

Measures of Australia's Progress 2006



EMBARGO: 11.30 AM (CANBERRA TIME) WED 31 MAY 2006

Reissue

Measures of Australia's Progress

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ABS Catalogue No. 1370.0

ISSN 1445-7121

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Foreword

Measuring a nation's progress – providing information about whether life is getting better – is one of the most important tasks that a national statistical agency can take on. For over 100 years, the Australian Bureau of Statistics has been measuring Australia's progress through the multitude of statistics we publish relating to Australia's economy, society and environment. However, for the most part, our statistical publications have tended to focus on each of these three broad areas in isolation.

There is continued public interest in the interrelationships between economic, social and environmental aspects of life. There have been, for example, debates about the sustainability of economic growth and a recognition that the environment is neither an inexhaustible source of raw materials nor capable of absorbing an unlimited amount of waste. Similarly, progress relates to social concerns – health, education and crime – and whether and how economic growth benefits those areas. Around the world a consensus is growing that countries and governments need to develop a more comprehensive view of progress, rather than focusing mainly on economic indicators such as Gross Domestic Product.

The past few years have seen the ABS develop and produce *Measures of Australia's Progress* (MAP) as a contribution to this discussion. It is important to recognise that in MAP we are not claiming to have included everything that is important to progress in this country. The suite of indicators provides the statistical evidence to allow the assessment of progress by users – those who formulate and evaluate policy, researchers and the community.

The first edition of MAP, then called *Measuring Australia's Progress*, was published in April 2002. It was an intentionally experimental publication and it was always our intention that the publication would further develop and evolve over time. The second edition was published in April 2004, which incorporated a number of changes to strengthen the publication based on comments received. This second edition followed the same format as the first. In April 2005, a smaller web-based product was released which incorporated more recent data for the headline indicators.

This is the third full edition of MAP and follows a similar format to the 2004 edition. As is the nature of an evolving product, a number of changes have been incorporated into this edition.

- ◆ The *Environment* dimensions have been restructured to move towards relating the indicators to the fundamental aspects of the environment, namely the natural landscape, the air and atmosphere, and oceans and estuaries. There have been no changes to the headline indicators.
- ◆ There is a feature essay on *Life satisfaction and measures of progress*.
- ◆ The *Family, community and social cohesion* chapter has been reviewed to further embrace ideas around social capital.
- ◆ More international comparisons have been incorporated throughout the publication, in addition to the essay on this topic.

As in past editions, a number of people assisted by reviewing material in this edition and I would like to acknowledge their valuable contribution.

Measures of Australia's Progress will be released in some format every year and will continue to evolve. Over the coming months we will seek feedback about the publication to ensure that it continues to meet user needs. Your suggestions and comments would be most welcome and they should be sent to Kirsty Leslie at the address below.

Dennis Trewin
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May 2006

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General information

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Inquiries about the availability of more recent data from the ABS should be directed to the National Information Service on 1300 135 070. A great deal of information can be found on the ABS website <<http://www.abs.gov.au>>.

ABS publications and services

A complete list of ABS publications produced in Canberra and each of the State Offices is contained in the *ABS Catalogue of Publications and Products* (cat. no. 1101.0), which is available from any ABS office or the website.

In many cases, the ABS can also provide information which is available on request, is historical or compiled from a variety sources. Information of this kind may be obtained through the Information Consultancy Service. The ABS also issues a daily release advice on the web site which details products to be released in the week ahead.

Abbreviations

The following abbreviations have been used in graphics and tables throughout this publication.

Australia, States and Territories of Australia

Aust.	Australia
NSW	New South Wales
Vic.	Victoria
Qld	Queensland
SA	South Australia
WA	Western Australia
Tas.	Tasmania
NT	Northern Territory
ACT	Australian Capital Territory

Other abbreviations

ABS	Australian Bureau of Statistics
AEC	Australian Electoral Commission
AGPS	Australian Government Publishing Service
AIHW	Australian Institute of Health and Welfare
AQIS	Australian Quarantine and Inspection Service
CD	Collection District
CDEP	Community Development Employment Program
CFCs	Chlorofluorocarbons
CLG	Community Leaders Group
CNG	Compressed Natural Gas
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DALY	Disability Adjusted Life Year
DEH	Department of the Environment and Heritage
DEST	Department of Education, Science and Training
DFD	Domestic Final Demand
EDR	Economically Demonstrated Resources
ERP	Estimated Resident Population
EU	European Union
FCE	Final Consumption Expenditure
GDP	Gross Domestic Product
GPI	Genuine Progress Indicator
GSS	General Social Survey
GST	Goods and Services Tax
HCFC	Hydrochlorofluorocarbons
HDI	Human Development Index
IBRA	Interim Biogeographic Regionalisation for Australia
IDEA	International Institute for Democratic and Electoral Assistance
ICT	Information and communications technology
IGR	Intergenerational Report
IGVA	Industry Gross Value Added
IHO	Indigenous Housing Organisations
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
IVA	Industry Value Added
LPG	Liquid Petroleum Gas
LWRDC	Land and Water Resources Development Corporation
MAP	Measures of Australia's Progress
MCEETYA	Ministerial Council for Education, Employment, Training and Youth Affairs
MFP	Multifactor Productivity
NEPM	National Environment Protection Measures
NGGI	National Greenhouse Gas Inventory
NLWRA	National Land and Water Resources Audit
NRSMPA	National Representative System of Marine Protected Areas
NSESD	National Strategy for Ecologically Sustainable Development
OECD	Organisation for Economic Co-operation and Development
ODPT	Ozone Depleting Potential Tonnes
PIM	Perpetual Inventory Method
PPM	Parts Per Million
PSR	Pressure–State–Response
R&D	Research and Development
RCIADIC	Royal Commission into Aboriginal Deaths in Custody

REER	Real Effective Exchange Rate
RFA	Regional Forest Agreement
RNNDI	Real Net National Disposable Income
ROW	Rest of the world
SEIFA	Socioeconomic Index for Areas
SESAME	System of Economic and Social Accounting Matrices and Extensions
SNA	System of National Accounts
SOE	State of the Environment
TFR	Total Fertility Rate
TNTS	The New Tax System
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
UV	Ultraviolet
VET	Vocational Education Training
WHO	World Health Organisation

Symbols and usages

The following symbols and usages mean:

billion	1,000 million
cm	centimetres
CO ₂	carbon dioxide
CO ₂ -e	carbon dioxide equivalent
GJ	gigajoules of energy
GL	gigalitres
hrs	hours
ha	hectares
kg	kilograms
km	kilometre
km-sq	square kilometres
m ²	square metre
ML	megalitre
MT	megatonnes
n.a.	not available
n.p.	not published
n.y.a.	not yet available
no.	number
p	preliminary – figures or series subject to revision
SO ₂	sulfur dioxide
°C	degrees Celsius
'000	thousand
\$	dollar
\$b	billion dollars
\$/cap	per capita dollars
\$m	million dollars
%	per cent
*	estimate has a relative standard error of 25% to 50% and should be used with caution
**	estimate has a relative standard error of greater than 50% and is considered too unreliable for general use
..	not applicable
—	nil or rounded to zero

Where figures have been rounded, discrepancies may occur between the sums of the component items and totals.

Measures of Australia's progress: summary

This publication is about Australia's progress. It is intended to help Australians address the question, 'Has life in our country got better, especially during the past decade?'

Answering the question is far from easy. Indeed there can be no definitive answer, because we all have our own views about what is most important to individual and national life. The ABS hopes that Australians will use these indicators to form their own views of how our country is progressing.

Assessing progress

A reader's assessment of whether Australia is, on balance, progressing will depend on the relative importance he or she places on each dimension. For some readers, an improvement in the health and education of Australians might be more important than a decline in our biodiversity. Others might disagree.

The reader's overall assessment might also be based upon the strength of progress or regress in each dimension. Or it might be based on patterns that underlie the national trends – so it might be important to know not just whether health is improving for the Australian population overall, but also whether it is improving for particular groups of Australians (such as Aboriginal and Torres Strait Islander peoples). The commentary on each dimension provides additional information of these kinds.

The suite of indicators presented in this publication suggests progress in some areas of Australian life and regress in others. What follows is a very brief summary of information embodied in the headline indicators. Overall progress, as explained above, should not be assessed by simply counting the numbers of areas getting better and subtracting those getting worse. Some aspects of progress (especially aspects such as national income and national wealth) are more easily

encapsulated in a small number of indicators, than are some social and environmental aspects. And some readers will give greater importance to some progress indicators than others.

Progress: Individuals

Three headline dimensions (*Health, Education and training*, and *Work*), and one supplementary dimension (*Culture and leisure*), are associated with this area of progress. There are three headline indicators and all three suggest progress during the past decade.

Health. During the past decade, Australians' health improved – children born in 2004 were expected to live two to three years longer than those born in 1994. While there have been some improvements, Indigenous Australians continue to have a life expectancy that is considerably lower than other Australians.

Education and training. During the past 10 years, the Australian population became more educated – between 1995 and 2005, the proportion of people aged 25–64 years with a vocational or higher education qualification rose from 46% to 58%.

Work. Since the last recession in the early 1990s the unemployment rate has continued to decline, and the average annual unemployment rate in 2005 was 5.1%.

Progress: The economy and economic resources

Five headline dimensions (*National income, Economic hardship, National wealth, Housing, and Productivity*), and two supplementary dimensions (*Competitiveness and openness, and Inflation*) are presented, although headline indicators are only available for four of the headline dimensions. There appears to have been progress in these dimensions.

Dimensions of progress

	<i>Individuals</i>	<i>The economy and economic resources</i>	<i>The environment</i>	<i>Living together</i>
Headline dimensions	Health	National income	The natural landscape	Family, community and social cohesion
	Education and training	Economic hardship	The air and atmosphere	Crime
	Work	National wealth	Oceans and estuaries	Democracy, governance and citizenship
		Housing		
	Productivity			
Supplementary dimensions	Culture and leisure	Competitiveness and openness		Communication
		Inflation		Transport

National income

Australia experienced significant real income growth during the past decade. Between 1994–95 and 2004–05, real net national disposable income per capita grew by around 3.0% a year.

Economic hardship

Between 1994–95 to 2003–04 the real income of less well-off Australians (those in the second and third lowest deciles of the income distribution) grew by 22%, as did the incomes of Australians in the middle income group.

National wealth

National wealth, as measured in Australia's balance sheet, grew over the past decade. Real net worth per capita increased by 0.9% a year on average between 1995 and 2005.

Housing

Housing is generally good in Australia, although poor or inadequate housing is a problem for some groups, especially for Aboriginal and Torres Strait Islander people living in remote areas. No headline indicator is presented.

Productivity

In recent years Australia has experienced improved productivity growth. During the decade 1994–95 to 2004–05, Australia's multifactor productivity rose 1.3% per year on average.

Progress: The environment

Three headline dimensions (*The natural landscape*, *The air and atmosphere*, and *Oceans and estuaries*) are presented. While there are six headline indicators across this broad area of progress, one headline dimension does not have a headline indicator. It is difficult to obtain national time series data that encapsulate the changes in Australia's natural capital. Several headline indicators suggest regress for some aspects of the environment during the past decade.

The natural landscape

Biodiversity cannot be measured comprehensively, but some experts, such as those on the State of the Environment Committee, believe Australian biodiversity declined during the past decade. This is partly encapsulated in a rise in the numbers of threatened birds and mammals. Land clearance, one influence thought to be reducing biodiversity, decreased by about 38% between 1993 and 2003. The area of land protected in national parks and the like increased.

In 2000, about 5.7 million hectares of land were affected by, or at high risk of developing, dryland salinity, a widespread form of land degradation.

Detailed national time series data are not available, but a variety of partial evidence points to a decline in the quality of some of Australia's waterways. In 2000 about one-quarter of Australia's surface water management areas were classed as highly used or overused.

The air and atmosphere

Australia's air remains relatively clean by the standards of other developed nations. The available indicators, such as the incidence of fine particle pollution in several cities, suggest that Australian air quality has not increased during the past decade, despite increased motor vehicle use.

Australia's total net greenhouse gas emissions in 2003 were 1.1% higher than they were in 1990. Per capita, we have one of the world's highest levels of greenhouse gas emissions, although our per capita emissions are decreasing, as are our emissions per \$ of GDP.

Oceans and estuaries

No headline indicator is presented although the commentary discusses a range of information about the pressures on – and state of – Australia's marine ecosystems.

Progress: Living together

Three headline dimensions (*Family, community and social cohesion*, *Crime*, and *Democracy, governance and citizenship*), and two supplementary dimensions (*Communication and Transport*), of progress are presented. Only one headline dimension has a headline indicator, although there is some discussion about progress below for the other two headline dimensions.

Family, community and social cohesion

Family and community are important aspects of society. The quality and strength of people's relationships and bonds with others – their family, friends and the wider community – are important ingredients of the level of social cohesion. And a more cohesive society is one in which communities are strong and inclusive, and where fewer people fall through the cracks. Rather than present a single indicator, this commentary presents some measures which illustrate aspects of family and community life in Australia, particularly those that are important to social cohesion.

Crime

Though small, the changes in the victimisation prevalence rates for personal crimes between 1998 and 2005 showed an increase from 4.8% to 5.3%, the same level as in 2002. Most of these people were assaulted. Between 1993 and 2005, the proportion of households that were the victim of a household crime (an actual or attempted break-in or motor vehicle theft) fell from 8.3% to 6.2%, after remaining at about 9% in 1998 and 2002.

Democracy, governance and citizenship

National life is influenced, not just by material qualities such as economic output, health and education, but also by many intangible qualities such as the quality of our public life, the fairness of our society, the health of our democracy and the extent to which citizens of Australia participate actively in their communities or cooperate with one another. Rather than present a single indicator, this commentary presents some

measures which illustrate aspects of democracy, governance and citizenship.

Links between dimensions of progress

Most, if not all, of these dimensions of progress are linked. Changes in one dimension will be associated with changes in many others – sometimes for the better and sometimes for the worse. A few of these links are outlined in each headline commentary; but many other important links are not discussed.

Plans for the future

The ABS publishes a summary of the headline indicators on the website annually. The next full issue of *Measures of Australia's Progress* is currently planned for 2008. The ABS hopes to continue to improve the publication in the future and a review of the current content of MAP is planned before the next full edition.

Measuring progress – an ABS approach

Introduction – why the ABS developed Measures of Australia's Progress

The past decade has seen growing public interest in assessing whether life in Australia and other countries is getting better, and whether the level of (or pace of improvement in) the quality of life can be sustained into the future. Although most regard Gross Domestic Product (GDP) as an important measure of progress, there are many who believe that it should be assessed in conjunction with other measures of progress. This is the prime reason the ABS looked for an alternative approach.

A national statistical agency like the ABS has an important role to play in providing the statistical evidence that will allow assessments of progress to be made by users – those who formulate and evaluate policy, researchers and the community. Through its publications, electronic releases of data and other means, the ABS provides a rich array of statistics relevant to assessing progress. But the very size of the information base means that it is not so accessible to many people. Moreover, most ABS products provide a window into one or a few aspects of life in Australia – say, health, education, income, water – whereas a comprehensive assessment of progress demands that these aspects of life are examined together.

One outcome of measuring and reporting on progress is to make sense of the world we live in. One of the purposes of using indicators to describe progress is that they represent key aspects of a complex reality in an informative way.

At the highest level, macro indicators can reduce the complexity of all the details and processes of the broad domains of national life to a few (seemingly) simple measures. A good example is GDP which incorporates all of the detail of national economic activity to single number which encapsulates the concept of economic growth. Because such measures are fairly easily digested, they can be useful in encouraging economic debate and they lend themselves to publication in the media.

However, to be truly useful in facilitating change, the development of such indicators must involve two other key players: researchers and government. The former group is needed to ensure a sound scientific basis for the concept or idea being measured, while the latter is needed to provide the assessment of social preference (through democratic political processes) and to, ultimately, develop and implement relevant policy.¹

Measures of Australia's Progress (MAP) provides a digestible selection of statistical evidence that will allow Australians to make their own assessment of whether life in Australia is getting better. MAP is not intended as a substitute for the full array of statistics – indeed, the ABS hopes that many readers will be led to read our other publications on the aspects of society, the economy and the environment that particularly interest them.

There are many different views of what progress means and how it might be measured. Some issues that arise when developing a publication like MAP include –

- ◆ What core concept is being addressed by MAP?
- ◆ What model or other view of the real world underlies the statistical evidence presented in MAP? – in particular, how does MAP deal with the complex interactions within and between society, the economy and the environment?
- ◆ On what basis were the selection and presentation of statistical evidence decided? How did the ABS decide what aspects of national life should be included, and what statistical indicators should be used to encapsulate those aspects? What presentational model did the ABS adopt and why?
- ◆ Any assessment of whether life is getting better is unavoidably based on values and preferences, so whose values and preferences are reflected in MAP, and at what points during the writing (and reading) are they applied?

What is meant by "national progress"?

Progress is one of a cluster of related concepts that also includes wellbeing, welfare, quality of life, sustainability and even happiness.

- ◆ *Wellbeing or welfare*, which is generally used to mean the condition of being well, contented and satisfied with life. It typically includes physical, emotional, psychological and spiritual aspects of life.
- ◆ *Quality of life*, which is linked strongly to (sometimes as synonymous with) wellbeing and can also be used in a collective sense to describe how well a society satisfies people's wants and needs.
- ◆ *Sustainability*, which considers whether an activity or condition can be maintained indefinitely. Although it has most commonly been used when considering the human impact on environmental systems (as in 'sustainable fishing'), it can also be extended to economic and social systems.

The ABS provides statistics relevant to some of these concepts as they bear upon some aspects of life in Australia – see, for example, *Measuring Wellbeing* (ABS cat. no. 4160.0), *Australian Social Trends* (ABS cat. no. 4102.0) and *Environment by Numbers* (ABS cat. no. 4617.0).

The distinguishing features of MAP are that it adopts progress as its central concept and that it tries to take a comprehensive view of progress, embracing the social, economic and environmental aspects of Australian life.

MAP does not provide a tight definition of progress; rather its aim is to 'provide statistical evidence about whether life in Australia is getting better'. Some readers of MAP have argued that the ABS should make explicit its definition of national progress, and even that the ABS should describe the future state towards which Australia should be progressing. In the ABS's view, specifying such a desired future state would be inappropriate for a national statistical agency. It is, however, possible to say some more about the notion of progress that underlies the design of MAP. Also, as discussed later, different Australians have different views of what constitutes progress.

Different approaches to these issues might be taken by, say, a policy agency or an academic researcher or an interest group or a private citizen. This essay sets out the approach that the ABS thinks appropriate for a national statistical agency.

Notions of progress

Thinking about progress and allied concepts (such as wellbeing and the good society) has exercised philosophers from the time of Socrates. Answering the question 'Is life getting better?' is not straightforward. It is clear, however, that to understand progress one must examine many aspects of people's lives – their health, the quality of their environment, their incomes, their work and leisure, their security from crime, and so on. So progress is multidimensional. Moreover, the dimensions of progress are intertwined. To earn more income, people may need to work longer hours and so have less leisure time. Increased industrial activity may generate more money to spend on health care, but it might also lead to more air pollution and hence to poorer health.

For this publication, we have chosen to adopt progress as our primary concept. Progress here encompasses more than improvements in the material standard of living or other changes in the economic aspects of life; it also includes changes in the social and environmental areas. It encompasses:

- ◆ The major direct influences on the changing wellbeing of the Australian population.
- ◆ The structure and growth of the Australian economy.
- ◆ The environment – important both as a direct influence on the wellbeing of Australians and the Australian economy, and because people value it in its own right.

While most would agree on the desirability of progress in, say, health, work or environmental protection, there is no universally accepted view of the relative importance of these aspects of Australian life. This publication contains an array of objective measures of progress; readers can apply their own subjective valuations to decide whether that array of measures implies that Australia is, on balance, progressing and at what rate. The measures (or indicators) can be loosely associated with one of the three broad domains of progress (economy, society and environment), although some relate to several domains. But the number of indicators associated with a domain is not a measure of the domain's relative importance to overall national progress.

This publication focuses on aspects of progress that are, in principle, susceptible to some objective measurement (e.g. life expectancy and educational qualifications). We have tended to avoid indicators that are either intrinsically subjective (e.g. happiness) or, while somewhat more objective, do not at present have generally agreed measures (e.g.

political freedom). These aspects of life are important to Australians, but they do not yet lend themselves to statistical expression. That said, the ABS acknowledges there is growing interest in life satisfaction (or happiness) as an important aspect of life in Australia and so this edition of MAP includes an essay which outlines some of the recent research into life satisfaction and the issues associated with its measurement.

Various temporal perspectives are provided within the publication. The major focus is on the history of progress over the past ten years in key economic, social and environmental aspects of Australian life. But a snapshot of the current (or, more strictly, recent) condition of the Australian economy, society and environment is also provided.

We have not made forecasts or entered into any direct discussion of sustainability. But we have, for some aspects of progress, reported on whether Australian stocks of assets (human, natural, produced and financial, and social assets) are being maintained.

Many aspects of progress relate to one another, and it is important to understand some of those links when assessing overall progress. The issues of concern that are considered span important aspects of life in Australia and enable readers to assess the country's capacity to maintain a healthy economy, society and environment.

Approaches to measuring progress

Most attempts at measuring progress begin with a model or paradigm. A paradigm provides a context for the dimensions of progress that one is trying to measure. It helps to identify gaps in the available measures. It can also be used to place a given approach within the discourse on progress, welfare, sustainability, etc.

There are two steps to applying the chosen paradigm. First, one defines and applies a mechanism for choosing what aspects of progress are to be measured. Second, one decides how each aspect is to be measured and how the measures are to be presented.

Mechanisms for choosing aspects of progress

The ABS considered three broad approaches to choosing what aspects of progress to measure:

- ◆ Referring to international standards or practice.
- ◆ Referring to current policy issues and debates.
- ◆ Referring to the views of stakeholders and the general Australian public.

International standards or practice. Some international statistical initiatives, such as the United Nations' Human Development Index (HDI), consider only a very few issues of concern common to all nations and so take quite a narrow view. (The HDI uses life expectancy, education and command over resources needed for a decent living (income)

to assess development.) Others use a larger number of issues. But some issues of concern in Australia are almost uniquely Australian (salinity, for example, affects few other countries; and while much of western Europe is preoccupied with road congestion, this is not (yet) a major issue here – at least not when compared to the scale of congestion problems in the UK, for example). We examined international standards and publications when listing aspects of progress. But because of this publication’s Australian focus, we did not judge it necessary to confine our list to aspects of progress for which international comparisons are possible. On occasion we refer to other countries’ data when they are useful for setting Australian progress in context (in the area of health, for example), and an article compares some key progress indicators across OECD countries.

Policy issues. Some statistical initiatives aim to choose measures which relate directly to government policy – the European System of Social Indicators, for example. Many aspects of progress included in this publication are potentially useful for assessing policy. However, they were not chosen with that in mind. *Measures of Australia’s Progress* is meant to inform public discussion of national progress, rather than be used as a scorecard for government policy.

Public opinion. Other projects in this field have asked the public about what aspects of progress should be measured. Approaches used or suggested include:

- ◆ Appealing to the choices and emphases expressed in current government policy (on the ground that policy reflects preferences expressed by the electorate).
- ◆ Using opinion polls and other attitudinal data to assess the relative importance that people place on different aspects of national life.
- ◆ Using polling or otherwise, to make a direct, summary assessment of whether Australians feel that life has got better or worse.

In the ABS’s view, these approaches may be appropriate for other investigators and other purposes, but they are not appropriate for a national statistical agency.

We have not polled members of the public directly, but we have gathered broad views about what

Alternative values and preferences

Whose values and preferences	Publication and author(a)
Community priorities	<i>Tasmania Together</i> , Tasmanian Parliament
Government policy priorities	<i>The European System of Social Indicators</i> , The European Union
International priorities	<i>The Human Development Index</i> , United Nations

(a) See Appendix II for more information.

The treatment of values, preferences and emphases

Any overall assessment about whether life is getting better unavoidably appeals to values and preferences.

Most obviously, values and preferences are invoked when readers survey any body of statistical evidence and make their assessments about the direction and pace of progress. For example, faced with statistics revealing that the life expectancy of Australians has lengthened during the past decade, average income has risen and more land has been degraded by salinity, one reader may judge that there has been progress and another that there has been regress. Even if all or most Australians attached much the same relative value to different aspects of life, it would be difficult to arrive at a one-line or summary judgment about whether life has got better or worse. Arriving at such a one-line judgment would be even more vexed in the face of widely diverging values and preferences.

Some commentators on MAP have argued that issues of value and preference must also be faced by the writers of such a publication. How, for example, does one decide which aspects of national life should be included, or which statistical indicators should be used to encapsulate those aspects? How does one decide on the balance of the publication across the various aspects of national life? Choices of this kind must be made – otherwise, the ABS would simply point readers to the full array of statistical publications and invite them to make their own selection of evidence and assign their own weightings. Such a course may be suitable for experts, but would be unhelpful to most people.

should be measured – first, by directly consulting stakeholders and experts in the fields of economic, social and environmental measurement; second, by distilling the views expressed during the ABS regular user group discussions regarding what data should be collected and published; and third, during a wide-ranging consultation process (in 2001 when the first issue of *Measures of Australia’s Progress* was being written, and in further consultations after it was released). The second edition reflected changes arising from that feedback. To maintain consistency in reporting over time we have not made any major changes for this edition but plan to review the publication and progress indicators before the next full edition.

Whichever mechanism is used, it is important to remember that society’s views of progress, and of what is important, change over time, and that there are also some aspects of progress – governance and democracy, for example – that are seen as important now, but for which there are no agreed statistical measures yet. The issue of ongoing statistical development is discussed in more detail at the end of this section.

Deciding how measures of progress should be presented

Three broad approaches to presenting the chosen indicators of progress were considered – the one-number approach; the integrated accounting approach; and the suite-of-indicators approach.

Alternative presentations

Presentation	Publication and author(a)
Suite of indicators	<i>Securing the Future</i> , United Kingdom Department of the Environment, Food and Rural Affairs
One number	<i>The Genuine Progress Indicator</i> , The Australia Institute
Integrated accounting framework	SESAME, Statistics Netherlands

(a) See Appendix II for more information.

The one-number approach combines data about progress across a number of fronts (such as health, wealth and the environment) into a single composite indicator. Such composite indicators can be set in contrast with narrower indicators such as GDP. The ABS considers that it is more appropriate for others to develop such composite measures (see box).

The accounting framework approach presents social, economic and environmental data in one unified system of accounts, measured in various units. Potentially this is a powerful tool for analysts, and a detailed set of accounts will complement indicators. However, such a complex system may be too difficult to interpret for anyone wishing quickly to form an overall view about Australian progress. Most importantly, Australia is still a long way from being able to develop such a system, although some environmental accounts (e.g. energy) have been developed to link the economy and the environment. The Dutch System of Economic and Social Accounting Matrices and Extensions (SESAME) is one of the most mature sets of integrated accounts – more details of SESAME are in Appendix II.

The suite-of-indicators approach sets out key aspects of progress side-by-side and discusses the links between them; readers make their own evaluations of whether the indicators together imply that Australia is on balance progressing and at what rate. This is the approach used in *Measures of Australia's Progress*. The approach makes no overall assessment about whether the array of statistical indicators presented implies that life is getting better or worse. Instead, the suite of indicators leaves each individual reader to apply their own values and preferences to the evidence, and to arrive at their own overall assessment of national progress.

The ABS already publishes sets of indicators relating to economic, social and environmental concerns. *Measures of Australia's Progress* brings together all three domains by providing a set of headline indicators of progress that are tracked over time. In our view, this approach strikes a balance between the potential oversimplification of the one-number approach and the complexity of the accounting framework approach. The approach has been used by other countries, for example in the United Kingdom where the government produces a publication *Securing the Future*.

One-number approaches to measuring progress

Although a good deal of effort has been put into trying to develop a single measure of progress (most notably the Genuine Progress Indicator, and the Human Development Index), consensus about the merits of the approach and about particular implementations still appears a long way off. There is no doubt that composite indicators are appealing. The demand for an alternative to that important indicator, GDP, is an argument in favour of a one-number approach.

However, difficulties arise when one wishes to combine several indicators into one number. The components of composite indicators are usually measured in different units – life expectancy (in years), income (in dollars), air pollution (in particles per volume of air), etc. Some compilers of composite indicators express the components in index form, then calculate a weighted or unweighted mean; others convert the components to a common unit of measurement, typically some estimate of their economic value or cost. But neither technique removes the basic issue – namely, that any composite indicator is based on some judgment regarding the relative weights to be applied to the components. Is a one-year increase in average life expectancy to be weighted more heavily than, less heavily than or equally with a 5% decrease in greenhouse gas emissions?

There is, therefore, a danger that a composite index will oversimplify a complex system and give potentially misleading signals.

There is still a debate about extending the scope of economic valuation into non-economic areas. Although attaching dollar values to changes in life expectancy, say, is usually done for methodological convenience, it might send the wrong signals. For example, E.F. Schumacher wrote, "To press non-economic values into the framework of the economic calculus...is a procedure by which the higher is reduced to the level of the lower and the priceless given a price".

Potential shortcomings of the suite-of-indicators approach

Although we adopted the suite-of-indicators approach, it is not without its problems.

- ◆ The choice of indicators could not be made using statistical criteria alone; it has required us to exercise judgment albeit based on the views of experts. Any of thousands of measures of progress could have been chosen, but we present just 14 headline dimensions, most of which use one headline indicator. Although we explain the criteria we have used to select headline indicators, there is an irreducible element of judgment, both in choosing the dimensions of progress to include and in choosing the statistical measures for those dimensions of progress.
- ◆ We have not included indicators for every aspect of progress that some Australians regard as significant. Some (such as a happiness indicator) are not included because such areas of progress are inherently subjective (although we do discuss the issues around measures of happiness and life satisfaction in a feature essay for this edition). Some (such as a single indicator for family and community) are not identified because there is not yet a consensus about the concept that one should measure. Some are not yet included because ABS data construction work or other statistical development is still in progress.

Choosing the progress indicators

The progress indicators presented in this publication were chosen in four key steps.

- ◆ First, we defined three broad domains of progress (social, economic and environmental).
- ◆ Second, we made a list of potential progress dimensions within each of the three domains.
- ◆ Third, we chose a subset of dimensions for which we would try to find indicators, and determined whether each would be a headline or supplementary dimension.
- ◆ Fourth, we chose an indicator (or indicators) to give statistical expression to each of those dimensions.

This was an iterative process and several steps were revisited after listening to the views of the many people we consulted during the publication's development. More information about our selection of dimensions and indicators is provided in the section – *A framework for measuring progress*.

Domains of progress

Most commentators consider that progress relates to issues clustered around broad areas of concern (*domains of progress*). Each domain in turn comprises a number of dimensions of progress. Domain boundaries can be drawn in several ways.

- ◆ The two-domain view: human concerns and environmental concerns.
- ◆ The three-domain view: economic concerns, societal concerns, and environmental concerns.
- ◆ The four-domain view: concerns about aggregate material wellbeing and economic development, society and equity, democracy and human rights, and the environment and nature.

In choosing measures for this publication we adopted the three-domain view, although in presenting the measures we have grouped them

From domains to dimensions

Economy. We began with the systems of economic accounting that guide the ABS program of economic statistics, and concentrated on the major stock and flow variables represented in those systems.

Society. We began by considering key dimensions of social concern, which are underlaid by a view of fundamental human needs and aspirations. The ABS program of social statistics is guided by a social concerns framework, the design of which has drawn on many other frameworks and initiatives, such as those developed by the UN, the OECD and the European Union.

Environment. We began by considering major ecosystems and environmental resources that are recognised in international frameworks such as the System of Economic and Environmental Accounting.

into four areas of progress. These areas relate to individuals; the economy and economic resources; the environment; and living together.

The choice of a view is largely a matter of convenience; the view is a tool to help choose or present the measures. The view we have adopted does not purport to be a model of a world in which the environment, economy and society can be separated. The three domains used in choosing the measures comprise one system: the economy depends on a functioning society which in turn depends on a functioning environment and economy. And although some concerns can, for the convenience of discussion, be attached loosely to the economy, the society or the environment, they are all of importance – education and training, and work, for example, are of both social and economic importance; air quality is of economic, social and environmental importance.

Dimensions of progress

To identify the major dimensions, the three domains were considered in detail and partitioned into a number of dimensions of progress to ensure that the important aspects of economic, social and environmental progress were considered.

Once a list of dimensions of progress that might be presented had been compiled, we selected the subset that would be presented. These were divided into headline and supplementary dimensions. A balance had to be struck – if we showed too many dimensions, readers would not be able to assimilate them; if we showed too few, important aspects of progress would be omitted, and the overall picture might be biased. Ten to twenty dimensions seemed about right, and the choice of those was guided by a wide variety of people from inside and outside the ABS.

Currently, MAP is structured around 14 headline dimensions which reflect key aspects of life in Australia. In addition, there are five supplementary dimensions, which although not given headline status are included in MAP in recognition of their relevance to the progress story.

During the design of MAP, we were guided by past and current ABS consultations. The ABS has a systematic program of consulting users of statistics about our statistical frameworks, surveys, products and analyses. Through this program, thousands of government agencies, academic researchers, businesses and business councils, community organisations and individual Australians have told the ABS what they think it is important that we measure. Our initial choices were tested through several further rounds of consultation undertaken specifically for MAP.

The final choice of measures was made by the ABS after taking account of the full spectrum of views. In so far as such selections are value-driven, they are distilled from the values and emphases expressed by the user community.

Indicators of progress

Our next step was to find an indicator to express each of these dimensions of progress. Our selection of indicators was guided by expert advice and by the criteria described in the box.

Such a small set of indicators cannot paint a full picture of progress, and so supplementary indicators are included. Some supplementary indicators give more information about dimensions of progress that are already represented by a headline indicator; others extend beyond the dimensions covered by the headline indicators.

We recognise that our sifting process means that this publication is both partial and selective – partial because not every dimension of progress is included, and selective because progress in each of the included dimensions is measured using just a few indicators.

The set of headline indicators plays a special role in MAP, and particular considerations of values and preferences arise. MAP presents several hundred indicators overall; to assist readers in gaining a quick understanding of the bigger picture about national progress, MAP presents a more compact suite of fourteen headline indicators, covering the fourteen headline dimensions (some headline dimensions have more than one headline indicator, and some have none).

Headline indicators are distinguished from others by their capacity to encapsulate major features of change in the given aspect of Australian life. And an additional criterion was applied to them – namely, that most Australians would agree that each headline indicator possessed a ‘good’ direction of movement (signalling progress, when that indicator is viewed alone) and a ‘bad’ direction of movement (signalling regress, when that indicator is viewed alone). This good-direction / bad-direction distinction raises unavoidably the question of values and preferences.

Once the ABS had drafted its initial list of candidate headline indicators, it undertook extensive consultation to test whether the list accorded with users' views. Whether a reader agrees with the ABS choice of headline indicators or not, he or she is free to peruse the whole suite of several hundred indicators in MAP and to assign high weight, low weight or no weight to each, as his or her own values and preferences dictate.

Some readers of MAP have tried to infer an ABS view about the relative importance of the different aspects of Australian life from the number of aspects discussed under the various headings, or from the number of headline indicators or the number of indicators overall. No such inference can or should be drawn. It is not for the national statistical agency to say what relative importance should be accorded to, say, changes in health, income or air quality. The ABS based its decision about how many indicators to present not on relative value but on statistical grounds – is it possible to find one or a few indicators that would encapsulate the changes in the given aspect of life?

Criteria for choosing progress indicators

When deciding which statistical indicators should be used to encapsulate each aspect of Australian life, we did not have a comprehensive or longstanding body of users' advice to rely upon. For some aspects – health, crime, income, productivity and air quality, for example – there was already some broad consensus regarding indicators that would meet MAP's criteria. But for other aspects – social capital, knowledge and innovation and biodiversity, for example – the effort to develop statistical indicators is more recent, and stakeholder agreement has not yet been reached. Thus, during the development of MAP, the ABS undertook wide-ranging consultation with experts and the general community of users regarding the indicators that would be ideal for each aspect of Australian life and the best approximations to those ideal indicators that are currently available. For the newer or less settled aspects, MAP generally provides an array of indicators and invites readers to form a view about progress.

Our first step was to take each dimension of progress in turn, and to ask ‘Why is this dimension particularly important to Australia's progress? What are the key facets of progress in that dimension that any headline indicator should seek to express?’

There were usually several competing indicators that might be included. We chose among them by reference to criteria, such as the following.

Indicators should focus on the **outcome** rather than, say, the inputs or other influences that generated the outcome, or the government and other social responses to the outcome. For example, an outcome indicator in the health dimension should if possible reflect people's actual health status and not, say, their dietary or smoking habits, or public and private expenditure on health treatment and education. Input and response variables are of course important to understanding why health outcomes change, but the outcome itself must be examined when one is assessing progress.

It was also judged important that movements in any indicator could be associated with progress by most Australians. For instance, one might consider including the number of divorces as an indicator for family life. But an increase in that number is ambiguous – it might reflect, say, a greater prevalence of unhappy marriages, or greater acceptance of dissolving unhappy marriages.

Applying this criterion depends crucially on interpreting movements in one indicator, assuming that the other indicators of progress are unchanged. For example, some would argue that economic growth has, at times, brought environmental problems in its wake, or even that the problems were so severe that the growth was undesirable. Others would argue that strong environmental protection might be retrograde to overall progress because it hampers economic growth. However, few would argue against economic growth or strong environmental protection if every other measure of progress was unaffected: that is, if growth could be achieved without environmental harm, or if environmental protection could be achieved without impeding economic growth. Of course, although keeping other things equal might be possible in theory, it seldom, if ever, occurs. The links between indicators are important, and *Measures of Australia's Progress* discusses these links once trends in the individual indicators have been analysed.

Other criteria included an indicator's availability at a national level and as a time series. A full list of our criteria for headline progress indicators is in Appendix I.

Deciding what attributes to measure

Once the ABS had decided on the suite-of-indicators presentation style and on the domains and dimensions of progress, there were still choices to be made regarding the characteristics or attributes of each dimension that should be measured. This is best explained through an example – say, the Health dimension. A comprehensive statistical compendium about health in Australia might present data on:

- ◆ health outcomes / the health status of the Australian people – e.g. life expectancy or the occurrence of disease or disability
- ◆ health risk factors / pressure points – e.g. patterns of diet, exercise, smoking and occupation that might point to future health outcomes
- ◆ financial and other resources (or inputs) expended on health improvement – e.g. government and private current and capital expenditures, the health workforce
- ◆ process measures – e.g. the number of people receiving health treatments
- ◆ performance metrics – e.g. productivity, efficiency and effectiveness ratios for health service delivery.

Whenever the available statistics support it, MAP focuses on outcomes, that is on things that provide direct measures of whether life in Australia has been getting better. For our headline health indicator, we sought a measure that encapsulates major elements of health outcomes for the whole Australian population. And the best available single measure at present is life expectancy at birth, which is supplemented by other aspects of outcomes such as the burden of disease.

