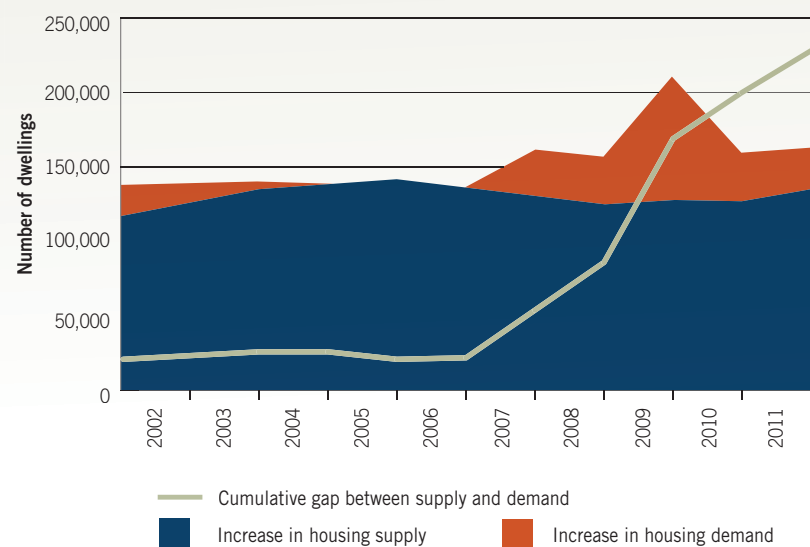
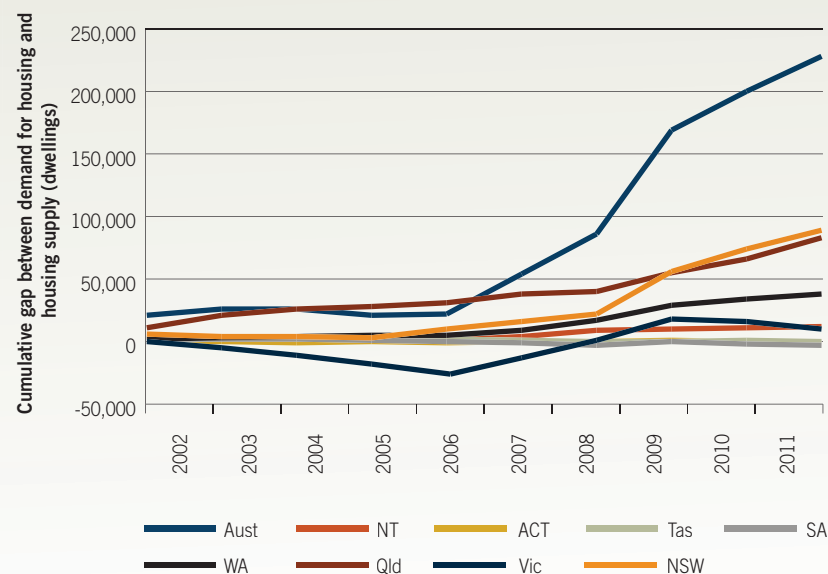


Figure 15B.2 Housing supply: gap between net supply and underlying demand, by state and territory, 2002 to 2011²



States with the highest estimated dwelling shortfall in 2011 were New South Wales (89,000) and Queensland (83,000). South Australia and the Australian Capital Territory each had a small excess of dwellings (3,000 and 1,000 respectively).

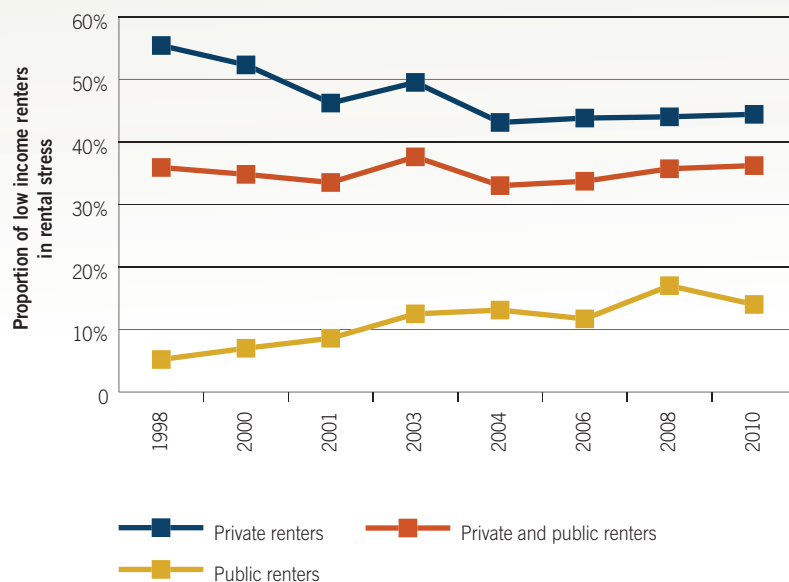
Housing supply is not keeping pace with demand and over one third of low income families are in rental or mortgage stress.^a

Housing affordability

Rental stress or mortgage stress are the terms given to the higher risk of financial stress or default because households spend a high proportion of their income on housing.

The proportion of low income households in rental stress was 36% in 2010, having remained fairly constant since 1998.^b Low income households renting privately are more likely to experience rental stress (44%) than public renters (14%).

Figure 15B.3 Housing affordability: rental stress, 1998 to 2010³



Of low income houses with a mortgage, 37% were reported to be in mortgage stress in 2010.^c

The highest proportion of low income households in mortgage stress in 2010 was in Sydney (49%), while the lowest was in the ACT (19%).

Figure 15B.4 Housing affordability: mortgage stress, 1995 to 2010⁴

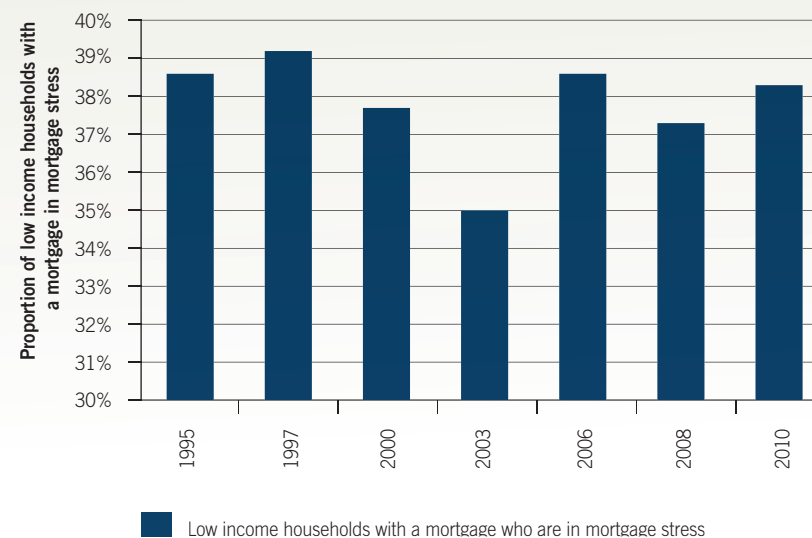
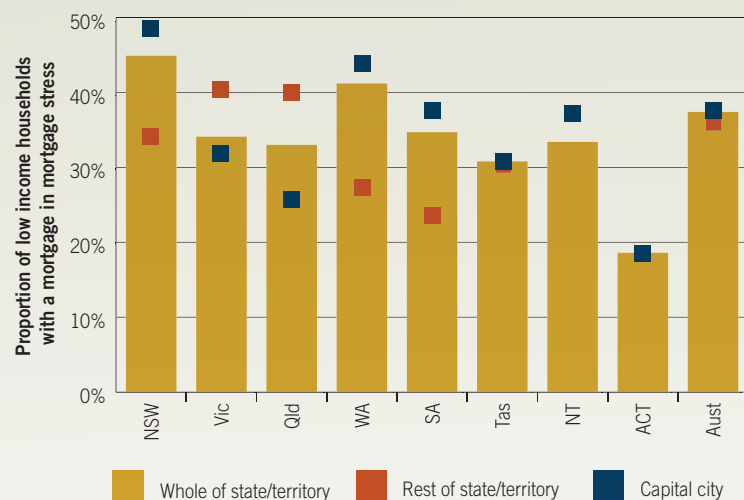
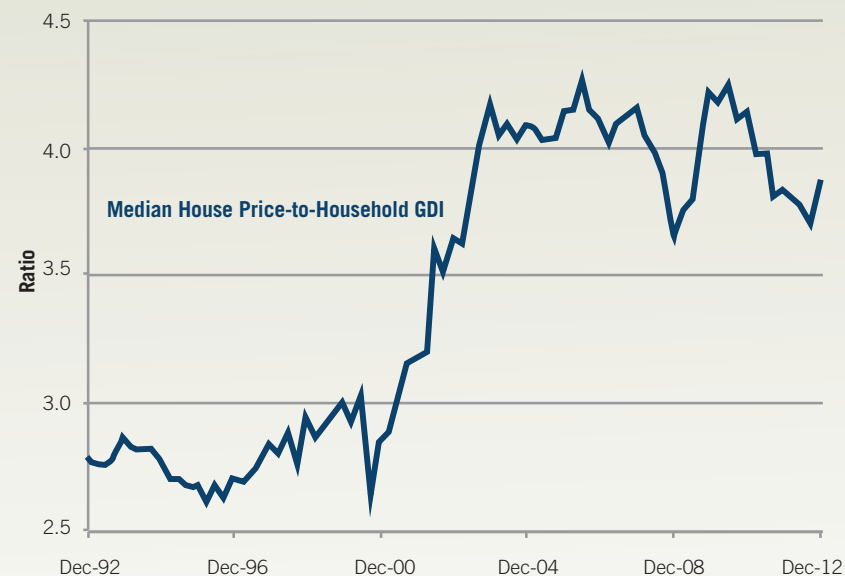


Figure 15B.5 Housing affordability: mortgage stress, by state and territory, 2010⁵



Median house price-to-income ratio is another measure that gives an indication of the relative expense of a home for a typical household. The ratio of dwelling prices to income was relatively stable over the early to mid-1980s, but rose considerably during the late 1980s, the 1990s and the early 2000s, driven by rising dwelling prices. Since 2003, the ratios flattened and then trended lower. The rise in the price-to-income ratio through the late 1980s, 1990s and early 2000s reflected a range of factors besides income that affected households' ability and willingness to pay for housing, including financial market deregulation increasing the amounts households could borrow and decreasing interest rates.

Figure 15B.6 Housing affordability: ratio of median house price to household gross disposable income (GDI), 1992 to 2012⁶



References

- 1 National Housing Supply Council (2012) *Housing Supply and Affordability – Key Indicators, 2012* Note: 2001 was selected by the National Housing Supply Council as the base year from which to cumulate measures of supply and underlying demand for several reasons: a Census was conducted that year; 2001 was a sufficiently long time ago to have allowed normal market cycles to correct any imbalances existing at that time; and research indicates that the housing market was close to balance in 2001.
- 2 Ibid.
- 3 Australian Bureau of Statistics, *Survey of Income and Housing 1998-99 to 2009-10* as reported in Australian Bureau of Statistics, *Measures of Australia's Progress: Summary Indicators, 2012* (cat. no. 1370.0.5.001). All time points refer to the year ending 30 June.
- 4 Australian Bureau of Statistics, unpublished data from *Survey of Income and Housing 1994-95 to 2009-10*. All time points refer to the year ending 30 June.
- 5 Australian Bureau of Statistics, *Survey of Income and Housing 2009-10* as reported in Steering Committee for the Review of Government Service Provision (2011), *National Agreement Performance Information 2010-11: National Affordable Housing Agreement*, Productivity Commission. Time point refers to the year ending 30 June 2010.
- 6 Australian Treasury analysis of: Australian Bureau of Statistics, *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), HIA data, RP Data-Rismark Home Value Index.

Notes

- (a) Of low income households (households in the bottom two income quintiles) with a mortgage or who are renting
- (b) *Low income households in rental stress*: The proportion of rental households in the bottom two income quintiles that spend more than 30% of their income on rent.
- (c) *Low income households in mortgage stress*: The proportion of home owner households with a mortgage for housing purposes and that are in the bottom two income quintiles (excluding households with nil or negative incomes) that spend more than 30% of their income on mortgage payments.

IMAGES

High density housing in Perth Silver, Sun Pictures

Showing building rubbish on a new building site in Harrison, Steve Wray

Other images www.istockphoto.com



ARE OUR TRANSPORT AND COMMUNICATION SYSTEMS ABLE TO SUPPORT OUR GROWING POPULATION?

The car is still the main form of transport for most Australians, with slow uptake of other transport options.

How much we travel, and the method we use to travel, can have significant implications for sustainability, particularly the health and wellbeing of communities and the environment. Increased congestion diminishes work-life balance and increases exhaust emissions, impacting our health and the environment.



While passenger car travel increased substantially over the last three decades, it has recently slowed. Light commercial vehicle travel has increased four-fold since 1971.

Distances travelled

The dominant mode of transport in Australia is the passenger car, accounting for 70% of passenger kilometres (pkm) and 72% of vehicle kilometres (vkm) travelled in 2009–2010.^a On average over this 12 month period, each person travelled 11,979km in the year.

Figure 15C.1 Passenger kilometres travelled per capita, by mode of transport, 1991 to 2010¹

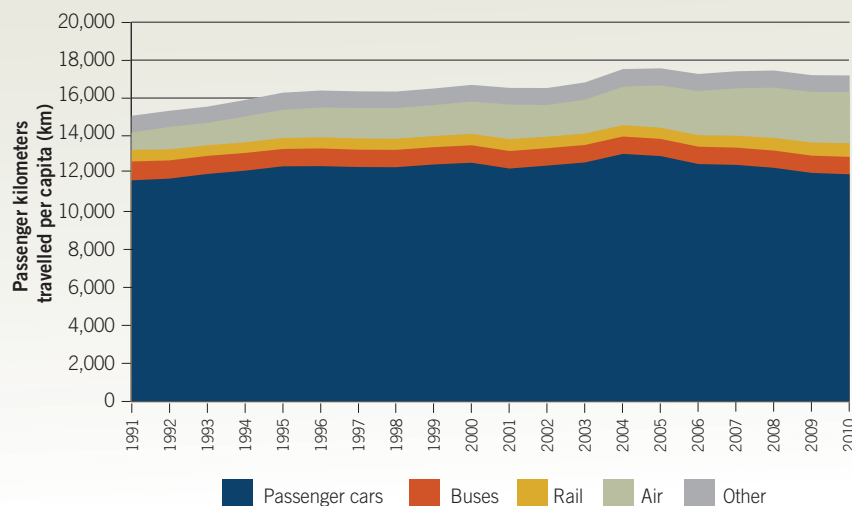
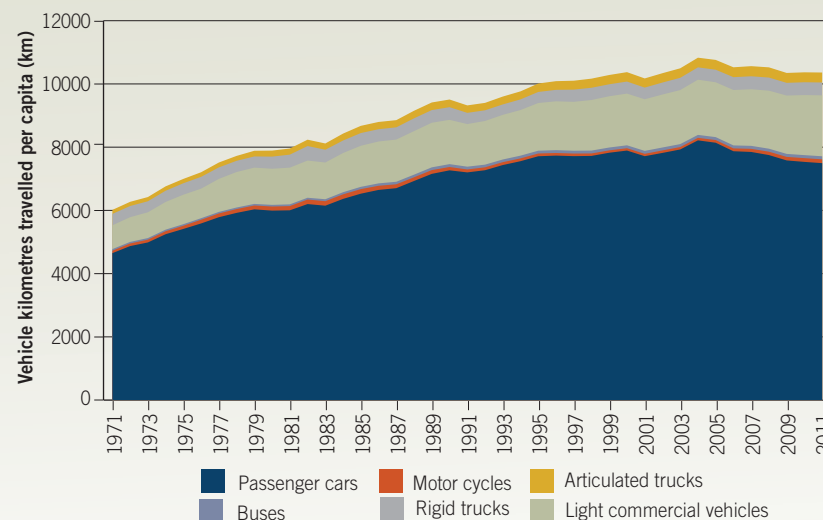


Figure 15C.2 Road vehicle kilometres travelled, by mode of road transport, 1971 to 2011²



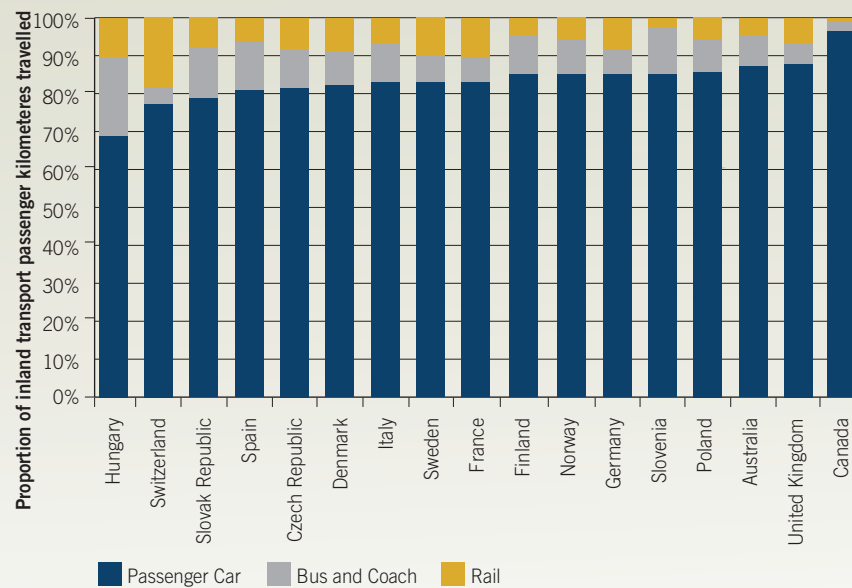
In recent years, in relation to total passenger kilometres per capita, car travel has reached a plateau. Domestic air travel comprises an increasing share of overall passenger kilometres per capita, up from 6% in 1990–1991 to 16% in 2009–2010.

In metropolitan areas, the proportions of travel by car (~80%) and urban public transport (~11%) have been steady over the past 30 years.

Of road vehicles, light commercial vehicle travel has grown the most over the past 30 years (337%), followed by articulated trucks (324%), buses (226%) and passenger cars (175%).

Compared with most other OECD countries for which data is available, Australia has a slightly higher reliance on passenger car travel – 88% compared with an average of 86%.

Figure 15C.3 Passenger kilometres travelled, share by mode of transport, by selected countries, 2009³



The average time spent travelling to and from work each week increased by 35 minutes between 2002 and 2011.

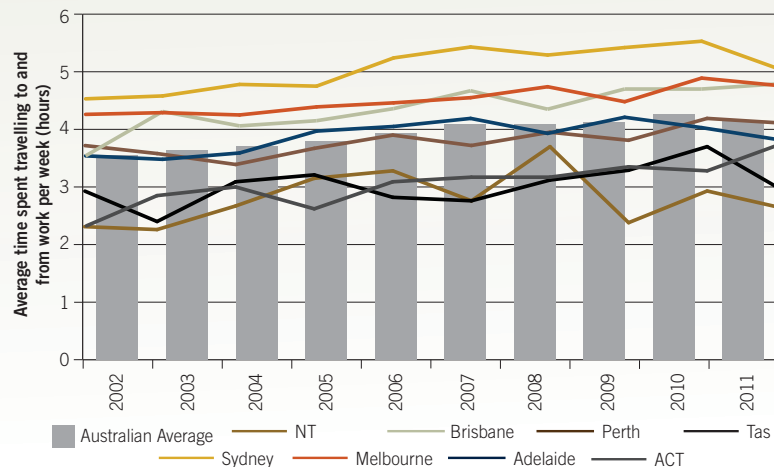
Travel time to work

The time each worker spends travelling to and from work each week has increased from an average of three hours and 33 minutes in 2002 to four hours and eight minutes in 2011.

Sydney workers travelled on average for the longest time to get to and from work each week in 2011 (~five hours).

However, the greatest increase in travel time between 2002 and 2011 was in the ACT (from ~2 hours 15 minutes to ~ three hours 45 minutes).

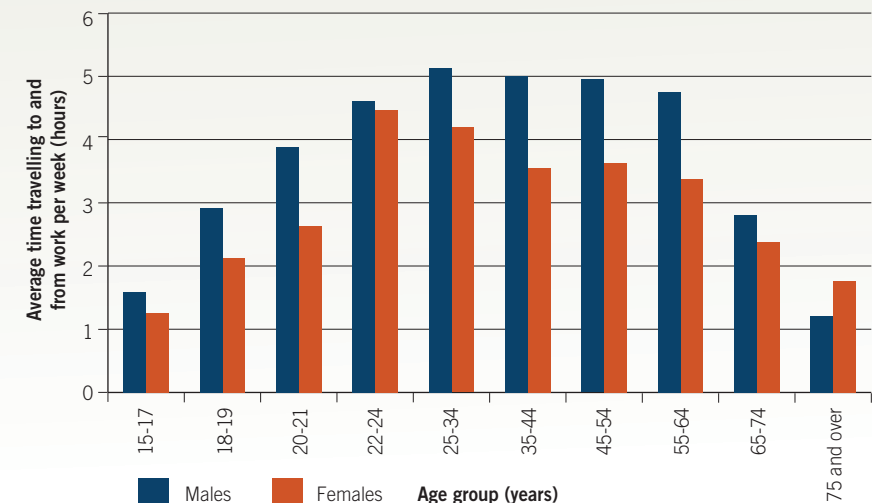
Figure 15C.4 Travel time to work, by capital city / territory, 2002 to 2011⁴



Travel time increased at roughly the same rate (17% to 18%) for both full-time and part-time workers from 2002 to 2011. In 2011, time spent travelling to work tended to be higher amongst men, likely reflecting the greater proportion of men employed full-time.

Travel time increases with age to 25 years and then remains fairly constant until retirement for men. Travel time decreases for women aged 25 to 34 as they move from the full-time to part-time workforce to have a family.

Figure 15C.5 Travel time to work, males and females, by age group, 2011⁵



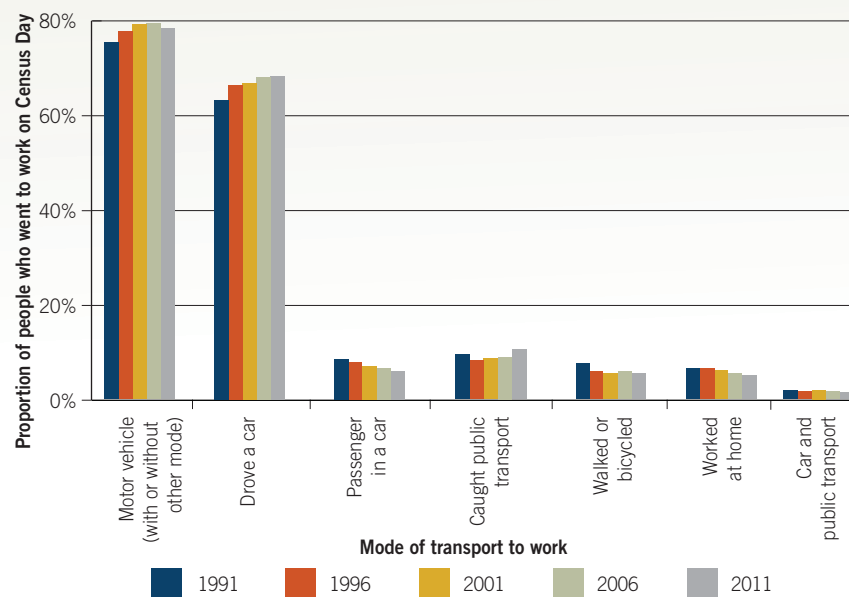
The car remains the dominant form of transport, with more than two-thirds of workers driving to work.

Mode of transport to work^b

In Australia, most people drive to work. More than two-thirds (68%) of people who went to work on Census Day 2011 drove a car. An additional 6% were driven to work as passengers in a car; 11% used public transport or taxis; 5% walked or cycled; and 5% worked at home.

Between 1991 and 2011, the proportion of workers using motor vehicles (with or without another mode of transport) to travel to work increased from 75% to 78%.

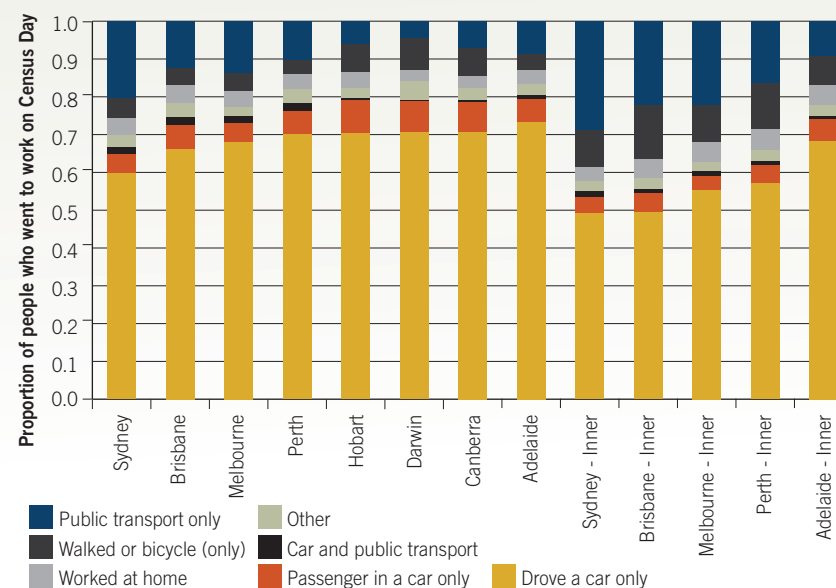
Figure 15C.6 Mode of transport to work, by combination of vehicles used, 1991 to 2011⁶



Over the same period, the proportion of workers who caught public transport to and from work increased from 9.5% to 10.5%. Walking or cycling to work decreased from 7.4% of workers to 5.4% of workers.

The proportion of people working from home also decreased slightly over the two decades, from 6.4% to 5%.

Figure 15C.7 Mode of transport to work, by capital city, 2011⁷



In 2011, Sydney showed the least dependency on car use to get to work, followed by Brisbane and Melbourne. When looking at inner city areas only, use of alternative transport options is even more pronounced, with significantly higher use of public transport and alternatives such as walking or cycling.

Almost three-quarters of households have access to broadband internet, a four-fold increase since 2005.

Broadband internet connections

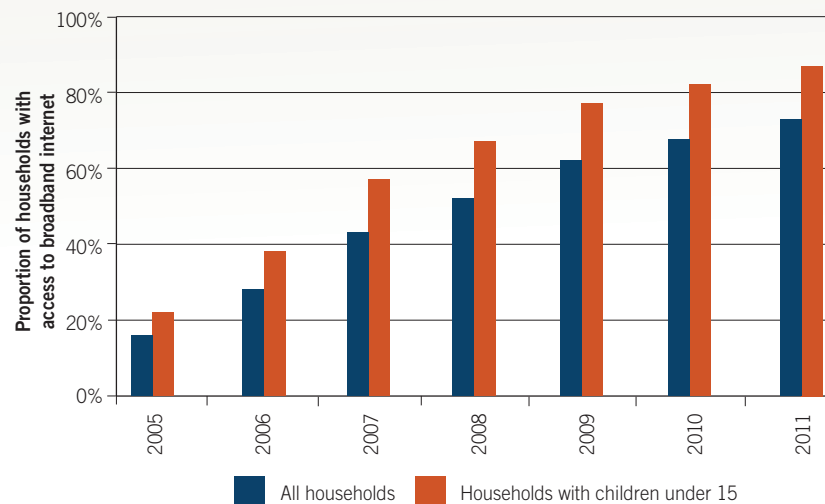
Broadband internet can enhance people's access to goods and services (including education and healthcare), reduce travel expenses and traffic congestion, and provide opportunities such as increased access to job opportunities or markets and social connections through access to information and people.

In 2011, 73% of Australian households had access to broadband internet, a substantial increase from 16% of households in 2005.

A greater proportion of households in capital cities had access to broadband internet (76%, compared to 68% for the rest of Australia).

Of households with internet connections, 96% had a broadband connection in 2012 – a significant rise from 11% in 2003.

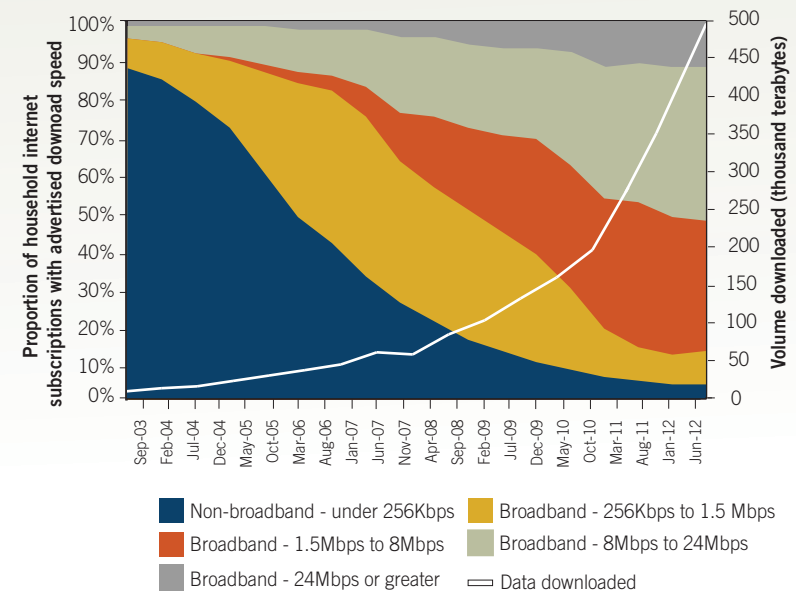
Figure 15C.8 Broadband internet connections, by household composition, 2005 to 2011⁸



Households are moving towards broadband connections with faster download speeds. In June 2012, 50% of internet connections had a speed of 8mbps or greater, compared with 22% in December 2007.

The volume of data downloaded in June 2012 was 20% more than December 2011, and a 632% increase from December 2007.

Figure 15C.9 Broadband internet connections, speeds and volume of data downloaded, 2003 to 2012⁹



References

- 1 Bureau of Infrastructure, Transport and Regional Economics (2012) *Australian infrastructure statistics Yearbook 2012*. Other transport mode represents primarily non-business use of light commercial vehicles (with contributions from motorcycles and non-business use of trucks and ferries). All time points refer to year ending 30 June.
- 2 Ibid.
- 3 Organisation for Economic Co-operation and Development Stat, International Transport Forum, Inland passenger transport (million pkm)
- 4 Melbourne Institute of Applied Economic and Social Research, Household, Income and Labour Dynamics in Australia Survey 2002 to 2011. Note: For ACT, NT and Tasmania, data includes whole state/territory as capital city only data is not available.
- 5 Ibid.
- 6 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of unpublished Australian Bureau of Statistics, *Census of Population and Housing*, 1991 to 2011. 2011 data extracted using Census TableBuilder, 27 March 2013.
- 7 Australian Government Department of Sustainability, Environment, Water, Population and Communities analysis of Australian Bureau of Statistics, *Census of Population and Housing 2011, extracted using Census TableBuilder, 27 March 2013* Sydney – Inner includes the SA4 areas 'Sydney – City and Inner South', 'Sydney – Inner South West' and 'Sydney – Inner West' Melbourne – Inner includes the SA4 areas 'Melbourne – Inner', 'Melbourne – Inner East' and 'Melbourne – Inner South' Brisbane – Inner includes the SA4 area 'Brisbane Inner City' Adelaide – Inner includes the SA4 area 'Adelaide – Central and Hills' Perth – Inner includes the SA4 area 'Perth – Inner'
- 8 Australian Bureau of Statistics, *Household Use of Information Technology, Australia*, (cat. no. 8146.0) 2004-05 to 2010-11 issues
- 9 Australian Bureau of Statistics, *Internet Activity, Australia, Sep 2003 to Jun 2012* (cat. no. 8153.0) Sep 2003 to Jun 2012 issues

Notes

- (a) Vehicle kilometres (vkm) show the total distance travelled by vehicles. Passenger kilometres (pkm) show distances travelled by passengers and are calculated by multiplying vehicle kilometres (vkm) by the number of passengers.
- (b) Some people travel to work using more than one mode of transport and up to three modes of transport could be recorded. For instance, some people may get a lift to a railway station, from where they complete their journey by train. In this theme, unless specified, information on individual modes of transport indicates the use of a single mode of transport.

IMAGES

Early evening traffic on the streets of the Melbourne CBD, Alex Zuk

Bicycles in racks in inner city Melbourne, John Baker



ARE WE FINDING NEW AND BETTER WAYS OF DOING THINGS?

Productivity growth has slowed in recent years, most likely due to both industry-specific factors and a diminishing reform impetus to improve efficiency and innovation over the past two decades.