For this and other dimensions of progress, statistics on other attributes are also presented in MAP. But the aim is always to assist the reader to make an overall assessment of historical trends in outcomes or of key influences on outcomes. So for example, the data on life expectancy trends and the burden of disease are supplemented by data on risk factors such as obesity, exercise and smoking – to assist readers who are interested in forming a judgment about past influences on (and the likely future course of) health outcomes.

For several environmental dimensions, outcome-based data are supplemented by discussions of the programs and resources directed to environmental amelioration, such as conservation reserves, revegetation and other efforts to address salinity, rates of water use, and so on.

The data on educational attainments are supplemented by process measures such as school retention rates that influence past and future trends in attainment.

The data on income and wealth are supplemented by performance metrics such as competitiveness that exert a key influence on past and future improvements in material wellbeing.

Is it possible to sum or otherwise combine indicators? To illustrate – changes in national wealth can be summarised well in one indicator (real net worth per capita), whereas half a dozen indicators are needed to depict significant changes in knowledge and innovation.

The place of values and preferences in MAP is well illustrated by its treatment of income distribution and equity. Many Australians believe that a more even distribution of income would represent

progress; some would argue that, other things equal, any shift to more even distribution would be an improvement; others would argue only for a somewhat more even distribution than at present – say, one that reduces extreme disparities between high and low incomes. Other Australians would not accept that more even distribution of income would represent progress. Thus, when developing MAP, the ABS decided that measures of income distribution should appear only as supplementary indicators, not as headline indicators. Likewise, associated with many other dimensions of progress, MAP compares and contrasts the circumstances of different groups in the population.

The treatment of linkages

A change in one aspect of national life is almost always associated with changes in others. Even if the linkages between the different aspects were relatively simple ('when this variable goes up by this amount, that variable goes down by this amount'), the occurrence of linkages poses problems for anyone developing a publication like MAP. And, of course, real-world linkages are much more complex.

One must decide how to present linkages between aspects of progress to the reader. To present particular linkages rigorously (and to present the full network of linkages comprehensively), one would need to provide a model of interactions between and within Australian society, economy and environment. The ABS puts considerable effort into developing statistical frameworks and data models that encapsulate the characteristics of entities (individuals, households, businesses, government agencies and other organisations) and the transactions, interactions and relationships between them. That work is informed by and seeks to assist 'scientific' models of the world; but developing such scientific models is not the business of a statistical agency. And a full-blown presentation of such models would be unsuitable for a publication like MAP.

On the other hand, ignoring linkages between the different aspects of progress could imply that an assessment of past progress can be achieved by a simple summation of changes in the indicators, or that a vision of future progress can be achieved by sketching a desirable or probable trajectory for each of the indicators. To forestall such an oversimplified view, the introductory chapters of MAP include a general discussion of 'How the progress indicators relate to one another'; and the chapter on each dimension of progress includes a short discussion of links to other dimensions. These discussions have been distilled from the large body of Australian and overseas research, and have been tested through user review.

Continuing development

These headline indicators form a core set of statistics for reporting on Australian progress. But those we have chosen will change over time, because, for example:

- ◆ Thinking may change about what is important to national progress.
- ◆ There may be conceptual developments relating to one or more dimensions of progress (such as social cohesion).
- ◆ There may be statistical developments that allow us to measure aspects of progress for which we do not at present construct indicators (such as human capital).

The commentary accompanying each headline indicator discusses what an ideal progress indicator might be for each dimension. The conceptually ideal indicators may, in some cases, help guide the continuing development of Measures of Australia's Progress.

Endnotes

- 1 OECD, 2005, OECD 2005 Statistics, Knowledge and Policy: Key Indicators to Inform Decision Making 'The Reduction of Complexity by Means of Indicators: Case Studies in the Environmental Domain'.

How the progress indicators are presented

Measures of Australia's Progress (MAP) portrays national progress using an array of indicators that measure change within different aspects of Australian life. The indicators provide the building blocks to which readers can apply their own evaluations to assess whether Australia is on balance progressing and at what rate.

Readers can use this publication in three ways to assess progress:

- ◆ First, by examining the data and reading comments about each indicator's historical movements.
- ◆ Second, by reading the discussion of links between indicators.
- ◆ Third, by reading the comments about factors that influence change and the national assets that may support future progress.

Considering each indicator in turn

The data are presented in a variety of ways and the comments made about the progress indicators also vary. But some common features are discussed for each:

- ◆ National, disaggregated national and international progress.
- ◆ Direction and rate of change.
- ◆ Recent and longer term progress.

National and other indicators

The indicators have been chosen to reflect recent progress (primarily over the past 10 years) at the national (or whole-of-Australia) level.

Disaggregated national data. Although an aspect of life for Australia as a whole may be progressing or regressing, the rate of change – or even its direction – may not be mirrored in every state and territory, or in every industry in Australia. For example, between 1995 and 2005 the number of people employed in Australia rose by 21%; some industries experienced much faster rises (for example in mining, employment grew by 60%), while in other industries there was a fall (employment in wholesale trade fell by 32%). We cannot discuss every difference within Australia for every indicator in this publication. But we do discuss some of the more significant differences and provide signposts to the more detailed and disaggregated data sets underlying the indicators.

Similarly, rates of progress may differ between various subgroups of the Australian population. We do not draw attention to every difference, nor do we systematically compare progress between men and women, between Indigenous and other Australians, or between other groups of people. But the commentary draws attention to differences that are particularly noticeable.

Aboriginal and Torres Strait Islander peoples

Measures of Australia's Progress (MAP) is built around indicators that provide a national summary of important areas of progress, presented in ways which can be quickly understood by all Australians. Its focus is Australia-wide, rather than summarising the progress of particular groups of people. However, acknowledging Aboriginal and Torres Strait Islander peoples as Australia's first inhabitants, and recognising the marked and widespread disadvantage that they experience, some supplementary commentary is included: their health, housing, education, and work are discussed within each headline indicator's commentary alongside differences between men and women, young and old, etc. (some of these issues were also examined in the article *Multiple disadvantage* which appeared in the 2004 edition of MAP). The commentary does not attempt to summarise general progress for Indigenous Australians. Rather, it contrasts their health, education, etc. with that of Australians generally. However, for some dimensions of progress, data comparing Indigenous Australians with other Australians, or showing changing levels of Indigenous disadvantage over time are still being developed.

But perhaps more importantly, Indigenous Australians' notions of what constitutes progress may differ in some ways from those of other Australians. For some areas of progress, such as family and community, Indigenous views of progress may be of a different nature from the notions of progress that are set out in this publication. Issues relating to cultural and spiritual values, including language and the relationship of Indigenous Australians with the land, are likely to be important. Further development of MAP will benefit from consultation between the ABS and Indigenous peoples about which issues of concern can be reflected in such a statistical summary.

While MAP looks at progress generally, and some aspects of Indigenous disadvantage in particular, the report *Overcoming Indigenous Disadvantage*, most recently issued in 2005 by the Steering Committee for the Review of Government Service Provision, contains more detailed statistics on Indigenous peoples. The report, like MAP, is built around a statistical framework with headline and supplementary (strategic change) indicators. It will be released regularly to measure progress in overcoming Indigenous disadvantage.

International comparisons. *Measures of Australia's Progress* reflects on issues of importance to Australia and Australians, and no systematic or comprehensive attempt has been made to compare Australia's progress with that in other countries. Considering Australian progress side-by-side with progress in other countries can be informative. However, if we were confined to presenting indicators for which comparable overseas data are available, the coverage here would be narrower and its focus would probably be less relevant to Australian concerns. Where possible we draw some international comparisons of headline indicators for those dimensions of progress for which comparable international data are available. And a special article compares information from members of the Organisation for Economic Co-operation and Development (OECD) across a range of areas of progress.

Direction and rate of change

Both the direction and rate of change in a progress indicator are important. It is informative to see whether life expectancy is increasing or decreasing, but the rate of increase is also informative, particularly when compared with historical rates.

Just as the rates of progress or regress differ, so do the levels of economic, social or environmental wellbeing attained. We concentrate on progress and hence on change but, when assessing national progress, it is sometimes informative also to consider levels.

Past, present and future

Each indicator considers progress during the recent past, typically the past ten years. Where possible, though, reference has been made to progress over the longer term. Some indicators move only slowly, and so a longer time horizon is needed to perceive any appreciable change. For other indicators, the longer lasting trends that are of greatest interest are overlaid by cyclical and other short term variation (e.g. the business cycle or regular climatic patterns such as El Niño).

How the indicators relate to one another

Each aspect of progress is related, either directly or indirectly, to most of the others. Change in one dimension of progress is typically accompanied by change elsewhere. Therefore it is important to consider the full array of indicators together.

Broadly, we may think of two types of relationship between different areas of progress – trade-offs and reinforcements.

- ◆ *Trade-offs* occur when one area of progress improves at the expense of another. In some cases, trade-offs arise after a change of preference: spending on education might be cut, for example, to give more money to health. But they also occur as flow-on effects: for example, economic activity rises and so might greenhouse gas emissions.
- ◆ *Reinforcements* occur when one aspect of progress improves and strengthens another. For example, as economic production rises, so might employment.

In reality, the overall effect of a change in any one dimension is much more complex. An intricate system of trade-offs and reinforcements comes into play when any dimension of progress changes. For example, suppose factory output increases. This generates more income, and so there is more money to pay for health care, for example. But increased factory output might also increase air pollution, which is harmful to people's health or might be detrimental to other economic activity such as agriculture.

Health and national progress

Health is linked with many other aspects of progress, and is both influenced by – and influences – them. Here are some of the relationships.

Health and the economy: economic activity provides the money (be it private or public) to pay for doctors and nurses and to build hospitals. But that money is spent at the expense of something else, be it education, law and order or more money for investment that might stimulate economic growth. In turn, a healthy population provides the work force to create economic growth. The changing composition of the economy, as well as the overall level of economic activity, can also affect health: proportionally more people employed in office-based jobs might mean fewer industrial accidents or pollution, but might also create an increase in medical complaints like repetitive strain injury. There might be health implications too if those working behind desks take less exercise than those in more active employment.

Health and Economic hardship and Housing: studies have pointed to the link between economic hardship and poor health. Although some of the links are not fully understood, it seems reasonable to speculate that the poorest members of society may have an inferior diet or accommodation (perhaps they might even be homeless) which will affect their health.

Health and Education and training: a healthy population is better able to take part in education. An educated population provides doctors and nurses to treat the sick, and the scientists to develop new treatments.

Health and Crime: being the victim of crime can of course affect one's health, while some crime is committed by those with a drug dependency, itself a health issue.

Health and the Environment: many aspects of environmental progress relate to health. Air pollution – both the quality of the air we breathe and the chemicals that have damaged the ozone layer – may affect health. Salinity and other forms of land degradation affect fresh water quality and availability. Land clearance has been one driver of land degradation. It has also put pressure on native wildlife. Many scientists believe that various cures for diseases lie hidden in the genes of animals and plants. Each time a species becomes extinct, its genetic material is lost.

Health and Family, community and social cohesion: a society whose members take care of one another will put less strain on the health system and perhaps leave it more available to take care of those most in need. Some experts believe that there are links between levels of social attachment and the incidence of both physical and mental illness.

Although within the indicator commentary we mention some of the more obvious links, we do not mention every relationship, and we hope that readers will bear in mind the many possible links between indicators. As an illustration, the box above discusses some of the relationships between progress in the health dimension and other headline indicators.

Looking to the future

Australians are, of course, concerned not just with historical progress or with the current condition of the nation, but also with the future. One salient question is 'Will progress in any area lead only to short term gain and perhaps eventual loss, or is the progress sustainable in the longer term?' This is not an easy question to answer.

When trying to paint a statistical picture of the future, one must invoke many more assumptions and exercise much more judgment than when depicting the past. Many styles of forward-looking analysis are not within the ambit of official statistics.

This publication tends not to enter into any direct discussion of sustainability into the future. Even in ecological studies, where the concept of sustainability most commonly arises, agreement has not yet been achieved regarding suitable summary measures of sustainability. Agreed measures are still more distant for such concepts as a sustainable distribution of income.

However, it is natural that people wish to consider the future, and the ABS believes that this publication has a role in facilitating this. One way of looking to the future is to consider whether Australia's stocks of assets (human, natural, produced and financial, and social) are being maintained. Our indicators measure progress in dimensions that relate directly to, or are intimately linked with, Australia's assets.

A framework for measuring progress

To assist in selecting measures of progress it is often useful to use some sort of framework to sketch out the territory one is trying to measure. Frameworks are a tool to support statistical measurement, data analysis and analytical commentary.

Frameworks have two main purposes.

At one level, frameworks can break the world into manageable pieces by providing a map of the conceptual terrain surrounding an area of interest. In other words frameworks can define the scope of an enquiry, delineate the important concepts associated with a topic and organise these into a logical structure. Rather than asking 'how should we measure progress?', one can use a framework to consider, separately, ways to measure progress in social, environmental and economic concerns. When considering progress, the choice of a view is largely a matter of convenience; the view is a tool to help choose or present areas of progress and progress indicators, but it does not have to purport to be a model of a world in which the environment, economy and society are separated. Such a framework can help in the preparation and presentation of a publication. It can also begin to set out the links between the various dimensions of progress: paid work for example is important to the economy and to people's sense of self-worth.

At another level, a framework can provide a theory of the way the world works. These frameworks also set out to demonstrate how the various aspects of progress fit together and relate to one another. Such theoretical frameworks often require value-judgements about what overall progress means. National statistical agencies are usually uncomfortable making such statements.

There is no one international framework on which everyone agrees. Some international statistical initiatives, such as the United Nations' Human Development Index (HDI), consider only a very few issues of concern common to all nations. Others use a larger number of issues. But it is unlikely that any international initiative will include all aspects that are important to any one country.

This essay describes the framework used by the ABS underpinning *Measures of Australia's Progress* (MAP). Just as there is no one view of progress, there is no single framework. We have listened to many views when developing this publication, and recognise the divergence of opinion that exists. We welcome comment and feedback from readers to assist in evolving the ideas and framework presented here.

General approach: Three key questions

This ABS framework is built around three fundamental questions.

- ◆ **Question 1:** What do we mean by progress overall?

- ◆ **Question 2:** How can we describe progress across society, the economy and the environment, and what dimensions of progress should be included?
- ◆ **Question 3:** What indicators best encapsulate progress in each dimension (noting that some desirable indicators need to be developed in the future or are too subjective for the ABS to use in the foreseeable future?)

The rest of this essay describes the ABS approach to answering these questions. It also describes the arrangement of the dimensions in this publication.

Question 1: What is 'progress'?

Throughout this publication, three principles are key when considering progress.

- ◆ First, we define progress – in its broadest sense – to be synonymous with life getting better.
- ◆ Second, progress is multidimensional. Whether or not we are progressing depends on the state of our environment, the health of our economy and a variety of areas of individual and societal wellbeing. And so measures of progress for each dimension are necessary.
- ◆ Third, any assessment of whether Australia is on balance progressing and at what rate depends on the personal evaluations that readers place on the relative importance of progress in each dimension.

With these three principles as a starting point, the ABS set out to develop a framework within which progress could be measured. This framework has been developed in consultation with a broad cross section of Australian society. It provides a basis from which the measures of progress in MAP were selected: guiding both the selection of dimensions of progress (those aspects of life seen as crucial to progress) and the statistical indicators of progress for each dimension. More detail is included in the essays *Measuring Progress – an ABS approach* and *How the progress indicators are presented*.

The three domains of progress

We noted above that progress is multidimensional. The various dimensions that comprise progress can be clustered in many ways. When developing MAP we organised our thinking across the three broad areas:

- ◆ Economic Progress
- ◆ Environmental Progress
- ◆ Social Progress

Our choice was largely a matter of convenience as a tool to help choose the dimensions to include. It does not purport to be a model of a world in which the environment, economy, and society can be separated.

We have chosen three domains of progress, and described what constitutes progress overall. But what constitutes progress in each domain?

Question 2: Progress in each domain

We have defined progress to be synonymous with life getting better. We characterise progress in each domain as follows.

- ◆ Environmental progress equates to a reduction of threats to the environment and improvements in the health of our ecosystems.
- ◆ Economic progress equates to enhancing the nation's income (broadly Australians' real per capita levels of consumption) while at least maintaining (or possibly enhancing) the national wealth that will support future consumption.
- ◆ Social progress equates to increases in the wellbeing of the population; a reduction of threats to, and increases in social cohesion; and protection and enhancement of democratic rights. (Social wellbeing is multi-dimensional and described in more detail later on).

Whether there has been progress overall will depend on each reader's own assessment of the relative importance of progress in each domain. Moreover, progress in any one domain might go hand in hand with progress in another. That is, progress in one area can reinforce progress in another: economic growth for example might provide more money for government to spend on environmental protection. But progress in one domain might also require some trade-off against progress in another: economic growth in certain sectors might create more greenhouse emissions.

We now have a broad characterisation of what progress in each domain amounts to. The next question we asked was: 'In order to assess progress, what dimensions (aspects) of each domain should be considered?'

The environment

Environmental progress equates to a reduction in threats to the environment and improvements in the health of our ecosystems.

In order to assess progress, what dimensions (aspects) of this domain should be considered?

- ◆ the quality of the natural landscape (land, water, biodiversity)
- ◆ the quality of the air and atmosphere
- ◆ the quality of oceans and estuaries

Why these dimensions are important.

The natural landscape comprises Australia's land and water and the plants and animals that rely on them. The three are inextricably linked.

Land: The condition of the soil covering Australia's land has a critical impact on our terrestrial ecosystems. Our soil resources are an important

natural asset, and their degradation is a significant concern to Australian farmers, governments and the general public.

Water is fundamental to the survival of people and other organisms. Apart from drinking water, much of our economy (agriculture in particular) relies on water. The condition of freshwater ecosystems has a critical impact on the wider environment.

Biodiversity: Our plants, animals and ecosystems bring important economic benefits, are valuable to society and are globally important. Native bushland has cultural, aesthetic and recreational importance to many Australians. Most importantly, the ways in which organisms interact with each other and their environment are important to human survival: we rely on ecosystems that function properly for clean air and water and healthy soil.

The air: Poor air quality has a range of negative impacts: it can cause health problems, damage infrastructure, reduce crop yields and harm plants and animals. Air pollution occurs both naturally and as a result of human activities. Australians consistently rank air pollution as a major environmental concern.

The atmosphere surrounding our planet plays a role in supporting life on earth, for example: oxygen is required to sustain living animals; a layer of ozone shields us from harmful ultraviolet rays from the sun; and greenhouse gases, predominantly carbon dioxide, maintain the surface temperature of the earth.

Estuaries and oceans: Our beaches, estuaries and wider marine ecosystems play an important role in Australian life. Our seas also support a vast array of life forms and many of our marine ecosystems are globally important.

Gaps?

These three dimensions encapsulate all of Australia and its ecosystems (the landscape, the seas that surround us; and the air around and above us). There do not, therefore, appear to be any conceptual gaps in this framework.

Society

Social progress involves increases in the wellbeing of the population; a reduction of threats to, and increases in social cohesion; and protection and enhancement of democratic rights.

In order to assess progress, what dimensions (aspects) of this domain should be considered?

- ◆ Health
- ◆ Education and training
- ◆ Work
- ◆ Housing
- ◆ Economic hardship
- ◆ Family, community and social cohesion
- ◆ Crime

◆ Democracy, governance and citizenship

Why these dimensions are important

Health: People hope to have a long life, free from pain, illness or disability. Good health for all brings social and economic benefits to individuals, their families and the wider community.

Education and training help people develop knowledge and skills that may be used to enhance their living standards, contribute to society and sustain and extend their cultural traditions. For an individual, educational attainment is widely seen as a key factor to a rewarding career. For the nation as a whole, having a skilled workforce is vital to supporting ongoing economic development and improvements in living conditions.

Work: Paid work is the means through which many people obtain the economic resources needed for day to day living, for themselves and their dependants, and to meet their longer-term financial needs. Having paid work contributes to a person's sense of identity and self-esteem. People's involvement in paid work also contributes to economic growth and development.

Housing provides people with shelter, security and privacy. Having a suitable place to live is fundamental to people's identity and wellbeing.

Economic hardship: Society generally accepts that people should have access to some minimum standard of consumption of goods and services. The presence of economic hardship that could preclude this minimum standard would be a societal concern.

Family, community and social cohesion: Families and communities are core structural elements in society – basic building blocks of national life. Families provide guidance on the social values underlying civil society and the care generated within the family supports the development of healthy functioning individuals. The vast range of services provided within communities by groups, clubs and charitable organisations are a crucial adjunct to support the role of the family. The quality and strength of people's relationships and bonds with others – their family, friends and the wider community – are important ingredients of the level of social cohesion. And a more cohesive society is one in which communities are strong and inclusive.

Crime takes many forms and can have a major impact on the wellbeing of victims, their families and friends, and the wider community. Those most directly affected may suffer financially, physically, psychologically and emotionally, while the fear of crime can affect people, restrict their lives in many ways, reduce levels of trust and impact on social cohesion. There are other costs as well, including the provision of law enforcement services and corrective services. Although government agencies take on the major responsibility for law enforcement, many businesses and householders also bear costs in protecting against or paying for the consequences of crime. A reduction in the

Inequality and Multiple Disadvantage

Inequality is one aspect of social progress that is not measured directly by these indicators.

Many people believe that the level of inequality in a society is a measure of its cohesiveness and that levels of disparity of opportunity in a society can be a threat to social cohesion. But many also recognise that the differences in reward for effort (which result in differences in material wellbeing across society) are an important, perhaps necessary, incentive in a western economy. And so it is very difficult to discuss progress in this area without making a value judgement about the level of inequality that may threaten social cohesion versus that needed to create incentive. An indicator based on changes in income distribution, for example, is unlikely to have unambiguously good and bad directions of movement upon which virtually all would agree (one of the criteria for MAP's headline indicators).

That said, information on the distribution of resources is included in MAP. Measures of the change in distribution of income, wealth and so on do not feature in the set of headline indicators, although some discussion about their distribution appears in relevant chapters. However, information indicating changes in the risk of economic hardship is included as a headline dimension.

Also, in the 2004 edition of MAP, multiple disadvantage in Australia was considered in an essay considering the a number of headline indicators side by side – health, income, education, work and housing. In particular we looked at patterns of different types of disadvantage among various population subgroups. No attempt was made, however, to describe progress in this area.

incidence of crime is linked to greater social cohesion.

Democracy, governance and citizenship:

National life is influenced, not just by material qualities such as economic output, health and education, but also by many intangible qualities such as the quality of our public life, the fairness of our society, the health of our democracy and the extent to which the citizens of Australia participate actively in their communities or cooperate with one another.

Good, effective public governance helps to strengthen democracy and human rights, promote economic prosperity and social cohesion, reduce poverty, enhance environmental protection and the sustainable use of natural resources, and deepen confidence in government and public administration.

Gaps?

There are many different frameworks for assessing progress and wellbeing in this area. The ABS has a well-developed framework for measuring social wellbeing (*Measuring Wellbeing, cat. no. 4160.0*). And these dimensions of social wellbeing are all covered in MAP. In addition to these eight headline dimensions, one supplementary dimension, *Culture and leisure*, is also considered.

The economy

Economic progress equates to enhancing Australia's national income (broadly Australians' real per capita levels of consumption) while at least maintaining (or possibly enhancing) the national wealth that will support future consumption.

In order to assess progress, what dimensions (aspects) of this domain should be considered?

- ◆ National wealth
- ◆ National income
- ◆ Productivity

Why these dimensions are important

National wealth: Along with the skills of the work force, a nation's wealth has a major effect on its capacity to generate income. Some produced assets (such as machinery and equipment) are used in income-generating economic activity. Some natural assets (such as minerals and native timber) generate income at the time of their extraction or harvest. Holdings of financial assets with the rest of the world (such as foreign shares, deposits and loans) return income flows to Australia. Other assets, such as owner-occupied dwellings, provide consumption services direct to their owners.

National income, reflects Australians' capacity to purchase goods and services, and is a key indicator of material living standards. It is also important for other aspects of progress. Not all income is spent on the current consumption of goods and services. Income that is saved can be used to accumulate wealth in the form of, say, houses, machinery or financial assets. These assets can directly satisfy individual and societal needs, or can generate future income and support future consumption.

Productivity: A nation's productivity is the volume of goods and services it produces (its output) for a given volume of inputs (such as labour and capital). The amount by which output growth exceeds input growth is the productivity improvement. Productivity is an important measure of economic progress and helps link changes in national income with changes in national wealth. Improvements in productivity mean the economy is using resources (capital, labour, energy or materials) more efficiently.

Gaps?

The System of National Accounts is a well developed framework for considering the workings of the economy. National income and wealth consolidate, respectively, economic stocks and flows. Productivity measures how efficiently economic inputs are used to generate income. Together, these three headline dimensions account for the key aspects of economic progress. Supplementary dimensions of *Transport, Communication, Competitiveness and openness,* and *Inflation* are also considered. Information on knowledge and innovation is included in the *Productivity* dimension.

Now that Questions 1 and 2 have been answered, we have an understanding of progress in each domain and the dimensions of progress that should be measured. But which statistical indicators should we use to measure progress in each dimension?

Question 3: What indicators could most effectively be used to assess progress related to these dimensions?

For each dimension we discuss a conceptually ideal indicator and the best available proxy.

The environment

The natural landscape: An ideal indicator might consider all Australian biodiversity – the diversity and abundance of micro-organisms, plants and animals, the genes they contain and the ecosystems of which they form a part. Such a measure would reflect changes in the health of Australia's ecosystems including our land and water. But to measure change as comprehensively as this would be difficult, if not impossible. Instead we use a suite of indicators to discuss progress in three key components of the landscape: land, water and biodiversity.

- ◆ **Biodiversity:** We use two headline indicators: change in the conservation status of one small component of faunal biodiversity: mammals and birds; and the clearance of native vegetation, itself a direct measure of the loss of floral biodiversity as well as a key threat to Australia's terrestrial biodiversity.
 - ◆ The number of endangered birds and mammals: This indicator ignores the vast majority of biological diversity. And changes to the list of threatened species should be treated cautiously. Species can be removed or added because of improved knowledge, not because they became more or less endangered. But over time, if the numbers of species that are threatened increase substantially there is reason to believe that certain species are declining.
 - ◆ Land clearing: Ideally, the headline indicator would consider the area of native vegetation cover in Australia. Such an indicator would require a weighted measure of the extent and intensities of land clearance and modification: apart from the practical difficulties of putting weights on different types of clearance, few accurate time series data are currently available. For the time being, estimates from the National Greenhouse Gas Inventory (NGGI) are used. These estimates do not include all land clearance, but include the majority of intensive clearance of native vegetation.
- ◆ **Land:** Ideally, the headline indicator would measure the land area affected by different types of degradation, and perhaps place a

dollar value on the cost of degradation to agriculture, infrastructure and the environment. It might also measure whether the ways we use the land that lead to degradation are continuing. But many forms of degradation overlap one another, and there is no single measure of the area of degraded land in Australia. We focus here on dryland salinity, a widespread form of soil degradation, the impacts of which are wider than lost agricultural production and include damage to water resources, biodiversity, pipelines, houses and roads. It is linked to other forms of degradation such as soil erosion, is expensive to rectify and adversely affects agricultural or pastoral yields.

- ◆ **Water:** Ideally the headline indicator would consider the health of Australia's freshwater ecosystems. Changes in the quantity and quality of all surface and groundwater would be measured, together with impacts from factors such as invasive species and changes to river flow. But such data are unavailable for much of the country, so we focus on water use, and consider the proportion of Australia's water management areas within which water extraction is thought to be sustainable.

The air and atmosphere: An ideal indicator might encapsulate how both the quality of the air and the atmosphere is changing over time. But the factors impacting on local air quality and those which impact on the atmosphere more broadly are very different and so we consider these issues separately.

- ◆ **Air:** Air quality has direct impacts on human health and enjoyment of life, and is particularly an issue in urban areas. Ideally, a headline indicator would encapsulate all aspects of air quality, but pollution takes many forms and there is, as yet, no agreed way in which different pollutants could be combined into just one measure. Therefore we focus on urban air quality expressed as the concentration of fine particle pollutants in the atmosphere, a form of air pollution about which many health experts in Australia are most concerned.
- ◆ **The atmosphere:** The atmosphere is an essential component of all ecological systems on Earth. Global warming and climate change are potential threats to biodiversity and to all ecosystems, economies and societies. Ideally, the headline indicator would assess Australia's total greenhouse emissions. But it is difficult to measure emissions from some sources accurately, especially emissions from land clearing and agriculture. The headline indicator looks at Australia's net emissions (including those from land use change).

Oceans and estuaries: A wide range of environmental concerns are associated with our oceans and estuaries. It is difficult to conceive of a single headline indicator that might measure the

health of our marine ecosystems other than some measure of the total biodiversity within them. We present a range of information about this dimension of progress but there is no headline indicator.

Society

Health: An indicator describing how long Australians live while simultaneously taking into account the full burden of illness and disability, would be a desirable summary measure of progress. But although such indicators have been developed they are not available as a time series. Life expectancy at birth is one of the most widely used indicators of population health. It focuses on length of life rather than its quality, but it usefully summarises the health of the population.

Education and training: An indicator that recognised the sum of all knowledge and skills held by people might be ideal, but is not available. The indicators of educational progress used here measure the attainment of formal non-school qualifications, and the levels of participation in education and training. The headline indicator is the proportion of the population aged 25–64 years with a vocational or higher education qualification. The age range selected identifies an age group where most people have completed any initial non-school qualifications.

Work: Many aspects of work affect people's wellbeing, such as hours worked, job satisfaction and security, levels of remuneration, opportunity for self-development, and interaction with people outside of home. An ideal indicator of progress would reflect these and other aspects of work to measure the extent to which Australians' work preferences are satisfied. While a single indicator covering all these aspects is not available, useful indicators of progress may be obtained by looking at the extent to which people's aspirations for wanting work, or more work, are unsatisfied. The official unemployment rate is a widely used measure of underutilised labour resources in the economy, and one that relates to both the economic and social aspects of work.

Housing: An ideal indicator might measure people's access to decent, affordable housing. But there is no single headline indicator to show whether housing circumstances have been getting better or worse. No such current data are available and so we discuss the importance of this dimension without using a headline indicator.

Economic hardship. An ideal indicator would identify changes in the extent to which people fall below minimum living standards, and the numbers of people that fall below. The problems of definition aside, measurement is difficult because it requires information about people's living standards. Such data are not available. The headline indicator focuses on changes in the average disposable (after tax) income of households close to the bottom of the income distribution. People in economic hardship are likely to have relatively low income and low

wealth. The headline indicator provides no information about the number of people living in economic hardship. But it does provide information about how the income of those in hardship is likely to be changing.

Family, community and social cohesion are important aspects of society, but the way in which they contribute to progress is difficult to define and measure. Rather than present a headline indicator, we present some measures relevant to this dimension, structured around types of networks: bonding, bridging and linking.

- ◆ Bonding – Families and family functioning: We present background information on family formation and dissolution and the caring role of families, as well as children without an employed parent.
- ◆ Bonding – Contact with friends and families: Contact with friends or family and greater participation in social activity build social cohesion through the reinforcement of bonding.
- ◆ Bridging and linking – Participation that occurs within the more formal social networks in the community: We discuss a range of information on aspects of progress including levels of volunteering and charitable donations, and cultural diversity and participation.
- ◆ Breakdown of social cohesion – homelessness, drug deaths and suicide – which reflect in part a lack of community support, are covered here.

Crime: Measuring the full cost of crime might provide an ideal single measure of progress in this area. But there is no well established means of doing this nor are there comprehensive data sources. Another way, albeit limited, of measuring progress in this dimension is to look at criminal offence victimisation rates. We focus on personal and household crimes.

Democracy, governance and citizenship: Although people agree democracy is important, there is less agreement about how to measure progress in the strength and quality of our democracy. In theory democratic government has been characterised as having two underlying principles: popular control over public decision making and decision makers; and equality between citizens in the exercise of that decision making. However, the strength and health of our democracy in practice is the product of many factors, not just the effectiveness of political institutions like Parliament, fair elections, an independent judiciary, equal laws and a free press.

Also important are the trust that citizens have in government and public institutions, and the degree to which they participate in civic and community life and they value and understand their rights and duties as citizens.

Democracy is not an uncontroversial subject (even if widely supported in principle) and there may be

many different views about the choice of indicators necessary to measure progress in this dimension. There are many possible indicators that relate to governance, democracy and citizenship but aspects that are measured include: voter turnout and invalid voting, the proportion of Australian residents who are citizens, participation in civic groups and organisations, women in decision-making positions, environmental citizenship, and Indigenous participation in democracy and governance.

The economy

National wealth: Our measure of national wealth would ideally have a comprehensive coverage of real net worth (i.e. the value of Australia's assets less the value of Australia's liabilities to the rest of the world). Assets would include all financial and non-financial assets over which ownership rights can be enforced and from which economic benefits can be derived by owners holding or using them.

The measure used in MAP excludes some assets which might ideally be embraced by this comprehensive definition (such as human capital and consumer durables) owing to measurement difficulties or to our decision to conform with the 'asset boundary' concept used in the Australian national accounts. A future wealth measure might include some of these further assets.

National income: Our measure of national income would ideally have a comprehensive coverage of real net disposable income (i.e. the amount that Australians can consume in aggregate, without reducing real national wealth).

The measure used in MAP embodies only some of the adjustments for the depreciation of wealth that should ideally be made. It is adjusted for the depreciation of machinery, buildings and other produced capital used in the production process, but not for the consumption of environmental assets for example. National income does not take account of some non-market activities (such as unpaid household work) that contribute to material living standards.

Productivity: Our measure of national productivity would ideally be derived from a comprehensive measure of output divided by a comprehensive measure of input. The measure used in MAP is not as comprehensive as this ideal measure. The numerator includes only the output of the 'market sector'; and the denominator includes only labour and capital inputs (not 'intermediate inputs' such as materials, services and energy used in the production process). A future productivity measure might have broader scope.

Presentation of the dimensions

While we have used the three domains of progress to organise our thinking around dimensions and help identify progress indicators, the presentation used in this publication groups the dimensions of progress into four broad areas of progress as follows:

Individuals

- ◆ Health
- ◆ Education and training
- ◆ Work
- ◆ Culture and leisure

The economy and economic resources

- ◆ National income
- ◆ Economic hardship
- ◆ National wealth
- ◆ Housing
- ◆ Productivity
- ◆ Competitiveness and openness
- ◆ Inflation

The environment

- ◆ The natural landscape
- ◆ The air and atmosphere
- ◆ Oceans and estuaries

Living together

- ◆ Family, community and social cohesion
- ◆ Crime
- ◆ Communication
- ◆ Transport
- ◆ Democracy, governance and citizenship

The area of progress relating to the *Environment* corresponds to the *Environment* domain of progress – the dimensions of progress are the same. However, the area relating to the *Economy and economic resources* includes selected dimensions from both the *Society* and *Economy* domains. Similarly, the area relating to *Living together* brings together selected dimensions from both those two domains. The area of progress relating to *Individuals* contains a subset of the dimensions identified in the *Society* domain.

There are many alternative ways in which the dimensions of progress could be drawn together. The approach used here is intended to assist the reader in assessing progress, both across and within broad areas of individual and national life.

Dimensions and indicators of progress

Headline dimensions	Headline progress indicators	Supplementary progress indicators	Other indicators
Health	Life expectancy at birth	Proportion of people surviving to ages 25, 50 and 75 ❖ Infant mortality rate ❖ Avoidable deaths ❖ Incidence of all cancer ❖ Incidence of heart attacks ❖ Burden of disease	International life expectancy at birth ❖ Living with disability ❖ Causes of death
Education and training	People aged 25–64 with a vocational or higher education qualification	Education participation rate for those aged 15–19 ❖ Year 7/8 to Year 12 apparent retention rate ❖ Human capital stock ❖ Education participation rates and attainment levels for those aged 15–64 ❖ OECD literacy rates, science, reading and mathematics ❖ Indigenous to non-Indigenous education participation and attainment ratios ❖ Female students as a proportion of all students	International level of higher education ❖ Education participation for those aged 15–64 ❖ Level of highest non-school qualification for those aged 25–64
Work	Unemployment rate	Labour force underutilisation rate ❖ Proportion of people working ❖ Long-term unemployment rate ❖ Retrenchment rate ❖ Unemployment to population ratios	Casual employees ❖ People working part-time or longer hours (50 hours a week worked or more) ❖ Average hours per week, full-time workers
National income	Real net national disposable income per capita	Real gross domestic product per capita ❖ Real final consumption expenditure per capita ❖ Real household consumption expenditure per capita ❖ Net national saving as a proportion of GDP ❖ Real industry gross value added ❖ Real gross state income per capita ❖ Terms of trade ❖ Population in work	Selected measures of equivalised household disposable income ❖ International comparisons of national income: Gross National income ❖ International comparisons of national income: average annual GDP growth
Economic hardship	Average real equivalised weekly disposable income of households in the second and third deciles of the income distribution	Indicators of economic situation by household composition	
National wealth	Real national net worth per capita	Real national assets and liabilities per capita ❖ Real net capital stock per capita ❖ Economically demonstrated resources (minerals and energy) per capita ❖ Real net foreign debt ❖ Real gross fixed capital formation per capita ❖ Mean household net worth ❖ Mean value of selected household assets and liabilities	
Housing	No headline indicator	None	Households in dwellings requiring an additional bedroom
Productivity	Multifactor productivity	Labour productivity ❖ Research and development expenditure as a proportion of GDP ❖ Investment in software as a proportion of GDP ❖ Managers and professionals as a proportion of total employment ❖ Proportion of businesses with web site or home page ❖ Hours worked and quality adjusted hours worked ❖ Proportion of businesses innovating	

Headline dimensions	Headline progress indicators	Supplementary progress indicators	Other indicators
The natural landscape	Threatened birds and mammals ❖ Annual area of land cleared ❖ Salinity, assets at risk in areas affected, or with a high potential to develop, salinity ❖ Water management areas, proportion where use exceeded 70% of sustainable yield	Trends in threatened species ❖ Mammalian extinctions ❖ Species-threatening invasive animals ❖ Proportion of ecosystems: area protected ❖ Weeds of national significance, distribution ❖ Native forest area ❖ Net water use ❖ Total water storage capacity of large dams ❖ Water diversions: Murray-Darling Basin ❖ River condition (biota) index	Cattle and sheep numbers ❖ Natural and actual flows in the River Murray ❖ International comparison: Threatened bird species ❖ International comparison: Water abstraction per capita
The air and atmosphere	Fine particle concentrations, days health standards exceeded, selected capital cities ❖ Net greenhouse gas emissions	Days when ozone concentrations exceeded guidelines, selected capital cities ❖ Highest one hour averages of SO ₂ , selected regional centres ❖ CO ₂ -e emissions, net, per capita and per \$ GDP ❖ Australia's greenhouse gas emissions for selected sectors ❖ Carbon dioxide concentrations ❖ Consumption of ozone depleting substances	International comparison: net greenhouse gas emissions per capita
Oceans and estuaries	No headline indicator	Visitors to the Great Barrier Reef ❖ Estuarine condition index ❖ Number of reported oil spills	
Family, community and social cohesion	No headline indicator	Proportion of children in lone mother families ❖ Children without an employed parent ❖ Primary carers of elderly and disabled ❖ No participation in selected activities ❖ Voluntary work ❖ Suicide and drug-induced death rates ❖ (indicators in the Work dimension are also relevant)	Family type ❖ Participation in religious activities ❖ Racism
Crime	Victims of personal and household crimes	Homicide rate	Imprisonment rates
Democracy, governance, and citizenship	No headline indicator	Proportion of eligible overseas-born residents who are citizens ❖ Voter turnout and informal votes cast ❖ Federal Parliamentary election candidates ❖ Volunteering rates for management, committee and coordination work ❖ Proportion of Federal parliamentarians who are women ❖ Proportion of executive managers and board members of ASX200 companies who are women	Indigenous members of Federal parliaments and State and Territory legislative assemblies

Supplementary dimension	Supplementary and other indicators
Culture and leisure	Attendance at cultural venues and events ❖ Attendance at sports events
Inflation	Consumer price index ❖ Domestic final demand price index ❖ Total final consumption expenditure ❖ Total gross fixed capital formation
Competitiveness and openness	Trade weighted exchange rate ❖ Real unit labour costs ❖ Foreign ownership of Australian enterprise ❖ Australian trade openness
Communication	Computer ownership and internet access, households
Transport	Passenger vehicles per 1,000 people ❖ Road fatalities

Population

The number of people living in Australia, together with their demographic characteristics and distribution across the country, is an important influence on many of the dimensions of progress mentioned in this publication. Similarly, many of the dimensions of progress influence the size and shape of Australia's population.