Innovation underpins economic upgrade and renewal, which is critical to sustainable growth in material living standards. Stronger resource productivity can help to decouple economic growth from resource depletion and environmental degradation, and provide new solutions to a range of long-term societal challenges.



Productivity grew strongly from 1992 to 1999, but growth was intermittent and volatile during the early 2000s and productivity declined noticeably thereafter.

Productivity

Multifactor productivity (MFP) is obtained by dividing a measure of value added (output) by a combined measure of labour and capital (inputs). Growth in MFP arises from improvements in work practices, education and training and innovation, as well as the adoption of new technology, all of which can make a contribution to growth that is sustainable over the longer term.

MFP growth is usually analysed over the long-term, using productivity cycles. Although the latest productivity cycle is not yet complete, MFP declined from 2008 to 2010 and has since been steady.

On average from 2004 to 2008, Australia experienced negative MFP growth (-0.8% per year).

Figure 15D.1 Trends in multifactor productivity for 16 market sector industries and 12 selected industries, with productivity cycles¹

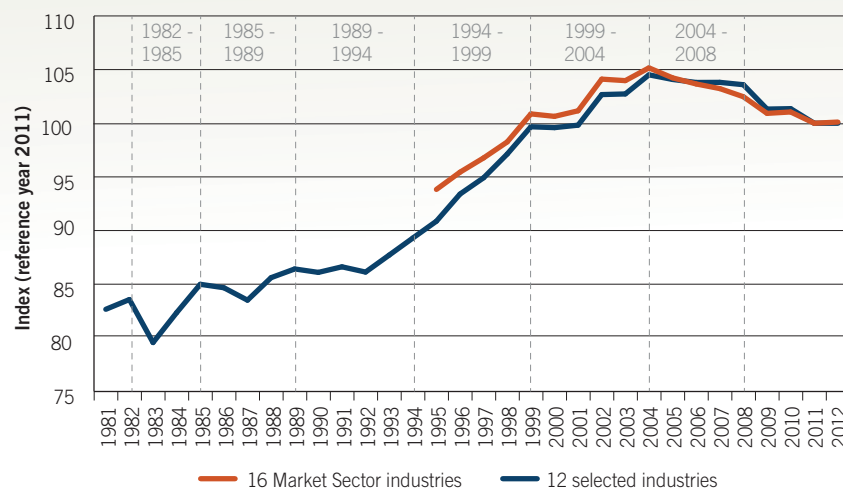
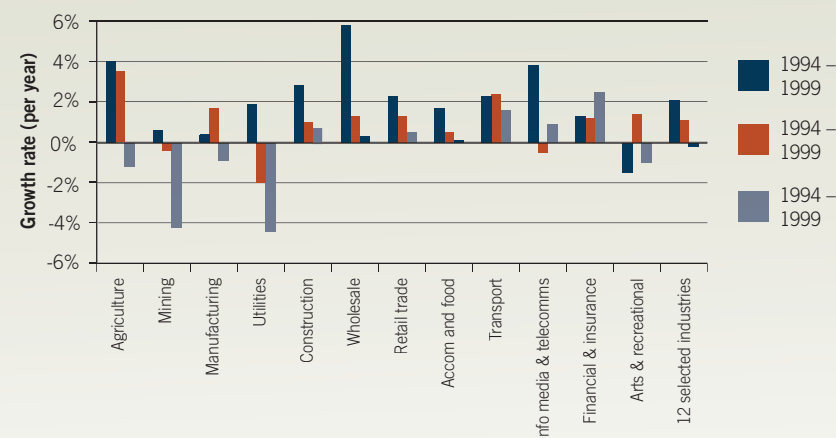


Figure 15D.2 Multifactor productivity, by industry, latest three productivity cycles (1994 to 2008)²



This decline in overall multifactor productivity partly reflects negative MFP growth in the mining, agriculture (at least until recently) and utilities sectors.

The mining boom prompted a rapid increase in capital investment and labour inputs; however, there is a lag between this investment and additional output and so MFP has declined. In the utilities sector, increased demand and reduced supply through lower rainfall have also prompted increased capital investment such as desalination and water recycling projects and extensive investment in upgraded electricity distribution networks. As these increased inputs do not necessarily translate into increased outputs, MFP is reduced during the investment period.

However, productivity growth fell in 10 of 12 market sectors and Australian productivity growth was weaker than in other OECD economies whether measured through the lens of MFP or labour productivity.³ While productivity measurement is fraught with difficulty, this suggests a need for a wider explanation than industry-specific drivers can provide.^a

In the near term, productivity in the mining industry is likely to increase as it moves from investment in new infrastructure and equipment to its utilisation. Similarly, agricultural productivity has already improved, in part due to drought conditions having eased. More generally, however, the range of competing pressures on the economy mean that it is difficult to predict future economy-wide productivity growth rates.

Figure 15D.3 Multifactor productivity growth, by selected countries, 2000 to 2010⁴

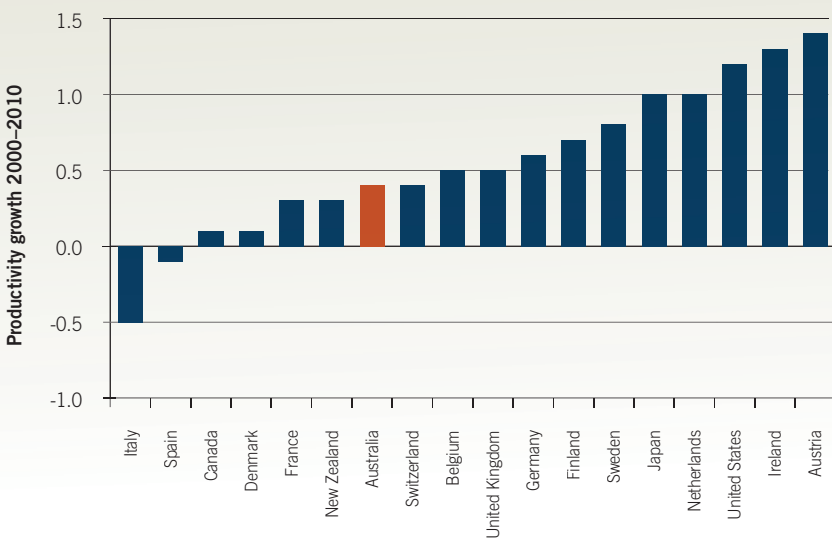
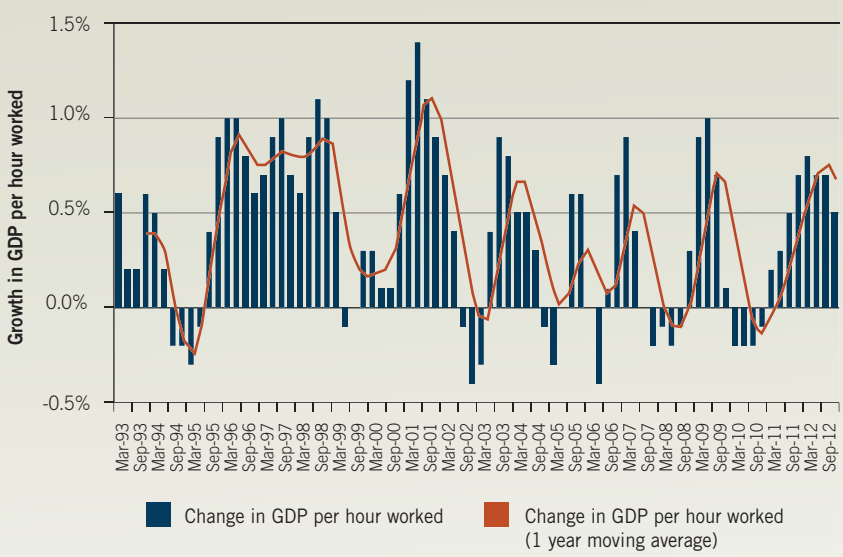


Figure 15D.4 Change in GDP per hour worked, 1993 to 2012⁵



The special circumstances brought on by the mining boom and the drought result in MFP for Australia being relatively low by international comparisons.

There are signs that labour productivity is improving. Gross domestic product per hour worked improved by 3.5% over the year to December 2012, continuing a trend of growth above 0.5% for seven consecutive quarters.

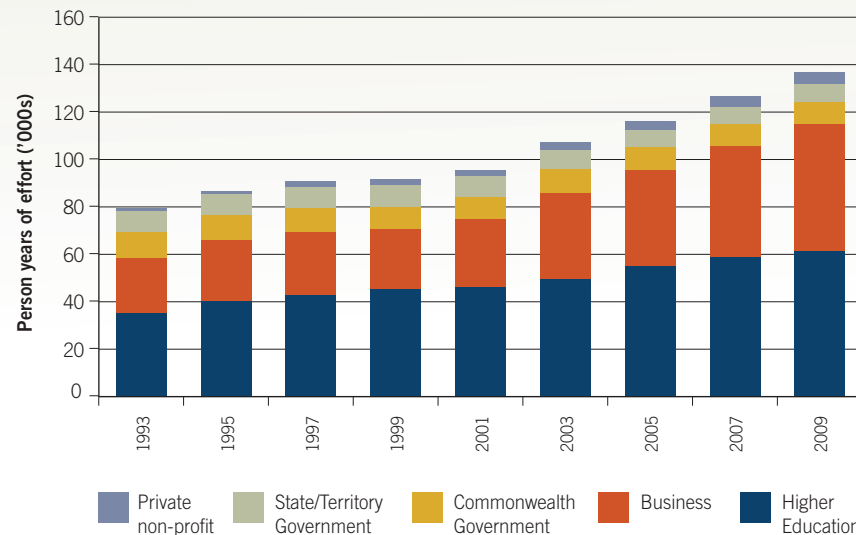
Human capital devoted to research and development has been increasing substantially; however, compared to other countries the amount of research being undertaken by business is low.

Research and development

Total human resources working on research and development (measured in person years of effort) have increased by 70% since 1993.

The majority of human capital devoted to research and development takes place in the higher education (45%) and business sectors (39%). The main business sectors devoting human capital to research and development are the manufacturing, mining and financial services sectors and the broad professional, scientific and technical services sector. Mining and financial services spend considerable amounts on overall research and development. Mining is the second largest sector after manufacturing in terms of total research and development spending.

Figure 15D.5 Human resources devoted to research and development, by sector, 1993 to 2009⁶



Internationally, Australia has a similar number of researchers in the workforce (8.4 researchers per 1000 workers) as most North American and European countries. Australian researchers are more heavily concentrated in the higher education sector than in other countries, resulting in relatively few researchers working in businesses compared with other nations.

Figure 15D.6 Researchers in business enterprises vs. researchers in higher education (per 1000 workers)⁷

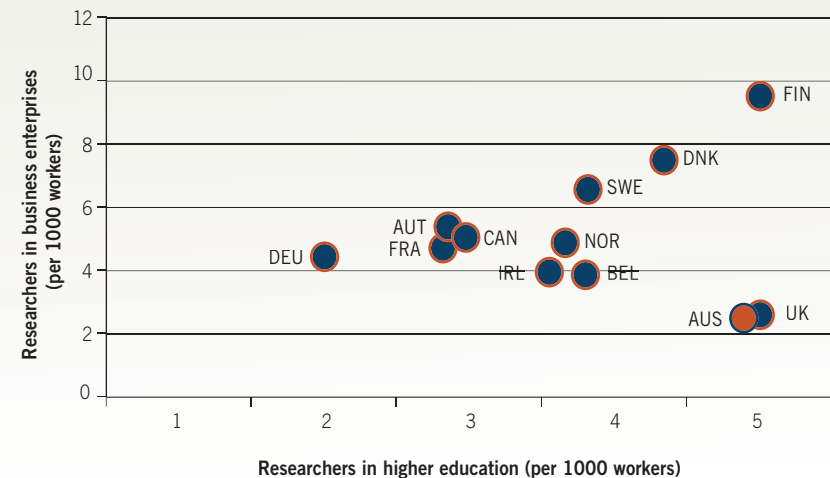
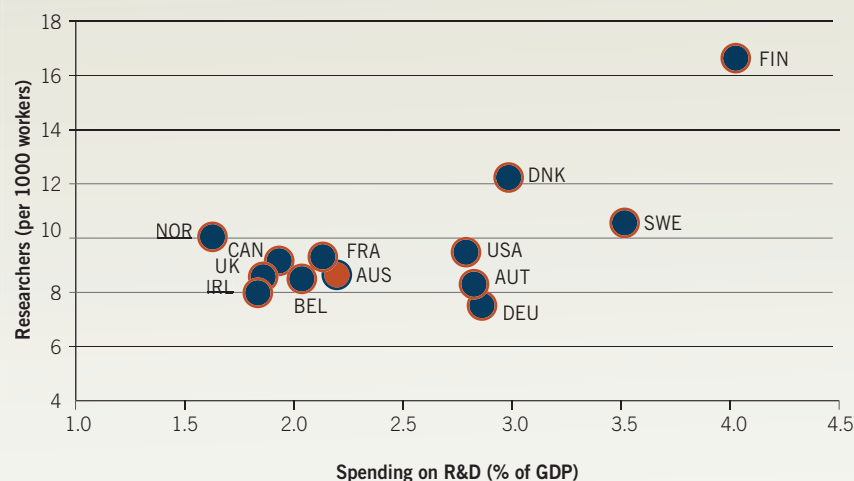


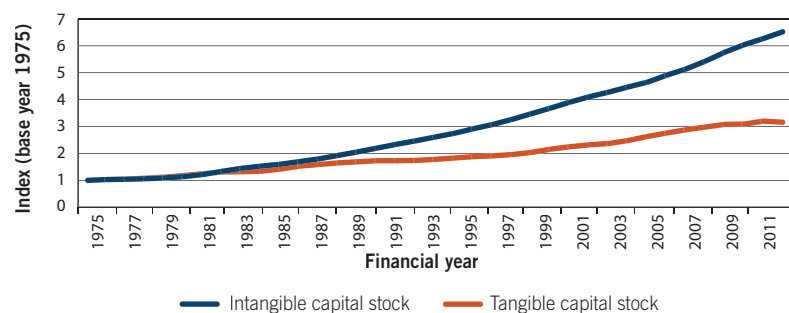
Figure 15D.7 Researchers (per 1000 workers) vs. spending on R&D (per cent of GDP)⁸



Research and development, along with other innovation-related assets such as skills development, design and organisational improvements, can be described as 'intangible capital', in contrast to 'physical capital' such as machinery, buildings and other physical assets.

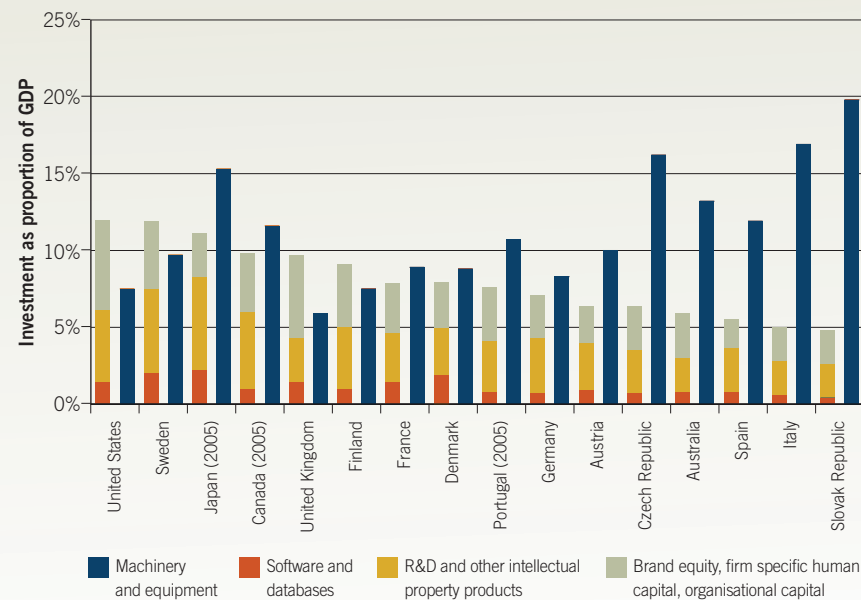
Investment in intangible assets has grown at a compound annual growth rate of 5.3% since 1974–75. The total intangible stock was estimated to be around \$250 billion in 2010–11. Intangible stock has grown at a faster rate than the stock of physical capital, a trend seen in most knowledge economies around the world.