This commentary provides some contextual information about the population and explains some of the links between changes in population and dimensions of progress. In doing so, the aim is not to answer questions about whether, and to what extent, Australia's population should grow.

Population size and trends

At June 2005, Australia's current resident population was estimated at 20.3 million people.¹ The population has increased by more than 16 million since 1901, when it was recorded at 3.8 million. Over that period, natural increase, defined as the excess of births over deaths, was the main source of growth in the population. However net overseas migration was also a significant source of increase.²

Australia reached the population milestone of 20 million people in December 2003, following an increase of more than 2 million people in the 10 years between June 1993 and June 2003. However, the rate of growth over that decade was, on average, markedly slower than growth rates in most previous decades. A major factor in this slower rate of population growth has been the decline in fertility, and its effect on the rate of natural increase. In 1921, a woman could be expected to give birth to around 3.1 children in her lifetime. Twenty years later, the expected number of births per woman, as measured by the Total Fertility Rate (TFR), had declined to 2.36 children. Over the last 80 years, fertility rates have fluctuated considerably, the highest being 3.55 in 1961. Since the early 1960s, fertility has been falling. In 2004, Australia had a TFR of 1.77 babies per woman. This is well below the current replacement level of 2.1 babies per woman, which is considered the number of babies a woman would have to have over her lifetime to replace herself and her partner.³

Estimated resident population

At 30 June	Population no.	Increase %
1995	18 071 758	. .
1996	18 310 714	1.32
1997	18 517 564	1.13
1998	18 711 271	1.05
1999	18 925 855	1.15
2000	19 153 380	1.20
2001	19 413 240	1.36
2002	19 640 979	1.17
2003	19 872 646	1.18
2004	20 091 504	1.10
2005	20 328 609	1.18

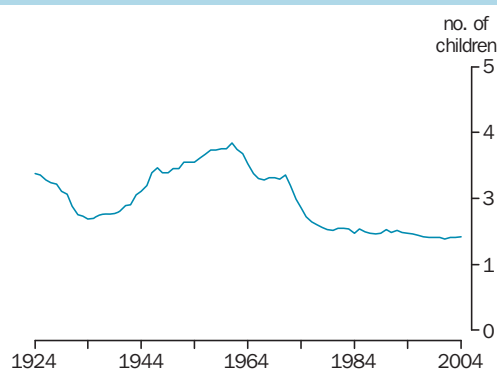
Source: *Australian Demographic Statistics*, cat. no. 3101.0.

Because of this shortfall, overseas migration remains important to Australia's continuing population growth, explaining a sizeable portion of our population increase in recent decades. The actual level of net overseas migration varies from year to year, and because natural increase has been trending gradually downwards since the 1970s, fluctuations in total population growth can thus be partly attributed to the size of migration intakes from year to year. Since 1996, net overseas migration has generally accounted for between 40 and 50% of Australia's annual population growth. The exception was 2001 when the contribution of net migration overtook that of natural increase, accounting for 53% of Australia's population growth in that year.¹

Population distribution

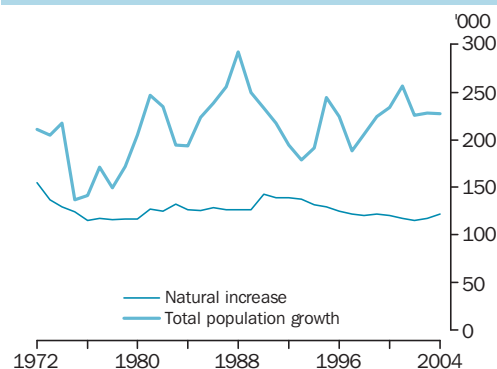
Australia is large in area, and compared with other countries, its population is small relative to its size. For every square kilometre of land there are, on average, around only two Australians. But this statistic hides the fact that Australia is a highly urbanised nation. Approximately 84% of the population is contained within the most densely populated 1% of the continent, the predominantly fertile temperate coastal regions.

Total fertility rate



Source: *Births, Australia*, cat. no. 3301.0.

Annual population growth



Source: *Births, Australia*, cat. no. 3301.0.

Population density of selected countries—2001

	People per square kilometre
Australia	2
Canada	3
Italy	190
Japan	336
Korea	476
New Zealand	14
United Kingdom	244
United States of America	29

Source: OECD in Figures 2002.

The majority of Australia's population is concentrated in two widely separated coastal regions. The larger of these is the east to south-east region, the smaller lies in the south-west of the continent.

New South Wales is the country's most populous state, accounting for one-third of the total population in 2005. Of all Australia's states and territories, the population of Queensland grew the fastest between 1995 and 2005 (by 21%), and the populations of Western Australia and the Northern Territory were next fastest, growing by 16% and 14% respectively. Tasmania had the slowest population growth over the period at 2%.¹ The rural population includes people living on private rural properties, in very small communities, and in bounded localities (population clusters of 200 to 999 people). From Federation until 1976, the percentage of Australians living in rural areas declined steadily. In 1911, 43% of Australians lived in rural areas; this proportion had fallen to 14% by 1976. Technological, social and economic changes contributed to population decline in these areas. Between 1976 and 2003, this decline appeared to have halted, with a slight increase in the proportion of people living outside capital cities.

Population age structure(a)

Age group (years)	1995	2005	Change	
	'000	'000		%
0–4	1,300	1,265	–	2.7
5–14	2,589	2,714		4.8
15–24	2,699	2,820		4.5
25–34	2,840	2,870		1.0
35–44	2,756	3,008		9.1
45–54	2,224	2,794		25.6
55–64	1,513	2,190		44.8
65–74	1,282	1,399		9.1
75–84	678	954		40.7
85+	191	315		64.8
Total	18,072	20,329		12.5

(a) Includes 'Other Territories' of Australia from September 1993. Source: Australian Historical Population Statistics, cat. no. 3105.0 .65.001; and Australian Demographic Statistics, cat. no. 3101.0.

This is largely due to people moving to coastal regions and other urban centres.

Population composition

The age structure of the population has changed significantly over the last century. A decline in birth rates, and increases in life expectancy have meant that children under 15 now make up a smaller proportion of the population. Conversely, in 1901 only 4% of the population was 65 or over whereas by 2005, this figure had risen to 13%.

The balance between men and women has also changed. In 1901 there were 110 men for every 100 women (in part due to the relatively high proportion of Australian immigrants who were male). This gap has closed. In 2005, there were slightly fewer men than women in Australia (100 men for every 101 women).^{1,2}

Aboriginal and Torres Strait Islander population

The Aboriginal and Torres Strait Islander population of Australia was estimated to be 458,500 people at 30 June 2001, or 2.4% of the total Australian population. The Indigenous population is projected to have grown to between 501,500 (low-series projection) and 542,900 (high-series projection) by mid-2006.⁴ In 2001, around 90% of Indigenous people were identified as being of Aboriginal origin, 6% were identified as being of Torres Strait Islander origin and 4% were identified as being of both Aboriginal and Torres Strait Islander origin. The Indigenous population is relatively young, with a median age of 21 years compared to 36 years for the non-Indigenous population.⁵

In 2001, around 30% of the Indigenous population lived in major cities, 43% in regional areas and 27% in remote areas. The majority of Indigenous people live in New South Wales (29% of the Indigenous population) and Queensland (27%), Western Australia (14%) and the Northern Territory

Estimated resident population by region of birth—2004

Region of birth	Change since 1996		
	'000	'000	%
North-West Europe	1,486.4	-34.4	-2.3
Southern and Eastern Europe	842.8	-50.6	-6.0
North Africa and the Middle east	272.3	60.5	22.2
South-East Asia	599.5	101.6	17.0
North-East Asia	364.9	84.8	23.2
Southern and Central Asia	245.4	84.0	34.2
Americas	185.2	20.1	10.8
Sub-Saharan Africa	193.1	74.7	38.7

Source: Migration, Australia, 2003–04, cat. no. 3412.0

Immigrant populations

Australia, along with New Zealand, Canada and the United States, is often described as a 'settlement country'. All four countries have experienced substantial positive net migration in the last decade, although New Zealand registered negative net migration for a short time in the late 1990s.⁶ These countries have higher proportions, than other OECD countries, of population who were born overseas. Australia has the highest proportion.

Immigrant population in selected OECD countries – 2001

Country	Percentage of total population
Australia	23.1
Canada	18.2
Denmark	6.0
Finland	2.8
Netherlands	10.4
New Zealand	19.5
Sweden	11.5
United States	11.1

Source: OECD Factbook 2005

(12%). Indigenous people comprise about 30% of the Northern Territory population but less than 4% in all other state/territory populations.⁵

Overseas born population

Australia has experienced successive waves of immigration over the past century, and each wave has been characterised by a different predominant region of origin, usually related to world events of the period. In the post World War II period, immigration from western Europe increased markedly. However since 1996, the number of Australians who were born in these countries has declined. As those earlier immigrants have grown older and returned to their country of origin or died, current levels of immigration from these regions have not been high enough to replace them. Since 1996, immigration from the various regions of Asia has continued to increase, part of a trend that began in the late 1970s. Overall numbers of immigrants from these regions continue to have comparatively high growth rates.

Links between population and progress

The size and composition of Australia's population influences, and is in turn influenced by, many aspects of progress considered in this publication. Some Australians believe the population should grow quickly to reach substantially higher levels by the end of this century – they point to the economic and other benefits not just of a larger population but also of a growing population.

Other Australians are of the view that our environment cannot sustain a significantly larger population and that economic progress should be generated mainly through productivity enhancements, rather than just through an increase in the scale of economic activities. This focus on sustainability acknowledges the need to obtain a given lifestyle now without reducing the capacity for future generations to enjoy comparable lifestyles.

Two of the environmental arguments advanced for stabilising our population are:

- ◆ The limited amount of land suitable for agriculture.
- ◆ Our climate patterns, and in particular the limited amount of rainfall.

Arguments raised to counter these two views include the following:

- ◆ Australia already provides for more people than its own population. In the mid-1990s, for example, a rough calculation from the State of the Environment report estimated that we produce one-third of the world's wool, and that our agricultural exports feed about 55 million people (at Australian levels of consumption).⁷

Milestone years for Australia's population

Year attained	Population
1858	1 million
1877	2 million
1889	3 million
1905	4 million
1918	5 million
1925	6 million
1939	7 million
1949	8 million
1954	9 million
1959	10 million
1963	11 million
1968	12 million
1971	13 million
1976	14 million
1981	15 million
1986	16 million
1990	17 million
1995	18 million
1999	19 million
2003	20 million

Source: Australia in Profile, cat. no. 2821.0; Australian Demographic Trends, cat. no. 3102.0; Australian Social Trends, cat. no. 4102.0; Estimated Resident Population by Country of Birth, Age and Sex, Australia, cat. no. 3221.0; Population by Age and Sex, Australian States and Territories, cat. no. 3201.0; and Year Book Australia, cat. no. 1301.0.

- ◆ Some 70% of current water use is by agricultural industries, rather than directly by Australian households.

Where people live also has important effects. Concentrating people within an area can have localised environmental effects, such as air pollution in cities. The concentration of people in the coastal areas of south-eastern Australia has also resulted in relatively high rates of land clearing for urban development, together with the need to provide water, sewerage and landfill sites. This urban expansion tends to occur in Australia's more fertile areas leaving less land available for preservation or agriculture.

Conversely, some remote and sparsely populated areas have seen declining population levels over the last decade. This has generally been characterised by declining numbers of young people in these areas and ageing of the local populations. Such population decreases are often associated with a decline in employment prospects and access to services.

The number of seats in the House of Representatives is determined by the size and distribution of the population. As the population changes, this feeds into changes in the number of seats allocated to each Australian state and territory.

The population's geographic and age distribution also influences the labour market. Changes in the labour market, in turn, can influence the geographic distribution of the population, by encouraging people to move to where they can find employment.

The proportion of the population that is employed provides a broad indicator of the degree of economic dependency in Australia – the relative sizes of the total population and of that part of the population engaged in paid work. Economic dependency may increase owing to, say, a rise in the number of unemployed or the number of people past retirement age. Between 1994–95 and 2004–05, the proportion of the civilian Australian population aged 15 and over, that was employed rose from 58% to 61%.⁸

Changes in patterns of mortality, fertility and migration lead to changes in the age distribution of the population. This in turn contributes to changes in the demand for health and other services. As an example, the current ageing of the population reflects an increase in life expectancy, and is contributing to an increasing demand for aged care services.

Current ABS population projections indicate that Australia's population could range between 25 and 33 million people by 2051, if various assumptions for fertility, mortality and net overseas migration were to hold.⁹ The population would have an older profile and there would be more older people not in the labour force per adult in paid work. The proportion of the total population aged between 15 and 64 could decline from 67% in 2004 to less

than 60% in 2051, according to the ABS projections.⁹

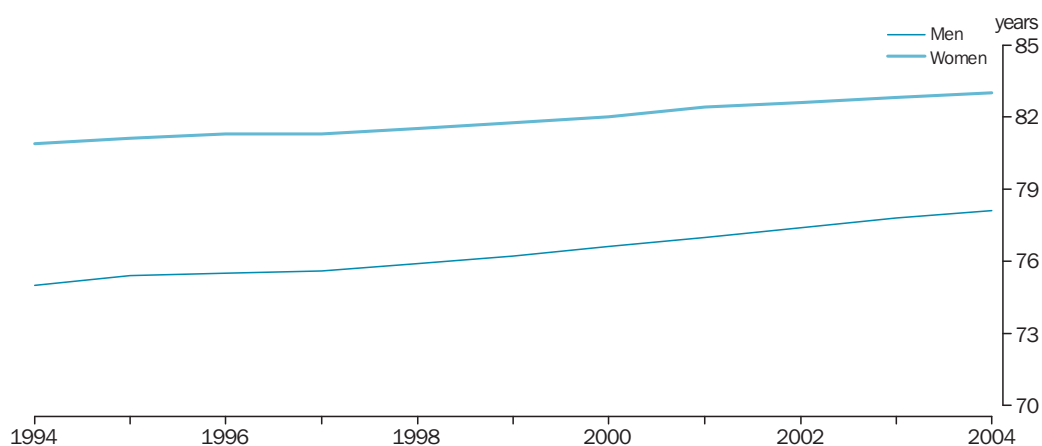
Endnotes

- 1 Australian Bureau of Statistics 2003, *Australian Demographic Statistics June 2005*, cat. no. 3101.0, ABS, Canberra.
- 2 Australian Bureau of Statistics 2005, *Year Book Australia 2003*, cat. no. 1301.0, ABS, Canberra.
- 3 Australian Bureau of Statistics 2005, *Births Australia, 2004*, cat. no. 3301.0, ABS, Canberra.
- 4 Australian Bureau of Statistics 2004, *Experimental estimates and projections, Aboriginal and Torres Strait Islander Australians*, cat. no. 3238.0, ABS, Canberra.
- 5 Australian Bureau of Statistics and Australian Institute of Health and Welfare 2003, *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*, cat. no. 4704.0, ABS, Canberra.
- 6 OECD Factbook - Population and migration - International migration, 2005
- 7 State of the Environment Advisory Council 1996, *Australia — State of the Environment Report 1996*, CSIRO Publishing, Melbourne.
- 8 Australian Bureau of Statistics 2006, *Labour Force Australia*, cat. no. 6202.0, ABS, Canberra.
- 9 Australian Bureau of Statistics 2005, *Population Projections, Australia 3222.0*, ABS, Canberra. ABS

The measures

Health: key points

Life expectancy at birth



Source: *Australian Demographic Trends 1997*, cat. no. 3102.0; and *Deaths, Australia (various)*, cat. no. 3302.0.

Australian life expectancy improved between 1994 and 2004. A boy born in 2004, could expect to live to be over 78, while a girl could expect to reach 83 – increases since 1994 of three and two years respectively.

The relationship of health to progress

People hope to have a long life, free from pain, illness or disability. Good health for all brings social and economic benefits to individuals, their families and the wider community.

About the headline indicator and its limitations: Life expectancy at birth

Life expectancy at birth is a measure of how long someone born in a particular year might expect to live if mortality patterns for that year remained unchanged over their lifetime. Life expectancy at birth is one of the most widely used indicators of population health. It focuses on the length of life rather than its quality, but it usefully summarises the health of the population.

Health: Other indicators of progress

The proportion of people surviving to ages 25, 50 and 75; infant mortality rates; burden of disease; avoidable deaths; incidence of heart attacks and all cancers.

Some differences within Australia

Although Australians are now among the longest-lived people in the world, substantial differences remain among certain parts of the population; Indigenous Australians in particular have much lower life expectancy than other Australians.

Links to other dimensions

Improvements in health may assist progress in other areas and vice versa. See also the commentaries *National income*, *The air and atmosphere*, *Work*, *Life satisfaction and measures of progress* and *Economic hardship*.

Health

Progress and the headline indicator

People hope to have a long life, free from pain, illness or disability. Good health for all brings social and economic benefits to individuals, their families and the wider community.

An indicator describing how long Australians live while simultaneously taking into account the full impact of illness and disability, would be a desirable summary measure of progress. But although such indicators have been developed they are not available as a time series (discussed later in this commentary). Life expectancy at birth is one of the most widely used indicators of population health. It focuses on length of life rather than its quality, but it usefully summarises the health of the population.

Australian life expectancy improved during the past ten years. A boy born in 2004 could expect to live to be over 78, while a girl could expect to reach 83 – increases since 1994 of three and two years respectively.

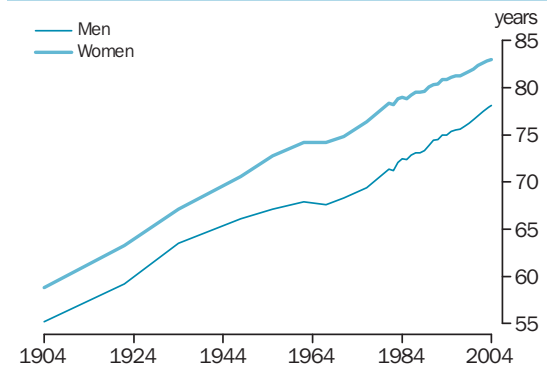
A longer term view

Increases in life expectancy occurred over most of the 20th century, and resulted in an increase of 20 years of life for both men and women. Much of the improvement in the first part of the century was because of a decline in deaths from infectious diseases. This was associated with improvements in living conditions, such as cleaner water, better sewerage systems and improved housing, coupled with rising incomes and improved public health care, including initiatives like mass immunisation.¹ These changes were particularly beneficial to infants, women who were pregnant or in childbirth, and older people; official statistics show that rapid declines in deaths among infants were the main reason that life expectancy increased in the first half of the century.² Increases in life expectancy slowed in the middle of the 20th century, and then plateaued in the 1960s, largely because of increases in the rates of cardiovascular disease.¹

Substantial improvements in life expectancy have been a feature of the second half of the 20th century, particularly since the 1970s. Between 1984 and 2004, life expectancy at age 70 increased by about three years for men and two years for women. Life expectancy at birth over the same period increased by five and a half years for men and just over five years for women.

Over the first half of the 20th century, as the number of deaths due to infectious diseases declined, chronic diseases, such as heart disease, cancer and strokes replaced infectious diseases as the main causes of death. In the latter part of the century, further progress was achieved with a decline in the number of deaths from these chronic conditions. This was largely due to the promotion of healthier lifestyles, continued improvements in living standards, and ongoing medical advances,

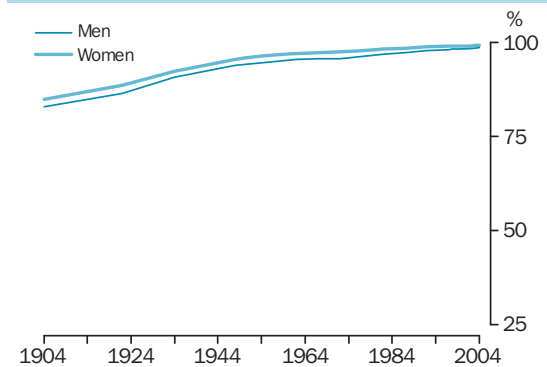
Life expectancy at birth: longer term view



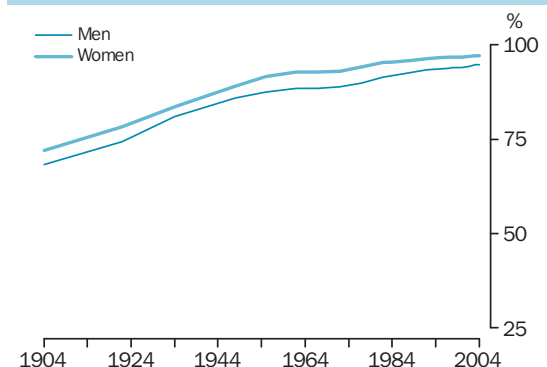
Years represent the last year of a three-year period. For example, 2004 refers to the period 2002–2004.

Source: Australian Historical Population Statistics, cat. no. 3105.0.65.001.

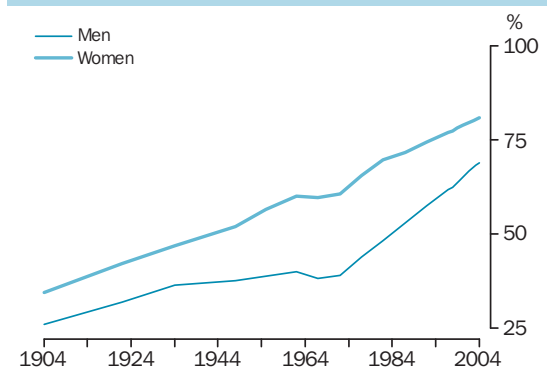
Proportion of people surviving to age 25



Proportion of people surviving to age 50



Proportion of people surviving to age 75



Source: Australian Historical Population Statistics, cat. no. 3105.0.65.001.

including improvement in illness prevention, screening and diagnosis and treatment.

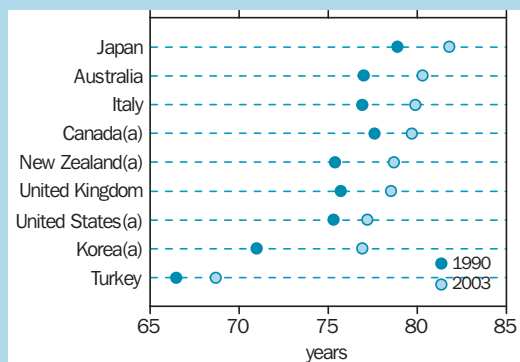
Survival rates

As well as considering changes in life expectancy at birth, one can also consider changes in the proportions of people surviving to a certain age. Over the 20th century, the proportion of the population surviving to the ages of 25, 50 and 75 increased dramatically.

In 1904, 83% of men and 85% of women lived to be 25 years old. By 2004 these figures stood at around 99% for both men and women. Over the same period the proportion of people surviving to age 50 increased from 68% and 72% to 95% and 97%, for men and women respectively. The difference between the sexes was evident throughout the period, however male rates are increasing at a faster rate than those for females.

Change was most evident when considering the proportion of the population living to 75. In 1904, just under 26% of men and 35% of women reached their 75th birthday. By 2004, these figures stood at 69% and 81% respectively. Improvement was

International comparison – life expectancy at birth



(a) Data are for 2002 not 2003

Source: OECD Health Data, 2005.

In 2003, Australians were among the longest lived OECD members, ranking fifth for life expectancy for the total population at birth (80 years). Australia was ranked sixth in the OECD for female life expectancy at birth (83 years) and fourth in the OECD for male life expectancy (78 years).

Japan reported the longest life expectancy in 2003 for females: a girl born in Japan could expect to live for 85 years. Iceland had the longest male life expectancy (79 years) in 2003. In 2003, Turkey had the lowest overall life expectancy of all OECD countries for both males (66 years) and females (71 years).

The OECD country experiencing the greatest increase in life expectancy for both males and females during the period 1990–2003 was Korea, where life expectancy for females increased from 75 years in 1990 to 80 years in 2003, and from 67 years in 1990 to 73 years in 2003 for men.

See also the international comparison for infant mortality in the *International comparisons of progress* essay on page 184.

relatively steady over the period, except during the 1960s when the rates of some conditions, including heart disease, increased, particularly among men older than 50.¹ Since the early 1970s, the gap between men and women has closed steadily (down from over 21 percentage points in 1970 to about 12 in 2004).

Some differences within Australia

Despite continued improvement in the population's health, there are significant disparities between different groups.

Life expectancy at birth varies between the states and territories. In 2002–2004 it was highest in the ACT for both men (79.7 years) and women (83.9 years) and lowest in the NT for both men (72.3 years) and women (78.0 years).

Men and women

Women tend to live longer than men, and this is reflected in the differences in life expectancy throughout the 20th century. However, in recent years life expectancy at birth for men has increased more quickly than for women, although a girl born in 2004 could still expect to live more than five years longer than a boy.

In 2004, death rates were higher for men than for women in all age groups. Women are thought to have a possible genetic advantage which makes them more resistant to a range of conditions.³

The remaining differences are attributed to different behavioural, lifestyle and working patterns of men and women. Women, for example, are less likely to be overweight or to smoke.⁴ Men are more often involved in hazardous occupations than women, while younger men in particular are more prone to risk-taking, and have higher death rates because of accidents.

Aboriginal and Torres Strait Islander Peoples

On average, Aboriginal and Torres Strait Islander people experience a higher burden of disease than non-Indigenous Australians and as a result experience higher rates of mortality. Life expectancy for Indigenous Australians both male and female is estimated to be about 17 years shorter than the measured life expectancy of all Australians.⁵

Data for Indigenous deaths by age and cause comes from Queensland, Western Australia, South Australia and the Northern Territory combined, as these are the jurisdictions with the most complete coverage of Indigenous deaths. In all age groups, other than those older than 75, the Indigenous death rate was at least double that of the non-Indigenous population. The largest differences were for men and women aged 35–54 (where Indigenous deaths rates were about five times higher than those of non-Indigenous people).⁶ In particular, death rates for this age group were higher for the Indigenous population than the non-Indigenous population for ischaemic heart

Living with disability(a) – 2003

Expected years of life:	1998		2003	
	Males	Females	Males	Females
Free of disability	58	62.1	59.1	62.2
With disability(a)	17.9	19.4	18.6	20.7
With severe core activity limitation(b)	5.3	7.6	5.4	8.3
Total life expectancy at birth	75.9	81.5	77.8	82.8

(a) Presence of one or more limitations lasting at least 6 months and restricting everyday activity.

(b) Sometimes or always needing assistance of supervision with a core activity; subset of disability

Source: AIHW analysis of ABS 1998 and 2003 Survey of Disability, Ageing and Carers; unpublished ABS Life Tables, 1996–98, 2001–03

disease, diseases of the liver (ie alcoholic liver disease and cirrhosis of the liver), diabetes and intentional self harm.

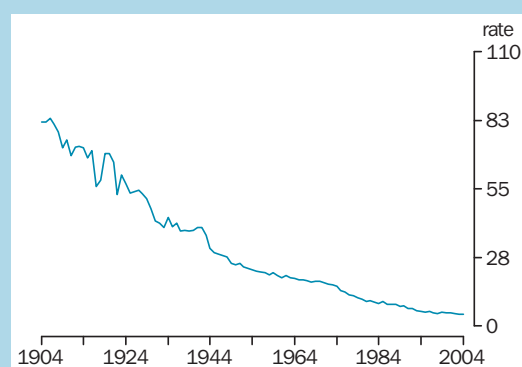
Indigenous infant mortality (in Queensland, Western Australia, South Australia and the Northern Territory combined) was three times higher than the non-indigenous infant mortality rate between 1999–2003. Male Indigenous infant mortality was estimated at about 15 deaths per 1000 births, while female Indigenous infant mortality was estimated as 12 deaths per 1000 births. For non-indigenous males and females respectively, it was 5 deaths per 1000 births and 4 deaths per 1000 births.⁶

Although Indigenous mortality continues to be higher than that of all Australians, there is some evidence that it is decreasing. Over the period 1991 to 2002, recorded mortality showed a decline for both males and females in the three states for which reliable long-term data is available (Western Australia, South Australia and Northern Territory, although only the decrease in Western Australia was statistically significant). Statistically significant declines in infant mortality were also recorded in all three jurisdictions over this period.

Indigenous Australians have high rates of infectious disease, obesity, diabetes, heart disease, kidney disease and cancer. They also experience high rates of injury and death from accidents and violence.⁶

In 2002, Indigenous people over 18 in non-remote areas were 1.7 times more likely than non-Indigenous people to report a disability resulting in a core activity limitation (after adjusting for age differences between the two populations).⁵

A number of factors help to explain why Indigenous Australians suffer poorer health than other Australians. In general, more Indigenous Australians experience disadvantages such as poor education, unemployment, and inadequate housing and infrastructure. In particular, crowded housing has been identified as contributing to the spread of infectious diseases. Indigenous Australians are also more likely to smoke, have poor diets and have high levels of obesity. In 2001,

Infant mortality rate per 1,000 births

Source: Australian Demographic Trends, 1997, cat. no. 3101.0; and Deaths, Australia, (various), cat. no. 3302.0.

Infant mortality

The decline in infant mortality was one of the prime drivers in increased life expectancy during the 20th century, particularly its first half. For every 1,000 babies born in 1904, nearly 82 would die before their first birthday. By 2004 this figure was just under 5 babies per 1,000, a reduction of 22% since 1994, when 6 babies per 1,000 died. In 2004, 40% of all infant deaths occurred within the first day of birth with a further 30% occurring before the baby reached four weeks.

Infant mortality declined particularly quickly in the first half of the 20th century (to around 29 deaths per 1,000 live births at the end of World War II). Clearly, the risk of death in the first year of life had a large impact on overall life expectancy: male life expectancy at birth in 1901–1910 was around 55 years, but was 60 years for those reaching their first birthday.

49% of Indigenous adults (aged over 18) were daily smokers compared with 22% of non-Indigenous adults, and 61% were overweight or obese compared with 48% of non-Indigenous adults.⁷

Older people

ABS population projections indicate that the proportion of the population aged 65 or more will rise. This has prompted concerns about the future cost of health services.

Older people are much more likely to experience ill health and disability. In 2003, 5% of 15–24 year olds reported a core activity limitation, compared to 64% of people aged 75 or more. Based on 2003 data, men can expect to live 19 years (24%) of their life with a disability, compared with 21 years (25%) for women.⁸

The burden of disease

Summary measures that combine information on mortality, disability and other non-fatal health outcomes give a more complete view of the health of the population than life expectancy alone. The most comprehensive measure in Australia has been published by the Australian Institute of Health and Welfare (AIHW) and is known as the Disability Adjusted Life Year (DALY). It is a measure that combines information about the years of healthy life lost due to either premature mortality (relative

Burden of disease(a) – 1996

Major disease group, health condition or injury	Years of life lost '000	Years of life with disability '000	Disability adjusted life years '000
Cardiovascular	447	100	547
Cancer	400	79	478
Mental illness	18	320	338
Nervous system	48	177	225
Injury	152	58	210
Chronic respiratory	76	104	180
Musculoskeletal	7	82	89
Digestive	41	36	77
Diabetes	31	45	77

(a) For nine major disease groups, health conditions or injury.
Source: Australian Institute of Health and Welfare 1999, *Burden of Disease and Injury in Australia*.

to a standard life expectancy) or to years lived with a disability (here disability means any departure from full health, and includes conditions that range from the common cold to quadriplegia).⁹ The burden of disease can be quantified by DALYs. In 1996, cardiovascular diseases and cancer were responsible for the loss of 547,000 and 478,000 years of healthy life, respectively. Over 85% of these years were lost due to premature mortality rather than time spent living with a disability. In contrast, almost 95% of the 338,000 years of healthy life lost to mental illness were due to years lived with a disability.

Factors influencing change

Historical studies of health improvement, as well as comparisons of health between developing and developed countries, provide ample evidence that many factors have helped to improve health. In developed countries, improvements in nutrition, sanitation, water supplies, hygiene, and living and working conditions, brought major improvements in health and life expectancy, particularly before the 1950s. Advances in medical technology have also been important, especially in the past 50 years. These advances have been supported by

Leading causes of death – 2004

	Males rate(a)	Females rate(a)	Male to female ratio
Malignant neoplasms (cancers)	231	143	1.6
Ischaemic heart disease	151	86	1.8
Cerebrovascular diseases (e.g. strokes)	58	54	1.1
Chronic lower respiratory diseases	36	21	1.7
Accidents	34	17	2.1

(a) Standardised death rate per 100,000 population.
Source: ABS Causes of Death collection.

further improvements in lifestyle such as better diet.

There is a good deal of debate about whether life expectancy will continue to increase, and there are two opposing schools of thought. Some analysts believe that there is a biological limit to an *average* life of around 85 years which has nearly been reached; others believe that life expectancy will continue to increase as a result of further medical advances and better lifestyles.¹ There is no doubt that there is more room for improvement among some groups of the population than among others.

Causes of death

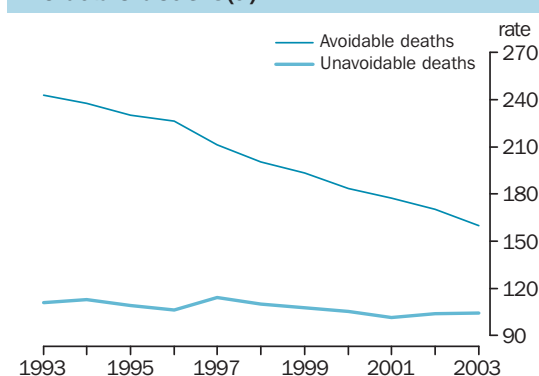
Causes of death are strongly linked to a person's age. Among people aged 1–44, external causes of death (including transport accidents and suicide) were the leading causes of death, with death rates from these causes much higher for men than for women. Among people older than 44 years, cancer and cardiovascular disease were the leading causes of death, with men again more at risk than women from these conditions.

Advances in medical technology, public health measures, including earlier detection of some illnesses, and healthier lifestyles, have contributed to declines in death rates from most of the leading causes of death. Between 1994 and 2004, death rates from malignant neoplasms declined by 17% for men and over 11% for women, and death rates from ischaemic heart disease declined by over 40% for men and women.

Medical experts classify deaths as avoidable and unavoidable. A potentially avoidable death is one that, theoretically, could have been avoided given current understanding of causation, and available disease prevention and health care.

One example of this is colorectal cancer, which is potentially avoidable by:

- ◆ primary prevention (through diet and exercise)
- ◆ secondary prevention (through early detection)
- ◆ tertiary prevention (through effective surgery, chemotherapy and radiotherapy).

Avoidable deaths(a)

(a) Rate per 100,000 people.

Source: Australian Institute of Health and Welfare (unpub).

Conversely an example of a death which is not potentially avoidable is one from dementia, where no substantial gains are available through either primary, secondary or tertiary prevention with current medical technology.¹⁰

Between 1993 and 2003 the overall death rate decreased by over 25% for the general population. Most of the fall was in potentially avoidable deaths, which declined by one-third (the unavoidable death rate fell by 6%). Men had a higher rate of potentially avoidable mortality than women, reflecting their higher rates of heart disease, and higher rates of death from injuries and accidents (mainly motor vehicle accidents and suicide).

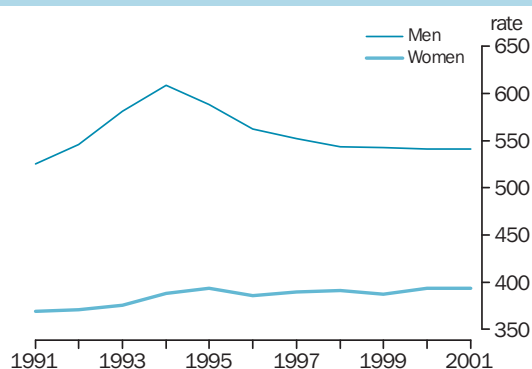
Incidence and treatment of cancer and heart diseases

In 2003, malignant neoplasms (cancers) were the leading cause of death accounting for over 28% of all deaths. Ischaemic heart diseases were the second leading cause of death, contributing over 19% of all deaths.¹¹ Changes in death rates from cancer and heart disease depend in part on prevention (which reduces the incidence of these diseases), and in part on improvements in treatment techniques.

Between 1991 and 2001 the incidence rate for all cancers (other than non-melanoma skin cancers) among men and women rose by an average of 0.3% and 0.6% per annum respectively. Over the period from around 1995 to 2001, male death rates from cancers fell by an average of 1.8% per annum and female death rates fell by an average of 1.4% per annum.¹²

A significant proportion of the rise in the female incidence rate can be attributed to increases in reported breast cancer which in turn is linked to better detection of cancers by breast screening programs. Lung cancer among women is also still increasing. The rise and then fall in the male cancer rate over the period is linked to the rise and fall in reported prostate cancer.¹²

Incidence rates for all cancers(a)



(a) Rate per 100,000 people. Excludes non-melanoma skin cancers. Age standardised to the 2001 population.

Source: Australian Institute of Health and Welfare (AIHW) and Australasian Association of Cancer Registries (AACR) 2003, *Cancer in Australia 2000*, AIHW cat. no. 23. AIHW, Canberra.

Lifestyles and health

People's lifestyles can have a major impact on their health. In 1998 the use of tobacco, alcohol and other (illicit) drugs was estimated to have caused about 25% (7,000) of the deaths of Australians under 65 years old. Deaths related to alcohol (which include alcohol-related road injuries) accounted for over 2,000 of these deaths, smoking about 4,200 and illicit drug use almost 1,000 deaths. Over 5,600 of the 7,000 deaths were of men. In 1996, a similar number of people died before age 65 from causes attributable to alcohol and tobacco. But the number of illicit drug deaths increased by one-third over the period.²⁰

Smoking is recognised as the single most preventable cause of death in Australia. The proportion of adults who smoked stood at 23% in 2004–05, down from 24% in 2001.⁴ A similar proportion of men in most age groups smoked in both 2001 and 2004–05, but there was a 3% decline among men aged 25–34. Between 2001 and 2004–05, there were no significant changes in the proportion of women who smoked in all age groups.⁴

Exercise can benefit both physical and mental health. Physical inactivity is believed to be responsible for about 7% of the total burden of disease in Australia.¹³ In the 2004–05 National Health Survey, about 66% of adults reported exercising for recreation, sport or fitness in the previous two weeks. The survey also asked about the frequency, type and duration of exercise to assess people's overall level of exercise. About two-thirds of men and three-quarters of women were assessed as having a low level of exercise or being sedentary. Results from surveys in 1995 and 2001 suggest that the proportion of people with a sedentary lifestyle has not changed over the past decade.

Being overweight is closely related to lack of exercise and diet. And being overweight or obese increases the risk of suffering from a range of conditions, including coronary heart disease, type 2 diabetes and some cancers. In 1996 problems associated with being overweight or obese accounted for 4% of the total burden of disease in Australia. Excluding those for whom body mass index could not be derived, the proportion of males classified as overweight or obese rose from 52% in 1995 to 62% in 2004–05; for females the increase was 37% to 45% (age standardised).⁴

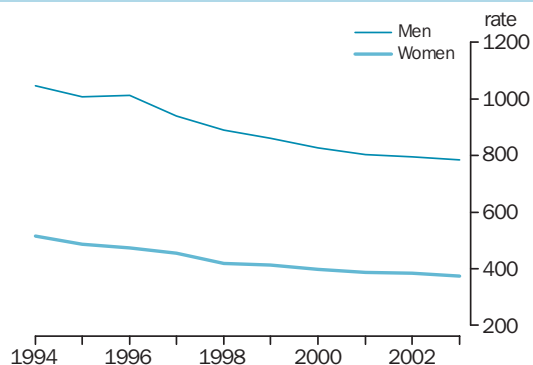
Adequate levels of fruit and vegetable consumption is associated with a reduced risk of coronary heart disease, stroke and several major cancers. The National Health Medical Research Council recommends that adults eat at least two serves of fruit and five serves of vegetables each day.¹⁴ In 2004–05, 46% of Australians aged 12 and over reported a daily fruit intake of one serve or less, and 86% reported a daily vegetable intake of four serves or less.⁴ Inadequate intakes were more common among men than women, and among young adults (aged 18–24 years) than other age groups.¹⁵

Many people's lifestyles involve a combination of health risk factors.¹⁵ In 2004–05, only 10% of men and 13% of women reported none of the four risk factors: smoking, high alcohol consumption, overweight/obese and low exercise levels.⁴

From 1982–1986 to 1992–1997 the percentage of cancer patients surviving 5 years or longer increased from 44% to 57% for men, and 55% to 63% for women.¹²

Between 1994 and 2003, the incidence of heart attacks fell by 25% for men and 27% for women.

Incidence rates for heart attacks(a)



(a) Incidence of major coronary events among 40-90 year olds (age standardised rate per 100,000 population), Australia, 1994-2003

Source: AIHW National Hospital Morbidity Database and AIHW Mortality Database.

The reduction in the rate of heart attacks for those who have already had one is attributed to better treatment of heart disease, be it changes to health behaviour, pharmaceutical treatment or surgery. Between 1993-94 and 2000-01 the proportion of heart attacks that lead to death declined from 35% to 30%.

Links to other dimensions of progress

Improvements in health may assist progress in other areas and vice versa. A substantial body of evidence shows that lower socioeconomic status and less education contributes to poorer health.¹⁶ Likewise, poor health, particularly in childhood, can impair education and thus affect socioeconomic position in later life.

Mental health

The prevalence of mental and behavioural problems as reported in the ABS National Health Survey (NHS)⁴ has increased since 1995: 6% of people in 1995 reported these problems while 11% reported them in 2004-05. Half of these people in 2004-05 reported mood (affective) problems (such as feeling depressed) and 46% reported anxiety related problems. However respondents in the survey were not specifically asked whether they had been diagnosed with any mental disorder so the information could be based on self-diagnosis rather than diagnosis by a health professional.

In 2004-05 and 2001, the NHS included questions covering people's feelings of distress (anxiety, depression and worry) over the preceding four weeks. There was no significant difference in the proportion of adults who reported high or very high psychological distress in 2001 and 2004-05, both 13%. The 2004-05 survey found that more women (15%) than men (11%) reported a high or very high level of psychological distress. Approximately 57% of those reporting very high distress levels were women. The rates varied with age. The highest proportion of women reporting high or very high distress were aged 18-24 (19%). The proportion of men reporting high or very high levels of distress was also highest in the 18-24 year age group (12%).

A healthy population with fewer sick people to care for allows economic resources to be used for other things. A larger pool of healthy people means a greater supply of labour for the workforce. Australian business benefits too from a healthy workforce taking fewer days off sick. Conversely the growth of the economy can help to provide funds, either to governments or individuals, to pay for better prevention programs, hospitals and health care, and to maintain suitable sanitation and housing services. Moreover, the health industry is a very significant employer and health spending accounted for about 30% of total government expenditure, and over 5% of household expenditure in 2004-05.¹⁷

Various types of economic activity also affect human health. The burning of fossil fuels, for example, is linked to types of air pollution and a variety of health concerns. The changing make-up of the Australian economy is having an effect too: a shift to more office-based work with proportionally fewer people employed in more dangerous occupations like mining has helped,^{18,19} along with other factors, to reduce the incidence of fatal accidents at work, although more sedentary occupations have some adverse health effects.

See also the commentaries *National income, The air and atmosphere, Work, and Economic hardship*.

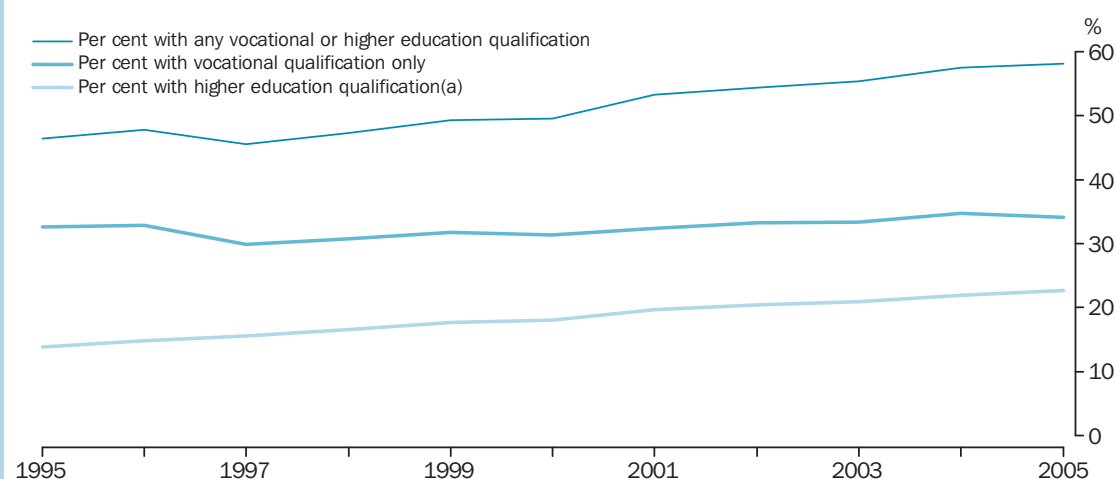
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Education and training: key points

People aged 25–64 with a vocational or higher education qualification



(a) Some of these people may also have a vocational qualification. As the data are based on people's level of highest non-school qualification, it is not possible to give the proportions of people with both types of qualification.

Source: Survey of Education and Work Australia, cat. no. 6227.0.

For the past ten years there has been an upward trend in the proportion of people with vocational or higher education qualifications. Between 1995 and 2005, the proportion of those aged 25–64 with a qualification increased from 46% to 58%. This increase continues a trend seen for several decades.

The relationship of education to progress

Education and training help people to develop knowledge and skills that may be used to enhance their own living standards and those of the broader community. Having a skilled workforce is vital to supporting ongoing economic development and improvements in living conditions. For further discussion see the box on human capital in this chapter.

About the headline indicator and its limitations: People aged 25–64 with a vocational or higher education qualification

While an indicator that recognises the sum of all knowledge and skills held by people would be desirable, such an indicator is not available. The headline indicator used here is the proportion of the population aged 25–64 with a vocational or higher education qualification.

Education: Other indicators

Education participation rate for those aged 15–19; Year 7/8 to Year 12 apparent retention rate; Human capital stock; Education participation rates and attainment levels for those aged 15–64; OECD literacy rates, science, reading and mathematics; Indigenous to non-Indigenous education participation and attainment ratios; Female students as a proportion of all students

Some differences within Australia

Educational attainment and participation differ substantially among various population subgroups – age groups, men and women, migrants, Indigenous Australians and for states and territories.

Links to other dimensions

Improvements in education may assist progress in other areas and vice versa. See also the commentaries *National income*, *Work*, *Economic hardship*, *Crime*, *Health*, and *Productivity*.

Education and training

Progress and the headline indicator

Education and training help people to develop knowledge and skills that may be used to enhance their own living standards and those of the broader community. For an individual, educational attainment is widely seen as a key factor to a rewarding career. For the nation as a whole, having a skilled workforce is vital to supporting ongoing economic development and improvements in living conditions.

People can obtain knowledge and skills in many different fields, and in many different ways (both formally and informally). Schools, providers of vocational education and training, and universities, offer many courses. Much formal learning also takes place in the workplace (either on the job or in work-related training courses). In addition, people may gain knowledge and skills by simply pursuing their own interests. An indicator that recognised the sum of all knowledge and skills held by people would in some ways be desirable, but such an indicator is not available. The commentary which follows focusses mainly on education and training in relation to the development of skills for use in paid employment.

The progress indicators used here measure the attainment of formal non-school qualifications, and the levels of participation in education and training. The headline indicator is the proportion of the population aged 25–64 with a vocational or higher education qualification (see box).

The indicator shows that there has been a rise in the proportion of people with non-school qualifications. Between 1995 and 2005, the proportion of 25–64 year olds with a vocational or higher education qualification rose from 46% to 58%, continuing a trend seen for several decades.^{1,2}

The increase over the last decade in the proportion of people with non-school qualifications was driven by the substantial increase in the proportion of people with a higher education qualification (i.e. a bachelor degree or above). Between 1995 and 2005, the proportion of people aged 25–64 with a higher education qualification increased from 14% to 23%. The proportion of people whose highest qualification was a vocational qualification was 34% in 2005, a similar level to a decade earlier.

Associated trends

Other indicators show that the increase in the overall levels of educational attainment is supported by continued high levels of participation in education and training. For example, the proportion of 15–19 year olds who were students (either in school or studying for a vocational or higher education qualification) increased steadily between 1985 and 1997, from 61% to 77%, and has remained steady since.

The apparent retention rate is one indicator of the degree to which young people are continuing their participation in secondary school education beyond the compulsory years. (Note that an

Measuring educational attainment

The educational attainment indicators refer to vocational and higher education qualifications (defined below) which are also called non-school qualifications.

Qualifications are defined as formal certifications, issued by a relevant approved body, in recognition that a person has achieved learning outcomes or competencies relevant to identified individual, professional, industry or community needs. Statements of attainment awarded for partial completion of a course of study at a particular level are excluded.

Vocational education qualifications include Advanced Diploma, Diploma, and Certificates I to IV.

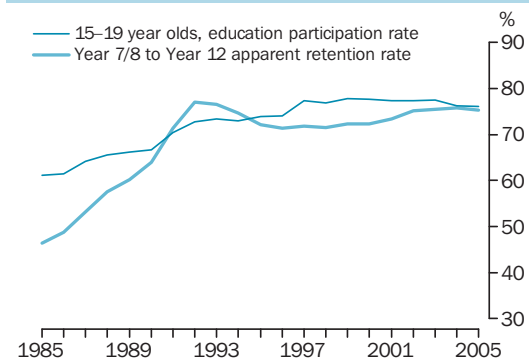
Higher education qualifications include Postgraduate Degree, Master Degree, Graduate Diploma, Graduate Certificate, and Bachelor Degree.

Non-school qualifications are awarded for educational attainments other than those of pre-primary, primary or secondary education. They include the higher education qualifications and vocational education qualifications listed above. Collectively, this group of qualifications is referred to as *non-school qualifications* instead of *post-school qualifications* because students can study for vocational qualifications, such as certificates and diplomas, while attending secondary school.

There have been some changes to the way in which information about qualifications has been collected and recorded.² While these changes involve relatively small numbers of people, they help to account for some of the changes seen in the time series.

international comparison of the proportion of young people completing at least upper secondary school across various OECD countries is included in the essay *Progress indicators in other countries*.) The increases in the level of retention of secondary school students through to Year 12, seen during the 1980s and early 1990s, have not continued at the same pace in recent years. The Year 7/8 to Year 12 apparent retention rate (see box on next page) stood at 75% in 2005, slightly higher than in 1995 (72%), and slightly below the

Education participation rate for persons aged 15–19 years and Year 7/8 to Year 12 apparent retention rate



Source: *Education and Work, Australia cat. no. 6227.0*; and *Schools, Australia cat. no. 4221.0*.

1992 peak of 77%. (The peak in 1992 occurred in a year of particularly high levels of unemployment – see the commentary *Work*.) Care should be taken in interpreting apparent retention rates as they do not account for influences on the Australian school student population.

Some differences in Australia

There are a range of differences throughout Australia in educational participation and attainment for different age groups, women and men, immigrants and Indigenous Australians.

Age group differences

In 2005, 57% of people aged 15–24 were attending an educational institution compared with 14% in the 25–34 year age group and lower proportions in older age groups. Overall, there is an ongoing increase in levels of participation in education among younger age groups. Consistent with this, the proportion of people with a vocational or higher education qualification was highest for those aged 25–34 (64%) in 2005.

People are most likely to obtain their initial vocational or higher education qualifications during their late teens and early 20s. However, between 1995 and 2005, the proportion of people with a vocational or higher education qualification increased for all age groups. This was partly because of increased educational participation across most age groups, but it also reflects the ongoing increase in education participation amongst young people. Over time, those older people who were less likely to have qualifications are moving out of the labour market and are being replaced by younger cohorts who are more likely to have obtained qualifications, usually when they were young.

Education participation and educational attainment for persons aged 15–64

Age group (years)	Education participation rate		Persons with a vocational or higher education qualification	
	1995	2005	1995	2005
	%	%	%	%
15–24	49.6	57.1	22.3	26.6
25–34	11.9	13.8	48.5	64.1
35–44	9.1	8.3	49.8	59.3
45–54	4.8	5.5	45.7	57.3
55–64	1.9	2.4	37.3	49.4
Total 25–64	7.8	7.9	46.4	58.1
Total 15–64	17.2	18.2	41.0	51.5

Source: ABS Survey of Education and Work, Australia, 2005 cat. no. 6227.0.

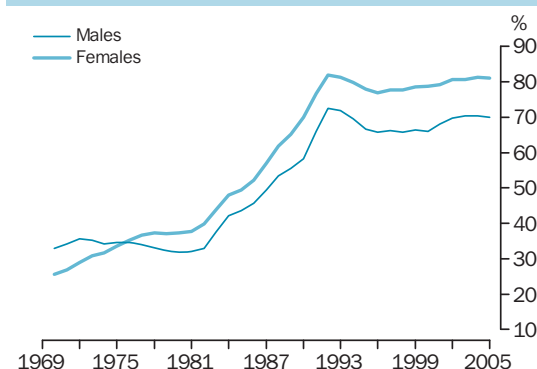
Apparent retention rates

Apparent retention rates in this chapter are calculated by dividing the number of full-time students in Year 12 by the number of full-time students in an earlier year of secondary school education (known as the base year), when the majority of that Year 12 cohort are assumed to have commenced. In this publication, the base year is Year 7 (five years earlier) in New South Wales, Victoria, Tasmania and the Australian Capital Territory and Year 8 (four years earlier) in Queensland, South Australia, Western Australia and the Northern Territory (since those years represent the commencement of secondary school in the respective state or territory). The figure is then converted to a percentage.

Over time, apparent retention rates have become less relevant and accurate as changes to the education system have broadened the range of pathways available to young people in post-compulsory education. Existing apparent retention rates do not take into account a range of factors, and readers are cautioned to exercise care in interpreting the measure. Students may repeat a year of education, or migrate between institutions, states/territories and in or out of Australia. An increasing number of students are considered to be part-time and there are also differing enrolment policies leading to different age/grade structures between states and territories. All these factors affect the number and composition of the student population when calculating apparent retention rates or alternative measures. The ABS is considering a range of adjustments which will better account for these factors. The ABS is also constructing a more comprehensive suite of measures to address issues of participation, pathways and outcomes of young people.⁵

There has been much interest in the educational attainment of older people with discussion focussing on life long learning and the need to develop and update knowledge and skills required to meet changes in the labour market. However, in the decade between 1995 and 2005 education participation rates for those aged 25–64 remained fairly constant.⁵

Year 7/8 to Year 12 apparent retention rate(a)



(a) Refers to full-time students only.

Source: Australian Bureau of Statistics, Schools, Australia cat. no. 4221.0

Education participation of persons aged 15–64

	Males %	Females %	Total %
1995	17.2	17.2	17.2
1996	17.2	18.2	17.7
1997	17.1	17.8	17.5
1998	16.9	17.8	17.4
1999	17.5	18.7	18.1
2000	17.0	18.6	17.8
2001	17.5	18.6	18.1
2002	17.8	19.2	18.5
2003	17.7	19.6	18.6
2004	16.9	18.5	17.7
2005	17.3	19.1	18.2

Source: ABS Survey of Education and Work

Male/female differences

Sometimes referred to as a social revolution, changes in social attitudes concerning the roles and responsibilities of men and women in the latter part of the last century have influenced the education participation and attainment levels of women.⁶ This has resulted in the differences between men and women in regard to educational attainment becoming less pronounced. In 2005, a higher proportion of women than men in the 15–24 age group had vocational or higher education qualifications (29% and 24% respectively).

However, in the 25–64 age group, a higher proportion of men have a vocational or higher education qualification, the difference increasing with age. Between 1995 and 2005 the proportion of women (aged 25–64 years) with a vocational or higher education qualification increased from 40% to 54%. For men, the proportion increased from 53% to 62%. These changes are more pronounced among younger age groups. In 2005, the proportion of women aged 25–34 years with a higher education qualification exceeded that of men (32% and 27% respectively), whereas a decade earlier the proportions for men and women aged 25–34 were both about 14%.

Not surprisingly, changes in attainment are consistent with changes in participation over this period. Between 1995 and 2005, education participation for women overall, increased slightly from 17% to 19%. In comparison, participation for men remained about the same at 17%. Since the mid-1970s, women have been more likely than men to continue through secondary school to the uppermost level of schooling, as indicated by Year 7/8 to Year 12 apparent retention rates,^{3,4} and this in turn has led to greater increases in participation in other programs of education and training. In 2005, the Year 12 apparent retention rate for women was 81% compared to 70% for men. The increasing difference in participation and

attainment levels of men and women in the younger age groups (particularly in the school system), has given rise to concerns about men's success in education.⁷

Migrants

Immigration has helped to build the skill levels of the population. Migrant groups tend, on average, to have higher levels of educational attainment than the Australian-born population.⁸

Levels of educational attainment have also generally increased among successive waves of migrants. Data from the ABS 2004 Labour Force Status and Other Characteristics of Migrants Survey showed that 55% of those who arrived in the period 2002 to 2004, and were aged 15 and over at that time, had a vocational or higher education qualification on arrival, compared with 52% of those who arrived from 1995 to 2001 and 45% of those who arrived from 1986 to 1994. The increased focus on the skilled migration component of Australia's migration program has contributed to this trend.⁹

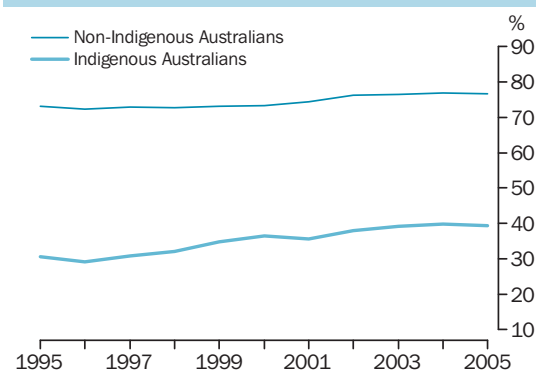
Aboriginal and Torres Strait Islander peoples

There has been significant progress in the levels of education participation and educational attainment among Indigenous Australians in recent years, and a narrowing of the gaps in both participation and attainment between Indigenous and non-Indigenous Australians over that period. However, both the levels of participation in education and training among Indigenous Australians and their levels of attainment remain well below those of non-Indigenous Australians.

Increases in the Year 7/8 to Year 12 apparent retention rate for Indigenous students, show an increasing proportion of Indigenous Australians progressing through to Year 12. Between 1995 and 2005 the Year 12 apparent retention rate for Indigenous students increased from 31% to 40%.

Between the 1994 National Aboriginal and Torres Strait Islander Survey and the 2002 National

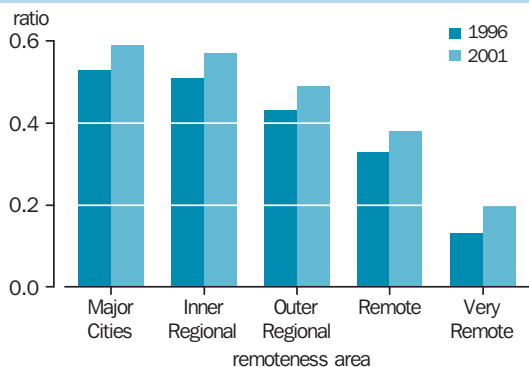
Year 7/8 to Year 12 apparent retention rate(a)



(a) Refers to full-time students only.

Source: Australian Bureau of Statistics, Schools, Australia, cat. no. 4221.0.

Indigenous to non-Indigenous attainment ratios(a)(b)



(a) The ratio of Indigenous to non-Indigenous attainment of a non-school qualification is calculated by dividing the Indigenous rate of attainment by the non-Indigenous rate of attainment. A ratio of less than one implies Indigenous disadvantage. (b) Attainment of non-school qualifications for persons aged 25–64. Source: Census of Population and Housing, 1996 & 2001.

Aboriginal and Torres Strait Islander Social Survey, the proportion of Indigenous adults aged 25–64 with a vocational or higher education qualification increased from 20% to 32%. Over this period, for those who reported their level of qualification, the proportion of Indigenous Australians with a certificate or diploma increased from 13% to 24%. Those reporting a bachelor degree or above increased from 1% in 1994 to 5% in 2002.¹⁰

Censuses of Population and Housing also show gains in Indigenous attainment between 1996 and 2001. While these gains were observed across geographic areas and in all age groups, the gap between the Indigenous and non-Indigenous populations increased with increasing geographic remoteness.

Level of highest non-school qualification for persons aged 25–64 – 2005

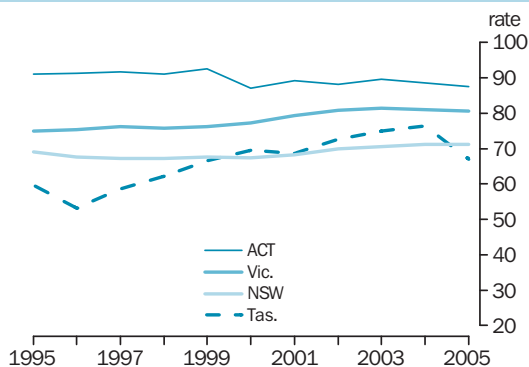
	Vocational qualification %	Higher education qualification %	Total(a) %
NSW	35.1	24.5	61.1
Vic.	32.0	24.3	57.5
Qld	35.1	19.0	55.3
SA	33.1	18.2	53.3
WA	36.1	21.2	58.7
Tas.	31.2	18.3	51.1
NT	37.0	22.7	60.7
ACT	27.0	39.5	68.7
Aust.	34.1	22.7	58.1

(a) The total is not the sum of the other two columns because it includes people whose level of non-school qualification was undetermined. Also, people with a higher education qualification may also have a vocational qualification. Source: Survey of Education and Work, cat. no. 6227.0.

State/territory differences

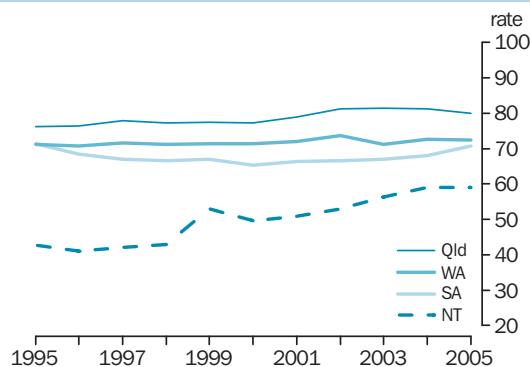
The differences across the states and territories in the proportion of people aged 25–64 whose level of highest non-school qualification was a vocational qualification ranged between 27% for the Australian Capital Territory and 37% for the Northern Territory in 2005. However, the proportions of persons with higher education qualifications differed more substantially, ranging from 40% in the Australian Capital Territory to 18% in South Australia. These differences may be related to a number of factors including: differences in the demand for highly skilled persons; differences in the age distribution of the individual state or territory populations; and the extent to which a particular state or territory may

Year 7 to Year 12 apparent retention rate, states/territories in which secondary school commences in Year 7(a)(b)



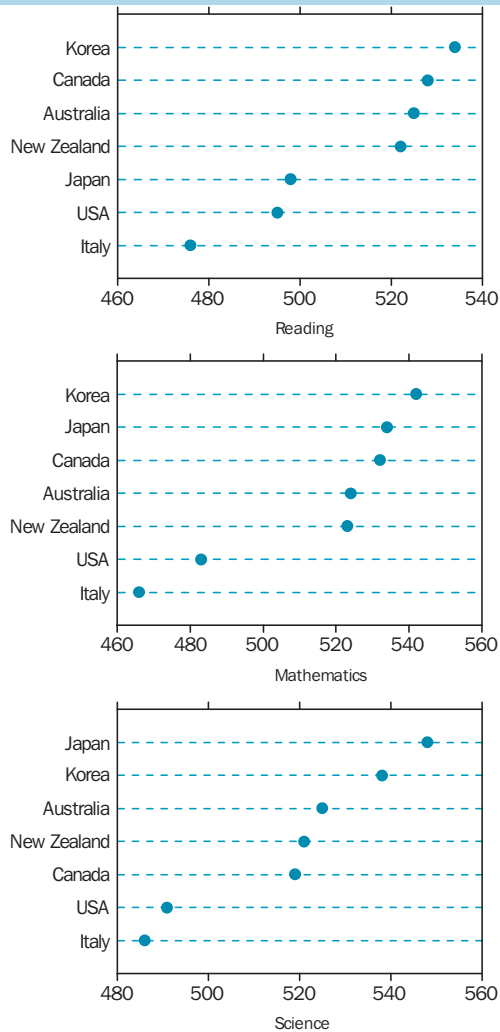
(a) Refers to full-time students only. (b) Relatively small changes in student numbers in smaller jurisdictions can create apparently significant movements in retention rates. Source: National Schools Statistics Collection; and Schools, Australia cat. no. 4221.0.

Year 8 to Year 12 apparent retention rate, states/territories in which secondary school commences in Year 8(a)(b)



(a) Refers to full-time students only. (b) Relatively small changes in student numbers in smaller jurisdictions can create apparently significant movements in retention rates. Source: National Schools Statistics Collection; and Schools, Australia cat. no. 4221.0.

Average literacy scores for 15 year olds in selected OECD countries – 2003



Source: OECD Education at a glance, 2005, table A4.3 (for Maths) and OECD Learning for Tomorrow's World – First Results from PISA 2003, 2004 figures 6.3 (for reading) and 6.10 (for science).

The Organisation for Economic Co-operation and Development (OECD) periodically publishes average scientific, mathematical and reading literacy scores under its Programme for International Student Assessment (PISA). PISA aims to assess whether students, approaching the end of compulsory education, have acquired some of the knowledge and skills that are necessary for full participation in society. In 2003, the survey was carried out with a minimum sample size of 4,500 15 year old students from at least 150 schools in each participating country. The OECD scales were constructed to have a mean of 500 and a standard deviation of 100, so that almost two-thirds of students across the OECD obtained scores between 400 and 600 points.

The average literacy scores show that Australia, Canada and New Zealand have similar scores, with average scores between 522–528 on the reading scale, 523–532 on the mathematics scale and 519–525 on the science scale. Japan and Korea scored highly in both science and mathematics literacy assessments. Of all 30 surveyed countries (a selection of which are included in the graphs), Australia was ranked 4th for reading and science and 8th for mathematics.¹²

attract migrants (both interstate and international) with high levels of educational attainment.

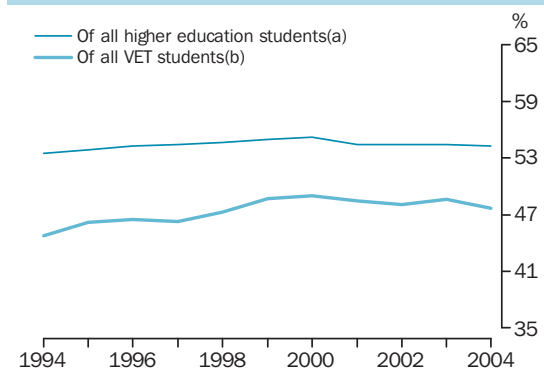
There have been substantial differences in Year 7/8 to Year 12 apparent retention rates among the states and territories. The Australian Capital Territory had the highest apparent retention rate in 2005 (88%) while the Northern Territory had the lowest (59%). The general pattern of change in Year 12 apparent retention rates over the last decade has been similar in most of the states and territories, i.e. generally falling from a peak in the early 1990s and remaining fairly stable since the mid-1990s. The drop-off from the early 1990s peak was more pronounced in South Australia and the Northern Territory. Contrary to the general pattern, Year 12 apparent retention rates increased substantially in Tasmania between 1995 and 2003 but have declined more recently. Nevertheless, in the decade 1995 to 2005, they showed an overall increase, from 60% to 67%.

The greater fall in apparent retention rates seen in some states earlier in the decade, particularly South Australia, is partly related to increasing numbers of students opting to complete upper levels of secondary school on a part-time basis.¹¹ Part-time students are excluded from the calculation of the Year 7/8 to Year 12 apparent retention rates.

Factors influencing change

The pace at which knowledge and skills are developed within the population is influenced by many factors. Increasing requirements for high level skills and qualifications in the work force due to the changing nature of work (including technological change within industries and their changing structure) are important drivers of change.¹³ The policies of governments and industry groups in providing opportunities for people (especially young people) to develop their knowledge and skills also play an important role in

Female students as a proportion of all students



(a) The scope of the data in 2002 is different to that used in previous series. From 2001 DEST has recalculated the data to align with this change. (b) Private providers are included from 1996, and VET in schools was included from 1997 to 2001.

Source: DEST 2003 and 2000, Students, Selected Higher Education Statistics. VET data is from NCVER, Students and Courses 2005: Summary, Higher Ed. data from DEST Higher Education Statistics 2004

Human capital

In 2004, the ABS released its first experimental estimates of the value of an aspect of Australia's human capital stock. The estimates were calculated using a 'lifetime labour income' approach which quantified the total income a person could expect to receive over the course of their working life, and also considered the effect on people's income of taking additional educational qualifications.

Australia's stock of this aspect of human capital was valued at \$5,600 billion in 2001, a real increase of 75% since 1981. The study found that growth in human capital has been quicker among women than men, with the value of women's human capital rising by 84% over the period (compared to 69% for men). The increase was driven, in part, by a rise in the number of people with higher education qualifications.¹⁴

Australia's human capital stock(a) by educational qualification

	1981 \$ billion	2001 \$ billion
Male		
Higher degree	40.6	160.3
Degree	208.3	659.3
Skilled labour(b)	672.1	1,104.2
Unqualified	1,015.5	1,352.0
Total	1,936.4	3,275.7
Female		
Higher degree	8.9	88.7
Degree	84.2	570.2
Skilled labour(b)	268.7	464.0
Unqualified	887.3	1,177.1
Total	1,249.2	2,300.0
Total	3,185.6	5,575.7

(a) Figures are adjusted to 2001 dollars. (b) The study period for a skilled labour qualification is 2 years.

Source: *Working papers in econometrics and applied statistics: no. 2004/1 Measuring the Stock of Human Capital for Australia – Experimental Estimates, September 2001. cat. no. 1351.0.55.001.*

educational participation and attainment. Australia's continued interest in attracting skilled migrants from other countries may also help to increase the attainment levels of Australia's population.⁹

Throughout the past decade, women have outnumbered men in higher education. The proportion of higher education students who are women has remained at around 54%. The representation of women in the VET sector however is below that of men, although the proportion increased over the decade to 2004 (45% in 1994 and 48% in 2004).

Links to other dimensions of progress

The ongoing development of people's knowledge and skills influences many dimensions of progress. Increased education and training may support economic development by providing people with specialised skills capable of increasing levels of

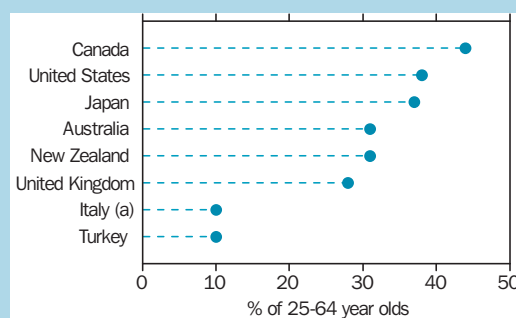
International comparisons of education

Due to differences in the way qualifications are classified in Australia and internationally, there is no OECD indicator that can be directly compared to the headline indicator. One important OECD indicator is the proportion of the adult population that has attained tertiary level education, a measure of attainment which attempts to bridge the variability in education programs across countries. The OECD defines a tertiary education and training program as having a content which: is either theoretically-based or focused on occupationally-specific skills; generally has pre-requisite studies; and is of at least two years duration. In the Australian context, these programs include Diploma, Advanced Diploma, Graduate Diploma, Graduate Certificate and Bachelor Degree and above.

In 2003, there was a wide variation in the proportion of 25–64 year olds with at least one such tertiary qualification among OECD member countries, ranging from 10% in Italy and Turkey to 44% in Canada.

The OECD reported that 31% of Australians aged 25–64 had attained a tertiary qualification, the seventh highest proportion among the 30 OECD member countries. Similar to most member countries, those in the younger age groups were more likely to have completed such qualifications than those who were older.

Persons aged 25–64 with a vocational or higher education qualification: selected OECD countries – 2003



(a) 2002 data.

Source: *OECD Education at a Glance 2005*

productivity and of extending the range and quality of goods and services produced. Education and training may also serve to improve our capability to address a wide range of public health and welfare issues, as well as various environmental problems. From an individual's perspective, educational participation and attainment can help to improve outcomes in areas such as employment, income and health.

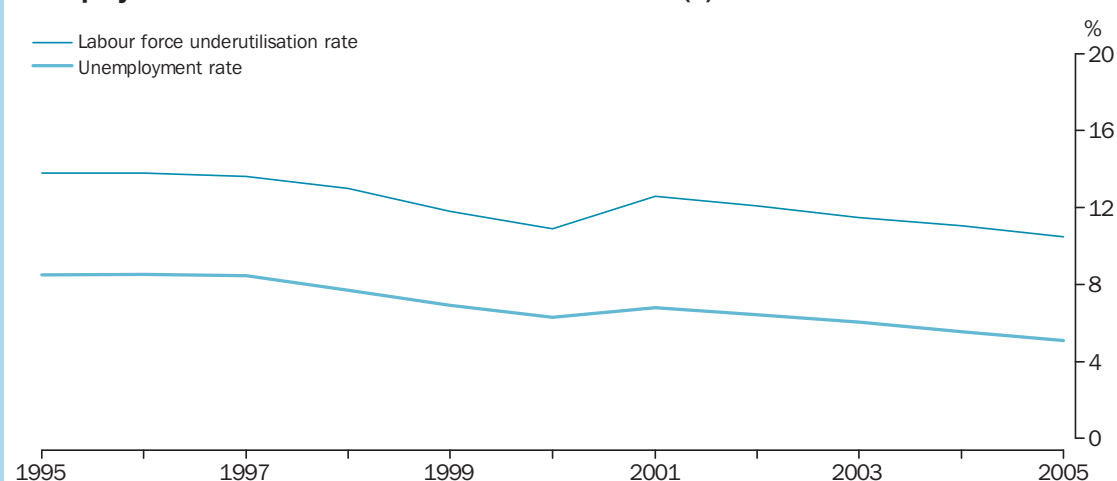
The opportunity to participate in education and training in turn depends on a broad range of social, economic, and individual factors including health, economic circumstances, established support mechanisms, and access to education and training. See also the commentaries *National income, Work, Economic hardship, Crime, Health, and Productivity*.