Figure 15D.8 Market sector, intangible and tangible capital stocks, 1975 to 2011⁹



However, Australia has a lower investment in intangibles than physical capital as a share of gross domestic product (GDP), compared to other advanced OECD countries.

Figure 15D.9 Investment in physical capital and intangibles as a proportion of GDP, 2006¹⁰

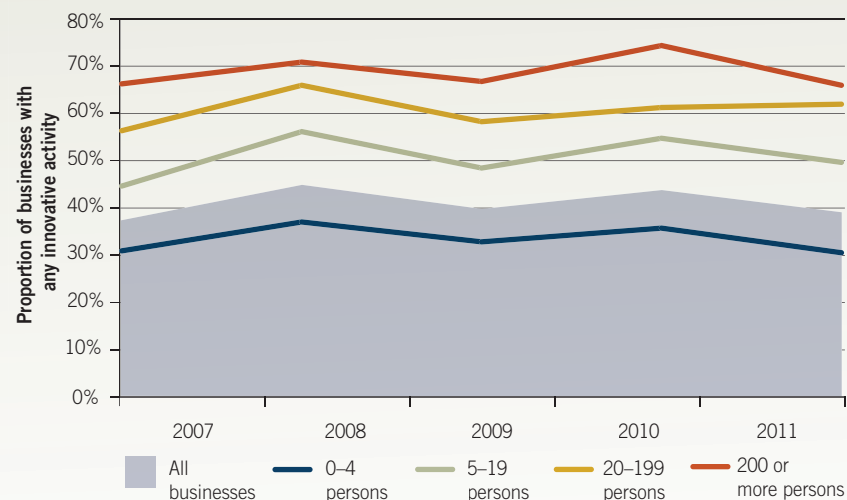


The proportion of Australian businesses undertaking innovative activities has remained stable since 2007, at around 40%.

Business innovation

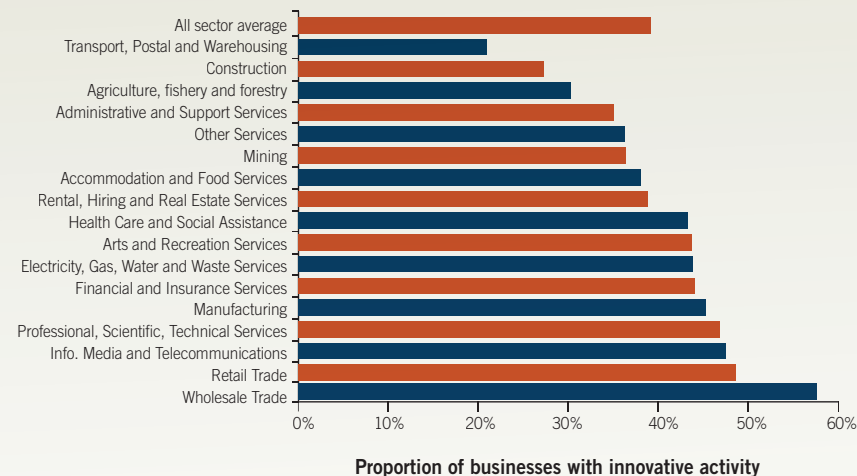
In 2011, 39% of Australian businesses undertook some form of innovative activity. This is roughly the same percentage as in 2007.

Figure 15D.10 Change in innovative activity, by business size, 2007 to 2011¹¹



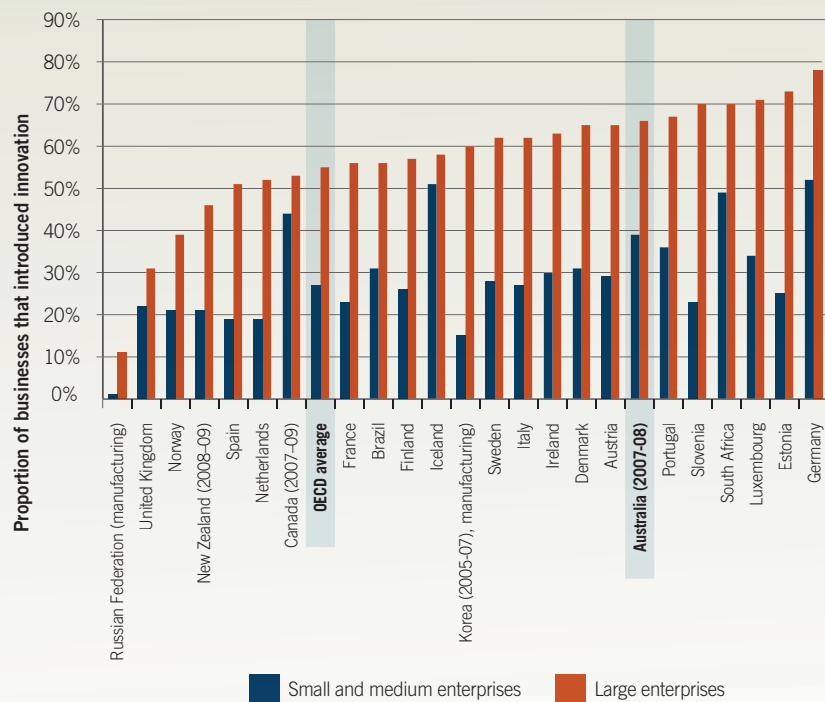
During 2011, wholesale trade was the industry with the highest proportion of businesses with innovative activity (58%), followed by retail trade (49%). This illustrates the applied character of innovation, as these industries are heavy adopters of new business models, practices and technologies. Businesses in the transport, postal and warehousing sector were least likely to have innovative activity (21%).

Figure 15D.11 Business innovation, by sector, 2011¹²



Profit related reasons were the most commonly cited drivers for innovative activity (by 73% of businesses undertaking innovative activity). Other reasons included increasing responsiveness to customer needs (50%), to increase or maintain market share (40%), and to improve quality (36%). The proportion of businesses innovating to improve safety or reduce environmental impacts was 21% and 13% respectively.

Figure 15D.12 International comparison of innovation strategies, by firm size, 2006–08¹³



Australia was amongst the top five OECD countries in 2007–08, with 39% of small to medium enterprises introducing innovation. The OECD average for small and medium enterprises introducing innovation was 25% in 2007–08. For innovation in large enterprises, Australia (66%) was above the OECD average (55%) in 2007–08.

References

- 1 Australian Bureau of Statistics, *Experimental Estimates of Industry Multifactor Productivity, Australia* (cat. no. 5260.0.55.002)
- 2 Eslake, S and Walsh, M (2011) Australia's Productivity Challenge, The Grattan Institute, p.16
- 3 Productivity Commission, Annual Report 2009-10 (2010). Note: A common method of examining changes in productivity over an extended period involves identifying and dividing the data into productivity 'growth cycles'. The reason for this relates to the natural variations in productivity growth present within the business cycle and how these relate to measurement issues, such as the ability to capture capacity utilisation within the input statistics. This means that year to year changes in estimates may not be truly indicative of a change in productivity. By analysing average productivity statistics between growth cycle peaks, the effects of some of these influences can be minimised, allowing better analysis of the drivers of growth in different periods.
- 4 Organisation for Economic Co-operation and Development, Statistics Database. Note: Comparison of Australia's long-term average annual MFP growth with OECD countries for which MFP estimates are available can only be made over a variety of time periods due to variations in data availability. OECD estimates for Australia differ somewhat from the official ABS estimates due to adjustments necessary for cross country methodological uniformity.
- 5 Australian Bureau of Statistics, *Australian National Accounts: National Income, Expenditure and Product, Dec 2012* (cat. no. 5206.0), Table 1
- 6 Australian Bureau of Statistics, *Research and Experimental Design, All Sector Summary, Australia, 2008–09* (cat. no. 8112.0).
- 7 Pettigrew, Alan (2012) Australia's position in the world of science, technology and innovation, Australia's Chief Scientist Occasional Paper Series. *Figure 2: OECD, OECD Science Technology and Industry Scoreboard 2011; OECD Main Science and Technology Indicators*, June 2011.
- 8 Pettigrew, Alan (2012) Australia's position in the world of science, technology and innovation, Australia's Chief Scientist Occasional Paper Series. *Figure 2: OECD, OECD Science Technology and Industry Scoreboard 2011; OECD Main Science and Technology Indicators*, June 2011
- 9 Australian Bureau of Statistics, *Australian System of National Accounts, 2012* (cat. No. 5204.0); Melbourne Institute of Applied Economic and Social Research (2012) Figures commissioned by the DIISRTE. Note that intangible capital investment includes R&D, design, market research and branding, organisational improvement, firm-specific training and skills development, software development, mineral exploration and artistic originals.
- 10 Organisation for Economic Co-operation and Development, Measuring Innovation: A new perspective, 2010. The 16 OECD countries are ranked by total expenditure in intangibles assets as a percentage of GDP. Investment in intangible assets is provided in the three categories: computerised information, innovative property and economic competences. Investment in fixed assets (machinery and equipment) is shown in blue as a contrast with intangibles for each country.
- 11 Australian Bureau of Statistics, *Summary of IT Use and Innovation in Australian Businesses* (cat. no. 8166.0)
- 12 Australian Bureau of Statistics, *Innovation in Australian Business, 2010–11* (cat. no. 8158.0)
 Note: The ABS draws on the conceptual definitions and guidelines included in the 'Oslo Manual, Guidelines for Collecting and Interpreting Innovation Data' (Third Edition, 2005). This manual provides a framework for the collection of innovation statistics and specifies the definitions of innovating businesses and innovation-active businesses that are used by the ABS. The 2010–11 BCS draws on this manual for the questions used in the BCS and in the presentation of outputs from the survey.
 Key indicators of innovation include: measures of business innovation (innovating, innovation-active); types of innovation (goods and/or services, operational processes, organisational/managerial processes, marketing methods); and status of innovation (introduced, still in development, abandoned).
- 13 Organisation for Economic Co-operation and Development, based on Eurostat (CIS-2008) and national data sources, June 2011
 Note that the OECD average presented here is an average of countries that reported business innovation statistics only.
 The indicators presented in this figure may be affected by differences in the sectoral coverage of innovation surveys across countries. Although an effort was made to align the data for non-European countries to what is included in the 'core' coverage of the Community Innovation Survey (CIS), this is not always possible due to survey and sample design. For example, in Korea and the Russian Federation, these data only cover the manufacturing sector. Similarly, differences in the sectoral coverage for Brazil, Canada, Chile, New Zealand and South Africa may have an impact on some indicators.
 In addition, some countries do not identify firms with ongoing/abandoned innovation activities, so that (contrary to the CIS data) these are not included in the figures for innovative (or innovation-active) firms.

Notes

- (a) For a discussion of potential explanations, see Parham, D (2012) *Australia's Productivity Growth Slump: Signs of Crisis, Adjustment or Both?*, Productivity Commission, Visiting Research Paper, April 2012.



ADDITIONAL ECONOMIC INFORMATION

In addition to the current set of sustainability indicators for Australia, the Council considers the following information on Gross Domestic Product per capita, government net debt and household debt levels should be considered.

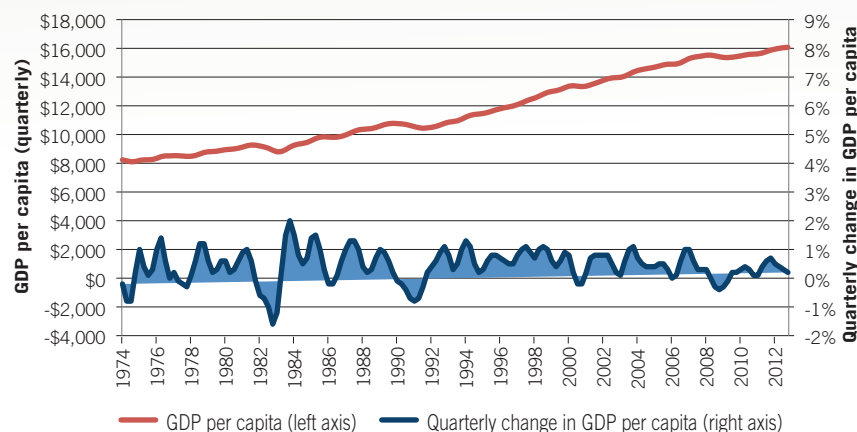
In addition to the current set of sustainability indicators for Australia, the Council considers the following information on Gross Domestic Product per capita, government net debt and household debt levels should be considered.

GDP per capita

The performance of the economy is often illustrated by a measure of Gross Domestic Product (GDP), which indicates the total value of goods and services produced within the economy. GDP per capita is simply GDP divided by the population of the country and provides an indication of the average economic output per person. Changes in GDP per capita therefore depend on changes in both population and total economic output. While it is only an average value, and does not reflect distribution of wealth or income, growth in GDP per capita can indicate an overall increase in productivity across the economy.

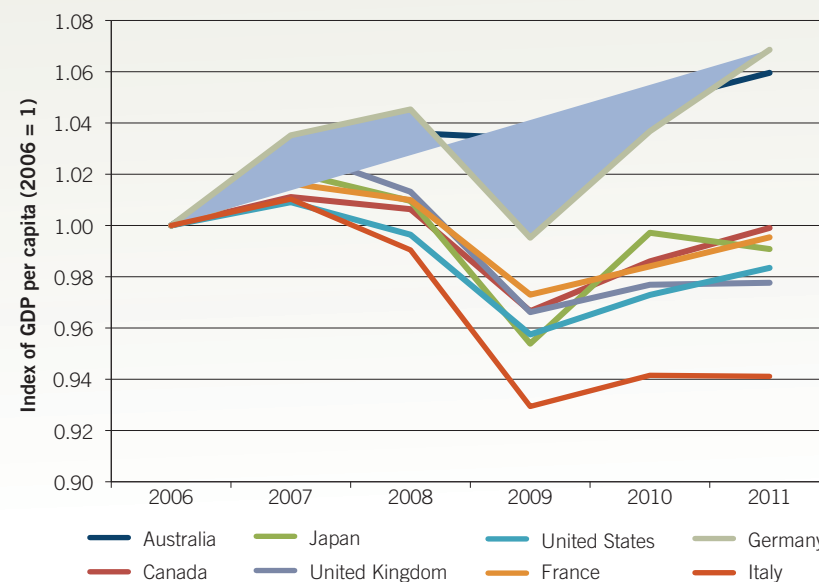
Growth in GDP per capita in Australia has been relatively steady over the past few decades, suffering only short periods of negative growth, generally coinciding with periods of global economic downturns such as the early 1990's and the recent global financial crisis.

Figure 15E.1 Real GDP per Capita, Trend, December Quarter 1973 – December Quarter 2012¹



However Australia avoided the worst effects of the recent financial crisis, with GDP per capita dropping only slightly before returning to levels above that recorded prior to the crisis, in contrast to the major advanced economies which were impacted to a much greater degree.

Figure 15E.2 Real GDP per Capita, Australia and Major Advanced Economies (G7), 2006 - 2011 indexed (2006 = 1)².



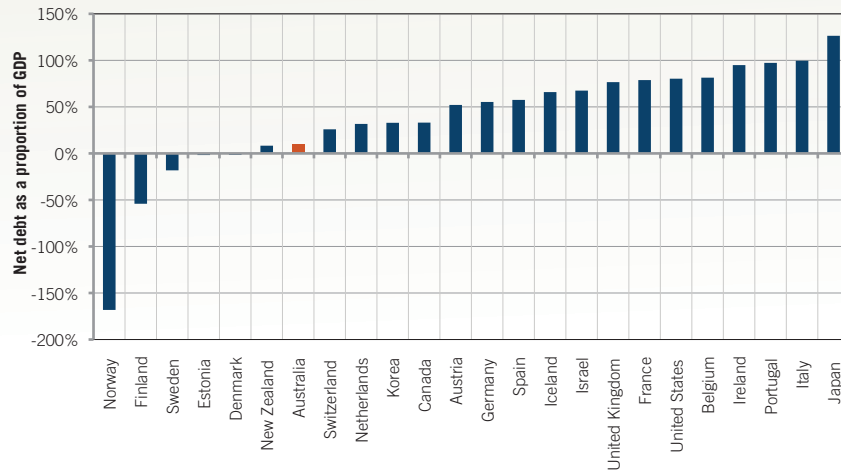
The Australian Treasury projects Australian real GDP per capita growth to 2050 to slow to 1.5 per cent per annum, from 1.9 per cent per annum over the previous 40 years to 2010³. This is largely related to the aging population structure, reducing the proportion of the population who are of working age.