Endnotes

- 1 Data for 1969 and 1982 show that the proportion of people aged 20–64 years (a slightly larger age group than that used as the main indicator in this report) who had a non-school qualification increased from 20% to 42%. See Australian Bureau of Statistics 1984, *Social Indicators, Australia, No. 4*, cat. no. 4101.0, ABS, Canberra.
- 2 There have been four major breaks in the series between 1990 and 2003. The breaks listed below are considered to have impacted on the comparability of data relating to qualifications.
 - (a) In 1993, the ABS introduced the Australian Bureau of Statistics *Classification of Qualifications (ABSCQ)*, 1993 (cat. no. 1262.0).
 - (b) In 1994, qualifications of nurses were treated separately, which resulted in some movement of data relating to level of qualifications.
 - (c) In 1997, prompt cards were no longer used and computer assisted coding methodology was adopted, resulting in changes in the relative distribution within vocational education qualifications.
 - (d) In 2001, the ABSCQ was replaced by the *Australian Standard Classification of Education (ASCED)* cat. no. 1272.0. The ASCED is a national standard classification, which can be applied to all sectors of the Australian education system including schools, vocational education and training and higher education.
- 3 Australian Bureau of Statistics, 'Review of ABS Apparent Retention Rates Series' in *Schools, Australia 2004*, cat. no. 4221.0, ABS, Canberra.
- 4 Australian Bureau of Statistics, 'Update of the Review of ABS Apparent Retention Rates Series' in *Schools, Australia 2005*, cat. no. 4221.0, ABS, Canberra.
- 5 Australian Bureau of Statistics, *Schools, Australia, 2005* cat. no. 4221.0, ABS, Canberra.
- 6 Mackay, H. 1993, *Reinventing Australia. The mind and mood of Australia in the 90s*, Angus and Robertson, Sydney.
- 7 Buckingham, J. 2000, *Boy Troubles: Understanding rising suicide, rising crime and educational failure*, The Centre for Independent Studies, St. Leonards.
- 8 For example, in 2001, 54% of persons aged 15–64 years in the survey population (see note below) born outside Australia had a non-school qualification, compared to 50% among Australian-born. Among those born outside Australia, those who spoke English as their first language were more likely to hold a non-school qualification (58%) than those who first spoke another language (51%). See Australian Bureau of Statistics, *Education and Training Experience*, 2001, cat. no. 6278.0, ABS, Canberra.
For details of analysis of other data about migrants, see Australian Bureau of Statistics *Labour Force Status and Other Characteristics of Migrants, Australia, Nov. 2004*, cat. no. 6250.0., ABS, Canberra.
- 9 Australian Bureau of Statistics 2004, *Labour force Status and other characteristics of migrants, Australia, Nov 2004*, cat. no. 6250.0, ABS, Canberra.
- 10 Australian Bureau of Statistics and Australian Institute of Health and Welfare, *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*, 2005 cat. no. 4704.0, ABS and AIHW, Canberra.
- 11 For example, in 2004, 88% of all students in South Australia, including those attending on a part-time basis, had continued from Year 10 to Year 12, compared with 72% for full time students only. See Steering Committee for the Review of Commonwealth/State Service Provision (SCRCSPP) 2006, *Report on Government Services 2006, Vol. 1*. Ausinfo, Canberra.
- 12 The OECD definition of at least upper secondary level education corresponds to the final stages of secondary education and above. In the Australian context, this includes completion of Years 11 or 12 of secondary school, Certificate III or IV, Diploma, Advanced Diploma, Bachelor Degree or above. Refer to The International Standard Classification of Education: ISCED 97, UNESCO, Paris, 1997 for more details.
- 13 Economic Planning Advisory Council (EPAC) 1996, *The changing Australian Labour Market*, AGPS, Canberra
- 14 There is a wealth of research on the link between education and economic growth. For recent Australian research see Chou, Y. K. 'The Australian growth experience, 1960–2000: Human capital, R&D or steady-state growth', in *The Australian Economic Review*, Vol 36, Melbourne, 2003.

Work: key points

Unemployment and labour force underutilisation rates(a)



(a) The labour force underutilisation rate is the number of unemployed and underemployed persons, expressed as a proportion of the labour force.

Source: *Australian Labour Market Statistics, October 2005, cat. no. 6105.0.*

The unemployment rate has had a downward trend since the last recession in the early 1990s. The annual average unemployment rate was 8.2% during 1995. Since then it has generally fallen, to be 5.1% in 2005. On average the unemployment rate was lower in the 1960s and early 1970s, than it has been since the mid 1970s.

The relationship between work and progress

Paid work is the way most people obtain the economic resources needed for day to day living. Having paid work contributes to a person's sense of identity and self-esteem. People's involvement in paid work also contributes to economic growth and development.

About the headline indicator and its limitations: Unemployment rate

While a single indicator covering all that is important to progress in the work dimension is not available, useful indicators of progress may be obtained by looking at the extent to which people are working their preferred number of hours. The unemployment rate, which is the number of unemployed people expressed as a proportion of the labour force, is a widely used measure of underutilised labour resources in the economy. This has been chosen as the headline indicator, because of its relevance to economic and social aspects of work. The graph above also includes the labour force underutilisation rate, which is a measure of the number of unemployed and underemployed people, expressed as a proportion of the labour force.

Work: Other indicators

Labour force underutilisation rate; long-term unemployment rate; proportion of people working; retrenchment rate; unemployment to population ratio; casual employees; people working part-time or longer hours (50 hours a week or more); average hours worked per week by full-time workers.

Some differences within Australia

Significant economic and social changes over recent decades have altered the way in which work is organised and carried out. Some of these changes have been reflected in the rapid growth of part-time and casual employment. There are also notable differences in unemployment rates among different sub-groups – young people and Indigenous Australians have higher rates of unemployment than the population average.

Links to other dimensions

Improvements in employment may assist progress in other areas and *vice versa*. See also the commentaries *National income, Education and training, Crime, Health, Economic hardship*, and *Family, community and social cohesion*.

Work

Progress and the headline indicator

Paid work is the way most people obtain the economic resources needed for day to day living, for themselves and their dependants, and to meet their longer term financial needs. Having paid work contributes to a person's sense of identity and self-esteem. People's involvement in paid work also contributes to economic growth and development.

The number of people in Australia in paid employment has grown steadily over the last 25 years. In 1980, there were 6.3 million employed people in Australia. By 2005, largely due to population growth, this had increased by 59% to 10 million people. Since 1980, the employment to population ratio has increased from 58% to 61%.

Once in paid employment, many aspects of work affect people's wellbeing, such as hours worked, levels of remuneration, job satisfaction and security, opportunity for self-development, and interaction with people outside the home. An ideal indicator of progress would reflect these and other aspects of work to measure the extent to which Australians' work preferences are satisfied.

While a single indicator covering all these aspects is not available, useful indicators of progress may be obtained by looking at the extent to which people's aspirations for work, or more work, are unsatisfied. The unemployment rate, which is the number of unemployed persons expressed as a percentage of the labour force, is a widely used measure of underutilised labour resources in the economy. It has been chosen as the headline indicator because of its relevance to the economic and social aspects of work.

Measures of underutilised labour such as the unemployment rate are sensitive to changes in the economy. For example, the unemployment rate is widely used as a key indicator of changing economic conditions across the business cycle.

In 1995, the annual average unemployment rate stood at 8.2% as a result of the economic recession in the early 1990s. Since then it has generally fallen, to stand at 5.1% in 2005. Broadly consistent measures of unemployment are available back to 1966. The unemployment rate has risen considerably since the late 1960s, when it averaged about 2%. There was a marked increase from 2.3% in 1973 to 5.8% in 1981. In 2004, the annual average unemployment rate fell below 6% for the first time since the early 1980s. Over the past 25 years there has been a consistent pattern to changes in the unemployment rate. It has tended to rise quickly during economic downturns and fall slowly during economic expansions.

Associated trends

The labour force underutilisation rate is the proportion of people in the labour force whose labour is underutilised. It provides a wider view of underutilised labour than the unemployment rate,

Unpaid work

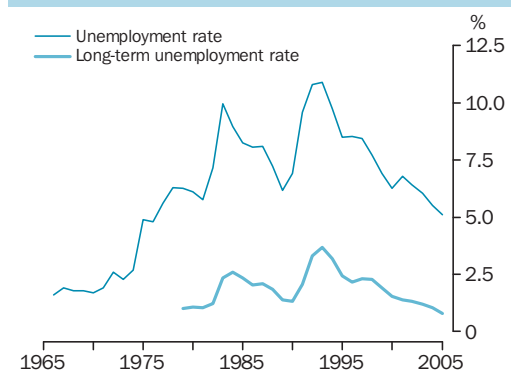
This section focuses on people in or seeking paid work. But a great deal of work is undertaken outside of the market economy and is unpaid. In 1997, an estimated 19.3 billion hours of unpaid housework and unpaid volunteer and community work were undertaken in Australia. ABS estimates put the value of this work at \$261 billion, which was equivalent to 48% of GDP.¹ Most of this was attributable to housework (91%) and a large share of it represented work undertaken by women (65%). For further discussion on voluntary work see the *Family, community and social cohesion* chapter.

While there was an increase in the number of unpaid hours worked between 1992 and 1997 (up by 0.4 billion hours), the value of unpaid work relative to GDP declined (down from 52% of GDP in 1992). The decline was partly due to the rapid increase in demand for labour in the market economy, so that relatively more work was done on a paid rather than an unpaid basis. Also wage rates for jobs such as housework (on which estimates of the value of unpaid work are based) did not grow as substantially as wage rates for higher skilled jobs. Other factors, such as rapid growth in technological innovation and the changing size and composition of households, has affected the estimated value of unpaid work.

as it takes account of both the unemployed (i.e. people who were not working but who were actively looking and available for work) and the underemployed (i.e. people working less than 35 hours a week who wanted to, and were available to, work additional hours). Between 1995 and 2005, the labour force underutilisation rate fell from 14% to just over 10%. Its movements closely tracked those of the unemployment rate.

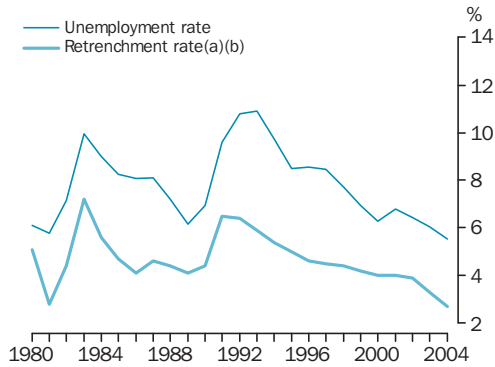
People unemployed for long periods may experience greater economic hardship, and may have more difficulties in finding employment because of the loss of relevant skills and employers' perceptions of their 'employability'. The long-term unemployment rate is the number of people who have been continuously unemployed for a period of 12 months or longer, as a percentage of the labour force. In 2005, the annual average long-term unemployment rate was 0.8%, compared with 2.5% in 1995 in the aftermath of

Unemployment and long-term unemployment: longer term views



Source: Labour Force, Australia, detailed electronic delivery (cat. no. 6291.0.55.001).

Unemployment and retrenchment rates



(a) People who were retrenched or made redundant over the 12-month period before the survey, as a percentage of all people who had been employed at some time over the same period. Surveys were conducted in February of the relevant years. (b) From 1992 onwards the survey was only conducted every 2 years.

Source: *Labour Mobility, Australia, February 1980 to February 2004*, cat. no. 6209.0; *Labour Force, Australia* cat. no. 6202.0.

the last recession. Movements in the long-term unemployment rate often lag movements in the total unemployment rate.

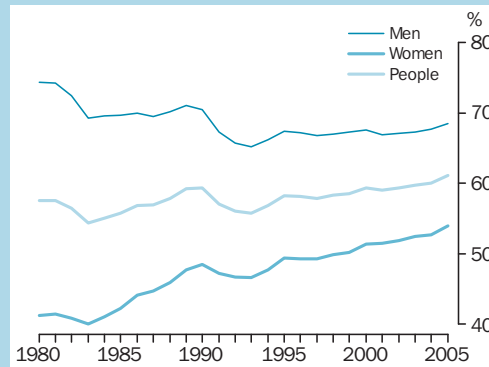
Job security

People's feelings of job security are thought to be closely linked to changes in the level of unemployment.² This may be a consequence of people seeing other employees being retrenched or made redundant.

As might be expected, the retrenchment rate moves similarly to the unemployment rate through each economic cycle and has generally declined through the mid to late 1990s. In the 12 months from March 2003 to February 2004, some 270,700 people were retrenched or made redundant. This number represented 2.7% of all people who had been employed during the same period, a proportion considerably below that recorded in the 12 months from March 1993 to February 1994 (5.4%) following the peak of the last recession. However, the fall that occurred during the 1990s was slower than that which occurred in the 1980s following the recession in the earlier part of that decade.

One way to measure people's perception of job security is to consider the proportion of workers who report that they do not expect to be working with their current employer or in their current business in 12 months' time. In November 2005, 10.0% of people in the workforce had this expectation. However, 8.5% of employees thought they would do this for voluntary reasons. Only 1.5% of employed people in 2005 thought they would need to leave their job for involuntary or economic reasons.⁴

Proportion of people working



Source: *Labour Force, Australia, detailed electronic delivery* (cat. no. 6291.0.55.001)

Proportion of people working: employment to population ratio

The headline indicator for work focuses on unemployment, which is a measure of the extent to which people's desire for work is unsatisfied. But any assessment of progress in the work dimension needs also to consider changes in the number of people working. One way to measure whether there has been an increase or decrease in the proportion of people working is to calculate the employment to population ratio. This is done by taking the number of employed people and dividing it by the population of people who could be potentially employed. In this case we have used the civilian population 15 years and over.

There have been some significant changes in people's working patterns over the past 25 years. One highly significant change has been the growth in the proportion of women working in paid employment. This change reflects changes in the traditional roles of full-time employment for the male partner, and child care and household responsibilities for the female partner, which began around the 1960s and gained momentum over the 1980s and 1990s.³ While the proportion of men working fell from 1980 to 2005 (74% to 69%) the proportion of women working increased (from 41% to 54%).

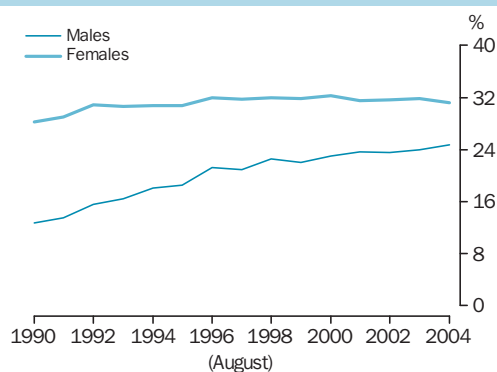
The period 1980 to 2005 also saw major changes to industry and workforce structure. Employment growth was concentrated in the service sector. Much of this growth was in part-time and casual jobs.

See also the international comparison for employment to population ratio in the *International comparisons of progress* essay on page 188.

Casual employment

There has been strong growth in the number of casual employees over the last two decades. Casual employees are usually not entitled to paid leave but receive a higher rate of pay to compensate for this and their lack of permanency. The number of casual employees can be approximated by the number of employees who are not entitled to paid holiday leave or paid sick leave.⁵ On this basis, the proportion of male employees who are casual employees has almost doubled, increasing from 13% in 1990 to 25% in 2004. Over the same period, the proportion of female employees who are casual employees increased from 28% to 31%. The pace of change has slowed in recent years.

Casual employees(a)



(a) Employees who were not entitled to either paid holiday or sick leave in their main job as a percentage of all employees. Casual employees included employees who operate their own incorporated enterprise with or without hiring employees.

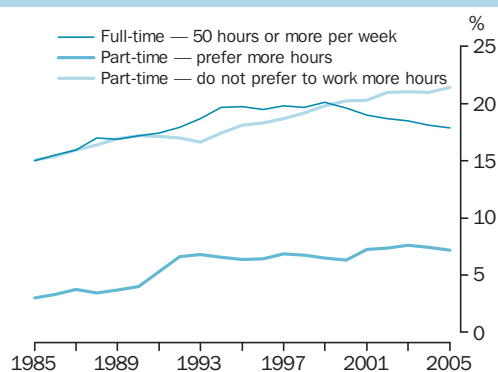
Source: *Weekly Earnings of Employees, Australia* cat. no. 6310.0. For data after 1998, *Employee Earnings, Benefits and Trade Union Membership Australia* cat. no. 6310.0.

These changes, which have occurred in association with rapid growth in employment in service industries, are viewed by many employers and employees as beneficial. For example, for people employed in such jobs, often women and younger people, the flexibility associated with such arrangements may suit their particular needs. But the extent to which people's preferences for alternative work arrangements are not being satisfied also needs to be considered.

Hours worked

There has been a trend away from the traditional 9-to-5 job towards more diverse arrangements.⁶ The increased availability of part-time work has widened opportunities for people to balance work with family responsibilities, participate in education, or make the transition to retirement. The proportion of employed people working part-time has increased from 16% in 1979 to 29% in 2005. But not all part-time workers are working their preferred number of hours. In 2005, 7% of employed people worked part-time and wanted

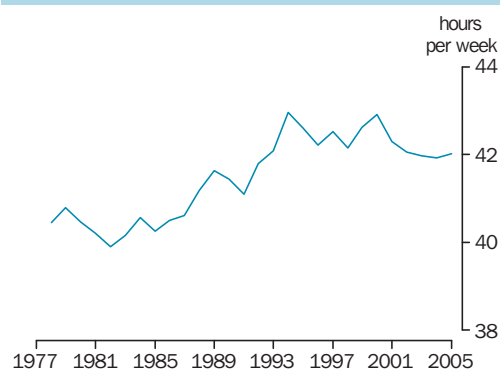
People working part-time or long hours(a)



(a) Annual averages as a percentage of all employed people.

Source: *Labour Force, Australia, detailed electronic delivery* (cat. no. 6291.0.55.001).

Average hours worked per week, full-time workers(a)



(a) An average of hours actually worked, including overtime, by full-time workers, divided by the number of full-time workers. Figures are for August of each year.

Source: *Labour Force Australia, detailed, Electronic delivery* (cat. no. 6291.0.55.001).

to work more hours. This compares with 3% in 1985 and 6% in 1995.

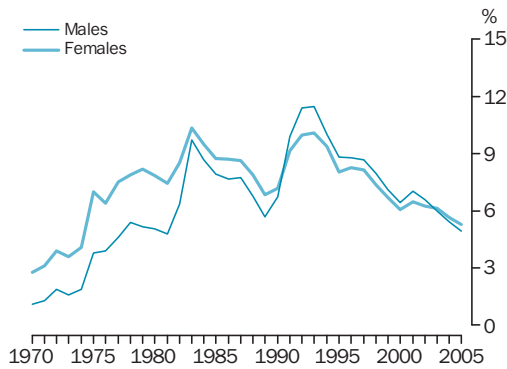
The average number of hours worked by full-time workers, and the proportion of employees who work long hours, have also increased in recent decades. Average hours worked by full-time workers in 1979 stood at 41 hours, compared with 43 hours in 1995 and 42 hours in 2005. The proportion of employees who worked 50 hours or more increased between 1979 and 1999, from 14% to 19%, but had declined slightly to 18% in 2005. The proportion of employees who worked very long hours (60 hours or more), continued to increase from 8% to 11% between 1979 and 2005.

Some differences within Australia

In a job market where there are too few jobs for all those actively seeking paid employment, groups with characteristics that are in low demand (e.g. people with low levels of educational attainment, limited relevant work experience, or in relatively poor health) have greater difficulty in securing a job. Among the most disadvantaged groups in this regard are young people, older people with work experience in occupations that have declined in demand, and Indigenous Australians. The extent of disadvantage for some of these groups is examined in more detail below.

Significant economic and social changes over recent decades have altered the way in which work is organised and carried out. There have also been changes in the composition of the workforce, and in the way pay and other employment conditions are set. Some of these changes have been reflected in the rapid growth in part-time and casual employment, the emergence of different employment arrangements, and the increase in working hours. The impact of these changes has not been uniform across the various subgroups within the population.

Unemployment rates, by sex



Source: Labour Force, Australia, detailed electronic delivery (cat. no. 6291.0.55.001).

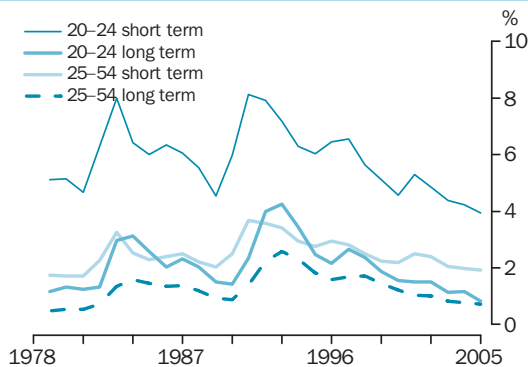
Male/female differences

As with their increasing participation in education and training, Australian women have taken a more active role in the labour force than was the case two decades ago. This can be illustrated by considering the changes in participation rates over time. The labour force participation rate is a total of the employed plus the unemployed as a percentage of the civilian population aged 15 and over. In the years from 1985 to 2005, the labour force participation rate for women increased from 46% in 1985 to 54% in 1995 and 57% in 2005. In contrast, the participation rate for men decreased from 76% in 1985 to 74% in 1995 and 72% in 2005.

Unemployment rates among men and women continue to change relative to each other. The rates for women were lower than those for men throughout the 1990s. In 2003, the male rate fell below the female rate, although they were very close. This situation continued through to 2005.

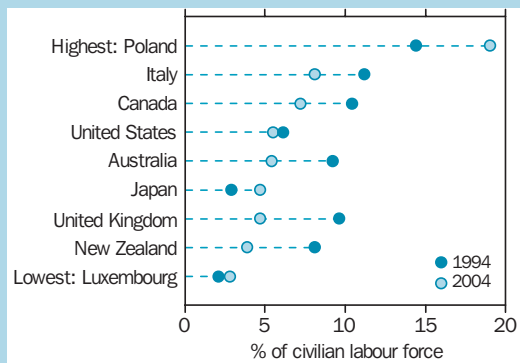
The increase in women's participation in employment has been strongly associated with an increase in part-time work, with women accounting for the majority of part-time workers (72% in 2005). Although most of the workers in part-time employment prefer part-time work to

Unemployment to population ratio(a), by age group



(a) Unemployed people looking for full-time work. Source: Labour Force, Australia, detailed electronic delivery (cat. no. 6291.0.55.001).

International comparison – unemployment rate



Source: OECD in Figures 2005/supplement 1.

The unemployment rate is a widely used measure of underutilised labour resources in the economy. Unemployment has both an economic and social dimension.

In 2004, the unemployment rate in Australia was 5.4%. This compared with 9.2% a decade earlier in 1994. There were twelve OECD countries that in 2004 had a lower unemployment rate than Australia, with Luxembourg the lowest at 2.8%. Poland had the highest unemployment rate in 2004 at 19.0% (up from 14.4% in 1994).

During the period 1994 to 2004, many OECD countries experienced declines in their unemployment rate. This was notably so for Ireland, where strong economic growth was coupled with declining unemployment. In 1994 the unemployment rate in Ireland was 14.8%, falling to 4.4% in 2004. Other countries experiencing large declines in their unemployment rate during this period were Spain (from 24.2% to 11%), and Finland (from 16.6% to 8.8%).

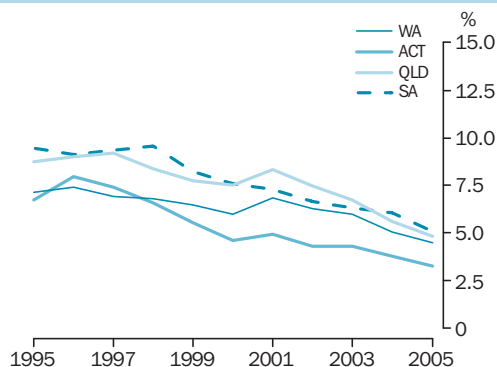
full-time work, 4.3% (90,100) of female part-time workers and 8.5% (68,400) of male part-time workers wanted to work full-time and were available, and actively looking for full-time work in August 2005.

Age group differences

Levels of involvement in the paid workforce vary through life. Participation increases with age as young people move from education and training (often combined with part-time work) to full-time jobs. It remains relatively high during people's thirties and forties, and then declines towards the years of retirement. Participation in the labour force is interrupted for many women as they take time out to raise families. In recent years, women have increasingly participated in the workforce during their childbearing years, often in part-time jobs.

The likelihood of being unemployed is also partly related to life-cycle stages. In particular, young people tend to have a relatively high unemployment rate. In 2005, 5.8% of 20–24 year-olds in the labour force were looking for full-time employment. However, most (more than 83%) of this unemployment was short-term (less

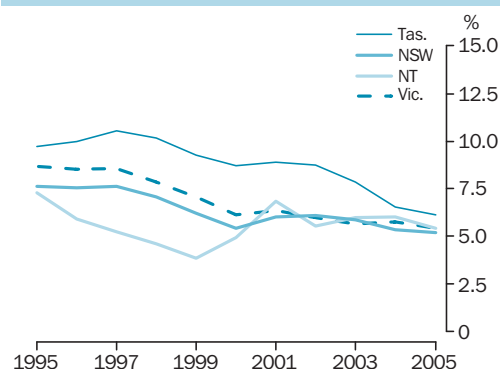
Unemployment rate – states and territories with the lowest rates in 2005(a)



(a) Annual average rate.

Source: Labour Force, Australia, Spreadsheets (cat. no. 6202.0.55.001).

Unemployment rate – states and territories with the highest rates in 2005(a)



(a) Annual average rate.

(Source: Labour Force, Australia, Spreadsheets (cat. no. 6202.0.55.001).

than one year), in part influenced by young people entering the labour market for the first time.

Young people can have difficulty finding work during an economic downturn, and the proportion becoming long-term unemployed increases. In 1993, 4.3% of 20–24 year-olds were long-term unemployed and looking for full-time work, whereas for 25–54 year-olds it was 2.6%. By 2005, the proportions had become quite similar (0.8% and 0.6%).

Aboriginal and Torres Strait Islander peoples

Indigenous Australians continue to have substantially lower levels of labour force participation and higher levels of unemployment than the rest of Australia's population, despite some gains in this area. In 2002, 64% of Indigenous adults aged 18–64 were in the labour force (a similar proportion to 1994), compared with 79% of the non-Indigenous population in this age group. And while the unemployment rate for Indigenous adults decreased over this period (from 37% in 1994 to 20% in 2002), this was still substantially higher than the rate for non-indigenous adults (6%). To some extent these disparities reflect where people live and the job opportunities available to them. The 2001 Census of Population and Housing showed that among those aged 15 and over, more than one-quarter (27%) of all Indigenous people were living in a remote or very remote part of Australia compared with just 2% of non-Indigenous people. Between 1994 and 2002, the proportion of Indigenous people aged 18–64 in mainstream employment (non-CDEP jobs) rose from 31% to 38%. Much of this gain was in part-time employment which increased from 8% to 12%. In 2002, a further 13% of Indigenous people aged 18–64 were employed in the CDEP scheme. Most CDEP participants were in remote areas, while in non-remote areas there was a higher proportion of people in mainstream employment.

Differences according to place

Opportunities for work vary across Australia with the nature and strength of the economic base and the relative growth of industries from place to place and over time. This may reflect the fact that some places have been more affected than others by restructuring within the economy, and the move away from traditional manufacturing to service industries in particular. Other factors, including the population's age composition and growth, and the occupation and skill base of residents, can influence regional differences in unemployment.⁷

Among the states and territories, Tasmania consistently had the highest unemployment rate throughout the 1990s. But, as with each of the other states and the territories, unemployment rates have generally declined through the 1990s. In 2005, the states with the highest annual average unemployment rates were Tasmania, Victoria, the Northern Territory, and New South Wales.

Factors influencing change

Factors that influence labour underutilisation can be characterised as those related to the demand for labour and those related to its supply.

The demand for labour is strongly influenced by economic activity and therefore varies over the business cycle. The demand for specific types of labour will also vary with structural change within the economy. For example, there may be a decrease in demand for workers who have the skills required for declining industries, and an increase in demand for those people with the skills needed in newer types of occupations.

Factors which affect the supply of labour also influence the indicators. Factors which influence the supply of labour include: population growth and immigration; the willingness of people to work; policies that affect levels of remuneration from work vis-a-vis income from the social security system (e.g. minimum wage, taxation and income support policies); attitudes to combining work and

family responsibilities; early retirement; and participation in education and training.

Links to other dimensions of progress

Work, and the economic and social benefits that flow from it, are important to the wellbeing of individuals and the broader community. The underutilisation of labour resources is a lost opportunity for producing goods and services, and income support and other services provided to assist the unemployed use government funds which could be used in other ways.

There are links between work, or a lack of work, and other aspects of progress. For example, studies generally suggest that unemployment is associated with crime, with poorer health, and with higher risks of financial hardship and lower levels of social cohesion.⁸ These associations tend to be stronger for those unemployed for longer periods of time. Reducing levels of unemployment may help to reduce the extent of these associated problems.

Economic growth is very strongly influenced by changes in labour force participation rates and labour productivity.

See also the commentaries *National income, Education and training, Crime, Economic hardship, Family, community and social cohesion, and Health*.

Endnotes

- 1 Australian Bureau of Statistics 2000, *Unpaid Work and the Australian Economy, 1997*, cat. no. 5240.0, ABS, Canberra. Estimates of unpaid work were based on the ABS Time Use Survey.
- 2 Borland, J. 2001, 'Job stability and job security', in Borland, Gregory and Sheehan (eds), *Work Rich, Work Poor: Inequality and economic change in Australia*, Victoria University, Victoria.
- 3 Australian Bureau of Statistics 2001, 'Work — Paid Work: Trends in employment population ratios', in *Australian Social Trends 2001*, cat. no. 4102.0, ABS, Canberra.
- 4 Australian Bureau of Statistics 2006, *Australian Labour Market Statistics*, cat. no. 6105.0, ABS, Canberra.
- 5 Included in the statistics of casual employment are a group of people who many analysts would prefer to remove from the figures. In ABS labour statistics, owner managers of incorporated enterprises are classified as employees. They are included as casual employees if they do not have paid leave entitlements. Many would consider that if a person is an owner-manager of a business it is not of great concern if he or she is not entitled to paid leave, as other benefits such as control of the business, flexibility and profits compensate for the loss of leave entitlements. From 2001 it is possible to remove owner managers of incorporated enterprises from casual employment statistics. Figures from 2002 *Employee Earnings, Benefits and Trade Union Membership* indicate that the figure for casual employees as a percentage of all employees decreases from 27% to 23% if owner managers of incorporated enterprises are removed.
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- 7 Australian Bureau of Statistics 2001, 'Unemployment trends and patterns', in *Australian Social Trends 2001*, cat. no. 4102.0, ABS, Canberra.

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Culture and leisure

People can benefit in many ways from participation in cultural and leisure activities. Participation in these activities can enhance community cohesion and strength. Cultural activities are seen as a valuable forum for social examination and debate, and a means of fostering the creativity, innovation, and dialogue necessary for economic development. And many leisure activities bring health benefits by providing relaxation and physical activity.

The concept of culture and leisure allows us to acknowledge some inherent aspects of human nature, such as our need for identity, our creativity, history, attunement to aesthetic meaning, spirituality and our propensity for play and enjoyment. Given the wide variety of factors these concepts cover, there are difficulties in selecting an appropriate indicator that can be used to assess progress in this area. One measure of progress might focus on our freedom to express our cultural identity, who we are and to celebrate our cultural differences. Another might measure our ability and willingness to interact with other cultures, or to participate in the arts, sports and recreational activities.

While we recognise the importance of reporting on all these aspects of progress in culture and leisure, at present we only include a number of supplementary indicators relating to participation in arts, sports and leisure activities. Future editions of MAP will provide further exploration of cultural indicators. Measures of our attendance and participation in cultural and leisure activities can provide an indication of our capacity to undertake these activities, and the level of importance we place on their contributions to our wellbeing.

Attendance rates are a way of quantifying the extent of involvement in culture and leisure activities. Attendance at cultural venues and events and at sporting events was slightly higher in 2002 than in 1995. During 2002, about 88% of the Australian population aged 18 and over attended at least one cultural venue or event. In 1995 this

What is culture and leisure?

Culture and leisure have much in common. Many activities are both cultural activities and leisure activities (e.g. visiting a museum). Often what separates a cultural activity from a leisure activity is simply the context in which it takes place. Culture and leisure also support and feed off one another. Subcultures often develop around leisure activities, and leisure activities such as socialising are central to broader cultural exchange and interaction.¹

Culture

Culture is a set of distinctive spiritual, material, intellectual and emotional features of society or a social group. It encompasses, in addition to art and literature, lifestyles, ways of living together, values systems, traditions and beliefs.² In this edition of MAP we focus on culture as expressed through participation in the arts, sports and recreational activities.

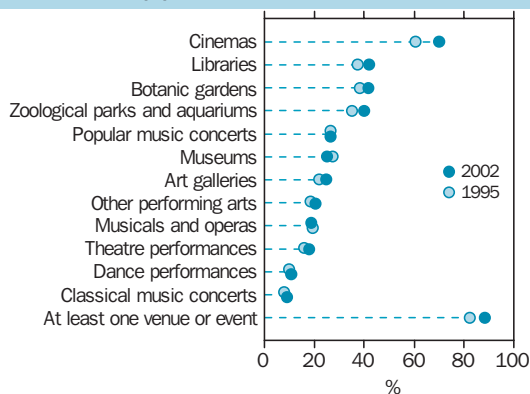
Leisure

Leisure are those activities undertaken by a person for enjoyment, recuperation, or relaxation and includes hobbies, recreation and cultural and artistic pursuits.³ Leisure time gives people an opportunity to recover from pressures of work and other commitments, to bond with family and community members, to pursue their interests and to reflect on their life direction and meaning.¹

figure was 82%. Cinemas were reported as the cultural venue with the highest attendance rates in both years (70% of people in 2002 and 60% in 1995). About 40% of those who visited libraries in 2002 went over 10 times during the year, however the majority of people who visited museums, or attended musicals and operas went only once during the 12 month period.⁴

There were 7 million persons aged 18 and over (42% of the adult population) who attended at least one sporting event during 2002. Attendance at sporting events has risen over the period 1995 to 2002, with 5.6 million people attending a sports event (excluding motor sports) in 1995 and 6.5 million attending in 2002. Over this period, there was a large increase in the number of persons attending Australian Rules football (from 1.7

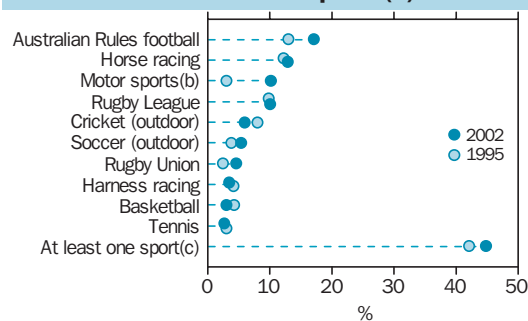
Attendance at selected cultural venues and events(a)



(a) Data relate to persons aged 18 years and over.

Source: ABS Attendance at selected cultural venues and events 2002 cat. no. 4114.0

Attendance at selected sports(a)



(a) Data relate to persons aged 18 years and over.

(b) The increase in motor sport attendance needs to be interpreted with caution because a specific question on motor sports attendance was asked in 1999 and 2002.

(c) Does not include motor sports.

Source: Sports Attendance, Australia 2002 cat. no. 4174.0

Leisure and free time

The ABS Time Use Survey divides the activities on which people spend their time into four main categories: necessary time, contracted time, committed time, and free time. 'Free time' is the amount of time left over when the previous three types of time have been taken out. Although 'free time' may be a positive for many people, by providing opportunity for involvement in culture and leisure activities, others may find free time less positive. For example, some unemployed or retired persons may feel they have too much free time, or may be unable to participate in leisure activities for a range of reasons (health or economic reasons), resulting in social isolation. Also, free time can be used for leisure activities with negative social implications, such as gambling or drug use.

Between 1992 and 1997 there was no overall change in the amount of 'free time' reported by Australians, with free time taking up about 22% of the day. Most free time (86%) was spent on a range of recreation and leisure activities such as watching TV, listening to the radio, taking part in sport and outdoor activities, reading and talking. As free time activities are often combined (reading and listening to music) or done at the same time as activities in other time categories (e.g. housework and listening to the radio), the following information applies to the time spent on all activities (e.g. main activities and simultaneous activities). Combining the main and simultaneous activities shows that 551 minutes a day were spent on free time activities, with men and women spending an almost identical amount of time.³ In 1997, visiting entertainment and cultural venues attracted about 5% of the population who spent on average about 2 hours when they attended. Activities included movies, concerts, theatres and the library.⁶ On average, 27% of Australians aged 15 and over actually participated in sport or outdoor activities each day in 1997. Those who participated spent an average of 1 hour and 43 minutes of their free time each day.⁷

The average amount of time people spent on recreational pursuits decreased by 90 minutes per day from 1992 to 1997. There was a decrease of 43 minutes in the average time spent on audio visual media (which includes watching television and videos). There was also a decrease in the time spent talking, from 171 minutes to 162 minutes per day.⁵

From 1992 to 1997, there was a decline in Australians' involvement in formal and informal sport. On an average day, there was little change in the average time spent but the participation rate for men fell from 12% to 9% and for women from 5% to 4%.⁵

million to 2.5 million) and Rugby Union (from 329,900 to 673,600). Conversely, there was a decrease in the number of persons attending outdoor cricket matches and competitions between 1995 and 2002 (falling from 1.1 million to 0.9 million).⁸

Data on the level of the participation in physical activities also portrays a relatively positive image of social participation in Australia. In 2002, 62% of the adult population (9.1 million people aged 18 and over) participated in physical activities for recreation, exercise or sport. More than half of these people participated in organised sports and physical recreation. Around 27% of Australians

aged 15 and over participated in sport or outdoor activities at least once each day in 1997.⁷

Children's participation in cultural and sporting activities did not change significantly between 2000 and 2003 – 95% of children participated in some form of culture or leisure activity in both years. Participation in organised cultural activities, organised sports and leisure activities were relatively stable across this period, however there was a rise in the proportion of children undertaking computer activities outside of school hours with the participation rate for Internet access increasing from 47% to 64%.⁹

The amount of time people will voluntarily give to cultural and leisure organisations or groups tells us about the value the Australian population places on these activities. Sport/recreation activities accounted for nearly a third (34%) of all voluntary work in Australia in 2000 – volunteers in these types of organisations contributed a total 147.7 million hours of their time to support these activities over this 12 month period. Volunteers in Arts/culture organisations committed 33.6 million hours (6% of total volunteer involvement).¹⁰ In the 12 months to April 2004, an estimated 18% of persons aged 15 and over (2.9 million people) participated in some form of paid or unpaid work relating to culture and leisure activities.¹¹

Some differences in Australia

In 2002, nine out of ten Indigenous people aged 15 and over had participated in social activities such as ceremonies, festivals and visiting a museum or art gallery in the previous three months and about seven out of ten Indigenous people had attended a cultural event that year. Just under half (49%) of the Indigenous population aged 15 and over had participated in sport or physical recreation activities in 2002.¹²

Attendance at sporting events is higher for men (56%) than women (41%) in all age groups.⁷ In contrast, in 2002, attendance rates at cultural venues and events were consistently higher for women than men (90% of women compared to 87% of men).⁴ In terms of participation, a higher proportion of women (20%), than men (16%) aged 15 and over worked in a culture or leisure field,¹¹ however men are more likely to participate in sports and physical recreation activities (65% of men compared to 60% of women).⁷

In 2002, apart from dance performances, attendance rates at cultural venues and events for people living in the capital cities were higher than those for people in the rest of Australia. For most venues and events, residents in the Australian Capital Territory recorded the highest attendance rates. However, Victorian residents had the highest attendance rate for musicals and operas, South Australian residents the highest rate for other performing arts and Northern Territory residents the highest rate for botanic gardens.⁴ Attendance at sports events was reasonably consistent across all of the states with the NT reporting the highest attendance rate (57%) and NSW the lowest (44%).⁸

Factors influencing change

The availability of free time is an important factor to participation in culture and leisure activities. Many changes that took place during the 20th century theoretically should have resulted in an increase in the leisure time available to households, however in many households the additional 'free' time has been filled by increased work responsibilities.¹

Technology is one such area where change has the potential to increase the amount of leisure time available (i.e. through the development of labour saving devices), however technological change also presents other opportunities and risks for the culture and leisure sector. New technologies allow new forms of cultural expression (for example, visual arts may be enhanced through the use of multimedia technologies), but may threaten the sustainability of traditional forms of expression. The rights of artists are seen to be particularly threatened by new technologies that facilitate the unlawful reproduction of materials protected by copyright, however these same technologies increase options for interpersonal communication and consequently, may increase cultural networks.¹

Demographic change can also have an impact on the types of culture and leisure activities undertaken. Reflecting the changing preferences for activities through an individual's life cycle (e.g. higher attendance at live music events for people aged 18–25 than those aged 55–64, and the reverse for classical music concerts),⁴ the ageing of the Australian population will affect the types of culture and leisure activities which people participate in. In particular, the movement of the

baby boomer cohort into retirement may have implications for the nature of and demand for culture and leisure activities and related facilities.¹

Links to other dimensions of progress

Many leisure activities have a positive impact on health by providing relaxation and physical activity and extending social networks. Participation in sports and active leisure is seen as a crucial element in strategies aimed at maintaining and improving the physical and mental health of Australians.

Participating in cultural and recreational activities is a form social participation which can have benefits to individual's wellbeing. This participation can also support the development of social cohesion, integrate communities in positive ways and build social capital – people can become socially connected through arts and sports activities, develop skills and contribute to the cultural identity of their community.

The idea of leisure as those activities enjoyed in an individual's 'free time' – in terms of freedom from obligations or duty and in terms of the way in which the time is spent – also includes activities with negative social implications. A range of criminal activities (such as graffiti and vandalism) and activities that can be clearly linked to negative social outcomes (e.g. gambling and drug use) remain leisure choices for some Australians.

Culture and leisure industries are recognised as growth industries, and are becoming an increasingly important sector of the Australian economy.¹

See also the commentaries *National income, Health, Family, community and social cohesion, and Communication*.

Cultural trade

Australian culture has evolved over many years and continues to be influenced by the diverse backgrounds of people who have migrated to Australia. Overseas trade in goods and services also has an impact on Australian culture that extends well beyond its economic significance, as the imports of items such as films, music and books influence the way Australians think and act.

In 2002–03 Australia exported \$97m worth of printed books, with paintings, drawings and pastels executed entirely by hand (\$72m) and brochures, leaflets and similar printed matter and children's drawing and colouring books (\$65m) also making large contributions to the total value of exported cultural goods. The largest cultural commodity imported in 2002–03 was television receivers (\$754m).

Australia earned \$342m from other countries for cultural and recreational services in 2002–03, approximately 1% of its total earnings from services in that year. This figure has remained relatively constant over recent years, with the exception of 2000–01 when the inclusion of television rights to the Sydney 2000 Olympic and Paralympic Games boosted it to about 4%. Australia paid \$986m to other countries for cultural and recreational services in 2002–03, with audiovisual and related services accounting for 69% of that total, and music royalties a further 21%. This represented approximately 3% of all Australia's payments for services in that year.⁶

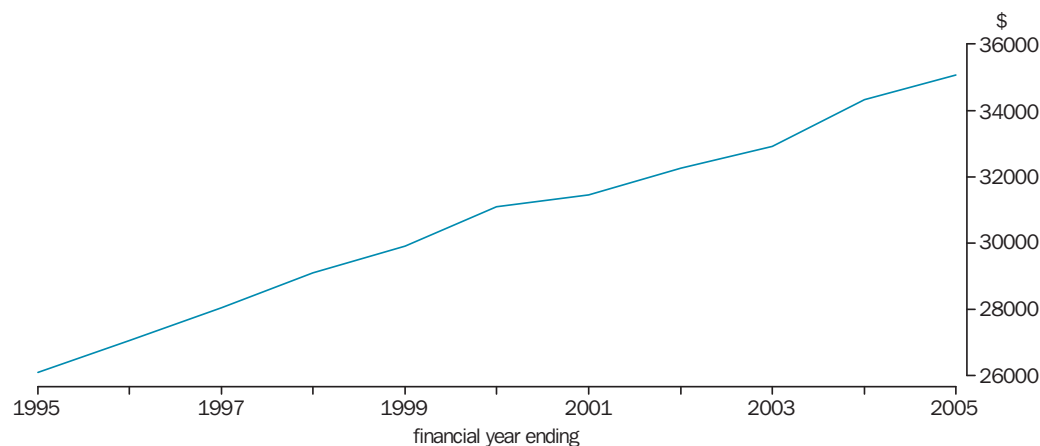
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- 4 Australian Bureau of Statistics 2003, *Attendance at selected cultural venues and events 2002*, cat.no.4114.0, ABS, Canberra
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National income: key points

Real net national disposable income(a) per capita



(a) Reference year 2003–2004.

Source: Australian System of National Accounts.¹

Australia experienced significant real income growth during the past decade. Between 1994–95 and 2004–05, real net national disposable income per capita grew by 3.0% a year – appreciably faster than during the preceding 20-year period.¹

The relationship of national income to progress

National income reflects Australians' capacity to purchase goods and services. It influences material living standards and is also important for other aspects of progress.

About the headline indicator and its limitations: Real net national disposable income per capita

There are many different ways of measuring income. The headline measure has a variety of features that make it an informative indicator of national progress (see box 'Measuring Australia's national income').

The headline indicator exhibits some advantages over other measures of income, but it does not account for everything of importance. National income does not take account of some non-market activities (such as unpaid household work), and the various other factors (such as assets and liabilities) that contribute to material living standards. Although these influences are not built into the headline income measure, commentaries on other progress indicators provide information about some of them.

National income: Other indicators

Real gross domestic product per capita; Real final consumption expenditure per capita; Real household consumption expenditure per capita; Net national saving as a proportion of GDP; Real industry gross value added; Real gross state income per capita; Terms of trade; Population in work; Selected measures of equivalised household disposable income.

Some differences within Australia

The headline indicator, real net national disposable income, is only available at the national level. However, one can look at real gross state income to provide a state-level perspective. Growth in real gross state income per capita was highest in Western Australia (3.7% per year) and lowest in the ACT (2.1% per year) over the period 1994–95 to 2004–05.

Between 1994–95 and 2003–04, the average real income of low income households (i.e. the 20% of people with household incomes between the bottom 10% and the bottom 30% of incomes) increased by 22%, while the average real income for the middle income and high income groups increased by 22% and 19% respectively.

Links to other dimensions

The income dimension of progress is strongly linked to the work dimension. See also the commentaries *National wealth*, *Productivity*, *Education and training*, *Health*, *Economic hardship*, *Work*, *The natural landscape*, and *The air and atmosphere*

National income

Progress and the headline indicator

National income is a measure of Australia's capacity to acquire goods and services for consumption. It is a determinant of material living standards and is also important for other aspects of progress.

Australia experienced significant real income growth during the past decade. Between 1994–95 and 2004–05, real net national disposable income per capita grew by 3.0% a year – appreciably faster than during the preceding 20-year period.¹

The headline indicator exhibits some advantages over other measures of income (see box), but it does not account for everything of importance. National income does not take account of some non-market activities (such as unpaid household work) that contribute to material living standards. Some analysts would prefer an income measure that is adjusted to take account of changes in the value of natural assets, such as increases in the value of subsoil assets due to technological advances in mining, depletion of resources used in the production process, or environmental degradation from pollution. These aspects are not built into the headline income measure, but commentaries on other progress indicators provide some more information.

Not all income is spent on the current consumption of goods and services. Part of income may be set aside as savings for future consumption. Income that is saved can be used for investment purposes in the form of, say, houses, machinery or financial assets. These assets can directly satisfy individual and societal needs, or can generate future income and support future consumption.

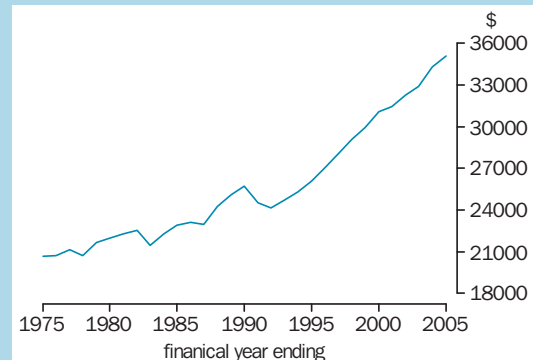
A more detailed discussion of consumption and saving follows.

Measuring Australia's national income

There are many different ways of measuring income. The headline measure – real net national disposable income per capita – has a variety of features that make it an informative indicator of national progress.

- ◆ It is a per capita measure. Total income could rise during periods of population growth, even though there may have been no improvement in Australians' average incomes.
- ◆ It is a real measure – it is adjusted to remove the effects of price change. Nominal or current price income could rise during periods of inflation, even though there may have been no increase in Australians' real capacity to buy goods and services.
- ◆ It takes account of income flows between Australia and overseas, and is adjusted for changes in the relative prices of our exports and imports (our 'terms of trade'). These international influences on Australia's income can increase or decrease Australians' capacity to buy goods and services.
- ◆ It is a net measure – it takes account of the depreciation of machinery, buildings and other produced capital used in the production process. Hence, it reflects the income Australia can derive today while keeping intact the fixed capital needed to generate future income.

Real net national disposable income per capita(a): longer term view



(a) Reference year 2003–04.

Source: Australian System of National Accounts.¹

Real per capita income growth during the past decade has been quite strong. The average annual growth rate (3.0%) since 1994–95 is appreciably above the 1.8% per year recorded over the 30 years to 2005.

Consumption

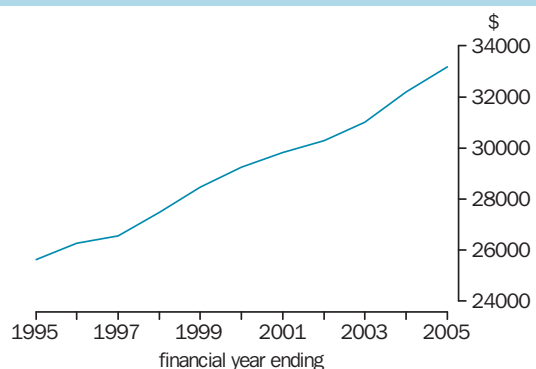
If a nation experiences income growth, there may be an increase in consumption or saving or both.

Among the different forms of consumption, final consumption expenditure (FCE) is the most directly relevant to an assessment of progress. FCE is the acquisition of goods and services used for the direct satisfaction of individual or collective wants. It is distinguished from 'intermediate consumption' (the using up of goods and services in the production of other goods and services) and 'consumption of fixed capital' (depreciation).

Over the past decade, growth in final consumption per capita has been quite strong. Between 1994–95 and 2004–05, real FCE per capita rose by 2.6% a year.

Both households and governments contribute to final consumption. There were some fluctuations in the relative contributions of the two sectors

Real final consumption expenditure(a) per capita



(a) Volume measure; reference year 2003–04.

Source: Australian System of National Accounts.¹

Real household final consumption(a) per capita

	1994–95	2004–05	Average annual growth rate
	\$	\$	%
Food	2 549	2 784	0.9
Alcoholic beverages and tobacco	975	1 007	0.3
Clothing and footwear	786	995	2.4
Rent and other dwelling services	3 532	4 388	2.2
Electricity, gas and other fuel	404	514	2.4
Furnishings and household equipment	1 009	1 470	3.8
Health	1 082	1 289	1.8
Transport	2 198	2 989	3.1
Communication	319	734	8.7
Recreation and culture	1 919	3 079	4.8
Education services	682	847	2.2
Hotels, cafes and restaurants	1 554	1 900	2.0
Miscellaneous goods and services	2 531	3 449	3.1
Total	19 376	25 447	2.8

(a) Volume measures; reference year 2003–04. Components may not sum to totals.

Source: Australian System of National Accounts.¹

during the past decade, but in both 1994–95 and 2004–05, households accounted for about three-quarters of the total and government for about one-quarter. The government contribution started to decline slightly towards the end of the decade as a result of government policy to reduce the rate of growth of spending in the public sector.

Real per capita household consumption expenditure grew by 2.8% per year on average between 1994–95 and 2004–05. Household expenditure on communication showed particularly strong growth (an average increase of 8.7% per year in real per capita terms). This partly reflected increased availability and use of both mobile phones and the Internet. Australians have often been quick to take up new consumer technologies. For more detail, see the commentary *Communication*.

Household expenditure on recreation and culture also grew strongly (up by 4.8% per year on average).

The share of household expenditure on items that could be considered essential for daily existence (namely, food, clothing, housing and utilities) fell

during the past decade (down from 38% in 1994–95 to 34% in 2004–05), reflecting the increase in real incomes.

Real government consumption expenditure per capita grew by 2.1% a year between 1994–95 and 2004–05. Expenditure on education and health were the largest components of government consumption throughout this period.

Saving

Saving is one means of funding investment, which is the formation of fixed capital used in the production of goods and services (see the *National wealth* chapter for a more detailed discussion of the concept of investment). Income that is saved rather than spent on current consumption can be used to accumulate assets (wealth) that will generate future income and support future consumption.

During the past decade, there was a 2.5 percentage point rise in the ratio of net national saving to GDP (from 2.2% to 4.7%). But the longer term trend has been downward; between 1964–65 and 2004–05 the ratio fell from 11.7% to 4.7%. Similar downward trends in national saving have been observed in some other developed countries, such as the United States of America and the United Kingdom.

There is an important distinction between gross and net national saving (see box overleaf). The ratio of depreciation to gross saving has risen during the past forty years – from an average of around 59% in the 1960s to 76% in 2004–05. This means that proportionately less of Australia's gross saving has been devoted to increasing the national stock of fixed capital and more to replacing the existing stock. A fuller discussion on capital stock and investment can be found in the commentary on *National wealth*.

Net national saving as a proportion of GDP

Source: Australian System of National Accounts.¹

Net national saving as a proportion of GDP has fluctuated a good deal during the past decade; between 1994–95 and 2004–05 the ratio rose from 2.2% to 4.7%. But the longer term trend during much of the past forty years has been downward.¹

Measuring national saving

Saving cannot be measured directly. It is calculated as a residual item by deducting final consumption expenditure from disposable income. Because it is estimated as the (relatively small) difference between two large national aggregates, saving is subject to any measurement error in, or revisions to, either aggregate.

Two concepts of national saving are used – gross and net. Gross saving represents the resources available for investment (capital formation) including replacement of fixed capital. Net saving is derived from gross saving by subtracting depreciation (consumption of fixed capital).

National saving and national wealth

The commentary *National wealth* introduces the concept of net worth (assets less liabilities). Measures of national and sectoral net worth provide an alternative, and in some ways preferable, perspective on how Australia's future income-generating potential is changing.

Net worth takes account not just of saving out of current income, but also of increases in national assets due to changes in volumes (such as the discovery of mineral deposits) and prices (such as capital gains).

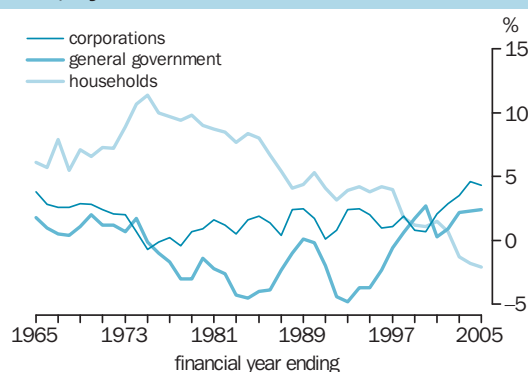
Sectors within a nation can have different saving behaviour, and net national saving can be dissected to show the trends in saving by the following sectors – households, general government and corporations.

Over the longer term (from the 1960s onward), the household sector has been the main contributor to national saving. However, since the mid 1970s, the net saving of the household sector relative to GDP has fallen.

The general government sector went from being a net saver during the 1960s to a net dissaver between the mid 1970s and mid 1990s. But during the 1990s, government dissaving was progressively reduced and between 1997–98 and 2004–05 the government sector was again a net saver.

Except for a few years in the mid to late 1970s, the corporate sector has been a net saver.

Net national savings as a proportion of GDP, by sector



Source: Derived from Australian System of National Accounts.¹

Real industry gross value added(a), average annual growth rates – 1994–95 to 2004–05

Industry	%
Agriculture, forestry and fishing(b)	4.5
Mining	2.6
Manufacturing	1.8
Electricity, gas and water supply	1.2
Construction	5.1
Wholesale trade	4.1
Retail trade	4.3
Accommodation, cafes and restaurants	4.1
Transport and storage	4.4
Communication services	6.4
Finance and insurance	3.9
Property and business services	5.1
Government administration and defence	2.4
Education	2.0
Health and community services	4.2
Cultural and recreation services	3.8
Personal and other services	3.5
Ownership of dwellings	4.1
Gross Domestic Product	3.7

(a) The sum of IGVA across industries differs from GDP to the extent of taxes less subsidies on products. (b) The growth rate has been significantly affected by the drought in the early 2000s. Source: Australian System of National Accounts.¹

Industry output

A strong influence on national income is the production of goods and services. Production can increase if the factors of production – capital, labour and non-produced assets (such as land) – are built up or are used more efficiently.

During the past decade, different industries have exhibited substantially different rates of real value added growth. Broadly, many service industries showed stronger growth than goods-producing industries.

Industry gross value added (IGVA) is the total value of goods and services produced by an industry, after deducting the cost of goods and services used up in the process of production. Among the industries showing strongest growth in real IGVA between 1994–95 and 2004–05 were Communication services (averaging over 6.4% a year), Property and business services, and Construction (both averaging 5.1% a year).

Some differences within Australia

By state

The headline indicator, real net disposable income per capita, is available only at the national level. To understand some of the trends underlying the national indicator, one can look at state contributions to GDP.

Real gross state income (RGSi) is the total value of goods and services produced in a state or territory, after deducting the cost of goods and services used up in the process of production and taking into account changes in state terms of trade. The comparable Australian estimate is real gross domestic income.

RGSi per capita grew in every state and territory between 1994–95 to 2004–05. Growth was strongest in Western Australia and the Northern Territory (respectively averaging 3.7% and 3.5% per year), and weakest in the Australian Capital Territory (averaging 2.1% per year). There were wide and persistent disparities in per capita RGSi levels among the states and territories between 1994–95 and 2004–05. In 2004–05, per capita RGSi levels ranged roughly between \$32,000 and \$55,000 (reference year 2003–04), with Tasmania the lowest and the ACT the highest.²

Real gross state income per capita, average annual growth rates – 1994–95 to 2004–05

	%
New South Wales	2.8
Victoria	3.2
Queensland	3.0
South Australia	3.2
Western Australia	3.7
Tasmania	2.7
Northern Territory	3.5
Australian Capital Territory	2.1
Australia	3.0

Source: Australian National Accounts: State Accounts.²

But state disposable incomes (if we could measure them) might not be so diverse, because there are significant transfer payments and other financial flows between states that can moderate the differences. Examples include Commonwealth

International comparisons of national income: Gross National Income

There is no OECD indicator available that is directly comparable to the headline indicator for national income: real net disposable income per capita. An indicator available for OECD countries that captures a similar concept is Gross National Income.

Gross National Income (GNI) measures the total domestic and foreign value added claimed by residents. GNI comprises Gross Domestic Product (GDP) plus net receipts of primary income from non-resident sources. This indicator reflects a country's capacity to purchase goods and services, which influences material living standards and is important for other aspects of progress.

In 2003, Luxembourg had the highest GNI per capita of US\$61,200. This was substantially higher than the next highest GNI of US\$39,700 in the United States. In 2003, the lowest GNI in the OECD was US\$7,700 in Turkey.

In 2003, Australia's GNI was US\$29,200 around the median for the OECD. France (US\$29,300), Finland (US\$29,600) and Sweden (US\$29,800) all had a very similar level of GNI to Australia.

See also the international comparison for consumption expenditure in the *Some international comparisons of progress* essay on page 186.

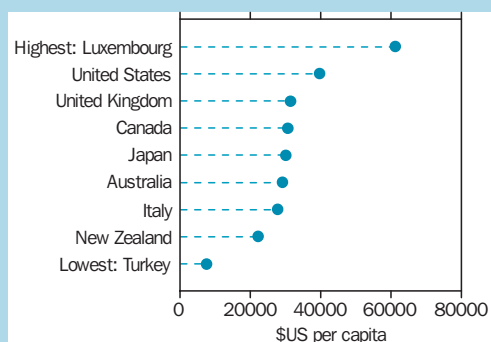
International comparisons of national income: average annual GDP growth

To examine changes over time in national income, growth in GDP is a useful indicator. GDP can be defined in three different ways: as the sum of labour incomes, net profits and depreciation; as the difference between gross output and intermediate consumption; or as the sum of consumption expenditures, fixed capital formation, changes in inventories and net exports.

During the period 1994–2004, Ireland reported the strongest GDP growth in the OECD with an average annual growth of 7.9%. This was substantially higher than the next highest annual average growth of 4.9% in Korea. The lowest annual average growth in GDP between 1994 and 2004 occurred in Japan (1.2%) and Switzerland (1.3%). Annual average growth in GDP in Australia during this period was 3.7%, the seventh highest of OECD countries.

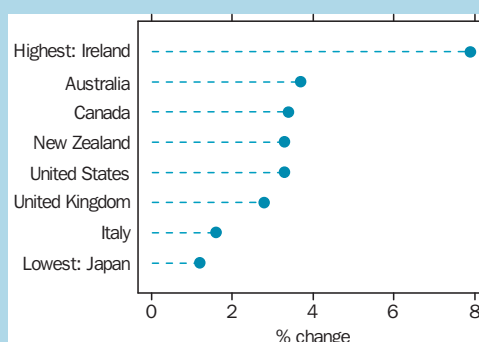
See also the international comparison for consumption expenditure in the *Some international comparisons of progress* essay on page 186.

Gross National Income(a) – 2004



(a) Calculated using purchasing power parities. Source: World Bank Development Indicators 2005.

Average annual GDP growth(a) – 1994 to 2004



(a) Average annual volume change. Source: National Accounts of OECD countries, 2005.

Selected measures of equivalised disposable household income(a)

Indicator	Unit	Year		Change 1994–95 to 2003–04	
		1994–95	2003–04	Absolute	%
Mean weekly income for selected groups of people(b)					
Low income(c)	\$	246	300	54	22.0
Middle income(d)	\$	404	492	88	21.8
High income(e)	\$	861	1,027	166	19.3
Weekly income at top of selected income percentiles(b)					
20th(P20)	\$	245	299	54	22.0
50th(P50)	\$	403	491	88	21.8
80th(P80)	\$	625	743	118	18.9
Ratios of incomes at top of selected income percentiles					
P90/P10	Ratio	3.77	3.70	-0.07	-1.9
P80/P20	Ratio	2.56	2.49	-0.07	-2.7
P80/P50	Ratio	1.55	1.52	-0.03	-1.9
P20/P50	Ratio	0.61	0.61	0.00	0.0
Share of total income received by people with:					
Low incomes(c)	%	10.8	10.9	0.1	0.9
High incomes(e)	%	37.8	37.4	-0.4	-1.1
Gini coefficient(f)	Ratio	0.302	0.294	-0.008	-2.6

(a) See the *Economic hardship* commentary for a definition of equivalised income. (b) Adjusted for changes in the Consumer Price Index; values are given in 2003–04 dollars. (c) People in the 2nd and 3rd income deciles after all people are ranked from lowest to highest by their equivalised household income. (d) People in the 5th and 6th deciles after all people are ranked from lowest to highest by their equivalised household income. (e) People in the 9th and 10th deciles after being ranked from lowest to highest by their equivalised household income. (f) A summary measure of income distribution between 0 and 1. If the measure approaches the value of 1 income inequality is higher and vice versa.

Source: *Household Income and Income Distribution, Australia, 2003–04*, cat. no. 6523.0.³

government taxes and expenditures, and incomes transferred between states or territories and the rest of the world.

Household income distribution

While aggregate national income growth is a key element of progress, the distribution of household income is also considered by many to be important in determining progress in this dimension.

The table above presents information about changes in household disposable income and its distribution among low, middle and high income households. Different households require different amounts of income to maintain the same standard of living. For example, larger households normally need more income than smaller households, and adults need more than children. The tabulated income data have been equivalised to put different households on an equal footing (this is explained in more detail in the *Economic hardship* commentary).

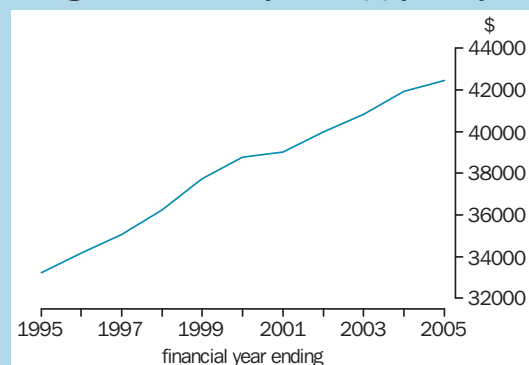
Between 1994–95 and 2003–04, the average real income of all households increased by 21%. There was a comparable increase for each of the different income groups; 22% for low income households (i.e. the 20% of people with household incomes between the bottom 10% and the bottom 30% of incomes), and 22% and 19% for the middle income and high income groups. One should remember that these figures are not necessarily comparing

changes in the same households over time. For example, some of the households that had a relatively low income in 1994–95 might, through changed circumstances, have income in the middle, or even higher, portion of the income distribution by 2003–04 (and vice versa).

Various measures of income distribution are included in the table above. Percentile ratios are one measure of the spread of incomes across the population. The P90/P10 ratio, for example, is the ratio of income at the 90th percentile (P90) to that at the 10th (P10). Another measure of income distribution is provided by the income shares going to groups of people at different points in the income distribution. The Gini coefficient is a single statistic that lies between 0 and 1 and is a summary indicator of the degree of inequality (values closer to 0 representing a lesser degree of inequality, and values closer to 1 representing greater inequality).

Changes in income distribution measures tend to be relatively small from year to year but trends can emerge over longer time periods. While it is difficult to assess the changes in income distribution over time due to methodological improvements introduced with the 2003–04 Survey of Income and Housing (for more information refer to *Household Income and Income Distribution, Australia, 2003–04*, cat. no. 6523.0), it appears that there has been no significant change

Real gross domestic product(a) per capita



(a) Chain volume measure; reference year 2003–04. Source: Australian System of National Accounts.¹

Gross Domestic Product

GDP is the total value of goods and services produced in Australia, after deducting the costs of goods and services used up in the production process. The volume measure of GDP is an indicator of real growth in Australian production. GDP is a fairly comprehensive measure of economic activity, but does not take account of some non-market activities such as unpaid household work.

As a measure of national progress, GDP is inferior to the headline indicator (real net national disposable income) in several ways. The headline indicator takes account of income flows between overseas and Australia and of changes in the terms of trade. Also, it is adjusted for the depreciation of fixed capital used in the production process.

GDP is discussed here because it is possible to dissect it by geography and by industry, to investigate different trends within Australia. Such dissections cannot be done for the headline indicator. As well, changes in domestic production are among the major driving forces underlying changes in Australia's incomes, so GDP and the headline indicator exhibit broadly similar trends.

in income inequality from the mid 1990s to 2003–04.

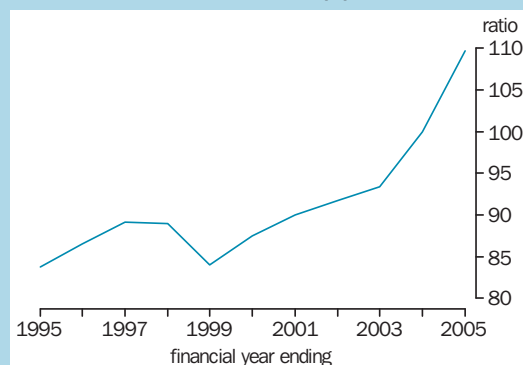
Factors influencing change

The most fundamental influence on income growth is growth in the volume of goods and services produced (real Gross Domestic Product, (GDP)). Between 1994–95 and 2004–05, Australia's real GDP grew by around 44% (averaging growth of 3.7% a year); in the same decade, the population grew by around 13% (averaging 1.2% a year).

GDP is, in turn, influenced by changes in labour, capital and non-produced assets (such as land), and by productivity change. Between 1994–95 and 2004–05, capital services used in market sector production grew by 49% (averaging growth of around 4.1% a year). In the same decade, the labour input to market sector production rose by 11% (averaging around 1.0% a year).

During the past decade, improvements in productivity (the amount of output per unit of input) have made a strong contribution to GDP growth. Between 1994–95 and 2004–05, market

Australia's terms of trade(a)



(a) Reference year 2003–04. Source: Australian System of National Accounts.¹

Australia's terms of trade

The terms of trade index shows the relationship between Australia's export and import prices. A rise in the terms of trade indicates that Australia could purchase a greater volume of imports with a given volume of exports; a fall indicates that a greater volume of exports is required to purchase a given volume of imports.

sector multifactor productivity rose by 13% (averaging 1.3% a year).

Domestic production is not the only influence on national income growth. Between 1994–95 and 2004–05, income receivable from overseas rose by more than 98%, while income payable overseas rose by almost 150%.

Household consumption expenditure behaviour has changed appreciably throughout the decade – in part reflecting new technologies and the growth in expenditure on some services.

Trends in government consumption have in part reflected policy emphases and some changes in the mix of public and private provision of services.

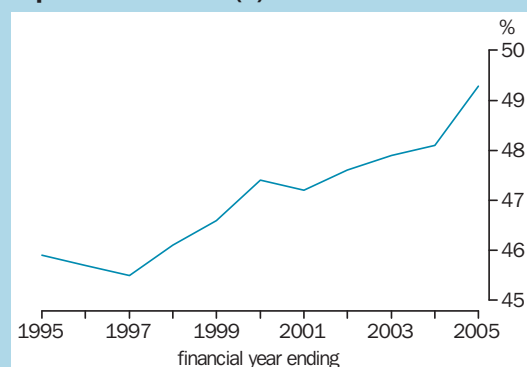
Both cyclical and behavioural influences can affect national and sectoral savings. For example, the economic cycle has a significant influence on government saving (as outlays tend to rise and receipts tend to fall during an economic downturn). In Australia, the government sector experienced a period of dissaving following the recession in 1991. The rise in government saving in recent years in part reflected sustained economic growth and fiscal consolidation.

The possible changes to the corporate sector's distribution of profits in the form of dividends during the 1990s may also have influenced saving activity over the last decade.

Changes in rates of inflation can also affect saving rates. A certain amount of saving is required to 'protect' the real value of assets which would otherwise fall due to inflation. In periods of lower inflation – such as the 1990s – less saving is needed to be set aside for this purpose.

Domestic economic events are not the only influence on national income. In particular,

Population in work(a)



(a) Total employed persons as a proportion of population.
Source: *Labour Force, Australia*.⁴

Population in work

Looking at the proportion of the population that is employed adds to the information provided by the income and output indicators discussed above.

First, this proportion provides a broad indicator of the degree of economic dependency in Australia – the relative sizes of the total population and of that part of the population engaged in income-generating economic activity. Economic dependency may increase owing to, say, a rise in the number of unemployed or the number of self-funded retirees.

Second, because the income of employed people generally exceeds the incomes of those not in employment, this proportion also casts light on trends in the equality of income distribution.

Between June 1995 and June 2005, the proportion of the Australian population that was employed rose from 45.9% to 49.3%.⁴

changes in the relative prices of Australia's exports and imports (the terms of trade) affect real national income.

In recent years, Australia's terms of trade have shown fairly wide oscillations. Overall, between 1994–95 and 2004–05, there was significant improvement, reflecting changes in both the prices and the composition of traded goods and services.

Imports give the residents of a country access to goods and services that cannot be produced (or cannot be produced as cheaply) in the domestic economy. Exports are one important way of funding purchases of imports and of maintaining levels of domestic production, income and employment. Thus, changes in the terms of trade can affect the volume of goods and services that must be exported to fund a given volume of imports.

The goods and services that make up a country's exports are typically quite different from those that make up its imports – for example, agricultural and mining products account for a fairly large proportion of Australia's exports, whereas manufactured goods and some services account for a large proportion of our imports.

During much of the 20th century, there was a general trend toward falling prices of primary

commodities (especially agricultural products) relative to other traded goods and services. This reflected both shifts in the composition of worldwide demand and supply, and the effect of improvements in productivity. Around that long-term trend, however, there have been oscillations (each lasting several years) that have reflected short-to-medium run changes in demand and supply conditions. In more recent times, there have been sustained falls in the prices of many manufactured goods, particularly computers and similar goods.

During the period 1994–95 to 2004–05, Australia's terms of trade showed an improvement (up by 31%, reflecting an 19% rise in export prices and a 9% decrease in import prices). The terms of trade started to improve from 1993–94 after experiencing a period of deterioration a few years earlier. However, it again deteriorated in 1998–99, owing to a fall in export prices and a rise in import prices. Rising export prices and continued falls in import prices thereafter continued to improve the terms of trade to a level significantly above a decade earlier.¹

Links to other dimensions of progress

Australia's national income provides the material basis for many other dimensions of progress. For example, improvements in health and education may rely on expenditures funded out of income – such as the construction of hospitals and schools. Conversely, a healthier, more educated population can better engage in the economic activity that generates income. Income-generating economic activity may also go hand in hand with environmental depletion or degradation. But income can also be invested in its restoration. Some of the growth may be channelled to the accumulation of national wealth that will generate future income. Or it may be spent to improve the welfare of economically disadvantaged Australians.

The income dimension of progress is strongly linked to work. Changes in income may reflect demographic and labour market trends. Income growth may result partly from a trade-off for longer working hours and reduced leisure.

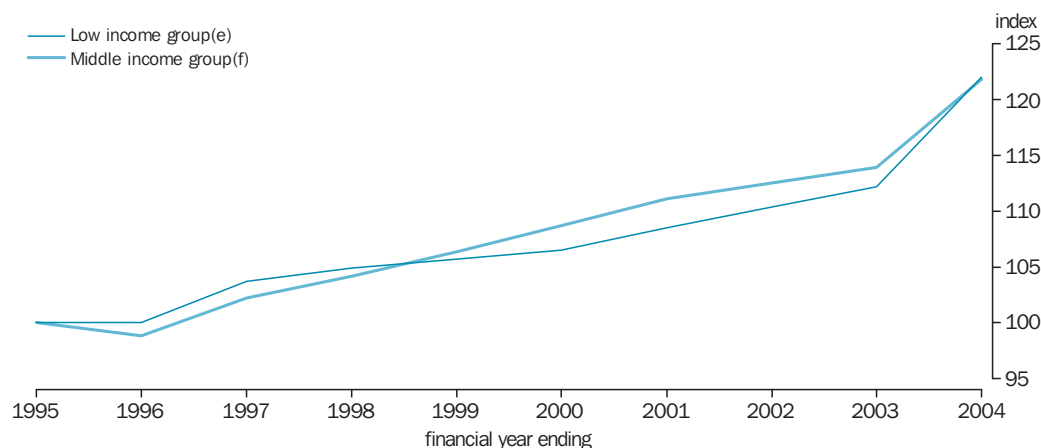
See also the commentaries *National wealth, Productivity, Education and training, Health, Economic hardship, Work, The natural landscape* and *The air and atmosphere*.

End notes

- 1 Unless otherwise indicated, all data in this commentary are derived from Australian Bureau of Statistics 2005, *Australian System of National Accounts 2004–05*, cat. no. 5204.0, ABS, Canberra.
- 2 Australian Bureau of Statistics 2005, *Australian National Accounts: State Accounts 2004–05*, cat. no. 5220.0, ABS, Canberra.
- 3 Australian Bureau of Statistics 2005, *Household Income and Income Distribution 2003–04*, cat. no. 6523.0, ABS, Canberra.
- 4 Australian Bureau of Statistics various issues, *Labour Force, Australia*, cat. no. 6202.0, ABS, Canberra.

Economic hardship: key points

Average real equivalised disposable household income(a)(b)(c)(d)



(a) Disposable (after income tax) income amounts are equivalised by applying the OECD equivalence scale.¹ (b) Base year is at 1994–95 and equals 100. (c) The equivalised income amounts are adjusted for changes in prices as measured by the Consumer Price Index (CPI). (d) No survey was conducted in 1998–99 or 2001–02. The values shown for these years are mid-point values between the survey values for 1997–98 and 1999–2000 and for 2000–01 and 2002–03. (e) People in the 2nd and 3rd income deciles from the bottom of the distribution when all people are ranked, from lowest to highest, by their equivalised disposable household income. (f) People in the middle income quintile (5th and 6th deciles) after being ranked, from lowest to highest, by their equivalised disposable household income.

Source: Data available on request, *Survey of Income and Housing*.

Between 1994–95 and 2003–04 the mean real equivalised household income of low income people rose by 22%, the same rise as for people in the middle income group.

The relationship of economic hardship to progress

Society generally accepts that people should be able to enjoy some minimum material standard of living. People who cannot achieve such a minimum due to lack of economic resources can be described as experiencing economic hardship. There is little consensus, however on how such a minimum should be defined or measured.

About the headline indicator and its limitations: Average income of people with low income

For most people, household income is the most important determinant of their economic situation. People living in households with low income are more likely to have insufficient economic resources to support a minimum material standard of living. However, income is not the only economic resource available to people.

Household expenditure data indicate that households with the lowest levels of income, as measured in household surveys, tend to have higher levels of consumption than households with slightly higher levels of income, implying that they have greater access to other economic resources such as wealth. Therefore the headline indicator focuses on changes in the average disposable (after tax) income of people close to the bottom of the income distribution (namely, the 20% of people in the second and third lowest income deciles).

Economic hardship: Other indicators

People with low economic resources, people in households with low average equivalised household expenditure on goods and services, proportion of population with government pensions and allowances as their principal source of income, proportion of population with high financial stress.

Some differences within Australia

Indicators of the economic situation of the household identify several groups to be most at risk of experiencing low material standards of living. They include Indigenous Australians and one parent families.

Links to other dimensions

See also the commentaries *National income, Education and training, Work, Health, and Family, community and social cohesion*.

Economic hardship

Progress and the headline indicator

Society generally accepts that people have a right to enjoy some minimum material standard of living, that is, to consume a minimum standard of goods and services. People who cannot achieve such a minimum due to the lack of economic resources can be described as experiencing economic hardship. However, there is no consensus about the minimum level of goods and services that is adequate or the amount of economic resources that an individual requires to pay for those goods and services. Moreover, views about a minimum standard change over time and are related to the norms of the community. There are therefore no widely accepted measures of the extent to which people fall below minimum living standards, and the numbers of people that fall below.

It is possible to measure the economic situation of households that have lower levels of economic resources such as income and wealth, and are therefore more likely to have standards of living below an acceptable minimum. It is also possible to identify the types of households that have lower levels of expenditure and therefore potentially also lower standards of living. A third and more direct approach to identify those who might have low living standards is to identify households that appear to be experiencing the greatest levels of economic difficulty.

As household income is the major component of economic resources for most households, it is a key determinant of the economic situation of households. The headline economic hardship indicator shows the growth in average real equivalised disposable income of people close to the bottom of the income distribution, that is, the 20% of people in the second and third lowest income deciles — the income group thought to best represent the characteristics of the people likely to have low living standards. These people are chosen rather than the lowest and second lowest income deciles because household income is not a good indicator of the total economic resources available to many people with very low recorded incomes (close to nil and sometimes negative).