Government net debt

Australia has had low levels of government net debt over the past two decades compared with most advanced economies. In the early 1990s, Australia, along with the major advanced economies, experienced an increase in net debt largely because of a global economic downturn. But in contrast to many other advanced economies, between 1995 and 2008, Australia experienced a significant fall in its net debt due to a period of fiscal consolidation and the avoidance of a recession in the early 2000s that afflicted a number of other advanced economies.

The net debt levels of the major advanced economies (G7), and many other advanced economies including Australia, have experienced an increase since 2008 due to the global financial crisis. However, Australia's government net debt to GDP ratio remains a fraction of the average level of the G7 economies.

Figure 15E.3 General government sector net debt, as percentage of GDP, advanced economies, 2011⁴

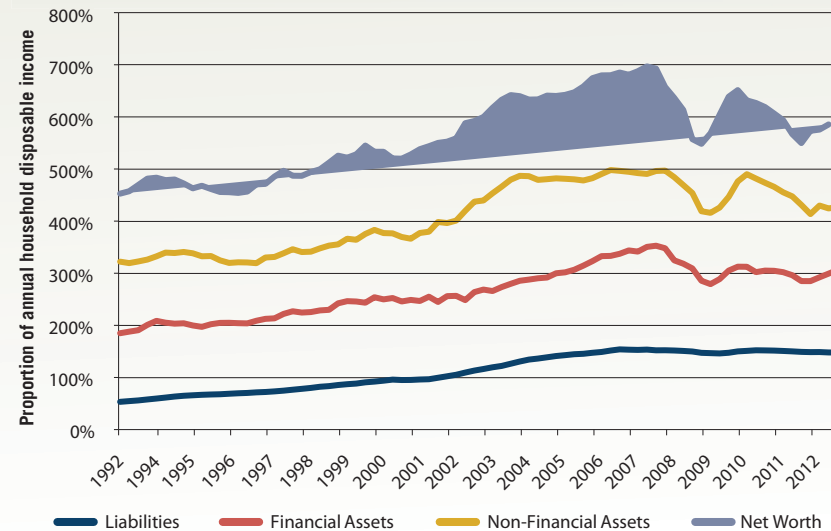


Household saving and debt

Since the early 1990s household debt has risen significantly faster than household income. In 1990 household debt equalled less than half a year's disposable income. In 2006 this had risen to over one and a half years' income. Most of the rise was due to housing debt, including debt used to fund investment properties.

Other household debt, including credit card debt, car loans, and margin loans, has risen only slightly relative to income over the period.

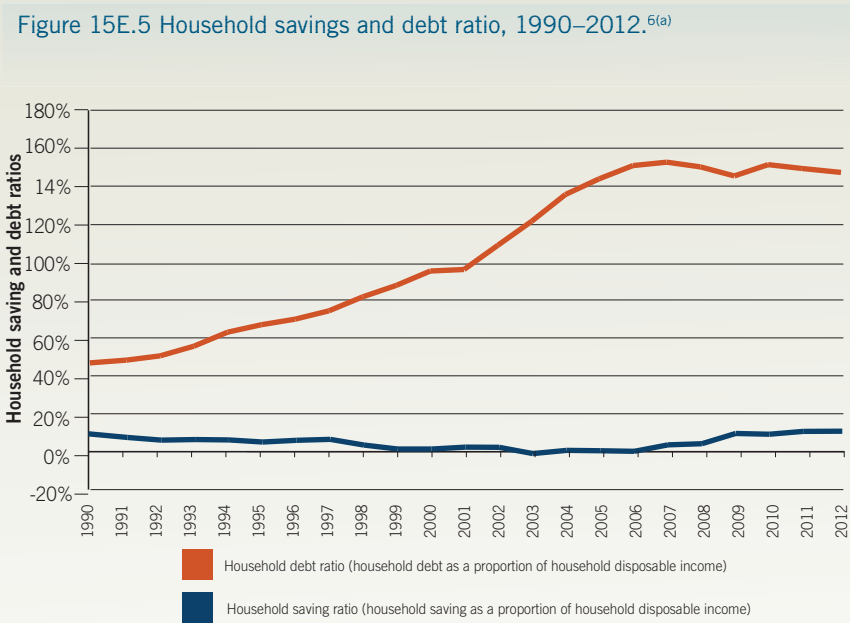
Figure 15E.4 Household Wealth and Liabilities, 1992–2012⁵



The value of household assets also grew much more quickly than household incomes over this period. Because the value of household assets increased faster than the value of household liabilities, there was a large increase in household net worth relative to income. More recently, the value of assets have not risen as much as previously and this has corresponded with period of falling household debt to disposable income.

The ratio of household debt to disposable income has stabilised since 2006, with a slight decline over the last five years.

This has been accompanied by a significant increase in the level of household savings as a proportion of disposable income. The household saving rate in Australia had been declining steadily from the mid-1970s to the mid-2000s, falling below zero for the first time on record in 2002.



References

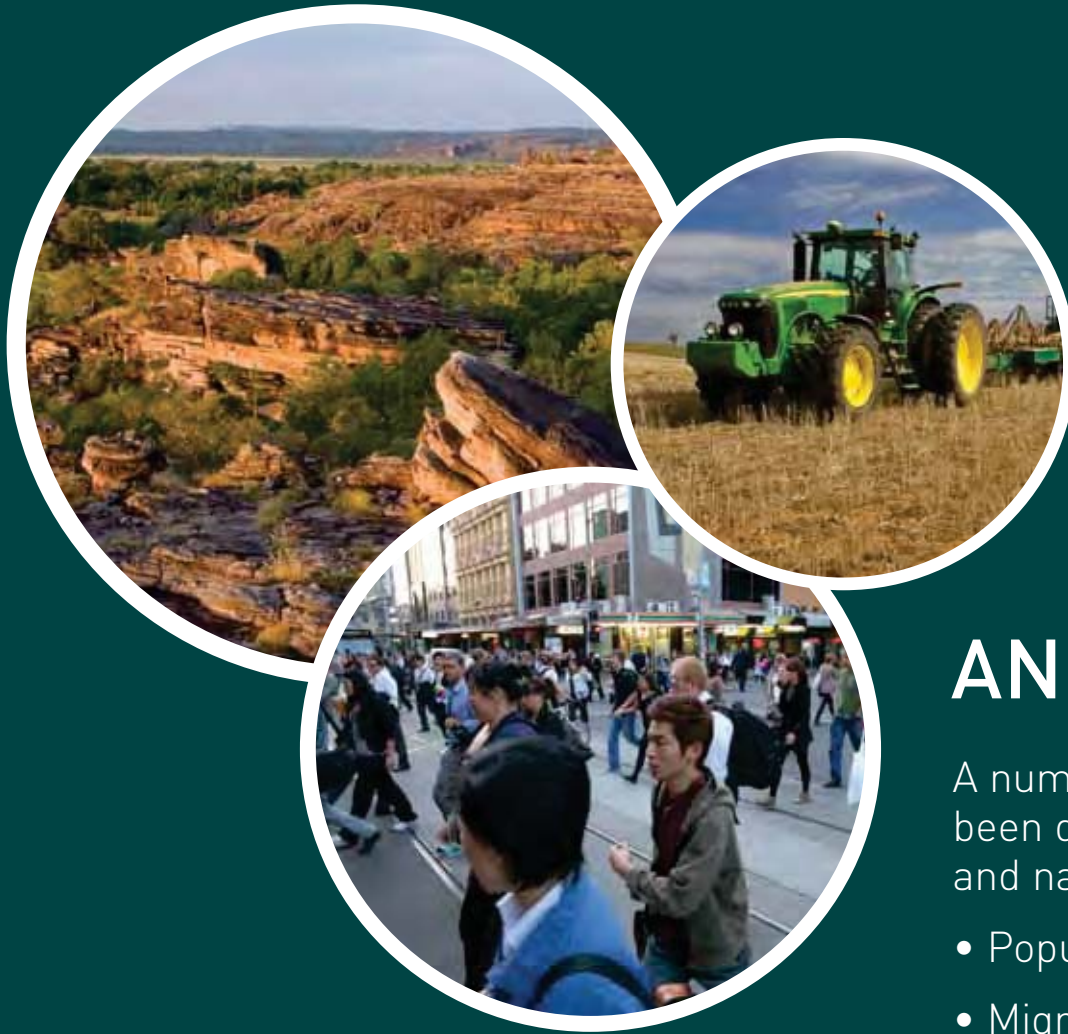
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- 2 International Monetary Fund (October 2012) *World Economic Outlook Database*
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- 4 Australian Government Treasury (October 2012) *Mid-year Economic and Fiscal Outlook 2012–13 Table D4: Australian Government general government sector net debt and net interest payments*, and International Monetary Fund, *Fiscal Monitor*.
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- 5 Reserve Bank of Australia, *B21 Household Finances - Selected Ratios*, available at www.rba.gov.au/statistics/tables
- 6 Household saving ratio: Australian Bureau of Statistics, *Australian System of National Accounts* (cat. no. 5204.0) Jun 2012 issue, Table 1
Household debt ratio: Reserve Bank of Australia, *Statistical Tables - Household Finances - Selected Ratios - B21*, Apr 2013 issue
Total household assets: Australian Bureau of Statistics, *Australian System of National Accounts* (cat. no. 5204.0) Jun 2012 issue, Table 41

Notes:

- (a) The household debt ratio measures household liabilities, i.e. housing and other personal debt, as a proportion of annual household gross disposable income.
- The household saving ratio measures household net saving as a proportion of household net disposable income. Household net disposable income is gross disposable income less consumption of fixed capital.

IMAGES

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AN AUSTRALIAN CONTEXT

A number of additional contextual indicators have been developed to complement the social, economic and natural indicators in previous chapters.

- Population
- Cultural diversity
- Migration
- Land use

While these contextual indicators themselves do not show whether our society is sustainable or not, they provide important background information and context essential to examining Australia's wellbeing.

The Australian population reached 23 million in April 2013. Our population has increased by a third since 1991 and grew by 1.7% in 2012.

Population size and growth

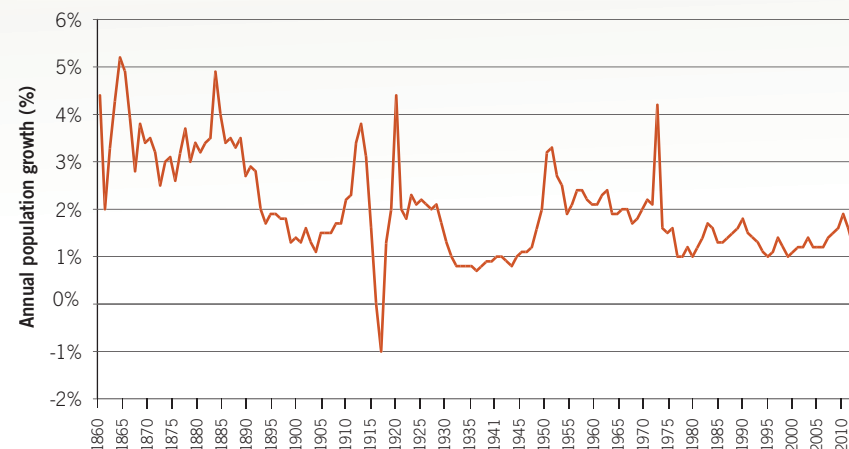
Population size and growth have complex relationships with sustainability. On the one hand, a bigger population can facilitate economic growth under some circumstances; on the other hand, it can place pressure on resources and investment in infrastructure. In Australia, there has been a longstanding debate on population size and growth, but it has largely been polarised between proponents of unlimited growth and those advocating zero growth.

At the time of initial European settlement, Australia's population is thought to have been around 350,000. The first million was reached in 1858. The rate at which millions have been added to the population has increased so that the 23rd million took only three years.¹ The most recent projections by the Australian Bureau of Statistics forecast Australia's population in 2021 being between 24.8 million and 26.5 million and in 2031 between 27.1 million and 30.9 million.²

Australia's rate of population growth of 1.7% is higher than that of the world as a whole (1.1%). Since 1991, it has fluctuated between a low of 1.02% (in 1993 and 1997) and a high of 1.93% (in 2008).

The world's population is currently 7.1 billion. The United Nations anticipates that it will continue to grow until around 2100 when it will stabilise at around 10 billion.⁴ Australia was the 45th largest country in the world in 1950 and is currently the 52nd largest.

Figure 16A.1 Annual population growth rate, Australia, 1860 to 2011³



Australia is the least densely settled continent apart from Antarctica, but the most striking characteristic is the high level of urban concentration of population.

Population density

Australia has one of the most distinctive population distributions of any nation. The overall density in 2011 was 2.9 people per square kilometre, compared with 2.6 in 2006. However, as shown in Figure 16A.2, 90% of the population lives in 0.22% of Australia's land area with a population density of more than 100 persons per square kilometre. Only 0.34% of the national population live in the 84.2% of land area with a population density of less than 0.1 persons per square kilometre.

Figure 16A.2 Distribution of land and population in Australia, 2011⁵

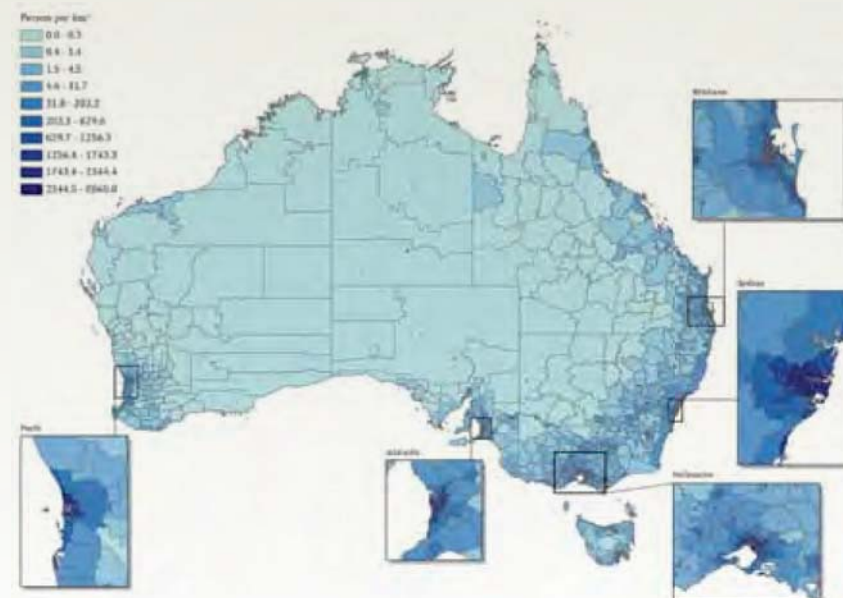
Density category	Proportion of population	Population living in density category	Proportion of land area
<i>persons per km²</i>	<i>%</i>	<i>persons</i>	<i>%</i>
Less than 0.1	0.34%	73,437	84.15%
0.1 to 1.0	1.42%	305,350	11.94%
1.0 to 10.0	3.30%	708,664	3.23%
10.0 to 100.0	4.45%	995,130	0.46%
Greater than 100.0	90.48%	19,416,150	0.22%

A concentrated population

In 2011:

- 86% of the population lived within 50km of the Australian coastline.
- 64% of the population lived in the eight capital cities.
- 87% of the population lived in urban areas.

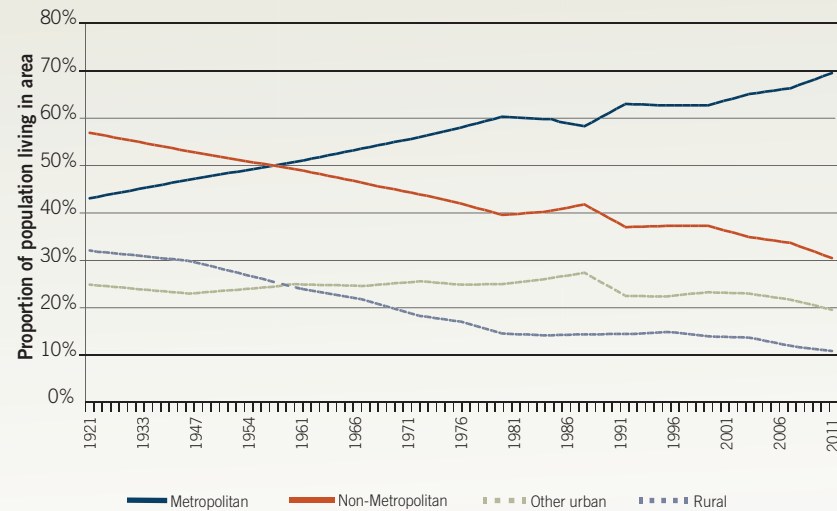
Figure 16A.3 Population density, Australia, 2011⁶



The distribution of the population and population density are of critical importance in assessing pressure on the environment. Australian cities are less dense than those in Europe and Asia, though comparable to some North American cities. The broad pattern of population distribution with concentration in the capital cities and along the well watered and fertile east, southeast and southwest coasts has been longstanding.