The headline economic hardship indicator shows that low income people experienced a trend of rising real incomes between 1994–95 and 2003–04. The average real equivalised disposable household income of low income people is estimated to have risen by 22% over the period, although part of the increase in 2003–04 may reflect improvements to the way income was collected in the survey introduced in that year. The same individuals were not necessarily in this income grouping for the entire period. But for those people who were, their rising incomes would on average have provided a capacity to increase their standard of living. While some would interpret this increase in real income of the low income group as progress, others would consider that it also needs to be weighed against

Measuring income, wealth and expenditure

The income measure used in this commentary is a person's equivalised disposable (after tax) household income.

Household income is used in preference to personal income in recognition of the sharing of income between partners in a couple relationship and between parents and dependent children. To a lesser degree, there may be sharing with other members of the household. Even when there is no transfer of income between members of a household, nor provision of free or cheap accommodation, members are likely to benefit from the economies of scale that arise from the sharing of dwellings. However, larger households normally require a greater level of income to maintain the same material standard of living as smaller households, and the needs of adults are normally greater than the needs of children. The income estimates are therefore adjusted by equivalence factors to standardise the income estimates for household size and composition, while taking into account the economies of scale that arise from the sharing of dwellings.¹

The measure of wealth used in this commentary is net worth, that is, assets less liabilities.

Similarly to income, net worth and expenditure are also measured on an equivalised basis.¹

Groups that have been missed

Data available from ABS household collections are likely to miss some of the most disadvantaged groups, such as homeless people sleeping out and people staying in boarding houses or crisis accommodation provided by welfare agencies. Information about the numbers of people in such circumstances, the duration of these circumstances, and the factors leading to these circumstances, is difficult to obtain, partly because such groups are highly mobile. See the commentary on *Family, community and social cohesion* for more information about homelessness.

changes in community standards. Although there is no direct measure of these, one approach is to compare changes with those of 'middle' Australians. And so the headline indicator chart also shows changes in the real income of people in the middle income group (i.e. households in the fifth and sixth income deciles) which also rose by 22% between 1994–95 and 2003–04. Further information about the distribution of income between households is given in the *National Income* commentary.

Income, wealth and standard of living

As discussed earlier, people with low household income are more likely to have insufficient economic resources to support an acceptable minimum material standard of living. However, income is not the only economic resource available to households. Households that have higher levels of wealth can utilise these assets to support a higher standard of living. Higher levels of wealth support higher living standards in two ways. First, living costs can be financed for at least a limited period of time by reducing net worth through running down bank balances and similar reserves

of cash, selling assets or borrowing against assets. Second, some forms of wealth directly contribute to living standards. For example, households with outright ownership of their dwelling do not have to pay rent or mortgage interest, that is, their cash living costs tend to be lower than those who are not outright home owners. For many people, their home is the main asset they own.

In order to describe households that have both low levels of income and low levels of wealth, this commentary presents statistics on those households with both income and wealth in the lowest three deciles. These households have been termed the low economic resource group and they account for 13% of the population.

A household's material standard of living is highly related to its consumption of goods and services, which in turn is associated with its level of expenditure on goods and services. For 2003–04, it is possible to identify households with different levels of income and wealth and to compare their average levels of expenditure. In 2003–04, the mean equivalised household expenditure of all Australians was \$534 per week. This compared with \$348 per week for people in low income households and \$309 per week for those in households with low economic resources.

Differing financial needs

The financial needs of households differ for a number of reasons in addition to those directly associated with the size of the household. For example, some households have more expensive medical needs than others. Some live in regions with higher prices than others, especially those influencing housing costs; but on the other hand, regions with higher housing costs may be closer to employment opportunities or medical, educational and other services.

Cash needs can be greater when considered over longer time periods, because it is possible to defer certain expenditure for a limited time. For example, there is the need to eventually replace worn out consumer durables such as motor vehicles and white goods. There is therefore interest in identifying people who may have low income for a relatively long period of time. People dependent on many forms of government benefits are likely to have low incomes for extended periods (see box).

As there is no standard way to measure the total economic resources available to a household, nor to measure the financial needs of a household, it is useful to examine indicators of the economic situation of households which can more directly identify households at risk of or actually falling below minimum acceptable living standards. For example, there are also indicators which identify households experiencing financial stress in various forms, such as being unable to pay certain bills or make mortgage or rent payments on time, or missing out on some activities, due to a shortage of money. A summary indicator is presented in the

Dependency on government benefits

One identifiable group with relatively low incomes are those people whose principal source of income is government pensions, allowances and similar payments. To be eligible to receive most such government benefits, beneficiaries also have to have relatively low levels of wealth.

Although the welfare system is designed to assist those whom society considers are in need of help, the benefits received may be insufficient to meet the financial requirements of some households that have particular circumstances such as unexpected health bills, past debts and the like. Of particular concern are younger people who depend on government benefits for long periods of time, as they have limited capacity to build up savings or other forms of wealth that can help them deal with contingencies in the future. And in contrast to older people receiving the Age pension, they are much less likely to own their own home.

While people with social security benefits as their principal source of income are likely to have lower living standards than those with higher incomes or wealth, an increase in the number of these people does not necessarily mean more people are living with an unacceptably low level of living standards. It may reflect a broadening of the eligibility criteria for benefits and a consequent improvement in living standards for some. The reverse may also be true.

Financial stress indicators

The ABS has asked questions in several surveys about cash flow problems and aspects of deprivation.² The table includes results from the 2003–04 Household Expenditure Survey (HES). Respondents were asked about a number of potential symptoms of financial stress over the past 12 months, including whether they had various cash flow problems, such as being unable to pay certain bills on time; or whether they could not afford activities such as a night out once a fortnight, or a special meal once a week; or whether they had gone without food or heating because of a shortage of money.

Different households will respond to financial pressures in different ways, and some higher income households will also experience cash flow problems. But the incidence of different household types reporting multiple indicators of financial stress can give an indication of those most likely to have unacceptably low living standards.

Households reporting cash flow problems did not necessarily report other symptoms of financial hardship and vice versa. And some households will have a greater preference than others to forgo some expenditure to avoid cash flow problems.

This commentary uses a 'high financial stress' indicator which was presented in the article 'Household Income, Living Standards and Financial Stress' that appeared in *Australian Economic Indicators, June 2001* (cat. no. 1350.0).² The indicator summarises 15 individual financial stress indicators. In the table, the indicator 'Persons in households with high financial stress' describes the proportion of people whose household reported an incidence of five or more out of a total of 15 individual financial stress indicators.

table, and its composition is discussed in the accompanying box.

Some differences within Australia

The following table shows selected indicators of the economic situation of people living in households with different types of family composition. The types of household that appear with the highest frequency across the range of indicators can be considered to be most at risk of having living standards below minimum acceptable levels.

One parent family households with dependent children (accounting for 8% of the population, or 1.5 million people) tend to have limited economic resources, and people in these households appear to have the lowest average standard of living. In 2003–04, over one third (38%) of people in one parent family households were in the 20% of the population designated as the low income group, and 45% were in the low economic resources

group. About 36% were in the lowest expenditure quintile, and over half (56%) had government benefits as their principal source of income. At 41%, their incidence of high financial stress was much higher than that of any other group.

The proportion of children living in households with limited economic resources and high financial stress is higher than the corresponding proportion of adults. In 2003–04, for example, 53% of children in one parent family households with dependent children were in the low economic resources group, compared to 38% of adults in those households.

People aged 65 or older living in couple only and lone person households, together accounted for 10% of the total population. Most people living in these types of households had government cash benefits as their principal source of income (67%

Indicators of economic situation by household composition(a) – 2003–04

Family composition of household	Population in households:					
	Total population	In low income group (b)	In low economic resources group (c)	With PSI of government pensions & allowances (d)	In lowest expenditure quintile	With high financial stress (e)
	'000	'000	'000	'000	'000	'000
Adults	15 651	2 984	1 770	3 472	3 101	1 717
Children (0–14 years old)	3 956	937	822	797	823	764
Total	19 607	3921	2 592	4 269	3 924	2 481
	'000	%	%	%	%	%
One family households						
Couple family with dependent children	8 667	16.6	10.8	8.3	14.9	12.1
Adults	5 508	15.1	9.2	7.7	13.8	11.4
Children (0–14 years old)	3 159	19.1	13.5	9.4	16.8	13.4
One parent family with dependent children	1 529	38.4	45.1	55.8	35.9	40.6
Adults	821	34.3	38.4	47.6	32.9	37.7
Children (0–14 years old)	709	43.1	52.8	65.4	39.2	43.7
Couple only, reference person aged						
Under 65	2 720	13.1	4.3	13.7	12.3	5.3
65 or over	1 313	52.4	9.3	66.9	42.6	5.5
Other one family households	2 392	12.2	7.2	15.9	16.5	8.3
Multiple family households	420	*18.3	15.1	25.2	*14.6	*23.3
Non-family household						
Lone person aged						
Under 35	336	6.0	18.3	12.9	12.9	15.2
35–64	909	12.0	18.7	30.8	25.5	18.1
65 or over	717	35.9	21.1	76.5	56.1	5.0
Group households	602	16.2	18.7	13.9	*10.3	8.6
Total	19 607	20.0	13.2	21.8	20.0	12.7

* estimate has a relative standard error of between 25% and 50% and should be used with caution.

(a) The data in columns 'In lowest expenditure quintile' and 'with high economic stress' come from the Household Expenditure Survey (HES) 2003–04. Other data come from the Survey of Income and Housing (SIH) 2003–04. (b) People in the second and third lowest income deciles. (c) Persons in simultaneously both the lowest three income deciles and the lowest three net worth deciles. (d) People in households in which government pensions, allowances and similar payments are the principal source of income. (e) A summary measure of households reporting various indicators of economic stress, see separate box for more detail.

Source: Data available on request, Survey of Income and Housing 2003–04; Household Expenditure Survey 2003–04.

Aboriginal and Torres Strait Islander peoples

Low levels of employment and high unemployment contribute to the economic disadvantage of Aboriginal and Torres Strait Islander peoples relative to other Australians. For many Indigenous Australians, lower levels of educational attainment and greater geographical isolation act as inhibitors to securing skilled jobs and high wages.

Data from the 2001 Census of Population and Housing show the mean equivalised gross household income for Indigenous people was \$364 per week compared with \$585 for non-Indigenous people. Between 1996 and 2001, the gap between Indigenous and non-Indigenous income remained the same, with non-Indigenous mean equivalised gross household income 1.6 times higher than the corresponding income for Indigenous people.

The commentaries about *Work, Education and training* and *Housing*, provide more information about factors linked to Indigenous peoples' economic hardship.

of people living in couple only households and 77% of lone persons). While they tended to have low income (with 52% and 36% respectively in the low income group), less were in the low economic resources group (9% and 21% respectively), reflecting the higher average levels of wealth of older people. A relatively high proportion were in the lowest expenditure quintile (43% of people living in couple only households and 56% of lone persons). However, as most own their own home outright, on average only a small amount of expenditure is required to cover housing costs. This is likely to be a major contributing factor on the low incidence of financial stress reported by older people (6% for people living in couple only households and 5% lone persons). It therefore seems that older people with low income are likely to have a higher standard of living than younger people with the same levels of income.

Factors influencing change

The overall vitality of the economy is a key determinant in providing jobs and therefore of the economic wellbeing of households. However, some people are unable to work, some earn more than others, consumption and investment behaviours differ, and family situations and life circumstances vary, as does the capacity of individuals to manage all these factors: they can all impact on the risk that an individual household might have an unacceptably low standard of living.

There are mechanisms to support people who fare less well. Important among them are government social support benefits to assist those with low levels of economic resources and who meet certain other eligibility criteria. The benefits are financed through taxation revenue. In addition to the direct income support payments (the pensions and allowances provided to people with limited means of their own), governments provide a wide range of education, health, housing and other indirect goods and services. Other support, provided by the work of charitable organisations (often with the

help of government) and the charitable donations made by businesses and households, help reduce the risks of inadequate food, clothing and shelter.

Links to other dimensions of progress

Changes in the standard of living will to some extent impact on, and be impacted by, many of the other dimensions of progress described in this publication.

The income generated by the economy as a whole is an important determinant of the overall living standards of the society. A strong economy is likely to present more opportunities for individuals to improve their financial situation. It also provides a greater capacity to provide support to those with the greatest need.

A low level of material standard of living is often associated with problems such as a lack of participation in work, substance abuse, poor health, poor education, poor housing, crime, social exclusion and a lack of opportunity for children. Of course changes in life fortunes can also be factors. Some people can benefit from windfall gains while others can suffer unexpected losses through crimes committed against them or other unexpected events.

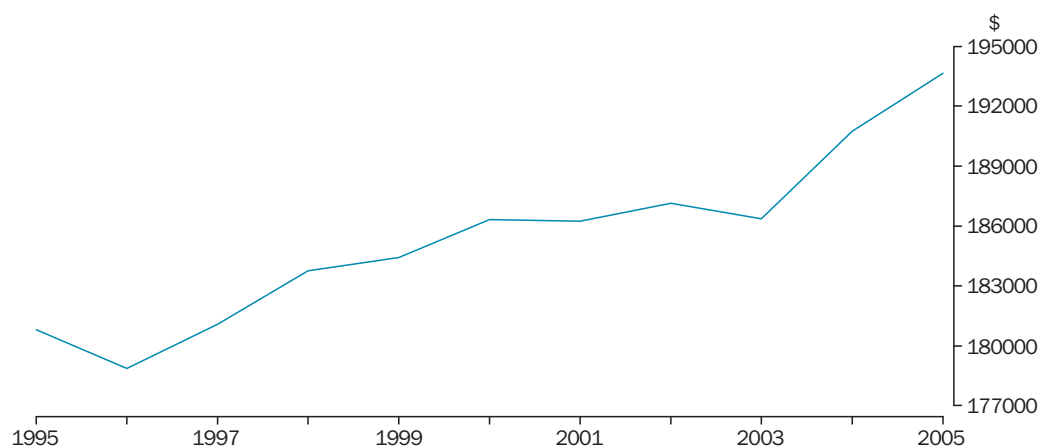
See also the commentaries *National income*, *National wealth*, *Education and training*, *Work*, *Health*, and *Family, community and social cohesion*.

Endnotes

- 1 The equivalence scale used to obtain equivalised incomes, expenditure and net worth is one that has been used in many studies, including some by the Organisation for Economic Co-operation and Development (OECD). It is sometimes referred to as the 'modified OECD scale'. The scale gives a weight of 1.0 to the first adult in the household, and a weight of 0.5 for each additional adult (people aged 15 years and over), and a weight of 0.3 for each child. By weighting individuals within households the resultant income measures take approximate account of the different needs of households of different size and composition.
- 2 Results from the 1998–99 Household Expenditure Survey were published by the ABS in McColl, B., Pietsch, L., and Gatenby, J. 2001 'Household Income, Living Standards and Financial Stress' in *Australian Economic Indicators, June 2001* (cat. no. 1350.0). A more detailed analysis was undertaken in Bray, J.R., *Hardship in Australia: an analysis of financial stress indicators in the 1998–99 Australian Bureau of Statistics Household Expenditure Survey, occasional paper no. 4, 2001*, Department of Family and Community Services, Canberra. Also see Australian Bureau of Statistics 2003, *General Social Survey: Summary Results, Australia*, cat. no. 4159.0, ABS, Canberra. Results from the 2003–04 Household Expenditure Survey are available on request.

National wealth: key points

Real national net worth(a) per capita



(a) Chain volume measure; reference year 2003–04.
Source: Australian System of National Accounts.¹

Between June 1995 and June 2005, Australia's real national net worth per capita rose at an average annual rate of 0.9%. Australia's real assets per capita grew by 1.9% per year, but this was largely offset by the 6.6% annual growth in real per capita liabilities to the rest of the world. Real produced assets per capita grew by around 2.0% per year. Of the produced assets, dwellings (up by 2.2% per year), machinery and equipment (up 3.5% per year) and software (up 11.5% per year) grew most strongly, although even by 2005 software still accounted for a small proportion of total assets (in part due to falling prices).

The relationship of national wealth to progress

National wealth and national income are very closely related. Along with the skills of the work force, a nation's wealth has a major effect on its capacity to generate income. Produced assets (such as machinery and equipment) are used in income-generating economic activity. Income, in turn, provides for saving that enables the accumulation of new wealth.

About the headline indicator and its limitations: Real national net worth per capita

Real national net worth per capita – exhibits features that make it an informative indicator of national progress. It is a net measure – it shows the amount by which Australia's assets exceed its liabilities to the rest of the world. It is a per capita measure – total wealth could rise if the population grew, even though there may have been no improvement in Australians' average wealth. And it is a real measure – it is adjusted to remove the effects of price change.

But it does not take account of everything that might be regarded as valuable. For example, it excludes: consumer durables (such as refrigerators) and motor vehicles that households use to produce services for themselves; native forests and other natural assets not used for economic production; valuables held as stores of wealth, such as precious metals and stones, antiques and works of art; human capital (e.g. knowledge and skills) and social capital (e.g. social networks and trust).

National wealth: Other indicators

Real national assets and liabilities per capita; Real net capital stock per capita; Real gross fixed capital formation per capita; Economically demonstrated resources (minerals and energy) per capita; Real net foreign debt; Average household net worth.

Some differences within Australia

Wealth statistics dissected by geography are not available but household wealth statistics (which include consumer durables and motor vehicles) dissected by age groups show, not surprisingly, that wealth increases as people age, although wealth also appears to be run down to some degree after retirement.

Links to other dimensions

The buildings and infrastructure used to deliver education, health and other services are important components of wealth, as are natural assets such as land and minerals. See also the commentaries *National income*, *Economic hardship*, *Housing* and *The natural landscape*.

National wealth

Progress and the headline indicator

National wealth and national income are very closely related.

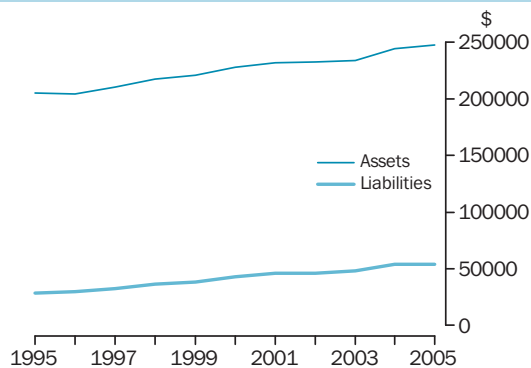
Along with the skills of the work force, a nation's wealth has a major effect on its capacity to generate income. Produced assets (such as machinery and equipment) are used in income-generating economic activity. Some natural assets (such as minerals and native timber) generate income at the time of their extraction or harvest. Holdings of financial assets with the rest of the world (such as foreign shares, deposits and loans) return income flows to Australia. Other assets, such as owner-occupied dwellings, provide consumption services direct to their owners.

Income that is saved rather than spent on current consumption allows the accumulation of wealth that will generate income and support higher levels of consumption in the future.

There are many different indicators of wealth. The headline measure – real national net worth per capita – exhibits features that make it an informative indicator of national progress.

- ◆ It is a net measure – it shows the amount by which Australia's assets exceed its liabilities to the rest of the world.
- ◆ It is a per capita measure – total wealth could rise if the population grew, even though there may have been no improvement in Australians' average wealth.
- ◆ It is a real measure – it is adjusted to remove the effects of price change. Nominal (or current price) wealth could rise during periods of asset-price inflation, even though there may have been no increase in the volume of tangible assets or no increase in capacity to generate future real income.

Real national assets and liabilities(a) per capita



(a) Chain volume measures; reference year 2003–04.
Source: Australian System of National Accounts.¹

Estimating wealth

Estimates of assets and liabilities are shown in the national balance sheet which forms part of the *Australian System of National Accounts*. For an asset to appear in the balance sheet, some person or institution must be able to enforce ownership rights over it; also, it must be possible for the owner of the asset to derive economic benefit from holding or using it. Assets include:

- ◆ Dwellings, other buildings, machinery, inventories, plantation forests and so on ('produced non-financial assets').
- ◆ Land, native forests and minerals that are used for economic purposes ('non-produced non-financial assets').
- ◆ Currency, shares, loans and other securities ('financial assets').

Australia's liabilities to the rest of the world include borrowings from overseas and foreign holdings of Australian currency, shares and other securities.

In principle, all assets and liabilities appear in the balance sheet at market value; in practice, owing to data limitations, a variety of approximations and estimating procedures must be used.

The headline indicator includes a wide range of items, but it does not take account of everything that might be regarded as valuable. For example, it excludes:

- ◆ Consumer durables (such as refrigerators) and motor vehicles that households use to produce services for themselves.
- ◆ Native forests and other natural assets not used for economic production.
- ◆ Valuables held as stores of wealth, such as precious metals and stones, antiques and works of art.
- ◆ Human capital, such as the stock of knowledge and skills embodied in the Australian population.
- ◆ Social capital, which refers to the networks, shared norms, values and understandings which facilitate cooperation within and among groups.

Although these items are not built into the headline wealth measure, other commentaries (such as those for the *Biodiversity*, *Oceans and estuaries* and *Education and training* dimensions of progress) provide information about some of them.

In this commentary, the terms net worth and wealth are used interchangeably.

Real national assets and liabilities per capita

Changes in Australia's net worth are the net result of changes in assets and liabilities. Between June 1995 and June 2005, Australia's real net worth per capita rose at an average annual rate of 0.9%. Australia's real assets per capita grew by 1.9% per year, but this was largely offset by the 6.6% annual growth in real per capita liabilities to the rest of the world. Nevertheless, in June 2005 the value of assets was around five times that of liabilities.¹

Between 1995 and 2005, real produced assets per capita grew by around 2.0% per year. Of the produced assets, dwellings showed fairly strong

What assets do Australians own?

The composition of Australia's total assets has been fairly stable during the past decade. There has been a modest decline in the relative importance of produced assets, and increases in the importance of non-produced and financial assets.

At 30 June 2005, significant assets included:

- ◆ land (32% of the total, down from 39% in 1995) and subsoil assets (6%, up marginally from 1995)
- ◆ dwellings (20%, up marginally from 1995) and non-dwelling construction (19%, down from 21%)
- ◆ machinery and equipment (8%), up marginally from 1995
- ◆ financial assets with the rest of the world (12%, up from 6%).

growth (up by more than 2% per year). Computer software grew by 11.5% a year, although even by 2005 software still accounted for a small proportion of total assets (in part due to falling prices).

Non-produced assets (such as land, mineral resources and native forests) are largely the result of natural endowment, although exploration and development have increased the economic value of these assets. Real non-produced assets per capita fell slightly (0.4% a year) between 1995 and 2005.

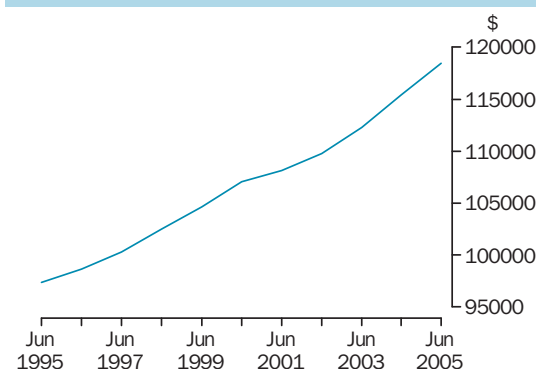
Australia's financial assets with the rest of the world more than doubled in real per capita terms between 1995 and 2005 (up by 9.4% per year). Shares and other equity showed particularly strong growth. Australia's per capita liabilities to the rest of the world rose by 6.6% per year between 1995 and 2005. Again, shares and other equity showed strong growth.

Major assets and liabilities(a) per capita

	At 30 June 1995	At 30 June 2005	Average annual growth rate
	\$	\$	%
Produced assets	101 269	123 647	2.0
Non-produced assets	98 159	94 641	-0.4
Total non-financial assets	196 517	218 288	1.1
Financial assets with ROW(b)	12 013	29 617	9.4
Total assets	205 160	247 899	1.9
Total liabilities to ROW(b)	28 625	54 240	6.6
Net worth	180 807	193 665	0.7

(a) In real/volume terms; reference year 2003–2004. Components may not sum to totals. (b) ROW = rest of the world. Source: Australian System of National Accounts.¹

Real net capital stock(a) per capita



(a) Volume measure; reference year 2003–2004. Source: Australian System of National Accounts.¹

Assets used in production – produced capital

Machinery, buildings and some other fixed assets are inputs to the production of goods and services, and are an important repository of national wealth. Australia's stock of these assets has been growing for many years, although in recent times this growth has been slower than the other components of assets. Real net capital stock, that is the net present values of the future capital services to be provided by these assets, grew on average by 2.0% per year on a per capita basis between June 1995 and June 2005. In both June 2005 and 1995, fixed assets accounted for 47% of the total value of Australia's assets.¹

The increase in capital stock has in turn led to an increase in capital services used per unit of labour input (a process known as 'capital deepening'). During the past decade, Australia's capital-labour ratio rose by 34% (or just under 3% per year). This has contributed to an increase in labour productivity.

The growth of a nation's net capital stock depends on the relative pace of two offsetting factors – investments (or 'capital formation') which increase

Real net capital stock(a) per capita

	30 June 1995	30 June 2005	Average annual growth rate
	\$	\$	%
Dwellings	39 254	48 828	2.2
Other buildings and structures	42 816	47 080	1.0
Machinery and equipment	13 444	19 040	3.5
Software	585	1 746	11.5
Other assets	2 029	1 768	-1.4
All assets	97 415	118 462	2.0

(a) Volume measures; reference year 2003–04. Components may not sum to totals. Source: Australian System of National Accounts.¹

Measuring Australia's capital stock

Broadly, economic statisticians have adopted two approaches to measuring a nation's stock of capital – direct measurement and the perpetual inventory method (PIM). Direct measurement involves surveying the owners of capital to ascertain the values of their machines, buildings and so on. Australian estimates are based on the PIM, which involves compiling a 'rolling inventory' of the capital stock based on historical data about investment flows. In a given year, investments in capital assets are added to the stock, and retirements of assets are deducted from the stock.

Several different measures of capital stock can be derived using the PIM. 'Net capital stock' is the most appropriate measure when one is analysing the nation's wealth. It has been adjusted downwards using estimates of depreciation as well as retirements. 'Productive capital stock' is the most appropriate measure when analysing production and productivity.

Real net capital stock(a), by industry

	30 June 1995	30 June 2005	Average growth rate p.a.
	\$million	\$million	%
Agriculture, forestry and fishing	62 451	69 135	1.0
Mining	106 252	159 356	4.1
Manufacturing	92 308	121 054	2.7
Electricity, gas and water supply	110 163	134 027	2.0
Construction	23 943	29 906	2.2
Wholesale trade	37 670	46 280	2.1
Retail trade	33 771	50 555	4.1
Accommodation, cafes and restaurants	32 848	49 359	4.2
Transport and storage	148 692	184 599	2.2
Communication services	41 614	69 618	5.3
Finance and insurance	69 273	87 664	2.4
Property and business services	79 639	140 462	5.8
Government admin and defence	61 579	67 745	1.0
Education	72 121	88 248	2.0
Health and community services	51 697	69 103	2.9
Cultural and recreational services	12 254	25 405	7.6
Personal and other services	14 168	22 887	4.9
Ownership of dwellings	709 390	992 494	3.4
All industries	1 538 027	1 937 187	2.3

(a) Volume measures; reference year 2003–04. Components may not sum to totals.

Source: Australian System of National Accounts.¹

the stock, and retirements and depreciation which reduce it. Investments significantly outstripped retirements and depreciation during the 1990s.

Diverse trends may underlie the aggregate growth pattern, such as shifts in the composition of economic activity toward industries that are more or less capital intensive, or more or less rapid capital deepening in individual industries. Technological changes – for example, the recent rapidly increasing importance of computer and communications hardware and software – have been a major driver of such trends.

Between 1995 and 2005, the types of capital showing the most rapid growth were dwellings (up 2.2% per year), machinery and equipment (up 3.5% per year) and software (up 11.5% per year).

Between 1995 and 2005, the industries showing the most rapid growth in net capital stock were Cultural and recreational services (up 7.6% per year), Property and business services (up 5.8% per year) and Communication services (up 5.3% per year).

Capital formation

Capital formation (commonly termed 'investment') is the process of creating produced assets – such as machinery and buildings – that can be used for the production of goods and services. Capital formation is a key influence on Australia's capacity to generate income in the future.

Gross fixed capital formation is the value of acquisitions less disposals of new or existing fixed assets. The measure is 'gross' because it has not been adjusted for depreciation (the consumption of fixed assets during the production process). (See box.)

Australia experienced a recession in the late 1980s and early 1990s. During this period capital formation fell. However, it recovered in 1992–93 and continued to increase through the remainder of the decade. Between 1994–95 and 2004–05 gross fixed capital formation per capita rose by 4.5% per year on average.

Capital formation is undertaken by all domestic sectors: general government, public corporations and the private sector, which comprises private corporations and the household sector. The private

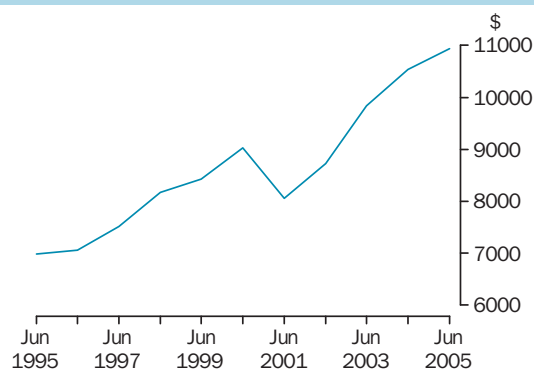
Gross versus net capital formation

The indicator here is a gross measure of capital formation, before deduction of depreciation (called 'consumption of fixed capital' in the Australian System of National Accounts). Net capital formation is derived by deducting depreciation from the gross measure.

During the years 1994–95 to 2004–05 depreciation was equivalent to around 59%–71% of gross capital formation.

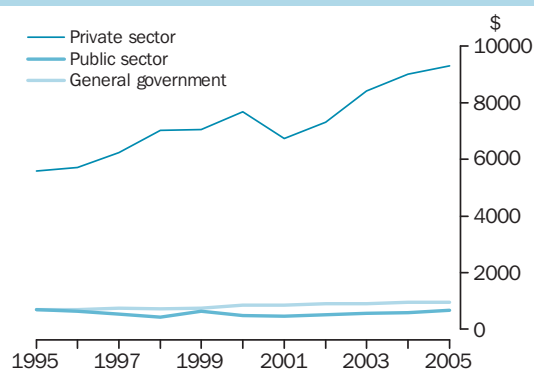
A gross measure is most suitable when one is analysing investment as a component of aggregate expenditure; a net measure is most suitable when one is analysing increases in the total stock of capital.

Real gross fixed capital formation(a) per capita



(a) Volume measure; reference year 2003–04. Source: Australian System of National Accounts.¹

Real gross fixed capital formation(a) per capita by sector



(a) Volume measures; reference year 2003–04. Source: Australian System of National Accounts.¹

sector consistently contributed most to overall capital formation during the past decade.

After an initial decrease in the early 1990s, private sector investment recovered and grew by 67% from 1994–95 to 2004–05. The private sector's contribution to overall gross fixed capital formation rose from around 80% in 1994–95 to just over 85% in 2004–05. Government and public corporations made a smaller contribution to total real gross fixed capital formation per capita. Government investment accounted for about 9% of the total investment figure in 2004–05, while public corporations accounted for about 6%.

Within private gross fixed capital formation, there was strong growth during the decade in investment in dwellings (up 24% in real per capita terms between 1994–95 and 2004–05). Investment in machinery and equipment also grew appreciably. By 2004–05, machinery and equipment accounted for about 35% of total private capital formation, compared to 26% a decade earlier. Purchases of information technology (including computer hardware and software) are among the fastest growing components, although this category still

Private real gross fixed capital formation per capita(a) by type of asset

	1994–95		2004–05		Average annual change %
	\$	\$	\$	\$	
Dwellings	2 249	2 790	2 249	2 790	2.2
Non-dwelling construction	1 074	1 919	1 074	1 919	6.0
Machinery & equipment	1 470	3 234	1 470	3 234	8.2
Livestock	134	133	134	133	-0.1
Intangible fixed assets	241	569	241	569	9.0
Ownership transfer costs	666	667	666	667	0.0
Total	5 580	9 312	5 580	9 312	5.3

(a) Volume measures; reference year 2003–04. Components may not sum to totals. Source: Australian System of National Accounts.¹

accounts for only a small proportion of total capital formation, in part due to falling prices.

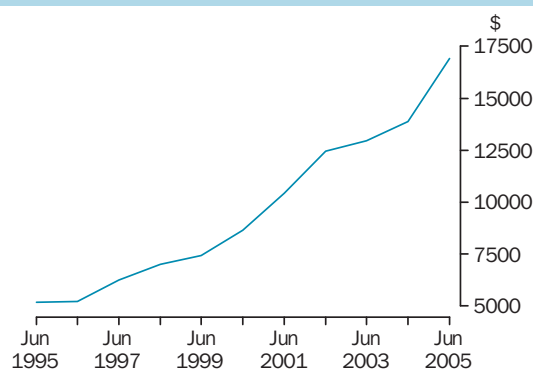
Non-produced assets – mineral and energy resources

Australia has many types of natural assets. Air, water, soil, and biodiversity resources are discussed in other commentaries. Subsoil assets, discussed below, are of major economic significance.

In recent years, there has been continued growth in Australia's known mineral resources, or economically demonstrated resources (EDR) (see box). The net present value of Australia's EDR per capita grew on average by around 12.5% a year between June 1995 and June 2005. After adjusting for the effects of price change, the real per capita value of Australia's subsoil assets grew by 9.8% per year on average over the same period.

The growth of a nation's stock of subsoil assets broadly depends on the relative pace of two offsetting influences – discoveries which increase

Economically demonstrated resources(a) per capita



(a) Minerals and energy, net present value of economically demonstrated resources. Source: Australian System of National Accounts.¹

Measuring Australia's mineral and energy resources

Estimating a nation's subsoil assets (such as coal, iron ore and so on) is a complex task. The size and value of such assets can be affected by technological change (which impinges on both exploration and extraction activities), by changes in prices (which can affect whether extraction is economically worthwhile) and by other influences.

The ABS uses the Bureau of Resource Sciences' term 'economically demonstrated resources' (EDR) to embody these concepts. EDR refers to subsoil assets 'with a very high degree of geological assurance and for which extraction is expected to be profitable over the life of the mine'.

Estimating the value of EDR requires a complex calculation of the present value of the income stream likely to flow from the asset. That income stream in turn depends on information about such factors as the value of annual output, production costs, and the expected life of the mine. Changes in EDR must be interpreted with care. For some resources, mining companies search for and 'prove' (confirm the physical extent and value of) just enough mineral deposit to support a certain number of years of future extraction.

the stock, and extractions which reduce it. The former significantly outstripped the latter during the 1990s, as was the case for most of the 20th century. But because the value of subsoil assets is defined in terms of EDR (see box), other influences come into play. There might, for example, be a marked rise in the world price for a mineral or a technological innovation that makes it economic to extract a known deposit that was hitherto uneconomic.

In 2005 Australia's economically demonstrated resources of zinc, lead, nickel, mineral sands (rutile and zircon), tantalum and uranium remain the world's largest, while bauxite, black coal, brown coal, copper, gold, iron ore, ilmenite, lithium, manganese ore, niobium, silver and industrial diamond rank in the top six worldwide.⁴

Among the minerals showing strongest annual growth in net present value of EDR in current price terms between 1995 and 2005 were naturally occurring LPG (up 19.3%), black coal (up 19.1%) and iron ore (up 16.6%).

External liabilities – foreign debt

In recent years, Australia's debt to the rest of the world has increased. Real net foreign debt grew on average by 6.4% per year between June 1995 and June 2005.²

The growth in a country's foreign debt can reflect several related influences. The value of its imports and other current payments to foreigners may outstrip the value of its exports and other current receipts from foreigners – if so, the nation experiences a deficit on its current account which must be funded.

An alternative view is that the saving of a country's residents may be outstripped by its needs for investment – i.e. the country experiences a shortfall in saving. Current account deficits and

Economically demonstrated resources(a) per capita by mineral

	30 June 1995	30 June 2005	Average annual growth rate
	\$	\$	%
Bauxite	195	234	1.9
Black coal	710	4 086	19.1
Copper	285	1 313	16.5
Iron ore	290	1 345	16.6
Magnesite	59	58	-0.2
Mineral sands	76	297	14.7
Nickel	140	1 117	23.1
Petroleum – crude oil	949	1 719	6.1
Petroleum – natural gas	1 736	4 070	8.9
Petroleum – condensate	239	928	14.5
LPG naturally occurring	95	554	19.3
Uranium	85	162	6.7
Zinc	121	268	8.3
Other minerals	205	700	13.1
All minerals	5 185	16 851	12.5

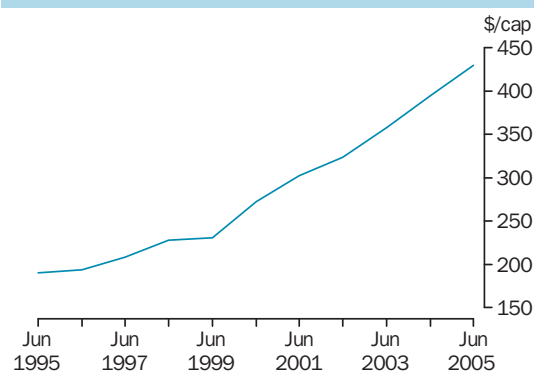
(a) Minerals and energy, net present value of economically demonstrated resources.

Source: Australian System of National Accounts.¹

saving shortfalls are conceptually the same phenomenon; they may be financed by, say, selling equity in enterprises to residents of other countries, or by borrowing from residents of other countries, or by running down financial assets held abroad.

Foreign holdings of Australian equity and debt were both rising through much of the 20th century.² Australia must pay income (profits or dividends and interest) on both forms of liability to foreign residents. However, if by incurring those

Real net foreign debt(a)



(a) To convert net foreign debt to real terms, the current-price figure has been divided by the implicit price deflator for domestic final demand. Reference year is 2003–04.

Source: Balance of Payments and International Investment Position.²

Real net foreign debt(a) by sector

	30 June 1995	30 June 2005	Average annual growth rate
	\$b	\$b	%
General government	32.8	22.1	-3.9
Other public sector	50.0	-15.0	. .
Private financial corporations	83.8	327.5	14.6
Private non-financial corporations	59.5	86.0	3.8
Australia	226.1	420.7	6.4

(a) To convert net foreign debt to real terms, the current-price figure has been divided by the implicit price deflator for domestic final demand. Reference year is 2003–04.

Source: *Balance of Payments and International Investment Position*.²

liabilities Australia has been able to acquire capital or other assets that enhance its productive capacity and income-generating potential, then the increased liabilities may not, on balance, have a deleterious impact on progress.

The public sector and private sector components of foreign debt showed markedly different trends during the past decade.

The real net foreign debt of the public sector fell from \$82.8b in June 1995 to a low of \$5.1b in June 2004. As at June 2005 it was slightly higher at \$7.2b.

The real net foreign debt of the private sector has risen continually throughout the last ten years to reach \$413.5b in June 2005.