Australia's population is one of the most urbanised in the world and the proportion of the population living in urban areas continues to increase. The environmental effects of population concentration in some fragile coastal environments, as well as the problems of environmental stewardship associated with depopulation in inland Australia, are important issues for a sustainable Australia.

Figure 16A.4 Changing distribution of the population between metropolitan and rural areas in Australia, 1921 to 2011⁷



Ageing is the dominant population issue facing Australia. Over the next 20 years, the number of Australians aged 65 years and over will increase by 84% and their proportion of the total population will grow from 14% to 20%.

Gender and age profile

Like other OECD countries, Australia's population is ageing. Australia's contemporary age structure shows the significance of the post-war baby boom generation born between 1946 and 1986. This was a prolonged period of high fertility and this group currently makes up 25% of the total population and 36% of the Australian workforce. The baby boom 'bulge' is exaggerated by the relatively small numbers born in the low fertility years of 1930 to 1945 and the low fertility of recent decades. The baby boomers are poised to enter the 65 years and over age bracket. The number of Australians aged 65 years and over is expected to increase by 84% in the next 20 years. This will also produce a decrease in the proportion of the population of working age (15 to 64 years) – from 67% in 2011 to 63% in 2031.

Figure 16A.5 Population by age and sex, 1992 and 2012⁸

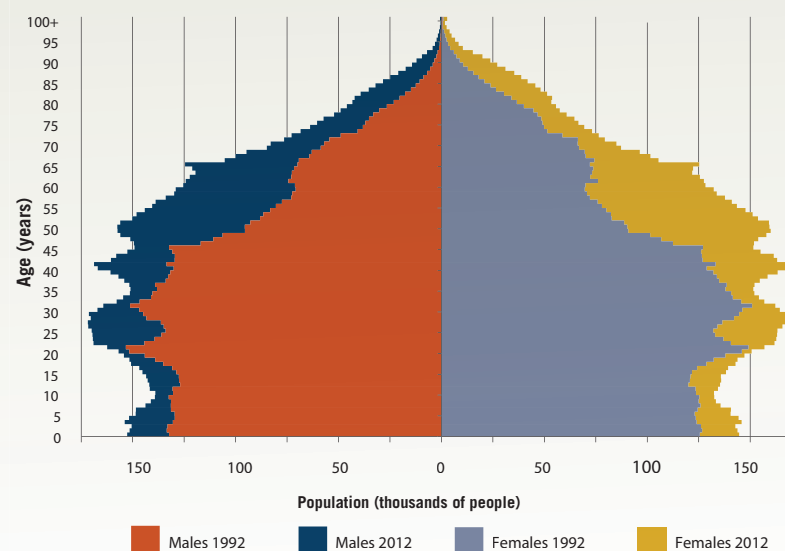
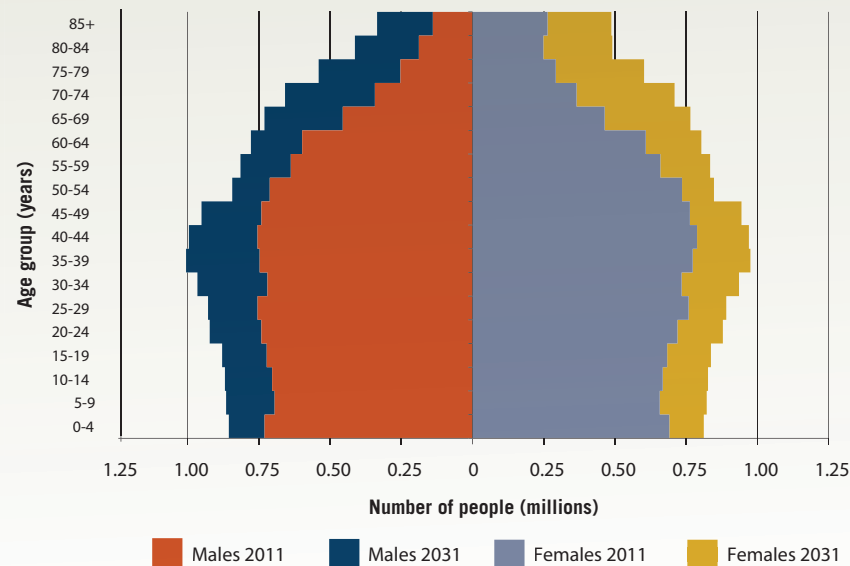


Figure 16A.6 Projected growth of the population by age, 2011 to 2031⁹

	2011		2021		2031		Change in population	
Age group	Population	Proportion of total population	Population	Proportion of total population	Population	Proportion of total population	2011 to 2021	2021 to 2031
<i>years</i>	<i>persons</i>	<i>%</i>	<i>persons</i>	<i>%</i>	<i>persons</i>	<i>%</i>	<i>%</i>	<i>%</i>
0 to 14	4,212,473	18.9%	4,693,727	18.3%	5,050,849	17.5%	11.4%	7.6%
15 to 64	12,034,921	67.3%	16,527,365	64.5%	18,003,557	62.5%	9.9%	8.9%
65 and over	3,076,593	13.8%	4,395,453	17.2%	5,732,080	19.9%	42.9%	30.4%
All ages	22,323,933	100.0%	25,616,545	100.0%	28,786,486	100.0%	14.7%	12.4%

When the age structure in 2011 is overlaid with the projected pattern for 2031, it is clear that the bulk of anticipated growth will be in the older age groups. There are variations in age structure between different parts of Australia, with Tasmania and South Australia having slightly older age structures than the other states. Non-metropolitan areas have older age structures than capital cities, but there is considerable variation between local areas. Since many age-specific services are provided locally, the variation in age structure is an important planning consideration for schools and community services such as health, recreation and aged care.

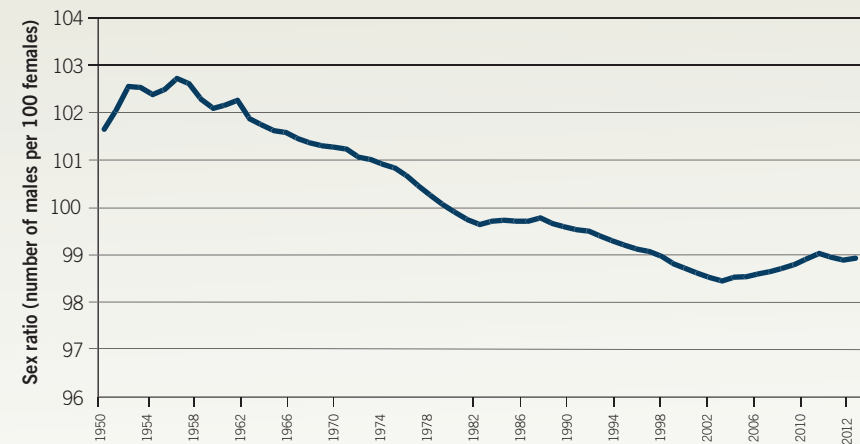
Figure 16A.7 Age sex distribution, 2011 and 2031¹⁰



Australia's history of acceptance of immigration and relatively high fertility means that it is demographically better placed than most OECD nations to cope with ageing. However, effective policies need to be put in place to cope with the rapid growth in the older population and also to take advantage of the opportunities this growth will create.

Currently, the sex ratio (males per hundred females) is 98.9. As shown in the Figure 16A.8, Australia passed an important milestone in 1979 when, for the first time since European settlement, the number of females was greater than the number of males. This is because female life expectancy is around four years greater than for males. However, until the last four decades, male immigration has been larger than female immigration.

Figure 16A.8 Sex ratio of the population, 1950 to 2012¹¹



References

- 1 Australian Bureau of Statistics, *Australian Demographic Statistics*, Sep 2012 (cat. no. 3101.0); Australian Bureau of Statistics, *Australian Historical Population Statistics*, 2008 (cat. no. 3105.0.65.001)
- 2 Australian Bureau of Statistics, *Population Projections, Australia, 2006 to 2101* (cat. no. 3222.0)
- 3 Australian Bureau of Statistics, *Australian Demographic Statistics*, Sep 2012 (cat. no. 3101.0); Australian Bureau of Statistics, *Australian Historical Population Statistics*, 2008 (cat. no. 3105.0.65.001)
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Australia has been transformed from a predominantly Anglo-Celtic society at the end of World War II to one of the world's most diverse multicultural nations.

Ethnic diversity

Diversity can be an important asset to Australia in a globalising world, enhancing connections with and understanding of other countries and cultures.

Prior to World War II, Australian immigration was restricted almost entirely to persons from the United Kingdom and other predominantly Anglo-Celtic nations. In 1947, 90% of Australians were Anglo-Celtic and 98% were born in Australia, UK, Ireland, New Zealand, South Africa, Canada or the United States.¹ By 2011, 29% of Australians reported having ancestry from a non-English speaking country and 74% were born in Australia.²

Figure 16B.1 Birthplace of the Australian population, 1947 to 2011³

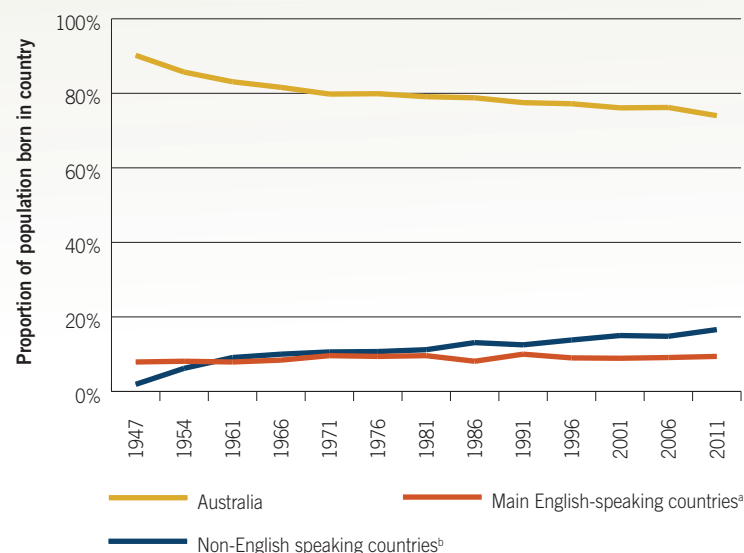


Figure 16B.2 shows that between World War II and 1988 the major increase in diversity was in European groups. However, in the last two decades there has been an increase in people of Asian, and to a lesser extent, African ancestry.

Figure 16B.2 Ancestry of Australians, 1947, 1988 and 2011⁴

Ancestry	1947	1988	2011
Proportion of population (%)			
Australia, UK, etc.	89.8%	74.6%	71.4%
Aboriginal	0.8%	1.0%	0.5%
Other European countries	7.9%	18.5%	15.2%
Asia	0.4%	3.2%	9.1%
Middle East*	1.1%	2.1%	2.1%
Africa*	0.0%	0.1%	0.8%
Other	–	0.5%	0.9%

* For 2011 figures, the Middle East includes those with North African ancestry, while Africa shows those with ancestry in Sub-Saharan Africa.

The number of Australians born overseas increased from 3.8 million (23%) to 5.3 million (26%) between 1991 and 2011. In 2011, 19% of the population was Australian born with at least one parent born overseas.

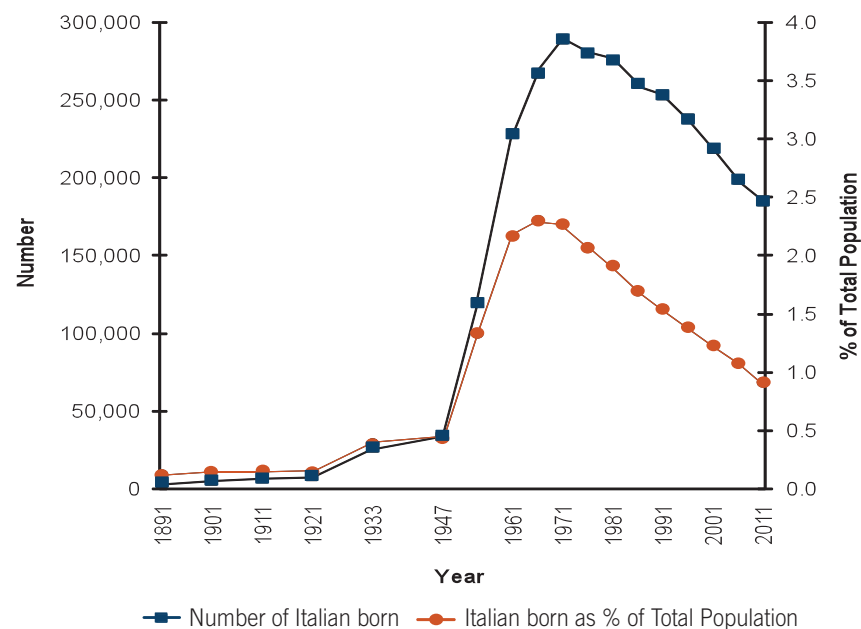
Figure 16B.3 Indicators of Australian diversity, 2011⁵

Indicator	Percent
Born overseas	26.1
Born overseas: Culturally & Linguistically Diverse country	16.6
Australia-born with an overseas-born parent	18.8
Speaks language other than English at home	19.2
Ancestry (multi response) in a CALD country (2006)	26.0
Non-Christian religion	22.3
Indigenous population	2.6
No. of birthplace groups with 10,000 +	67
No. of birthplace groups with 1,000 +	133
No. of indigenous persons	548,369

The second and later generations in the Italian community

Birthplace data are only a partial reflection of diversity. Second generation and later generations also contribute greatly to Australia's cultural diversity. This significance can be illustrated with the case of the Italian community.

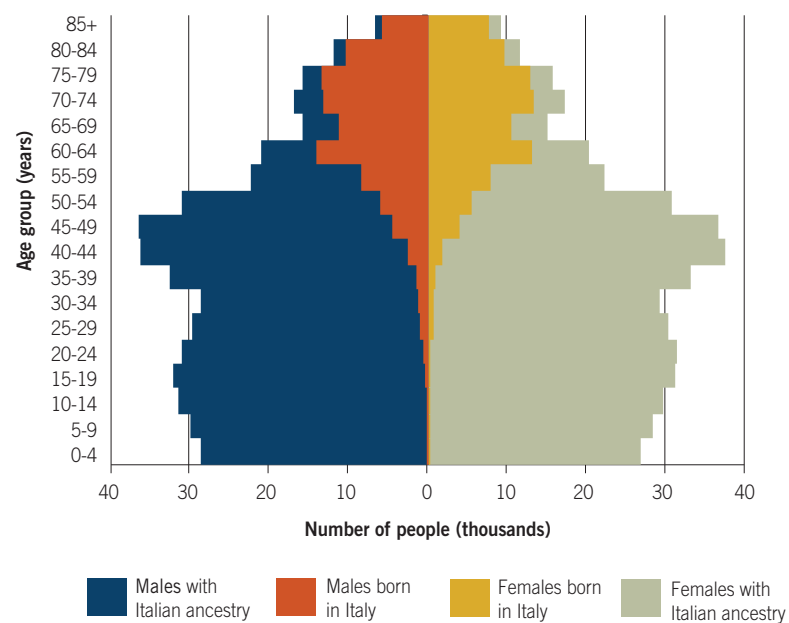
Due to substantial immigration in the early post war years, the Italian born population in Australia grew rapidly from 33,632 people in 1947 to 228,296 people in 1961. Immigration from Italy fell off during the 1960s and the Italian born population in Australia peaked at 289,476 people. With mortality and return migration, the Italian born population has steadily declined to 155,402 people in 2011.

Figure 16B.4 Growth of Italian born population, 1891 to 2011⁶

However, second and later generations in the Italian community have continued to grow. Accordingly, in 2011 the number of Australians reporting they were of Italian ancestry was 916,120.

While the Italian born population has a relatively old population distribution (median age of 68 years in 2011), the wider Italian community is primarily comprised of working age adults and children.

Figure 16B.5 Age and sex distribution of Australians with Italian ancestry (first and second responses) and Italian born, 2011⁷

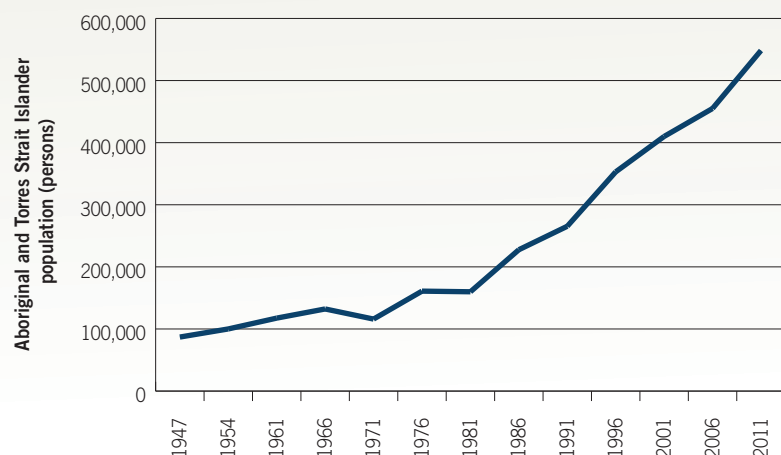


Aboriginal and Torres Strait Islanders numbered 548,370 in 2011 and made up 2.5% of the national population.

Aboriginal and Torres Strait Islander population

Although there is considerable debate, it is estimated that around 350,000 Aboriginal and Torres Strait Islander people inhabited Australia immediately before European settlement. Thereafter, the deprivation and decimation they suffered led to numbers declining to 67,314 people at the 1933 Census. Subsequently, the population recovered to 548,370 at the 2011 Census, comprising 2.5% of the national population.

Figure 16B.6 Growth of the Aboriginal and Torres Strait Islander population, 1947 to 2011⁸

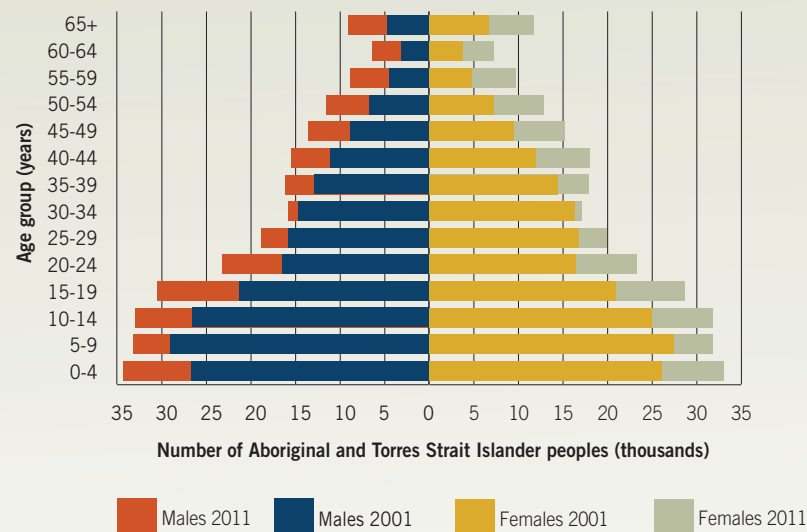


High levels of disadvantage among the Aboriginal and Torres Strait Islander population is evident in Figure 16B.7, which compares some key characteristics with the general population. Most tellingly, there is still a significant gap in mortality (currently being targeted through the Closing the Gap strategy). This is slightly offset by a higher level of fertility.

Figure 16B.7 Characteristics of the Aboriginal and Torres Strait Islander population and total population, 2011⁹

Characteristic	Total Australian population	Aboriginal and Torres Strait Islander population
Life expectancy at birth (males born in 2005–07)	78.5 years	67.2 years
Life expectancy at birth (females born in 2005–07)	82.4 years	72.9 years
Infant mortality rate, 2009–11 (deaths per 1000 live births)		
New South Wales	4.0	4.5
Queensland	5.1	8.4
South Australia	3.4	5.4
Western Australia	3.3	7.0
Northern Territory	7.3	13.0
Fertility rate, 2011 (births per woman)	1.884	2.74
Proportion in capital cities, 2011	64.5%	32.3%
Proportion aged less than 15 years, 2011	19.3%	35.9%
Proportion aged 65 or more years, 2011	14.0%	3.8%
Proportion unemployed	5.6%	17.1%
Proportion living in rental accommodation, 2011	28.5%	66.5%
Proportion with post-school education	46.3%	26.4%
Proportion employed in professional occupations	21.7%	13.6%
Proportion in low income categories, 2011	28.1%	41.5%

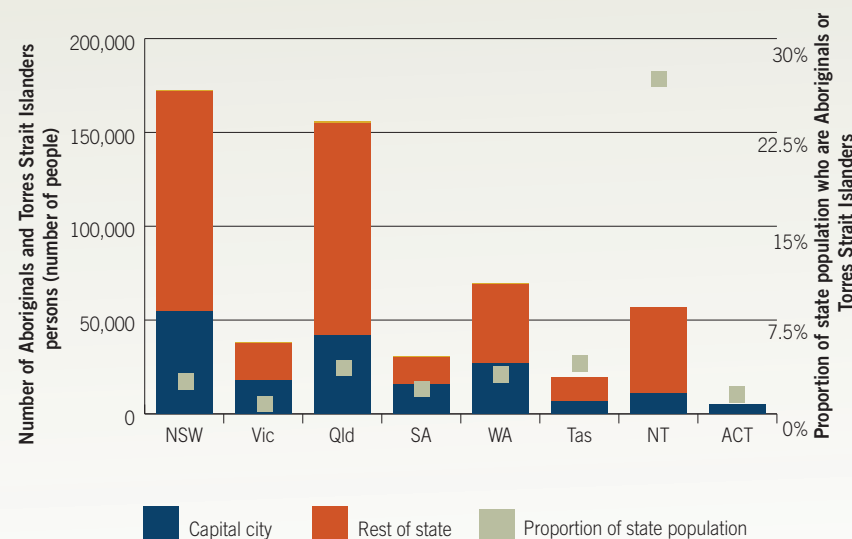
Figure 16B.8 Aboriginal and Torres Strait Islander population: by age and gender, 2001 and 2011¹⁰



The Aboriginal and Torres Strait Islander population is relatively young, with three quarters aged less than 40 years compared with slightly more than half for the general population. While a smaller percentage are aged 65 years and over, many disadvantaged Aboriginal and Torres Strait Islander people in their 50s are in need of aged care and health care services.

Despite increased urbanisation the Aboriginal and Torres Strait Islander population is more evenly distributed across the continent than the general population. The largest Aboriginal and Torres Strait Islander populations are in NSW and Queensland, but Aboriginal and Torres Strait Islander people comprise a higher proportion of the population in the Northern Territory.

Figure 16B.9 Aboriginal and Torres Strait Islander population, by capital city/rest of state, 2011¹¹

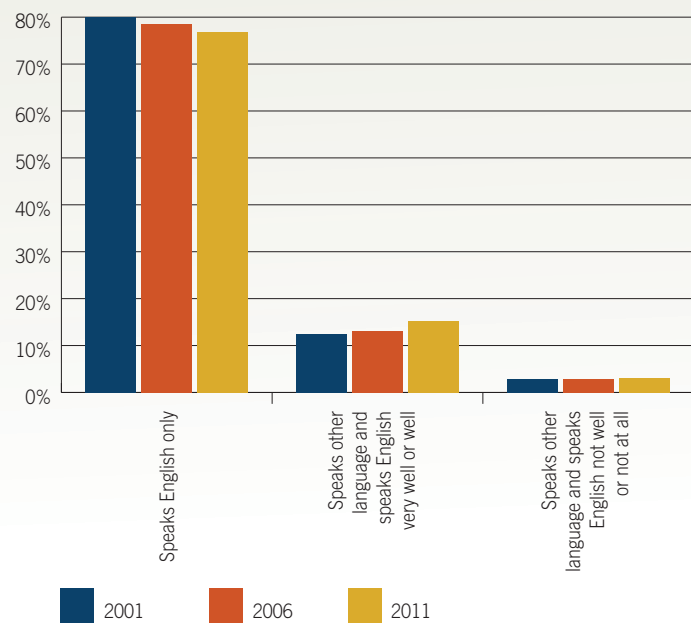


Approximately 3% of Australians did not speak English well or at all in 2011, a small increase from 2001.

Proficiency in spoken English

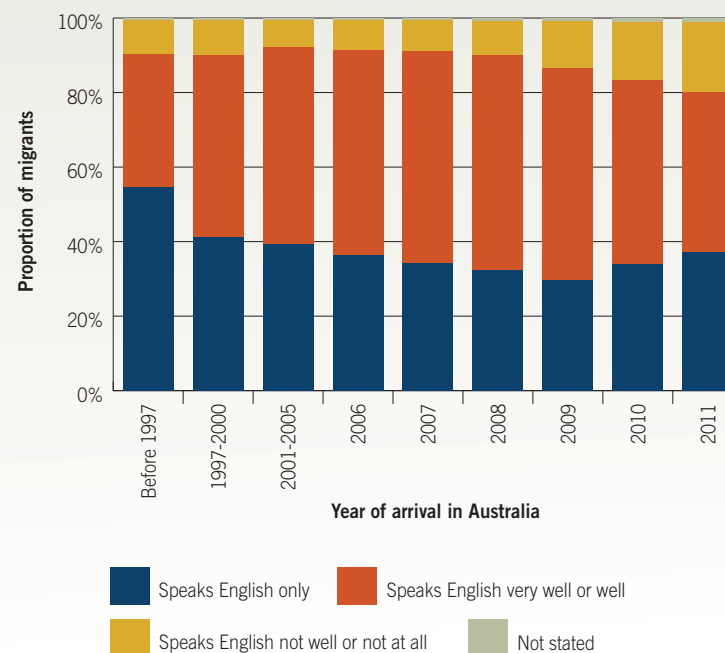
In 2011, approximately 655,379 (3%) of Australians did not speak English well or at all. This is a small increase from 531,838 (2.8%) of Australians in 2001.

Figure 16B.10 Proficiency in spoken English: 2001 to 2011¹²



Of the 5.3 million people living in Australia in 2011 who were born overseas, 47% speak only English at home and a further 42% speak English well or very well. Less than one in ten Australians born overseas report that they do not speak English well or they do not speak English at all.

Figure 16B.11 Proficiency in spoken English: migrants, by year of arrival and competency, 2011¹³



Levels of English proficiency amongst migrants can be influenced by a range of factors, including the length of time people have spent in Australia, as well as migration policies. Amongst migrants who arrived in Australia between 2009 and mid-2011, 15% do not speak English well or at all, compared with 9% of migrants who arrived before 1997.

References

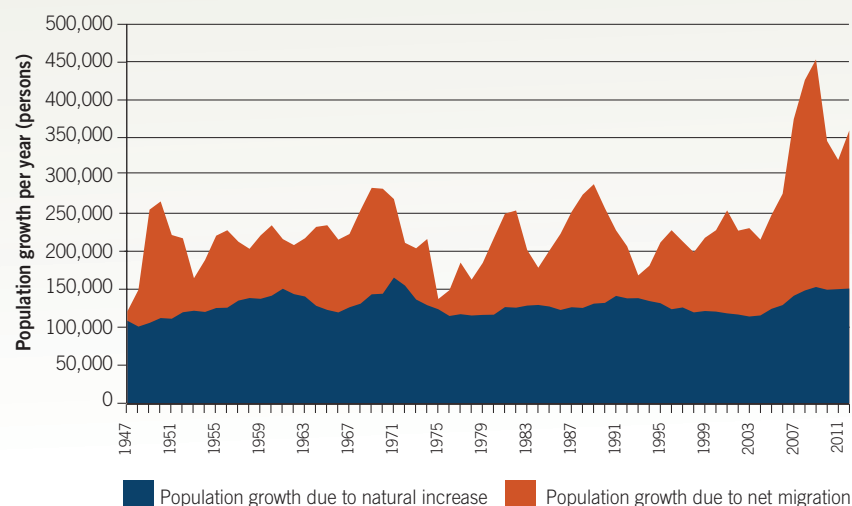
- 1 Estimated by Price, CA, 1989, *Ethnic Groups in Australia*, Discussion Paper prepared for Office of Multicultural Affairs, Department of Prime Minister and Cabinet, Canberra
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- 3 Australian Censuses, 1947 to 2011
- 4 Estimated by Price, CA (1989) *Ethnic Groups in Australia*, Discussion Paper prepared for Office of Multicultural Affairs, Department of Prime Minister and Cabinet, Canberra; Australian Bureau of Statistics, *2011 Census of Population and Housing*
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- 13 Ibid.

Almost half of Australia's population are immigrants or the children of an immigrant, making it one of the nations most influenced by migration in the world.

International migration

Population growth occurs through natural increase (births minus deaths) and net migration (immigration minus emigration). Figure 16C.1 shows that, while natural increase has been a relatively stable contributor to Australia's growth, net migration has been more volatile, fluctuating with changes in the economy and government policy.

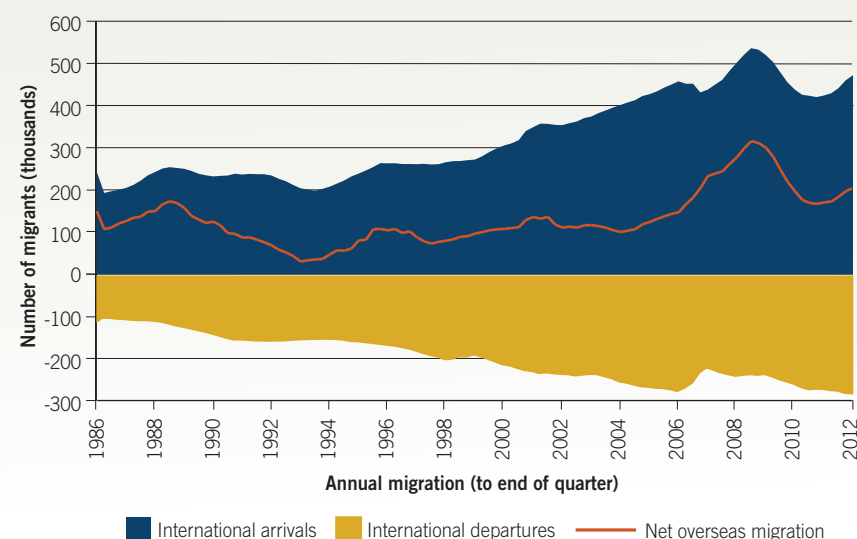
Figure 16C.1 Australian population growth showing natural increase and net migration components, 1947 to 2012¹



However, it is important to remember that net migration is the balance between flows into and out of the country. Figure 16C.2 shows trends in permanent and long term (generally of more than a year) movements

into and out of the country, indicating that both have increased since 2000 – although the impact of the global financial crisis is evident. In the June quarter 2011, there were 423,900 permanent or long term arrivals and 253,600 permanent or long term departures, giving a net gain of 170,300 or a 0.8% gain to the population.

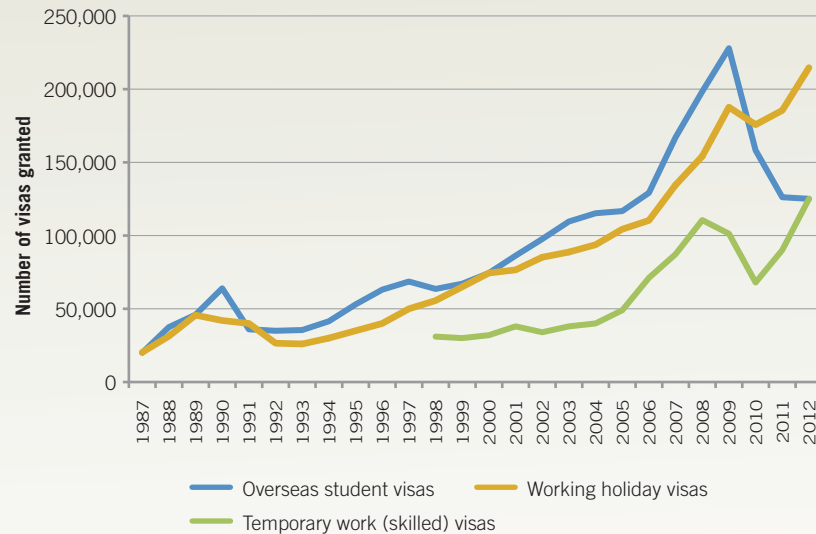
Figure 16C.2 International migration, 1986 to 2012²



Australia is generally depicted as a country of permanent settlement immigration but, as the above figure shows, there is also significant emigration. Of those emigrating from Australia, half are immigrants returning to their country of origin or moving to a third country and half are Australian-born residents departing.

Since the mid 1990s, temporary migration has increased in significance, with Temporary Business Skilled Migration (457 visas), Working Holiday Makers and Students being the main groups of temporary migrants.

Figure 16C.3 Temporary migration to Australia, 1987 to 2012³



At any one time there are around one million visitors in Australia on visitors' or temporary residence permits. In addition to permanent and long term migration into and out of Australia, there were 5.9 million short term (less than one year) visitors to Australia in 2011 and six million short term departures. Hence, it is more appropriate to depict Australia as part of a complex system of international population movement, with many people coming and going, rather than simply as a destination of permanent settlers.

Figure 16C.4 International migration rate for selected countries, 2005 to 2010⁴

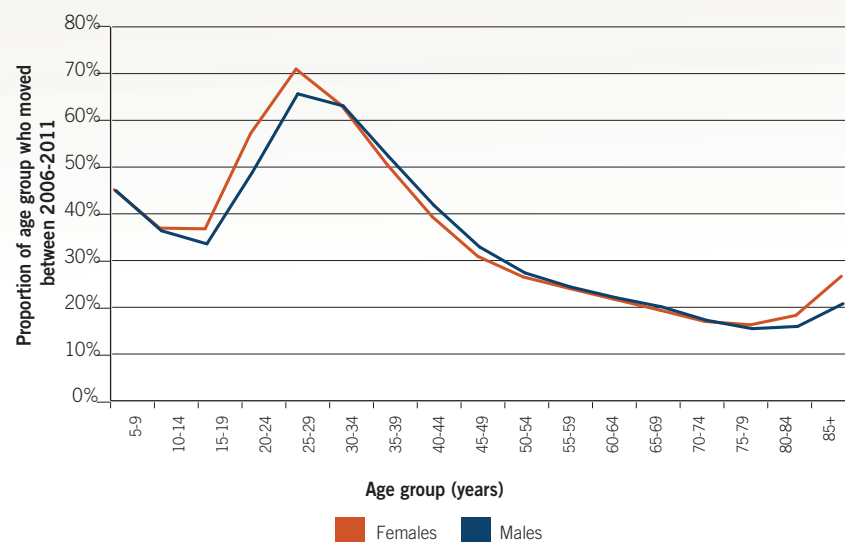
Country	Net international migration (average 2005 to 2010)	Migration rate (people arriving per 1,000 residents)
Australia	231,000	10.9
Canada	220,000	6.6
China	-377,000	-0.3
India	-600,000	-0.5
Japan	54,000	0.4
Republic of Korea	-6,000	-0.1
Malaysia	17,000	0.6
New Zealand	13,000	3.1
South Africa	140,000	2.9
United Kingdom	204,000	3.3
United States	991,000	3.3

Australia is one of the most mobile societies in the world. Some 16% of Australians changed their permanent place of residence in the year before the 2011 Census.

Internal migration

Australians move house more than people in most other countries. At the 2011 Census, 16% of the population had moved in the last year (14% had moved from another location in Australia and 1.5% were recent migrants or Australians recently returned from overseas) and 42% had moved within the previous 5 years. As in other countries, the propensity to move varies between groups. While men and women move at about the same rates, there is considerable variation amongst age groups (Figure 16C.5). The most mobile group are those aged between 25 and 29 years. Some 66% of males and 71% of females this age moved between 2006 and 2011. Rates of movement then tend to decline with increasing age.

Figure 16C.5 Proportion of Australians who moved, by age and gender, 2006 to 2011⁵



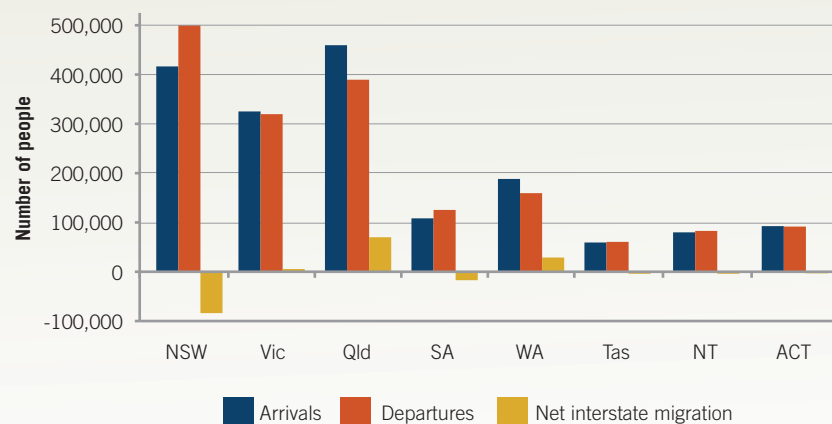
Most people move relatively short distances within housing and labour markets in response to life cycle changes and housing adjustments. Longer distance relocation is more related to job opportunities, although leisure and lifestyle factors are increasingly involved in Australians' relocation decisions.

Figure 16C.6 Proportion of people who moved, by country in the preceding year or five years⁶

People who moved in the preceding year			People who moved in the preceding five years		
Country	Census year	Percent moved	Country	Census year	Percent moved
Australia	2011	15.9%	New Zealand	2006	54.7%
Canada	2006	13.3%	USA	2000	44.3%
England	2001	10.7%	Canada	2006	38.5%
Ireland	2006	10.1%	Australia	2011	41.7%
Italy	2001	5.1%	Switzerland	2000	36.1%
Cyprus	2001	3.8%	France	2006	34.0%
			Israel	1995	28.2%
			Japan	2010	22.4%
			Malaysia	2000	17.1%
			Mauritius	2000	12.0%

The pattern of interstate migration over the 2007 to 2012 period is depicted in Figure 16C.7. It is immediately apparent that inflows and outflows are almost counterbalanced, with net migration being relatively small. The largest net losses were from New South Wales and South Australia, and the major net gains were in Queensland and Western Australia. In 2011–12, the net gains in Western Australia (11,100) were almost as large as those of Queensland (11,800) but for most of the last two decades, Queensland has demonstrated the largest internal net migration gains in Australia.

Figure 16C.7 Interstate migration by state and territory, 2007 to 2012⁷



In capital cities there have only been small net gains of internal migrants. There have been substantial net losses from Sydney, which have been counterbalanced by a net inflow of overseas migrants. Within these cities, there have been some small net gains in inner and middle suburbs, but the largest net gains have been in peripheral outer suburbs (despite efforts to increase the population density in inner and middle suburbs).

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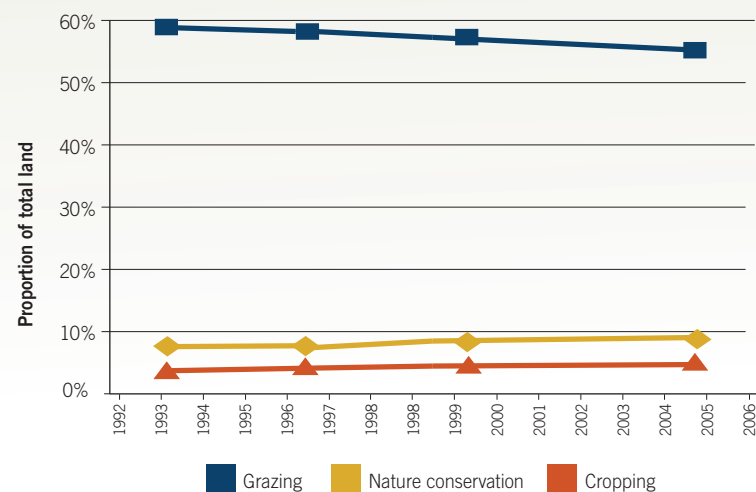
Across Australia, land use is changing – there has been a decline in the area used for agriculture, while areas devoted to conservation and intensive land uses are increasing.

Land use change^a

Land use in Australia has changed over the past two decades. Between 1993 and 2006, there was a 4% reduction in land used for agriculture (to approximately 456 million hectares (million ha)) and a 37% increase in nature conservation land (to 57 million ha).

Most of the decline in land used for agriculture was due to a decrease of 26 million ha in the area used for livestock grazing. Cropping increased by 7 million ha between 1993 and 2006.

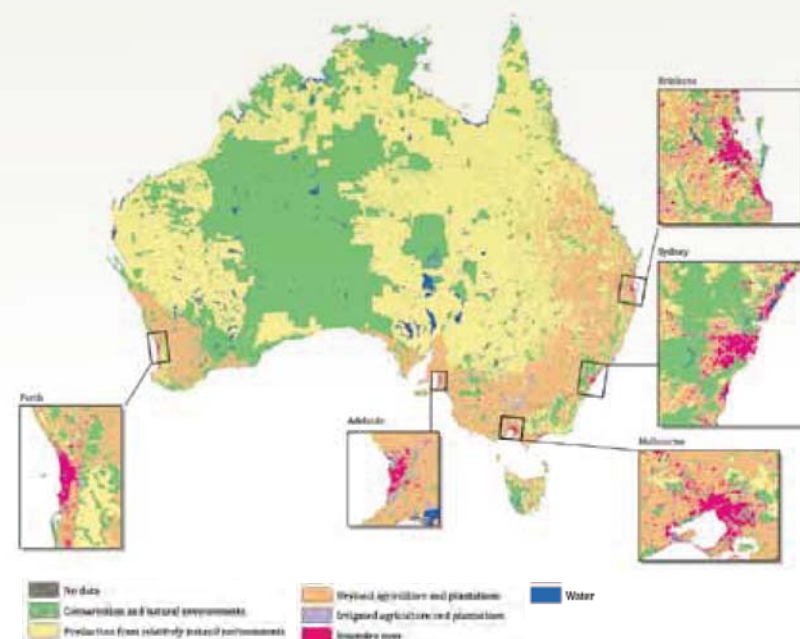
Figure 16D.1 Land use change, by selected uses, 1993 to 2006¹



In 2006, over 59% of land in Australia was used for agricultural purposes. Formal nature conservation occupied 7% of the continent, while other protected areas, including Indigenous uses, occupied a further 13% and 16% was classified as minimal use.

Of the land used for agriculture, most (355 million ha or 46% of the continent) was used for livestock grazing on native vegetation in arid and semi-arid areas. A further 71 million ha (9% of the continent) was modified pasture used for livestock grazing.

Figure 16D.2 Land use distribution, 2006²

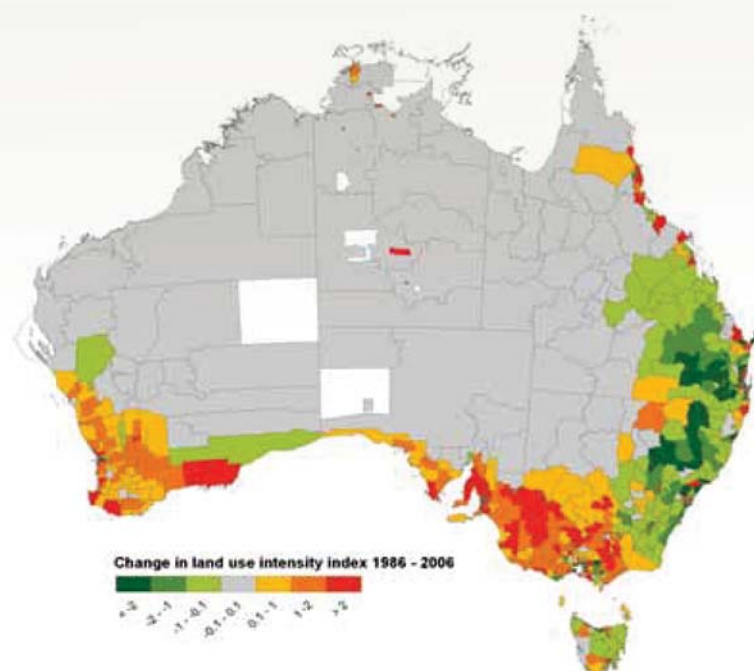


Intensive land uses (including urban areas, mining and waste, and intensive plant and animal production) occupied a relatively small 3 million ha (0.4%) of Australian land, mainly in and around major cities. Water covered approximately 12.6 million ha (1.6%) of the continent.

Intensification^b in land use is often the result of a desire to maintain or increase economic returns from land through increased inputs (including nutrients, water, energy and management effort) per hectare. Land use intensification can have both positive effects (e.g. increased productivity per hectare or less land area used for same produce) and negative effects upon land (e.g. greater transformation of land from its natural state, overworked land) depending on how the intensification is executed and managed.

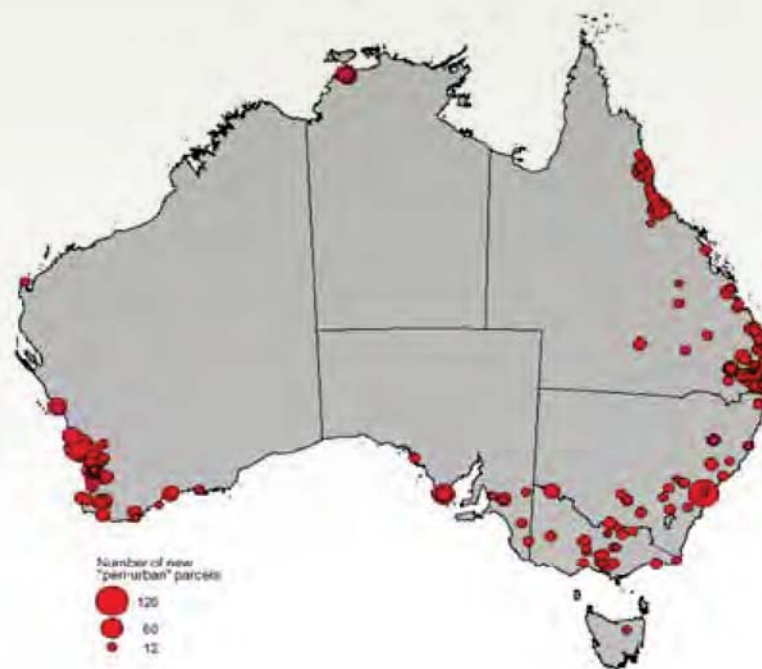
Intensification in agricultural uses between 1986 and 2006 was generally concentrated in the more agriculturally productive regions, across southern Australia and around metropolitan centres. Decreasing intensity was apparent in southern Queensland and northern New South Wales.

Figure 16D.3 Change in agricultural land use intensification^c between 1986 and 2006³



Land use intensification is also evident at the fringe of major cities and other areas of population growth where expansion of residential areas is taking place. Generally, a move out of broadacre agricultural land uses occurs, accompanied by an increase in population and changes to community composition and the structure of the local economy.^d Land parcel subdivision also takes place as part of this intensification. Subdivision in 2007 to 2008 was concentrated around mainland capitals, but also occurred across eastern New South Wales, southwestern Western Australia, Victoria and coastal Queensland.⁴

Figure 16D.4 New peri-urban land parcels, February 2007 to February 2008⁵



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Notes

- (a) General sources for this section are: Bureau of Regional Sciences (2006) *1996–97 Land Use of Australia, Version 3*; Australian Bureau of Agricultural and Resource Economics and Sciences (2010) *Land Use of Australia, Version 4, 2005–06*. All years in this section are financial years, except where stated.
- (b) Intensification may be defined as the increased intensity of human use of the land in a given area. However, it should be noted that 'intensification' has multiple definitions, each reflecting a different disciplinary perspective. For example, intensification in the context of agriculture may be defined as increased production from the same area of land. From a biodiversity perspective, it may be defined as increasing transformation of the land away from the original habitat. See, e.g., Lindenmayer D, Cunningham S and Young A (eds.) (2012) *Land use intensification: effects on agriculture, biodiversity and ecological processes*.
- (c) Land use intensity is calculated as an agricultural land use intensification index based on the average cost of production of specified agricultural land uses. The index is calculated as the sum of $L_i \times F_i$ where L_i is the proportion of different land use categories at the statistical local area (SLA) level and F_i is the corresponding intensity factor based on cost of production taken from the ABS Farm Financial Survey.
- (d) See for example: Lambin et al. (2001) 'The causes of land-use and land-cover change: moving beyond the myths' 11 *Global Environmental Change* 261.

IMAGES

Rock formations, Michelle McAuley

Pedestrians and traffic on the streets of the Melbourne CBD, Alex Zuk

Planting wheat crop directly into previous year's stubble. 'Homestead View' Greenethorpe, Andrew Tattnell

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N A T I O N A L S U S T A I N A B I L I T Y C O U N C I L