Some differences within Australia

In 2003–04 the 20% of households with the least wealth accounted for only 1% of total household

Australia's net foreign debt

Australia's net foreign debt is the net outcome of:

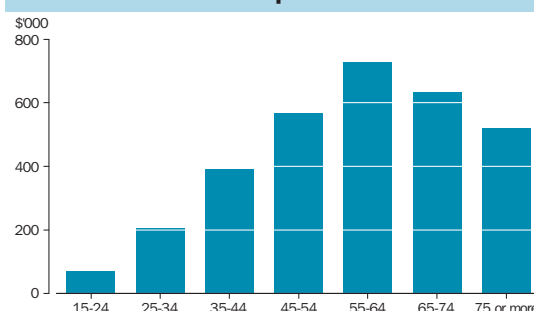
- ◆ Australian liabilities to overseas (\$709b in current-price terms at 30 June 2005).
- ◆ Foreign liabilities to Australia (\$279b in current-price terms at 30 June 2005).

Debt liabilities can be held by the public sector (for example, Commonwealth, state and local government, the Reserve Bank and other public sector corporations) and the private sector (for example, private financial and non-financial corporations).

Australia's capacity to service its foreign debt

Australia must pay interest on its foreign debt. The debt servicing ratio is a commonly used measure of a country's capacity to pay the costs associated with debt. It is calculated by dividing export earnings (goods and services credits) into the net interest payments (income accrued and payable on net foreign debt). During the past decade, Australia's debt servicing ratio has improved from 12.3% in 1994–95 to 9.4% in 2004–05.

Mean household net worth by age of household reference person – 2003–04



Source: ABS Survey of Income and Housing, 2003–04.

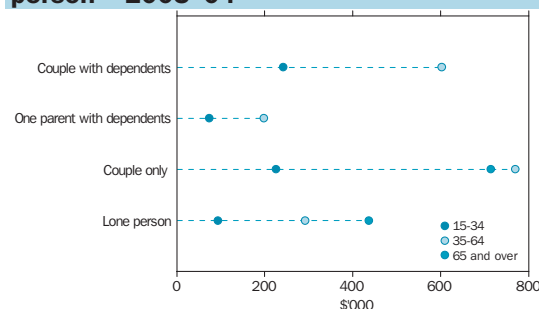
net worth or wealth, with an average net worth of \$23,000 per household. The share of net worth of the wealthiest 20% of households in Australia accounted for 59% of total household net worth, with average net worth of a little under \$1.4 million per household.

The distribution of wealth between households is closely associated with age, reflecting the common pattern of people gradually accumulating wealth throughout their working life and then drawing upon this wealth in retirement. In 2003–04, average household net worth peaked in the 55–64 age group, at \$728,000. This was four times the average net worth of households in the under 35 age group.

The distribution of wealth also varies across household types. The graph shows that lone persons and one parent households with dependents have substantially lower average wealth than couple households with a reference person in the corresponding age groups.

There are large differences in average household wealth between the states and territories. In 2003–04, New South Wales had an average net worth of \$563,000 per household, compared to \$325,000 per household in Tasmania and an Australian average of \$468,000.

Mean household net worth, selected household type by age of reference person – 2003–04



Source: ABS Survey of Income and Housing, 2003–04.

Mean value of selected household assets and liabilities by age

Assets and liabilities type	Age of household reference person (years)			Total
	Less than 35	35–64	65 or more	
	\$'000	\$'000	\$'000	\$'000
Value of accounts held with financial institutions	6.7	18.9	43.6	21.1
Superannuation	23.3	85.7	44.4	63.5
Other financial assets	10.3	60.1	75.3	51.9
Total financial assets	40.3	164.7	163.3	136.5
Estimated sale price of dwelling	133.6	281.4	285.5	249.0
Value of other property	35.9	86.1	65.8	70.8
Value of contents of own dwelling	36.4	52.2	45.9	47.4
Other non-financial assets	21.2	39.6	29.1	33.4
Total non-financial assets	227.1	459.3	426.2	400.6
Total assets	267.4	624.1	589.6	537.1
Principal outstanding on loans for own dwelling	59.8	45.6	1.5	40.0
Other liabilities	28.3	37.4	7.6	29.4
Total liabilities	88.1	83.1	9.0	69.4
Net worth of household	179.3	541.0	580.5	467.6

Source: ABS Survey of Income and Housing, 2003–04

In 2003–04 ownership of one's own home and value of other property were the most significant household assets in Australia, representing 53% and 15% respectively of total wealth held by households; superannuation and the value of contents of the dwelling followed in importance with 14% and 10% respectively.

As discussed above, the level of average household wealth is strongly related to the age of the household. The age of household members is also reflected in the composition of household wealth. For older households, the value of shares and trusts had relatively greater importance in

household net worth. Older households (those with a reference person aged 65 or over) also showed a large decrease in their superannuation funds and an increase in the value of their accounts held in financial institutions. This can be the result of retirees receiving a lump sum payment from their superannuation funds by the age of 65 and then transferring it to their bank accounts or other financial institutions. Total liabilities tend to be lower in older households as they have paid off most debts, especially those relating to mortgages.

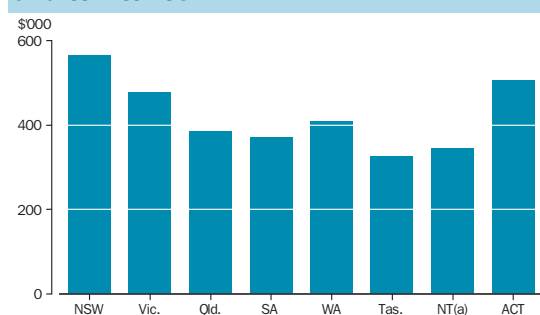
Factors influencing change

The growth in a nation's wealth is the outcome of a wide variety of influences. Broadly, changes in real wealth reflect both accumulations of past saving or dissaving and changes in the prices of assets and liabilities.

The economic cycle has a significant impact on the investment activity of a nation, which in turn, can affect its population's ability to accumulate wealth. The Australian economy's strong growth following the recession in the early part of the 1990s underpinned the increase in gross fixed capital formation in the 1990s and early 2000s.

Changes in technology, especially in information technology, have also influenced the increase in investment activity. For example, the computerisation of many manufacturing systems and processes may have driven increases in investment in machinery and equipment.

Mean net worth of households by states and territories



(a) Households in collection districts defined as very remote or Indigenous communities were excluded, accounting for about 23% of the population of the Northern Territory.

Source: ABS Survey of Income and Housing, 2003–04

Links to other dimensions of progress

The connections between wealth and income are discussed above and in the income commentary, and the link between wealth and economic hardship is discussed in that commentary.

The buildings and infrastructure used to deliver education, health and other services are important components of wealth, as are natural assets such as land and minerals.

See also the commentaries *National income*, *Productivity*, *Economic hardship* and *The natural landscape*.

Endnotes

- 1 Unless otherwise indicated, all data in this commentary are derived from Australian Bureau of Statistics, 2005, *Australian System of National Accounts 2004–05*, cat. no. 5204.0, ABS, Canberra.
- 2 All data in this segment is derived from Australian Bureau of Statistics 2005, *Balance of Payments and International Investment Position, Australia*, cat. no. 5302.0, ABS, Canberra.
- 3 Working papers in Econometrics and Applied Statistics, Australian Bureau of Statistics September 2002, *Experimental Estimates of the Distribution of Household Wealth, Australia, 1994–2000*, cat. no. 1351.0, ABS, Canberra.
- 4 Geoscience Australia 2005, *Australia's Identified Mineral Resources 2005* <http://www.ga.gov.au/minerals/exploration/resources_advice/AIMR2005.jsp> last viewed 21 April 2006.

Housing

Housing provides people with shelter, security and privacy. Having an adequate and appropriate place to live is fundamental to people's wellbeing, and there are many aspects to housing that affect the quality of people's lives. Dwelling attributes, such as size, number of bedrooms, physical condition, location relative to amenities and services, and affordability, are all important in this regard.

Although housing is a headline dimension of progress, there is no single indicator that succinctly captures whether people's many needs and desires for suitable housing are being met. While no headline or supplementary housing indicators are presented here, several dimensions of progress presented in this publication have a housing dimension.

The value of Australia's housing stock is a component of national wealth and is discussed in the commentary *National wealth*. Australians are continuing to invest significantly in the homes that they own. In the decade to June 2005, the household sector invested about \$400 billion (in current price terms) in new dwellings (excluding land). The value of land and dwellings owned by the household sector at 30 June 2005 represented close to 60% of the value of all assets owned by the sector.¹

The extent of homelessness is an associated issue of concern, and crisis accommodation services are often overburdened.² But housing shortages are not usually the primary cause of homelessness, and therefore it is discussed in the commentary on *Family, community and social cohesion*.

Australians are tending to live in smaller household groups, with the average household size shrinking by 13% over the 20 years to 2001. One consequence of the shrinking household size in Australia is that current housing stock can accommodate households more adequately. In 2003-04, while 5% of private dwellings across Australia required an extra bedroom to accommodate the residents of those dwellings, 69% of private dwellings had one or more bedrooms spare.^{3,4}

Some differences within Australia

The quality of dwellings is influenced by their age, the infrastructure available to support construction activity, the affluence of the communities in which they are located, and the local climate.

The physical condition and amenities of most Australian dwellings are generally good. The 1999 Australian Housing Survey showed that across Australia very few dwellings did not have running water, toilet, adequate kitchen facilities and the like. However 19% of all households in Australia lived in dwellings which had major structural problems (rising damp, major cracks in walls/floors, sinking or moving foundations, sagging floors, walls or windows that are not plumb, wood rot or termite damage, major electrical problems, major plumbing problems, and major roof defects).

Households in dwellings requiring additional bedroom(s)

	Remoteness			Australia
	Non-remote	Remote	Very remote	
	%	%	%	%
Households with Indigenous person(s)	12.0	21.5	45.9	15.7
Other households	3.4	3.2	3.9	3.4

Source: *Population Characteristics, Aboriginal and Torres Strait Islander Australians, 2001*, cat. no. 4713.0

The housing standards experienced by Aboriginal and Torres Strait Islander peoples tend to be lower than those experienced by other Australians. In particular, housing standards tend to be lowest in remote area communities. Building and maintenance costs are generally higher in remote areas because of access and distance related issues, and maintenance requirements are usually higher where environmental conditions are harsh or where accommodation is insufficient, leading to overcrowding.

In 2001, almost 1 in 6 households with Indigenous person(s) (16%) were accommodated in dwellings that required at least one extra bedroom, compared with 3% of other households. For households with Indigenous person(s), the proportion of households requiring at least one extra bedroom rose from 12% in non-remote areas to 46% in very remote areas. The need for an extra bedroom for other households was much lower, with less than 4% requiring an extra bedroom in any geographical area.⁵ Overcrowding is of particular concern because it has been associated with poor health outcomes.⁶

In 2002, in remote areas, more than half (60%) the dwellings of households with Indigenous person(s) had major structural problems. In non-remote areas the proportion was 34%.⁷

The lower housing standards experienced by Indigenous Australians are also reflected in the proportion (3%) of Indigenous people in 2001 who were occupying temporary dwellings, such as caravans, cabins or tin sheds (1% for non-Indigenous people).⁵

In 2002, of Indigenous people living in households in remote areas, 10% were living in dwellings that were owned or being purchasing by that household.⁷ This reflects, among other things, the provision of housing by Indigenous Community Housing Organisations on traditional Aboriginal and Torres Strait Islander lands.

Links to other dimensions of progress

Housing conditions are influenced by many factors, but most particularly the affluence of households. Unmet housing needs generally reflect low levels of socio-economic wellbeing and are often associated with other areas of concern such as poor health,

economic hardship, crime and low levels of social cohesion.⁸ Housing development is often seen as important to the economy and the housing stock is a part of national wealth.

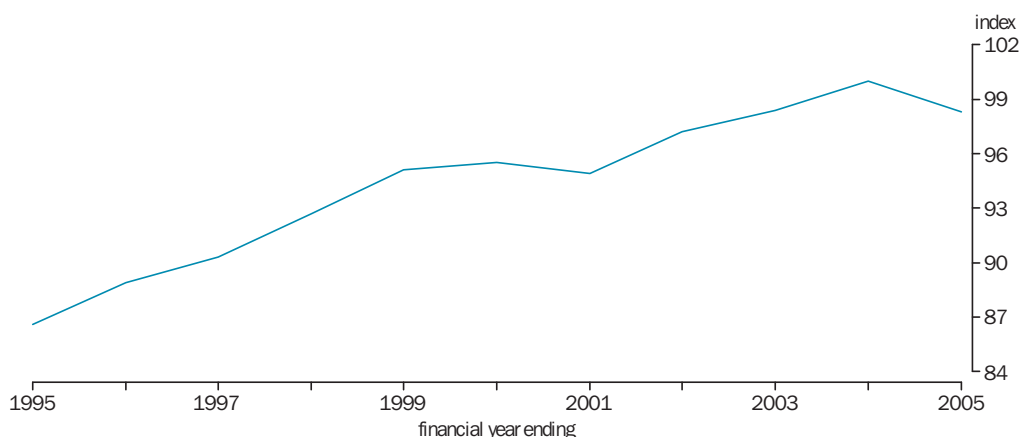
See also the commentaries *National income*, *National wealth*, *Economic hardship*, *Health*, and *Family, community and social cohesion*.

Endnotes

- 1 Australian Bureau of Statistics 2005, Australian System of National Accounts, 2003–04, cat. no. 5204.0, ABS, Canberra.
- 2 For details of unmet demand for crisis accommodation services, see Australian Institute of Health and Welfare (AIHW) 2004, Homeless People in SAAP: SAAP National Data Collection annual report 2003–2004 Australia. AIHW cat. no. HOU126. Canberra: AIHW (SAAP NDCA Report Series 9), Canberra.
- 3 There is no single standard measure for housing utilisation. However this publication has used the Canadian National Occupancy Standard for housing appropriateness. This indicator of potential overcrowding is based on a comparison of the number of bedrooms in a given dwelling and household demographics such as the number of usual residents, their relationship to one another, age and sex. Where the standard cannot be met, households are considered to be overcrowded. For more details see *Housing Occupancy and Costs, Australia, 2003–04*, cat no. 4130.0.55.001
- 4 Australian Bureau of Statistics 2005, *Survey of Income and Housing, 2003–04, Australia*. Data available on request.
- 5 Australian Bureau of Statistics 2003, *Population Characteristics: Aboriginal and Torres Strait Islander Australians, 2001*, cat. no. 4713.0, ABS, Canberra.
- 6 Australian Bureau of Statistics 2005, *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples 2005*, cat. no. 4704.0, ABS, Canberra.
- 7 Australian Bureau of Statistics 2005, *National Aboriginal and Torres Strait Islander Social Survey, 2002*. Data available on request.
- 8 Australian Bureau of Statistics 2001, *Measuring Wellbeing: Frameworks for Australian Social Statistics*, cat. no. 4160.0, ABS, Canberra.

Productivity: key points

Multifactor productivity(a)



(a) Reference year for MFP indexes is 2003–04 = 100 .

Source: Australian System of National Accounts, cat. no. 5204.0.¹

In recent years Australia has generally experienced improved productivity growth. During the decade 1994–95 to 2004–05, Australia's multifactor productivity rose 1.3% per year on average.

The relationship of productivity to progress

Productivity growth is an important source of growth in goods and services. A nation that achieves productivity growth produces more goods and services from its labour, its capital and its land, energy and other resources, than it would in the absence of such growth. Productivity growth can generate higher incomes. Benefits might also accrue in the form of lower output prices.

About the headline indicator and its limitations: Multifactor productivity

A nation's productivity is the ratio of the volume of goods and services it produces (its output) to the volume of inputs (such as labour and capital) it uses in that production. Much – but not all – of Australia's output growth can be accounted for by increases in the inputs to production. The amount by which output growth exceeds input growth is the productivity improvement.

Productivity can be measured in a variety of ways. The most comprehensive Australian measure available at present is multifactor productivity for the market sector. Multifactor productivity represents that part of the growth in output that cannot be explained by growth in labour and capital inputs.

Productivity: Other indicators

Labour productivity; Research and development expenditure, proportion of GDP; Investment in software, proportion of GDP; Managers and professionals, proportion of total employment; Proportion of businesses with web site or homepage; Hours worked and quality adjusted hours worked.

Some differences within Australia

Rates of productivity improvement are not uniform across the whole economy; they can differ appreciably from industry to industry. Estimates of multifactor productivity dissected by industry are not yet available for Australia from the ABS (although the Productivity Commission has produced estimates). But it is possible to examine industry changes in labour productivity (the ratio of output to labour input). These figures must be read with some care, as part of the rise in labour productivity will be due to 'capital deepening' (an increase in the ratio of capital to labour) or to changes in intermediate inputs.

During the last decade, the most rapid increases in labour productivity were achieved by: Agriculture, forestry and fishing (6.2% per year on average), Communication services (4.4% per year on average), Wholesale trade (4.2% a year on average) and Manufacturing (3.0% per year on average).

Links to other dimensions

See also the commentaries *National income, Inflation, Competitiveness and openness, Education and training, The natural landscape, Health and Work*.

Productivity

Progress and the headline indicator

A nation's productivity is the ratio of the volume of goods and services it produces (its output) to the volume of inputs (such as labour and capital) it uses in that production. Much – but not all – of Australia's output growth can be accounted for by increases in the inputs to production. The amount by which output growth exceeds input growth is the productivity improvement.

Australia experienced substantial productivity improvement in the two most recent productivity growth cycles (1993–94 to 1998–99 and 1998–99 to 2003–04). In the 1993–94 to 1998–99 growth cycle, real output of the market sector grew by an average 4.6% per year. In contrast labour inputs grew at 1.3% and capital at 4.3%, and combined these inputs grew at a rate of 2.4% per year. The 2.2% difference between this growth in output and growth in inputs is the measure of the average annual productivity improvement that occurred during this period.

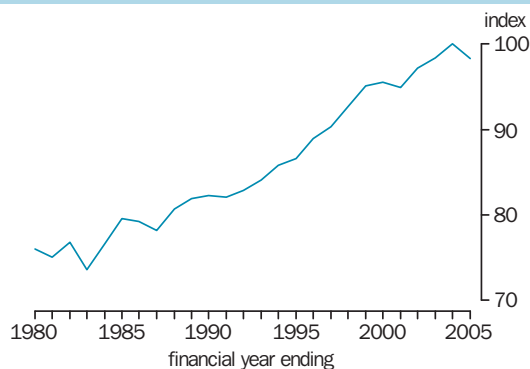
Similarly for the 1998–99 to 2003–04 growth cycle, output growth has averaged 3.1% per year. Input growth during this period was 0.9% for labour and 3.8% for capital giving a combined growth in inputs of 2.1%. The 1.0% difference is the measure of average annual productivity improvement during this latter period.

Productivity can be measured in a variety of ways. The most comprehensive Australian measure available at present is multifactor productivity for the market sector. Multifactor productivity represents that part of the growth in output that cannot be explained by growth in labour and capital inputs (see box).

A longer term view

Multifactor productivity estimates for Australia extend back to the mid-1960s. The improvement in multifactor productivity recorded during the decade 1994–95 to 2004–05 was 13.5%, averaging 1.3% per year. This was higher than the improvements recorded for the two earlier

Multifactor productivity: longer term view(a)



(a) Reference year for MFP indexes is 2003–04 = 100.
Source: Australian System of National Accounts.¹

Measuring Australia's productivity

Productivity measures are, in concept, ratios of the form:

$$\text{Productivity} = \text{Output volume} / \text{Input volume}$$

This ratio derives from the 'production function':

$$\text{Output} = \text{Productivity} * f(\text{Input})$$

which expresses the notion that growth in the volume of goods and services produced can result from growth in the volume of inputs used in the production process or growth in productivity or a combination of both.

There are many different measures of productivity; the main difference between them lies in which inputs are used in the denominator of the productivity ratio.

The most comprehensive measure of productivity is *gross output multifactor productivity*, which takes account of all inputs to production. Typically, the inputs are classified into capital (K), labour (L), energy (E), materials (M) and services (S) – and referred to as the KLEMS approach to productivity measurement. In principle, all the output and input measures are adjusted for quality change. But this approach demands a lot of data, and estimates of gross output multifactor productivity are available for industries in few countries.

More easily implemented are *value added multifactor productivity* (MFP) approaches which typically take account of just two inputs – capital and labour. MFP is the most comprehensive measure of productivity available for Australia at present. In principle, the labour input measure should be adjusted for improvements in the quality of labour ('human capital') so such improvements flow through to the MFP measure. Although the current official estimates are not 'quality-adjusted', the ABS has recently produced experimental measures of productivity that do allow for changes in the quality of labour. These are discussed in the *Some differences within Australia* section later on.

If only one input appears in the denominator, a single factor productivity measure is obtained. The most common such measures are *labour productivity* (the ratio of output to labour input) and *capital productivity* (the ratio of output to capital input). MFP is superior to such single-factor measures as an indicator of efficiency of resource use because the latter may also reflect substitutions between capital and labour inputs.

The MFP measure available for Australia at present relates to the market sector and does not take account of the efficiency with which inputs from other sectors (such as energy, subsoil assets, materials and services) are used in production.

decades. The improvement for the period 1984–85 to 1994–95 was 8.8%, averaging 0.8% per year and for 1974–75 to 1984–85, the improvement was 12.7%, averaging 1.2% per year. It should be noted, though, that the 10 year periods used for this analysis do not coincide with productivity growth cycles.

Some differences within Australia

Rates of productivity improvement are not uniform across the whole economy; they can differ appreciably from industry to industry. ABS estimates of multifactor productivity dissected by industry are not yet available (although the

Labour productivity(a), average annual growth rate – 1994–95 to 2004–2005

Industry(b)	%
Agriculture, forestry and fishing	6.2
Mining	0.9
Manufacturing	3.0
Electricity, gas and water supply	1.3
Construction	1.6
Wholesale trade	4.2
Retail trade	2.4
Accommodation, cafes and restaurants	1.6
Transport and storage	2.8
Communication services	4.4
Finance and insurance	2.4
Health and community services	1.1
Cultural and recreational services	1.6
All market sector industries	2.1

(a) Gross product per hour worked. (b) Estimates are not available for Property and business services, Government administration and defence, Education, and Personal and other services.

Source: Australian System of National Accounts.¹

Productivity Commission has produced estimates). But it is possible to examine industry changes in labour productivity (the ratio of output to labour input). These figures must be read with some care; part of the rise in labour productivity will be due to 'capital deepening' (an increase in the ratio of capital to labour).

During the decade 1994–95 to 2004–05, the most rapid increases in labour productivity were achieved by: Agriculture, forestry and fishing (6.2% per year on average), Communication services (4.4%), Wholesale trade (4.2%) and Manufacturing (3.0%). Some of these industries have experienced significant technological advance or industrial reorganisation. Productivity in the Agriculture industry can be significantly influenced by the weather.

Factors influencing change

A nation's productivity improvement is the outcome of a wide variety of interrelated influences. At the level of the individual firm or industry, key influences include technological advances and improvements to the quality of labour, or to management practices and work arrangements. National productivity levels may also improve with a shift of labour, capital and other inputs away from firms or industries that produce less output for a given level of input (i.e. are less productive) toward firms or industries that produce more (i.e. are more productive).

Such changes may in turn be prompted or assisted by changes in the overall economic environment, such as increased levels of domestic competition, reduced barriers to resource reallocation and greater openness to the international marketplace.

During the past few decades, successive Australian governments have enacted reforms that have sought to create an economic environment favourable to increased competition, better allocation of resources and more innovation. Key policy influences have included reduction of tariffs and other barriers to international trade, relaxation of barriers to international investment, changes to the structure and rates of taxation, domestic competition policy and reforms to financial, labour and other markets.

Economists continue to investigate the links each of these varied influences has on productivity growth, and many are not yet well understood. Some are discussed below in more detail.

Knowledge and innovation

Knowledge and innovation is one influence on productivity. For example, the development of new technologies and the application of these technologies (some of which may be developed in other countries) can improve Australia's productivity and raise national income. No single indicator encapsulates all aspects of knowledge and innovation. Therefore, several indicators, for which data are available, are provided: proportion of businesses which are innovating; some of Australia's investments in knowledge (namely expenditure on research and development and computer software); businesses' use of the Internet; and improvements in the quality of labour.

Worldwide during recent decades, new goods and services have emerged that account for rapidly growing shares of total expenditure. New production processes and new industries have emerged. Australia's capacity to take advantage of these changes depends on many factors, such as the existence of individuals, firms and institutions that can develop or apply new technologies,

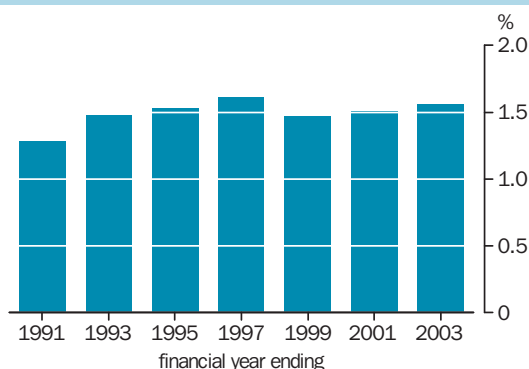
Measuring knowledge and innovation

There is no single measure that encapsulates all the elements of knowledge and innovation. An array of measures is needed. Aspects relevant to Australia's progress include the following.

- ◆ The proportion of businesses that are innovating.
- ◆ The economic resources and the number of people devoted to the creation and application of knowledge. Indicators include the proportion of businesses innovating and the proportion of GDP devoted to research and development.
- ◆ The skills and knowledge embodied in the labour force (discussed in the commentary *Education and training*).
- ◆ The rate at which current developments in information and knowledge are taken up. Among the most prominent of such developments in recent years are information technology and the Internet. Indicators include the ratio of investment in software to GDP and the proportion of businesses which have their own web site or home page.

Other aspects of knowledge and innovation have a bearing on productivity but are not measured here.

Research and development expenditure, proportion of GDP – selected years



Source: Research and Experimental Development, All Sector Summary.²

especially for the acquisition and sharing of information. There is evidence to suggest that the differences between countries' growth rates can be attributed in part to differences in their investments in information and communications technology and improvements in the quality of labour.²

During the three years to December 2003, innovation was undertaken by 34.8% of businesses employing more than 4 people, that is they developed new goods or services or significantly improved their operational or organisational processes. A higher proportion of these businesses implemented new or significantly improved operational processes (22.9%) than introduced new or significantly improved goods or services (16.6%). The level of innovation was highest for businesses with 100 or more employees (60.8%).

Research and development

Research and development (R&D) can be viewed in many ways. One international standard definition is:

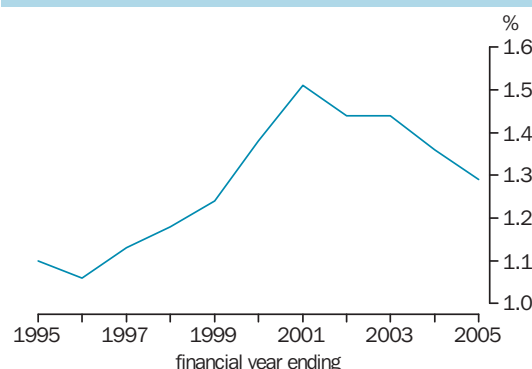
'systematic investigation or experimentation involving innovation or technical risk, the outcome of which is new knowledge, with or without specific practical application, or new

Proportion of businesses(a) innovating, 2001–2003

Proportion of businesses which introduced or implemented:	%
Any new or significantly improved goods or services	16.6
Any new or significantly improved operational processes	22.9
Any new or significantly improved organisational/managerial processes	21.4
Any new goods, services or processes	34.8

(a) Proportions are of businesses with more than 4 people employed. Source: Innovation in Australian Business 2003, cat. no. 8158.0.³

Investment in software, proportion of GDP



Source: Australian System of National Accounts.¹

or improved products, processes, materials, devices or services'.²

R&D encompasses both basic research (undertaken primarily to acquire new knowledge without a specific or immediate application in view) and applied research. The proportion of Australia's GDP devoted to R&D expenditure rose during the early part of the 1990s, to a high in 1996–97 of 1.6% and has stayed at around that level since then.

The proportion of Australian GDP devoted to research and development is relatively low among OECD countries. In 2000–01 Australia ranked 13th among OECD countries for gross expenditure on R&D as a proportion of GDP; for example, the corresponding proportion for Japan was 3.0%, for the USA 2.7%, for Germany 2.5% and for Canada 1.9%. Its position remained roughly the same in 2002–03. But Australia also imports technology and processes embodying R&D from elsewhere.²

The major sources of funds for R&D expenditure in Australia in 2002–03 were business 46.4% (\$5,688m), and Commonwealth government 37.7% (\$4,612m), similar proportions to 2000–01.

Investment in computer software

In recent years, information technology has become progressively more important to the Australian economy, as it has elsewhere. In this field, innovations are embodied in both hardware and software. Australian investment expenditure on software is one indicator of the rate at which the new technology is being taken up. Over the last decade Australian investment on software as a proportion of GDP rose from 1.1% in 1994–95 to a peak of 1.5% in 2000–01 but has since fallen to 1.3% in 2004–05. Software prices fell steadily in this period.

Business take-up of the Internet

One of the most recent waves of innovation in Australia and other countries is use of the Internet by businesses. More and more firms are using the Internet for business transactions (say, for receiving customer orders). In some industries (such as news and entertainment), services can be delivered to customers through the Internet. Other

Proportion of businesses with web site or home page(a)

No. of employees	1998	2000	2001	2002	2003	2004
	%	%	%	%	%	%
1-4	4	9	14	15	15	16
5-19	8	24	32	34	33	38
20-99	21	46	56	55	51	58
100 or more	58	68	81	81	80	83
All businesses	6	16	22	24	23	25

(a)2003 and 2004 estimates are post introduction of the new tax system and may not be comparable with previous estimates.
 Source: *Business Use of Information Technology, various issues, cat. no. 8129.0.*⁴

businesses use the Internet to provide customers with information about the goods and services available.

In June 1998, 6% of businesses had a web presence (either on their own web site or another entity's web site). By June 2001, this proportion had risen to 22% but the take up rate has since slowed, with 25% of businesses having a web presence in 2004.⁴ Larger businesses continue to be more likely to have a web presence. In 2004, 83% of businesses employing 100 or more people had a website or homepage compared with 16% of businesses with 1 to 4 employees.

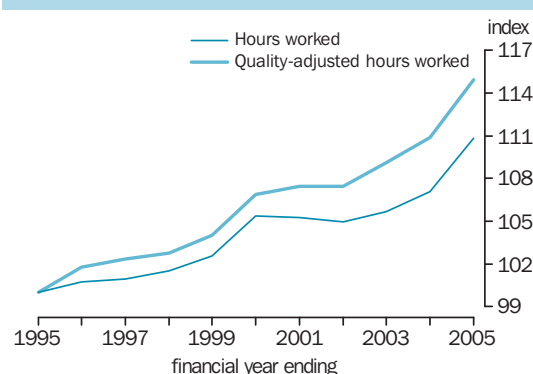
Quality adjusted labour inputs

Multifactor productivity represents that part of the growth in output that cannot be explained by growth in labour and capital inputs. There are, however, several ways to measure labour inputs. One might look simply at the *number of people employed*, but such a measure takes no account of changes in the mix of full-time and part-time employees, or, say, changes in overtime. A better measure is the *number of hours worked*: this is the labour input measure that underlies the estimates of labour and multifactor productivity used in this commentary. But one shortcoming of this measure is that it takes no account of changes in the aggregate quality of labour due to, say, an increase in the prevalence of highly qualified people in the work force.

Changes in the quality of labour are currently ascribed to changes in productivity, but there is an argument that they should be viewed instead as changes in inputs (similar to changes in the mix of different capital services). And so a better measure would be the *number of hours worked, adjusted for changes in the quality or composition of labour*. Such a series provides some information about the contribution that increased knowledge (characterised by qualifications and (potential) experience) has played in improving the quality of Australia's workforce and, hence, to economic growth. The ABS has recently produced such a series, although it is still regarded as experimental.

Because the quality of labour has tended to increase in recent times, the effect of adjusting for

Hours worked and quality adjusted hours worked



Source: *Australian System of National Accounts.*¹

changes in the quality of labour input has been to increase the contribution of labour inputs to growth and so decrease labour and multifactor productivity estimates. Over the past 20 years, unadjusted hours worked increased on average by 1.3% a year, whereas quality-adjusted labour inputs increased by 1.6% a year. The changes to labour composition, mean that growth in multifactor productivity calculated using the quality-adjusted labour input series is slightly lower than growth in unadjusted multifactor productivity: 0.8% a year compared to 1.1% over the period 1984-85 to 2004-05.

Links to other dimensions of progress

Productivity is an important source of output growth; it contributes to growth in national income. During a period of productivity growth, it is possible to raise real wages and other incomes without increasing inflationary pressures. Also, industries that experience higher rates of productivity growth than others can enhance their international competitiveness.

Education is important too as it both disseminates existing knowledge among the Australian population and enhances the probability that Australians will generate or adopt new technologies and other innovations.

Knowledge and innovation can contribute to Australia's productivity growth (and hence to improvements in national income and competitiveness) because they enhance the prospects of technological advances and of improvements to management and work practices and other aspects of economic production.

Knowledge and innovation can also result in improved approaches to satisfying the needs of Australians (say, through better health services) and to protecting Australia's environmental resources.

Natural assets (such as soil, minerals, water and timber) are used in production. If Australian industry can use such assets more efficiently, economic growth will, for a given volume of

output, require less draw-down of these resources and so have a smaller impact on the environment.

See also the commentaries *National income*, *Inflation, Competitiveness and openness*, *Education and training*, *The natural landscape*, *Health and Work*.

Endnotes

- 1 Australian Bureau of Statistics 2005, *Australian System of National Accounts 2004–05*, cat. no. 5204.0, ABS, Canberra.
- 2 Australian Bureau of Statistics various issues, *Research and Experimental Development, All Sector Summary*, cat. no. 8112.0, ABS, Canberra.
- 3 Australian Bureau of Statistics 2003, *Innovation in Australian Business*, cat. no. 8158.0, ABS, Canberra.
- 4 Australian Bureau of Statistics 1999 and 2005, *Business Use of Information Technology*, cat. no. 8129.0, ABS, Canberra.

Competitiveness and openness

Australia's international competitiveness affects our international trade and hence our national production, employment and income. A fall in our competitiveness implies that goods and services produced in Australia have difficulty finding buyers in both foreign and domestic markets.

Australia's international competitiveness fluctuated quite widely during the past decade. Although the price of labour in Australia (measured by real unit labour costs) remained quite steady there was a fair degree of movement in the value of the Australian dollar against other currencies.

Competitiveness

The competitiveness of a country's goods and services can depend on a variety of factors, but relative price has a major effect, and most statistical indicators of international competitiveness are derived from price measures. Two important influences are a nation's unit labour costs (the pace of wage rises compared to the pace of productivity improvement) and the value of its currency relative to the currencies of its trading partners.

Australia's real unit labour costs showed a moderate decrease between 1994–95 and 2004–05. This was due to productivity gains outstripping increases in real hourly labour costs. This decrease in real unit labour costs is likely to have had a positive effect on Australia's international competitiveness.¹

In recent years, there have been fairly wide fluctuations in the value of the Australian dollar relative to the currencies of our major trading partners. In 2004–05, the Australian dollar was stronger against the currencies of most of our

Trade-weighted exchange rate

The trade-weighted exchange rate measures the change of the value of the Australian dollar relative to our major trading partners. As at 1 October 2005, the weights for each exchange rate reflect Australia's two way merchandise trade in 2004–05. The Japanese yen has a weight of about 16%, the Chinese renminbi, about 13%, the European euro, about 13% and the US dollar, about 12%.

The Asia Pacific region accounts for 65%, which reflects the growth of merchandise trade between Australia and the Asia Pacific region.³

Measuring competitiveness

A country's international competitiveness can be measured in many ways. Two influences are particularly important.

- ◆ Changes in domestic prices relative to prices of competitor countries. All other things being equal, a country becomes more competitive if its prices rise more slowly than those of its competitors.
- ◆ Exchange rate movements. All other things being equal, a country becomes more competitive if the value of its currency falls relative to the currencies of its competitors – that is when there is a depreciation in its nominal exchange rate.

Real unit labour costs and the trade-weighted exchange rate



Base year is 2003–04 = 100.

Source: *Balance of Payments and International Investment Position, Australia*¹ and *Commonwealth Treasury*.²

major trading partners than it had been at any time during the previous ten years, and nearly 9% stronger than it had been in 2003–04. The recent strength of the Australian dollar has reduced the competitiveness of Australia's exports.

During the decade 1994–95 to 2004–05, there was a rise against the US dollar (up 8%) but a fall relative to the United Kingdom pound of 5%. The Australian dollar appreciated against most of our other major trading partners; in the case of the Japanese yen by almost 40%.

Factors influencing change

Changes in a nation's competitiveness are the outcome of many interconnecting influences. Most fundamental in the long run are such factors as technological advance and productivity improvement.

Three factors have an important influence, all of which would ideally be measured.

- ◆ Movements in Australian wages relative to the wages in other countries.
- ◆ Movements in Australian labour productivity (the amount of output per unit of labour input) relative to productivity in other countries.
- ◆ Changes in the exchange rate of the Australian dollar relative to the currencies of other countries.

The first two factors combine to generate shifts in Australian relative unit labour costs – it is the pace of wage rises compared with the pace of productivity improvement that matters, rather than wage rises alone. As discussed in the commentary *Productivity*, Australia exhibited good labour productivity growth during the 1990s relative to earlier periods. Also, Australian wage increases were more modest than in some earlier decades.

Openness – the interaction of Australia’s economy with other economies – can provide benefits to Australians. An increased openness to imports means that we have a wider range of goods and services to choose from, often at more competitive prices. Also, international trade and investment flows may give Australian businesses access to newer and more innovative technologies, which can in turn lead to productivity improvements. Competition with overseas suppliers may also prompt greater efficiencies or innovation in Australia.

This commentary considers two aspects of Australia’s openness: our imports of goods and services, and foreign investment flows into Australia.

Openness

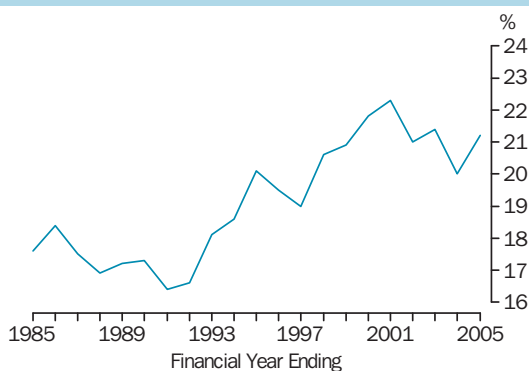
Openness can be assessed from the relative significance of overseas trade and investment flows to the national economy. It can also be assessed from the negotiation of free trade agreements or the barriers that a country places on trade and investment flows across its borders (for example, tariffs and quotas on imports or restrictions on foreign ownership of land or other assets). Ideally, indicators of openness would encapsulate both the size of and the barriers to flows of trade and investment.

Measures of effective rates of assistance to industry are available, but only cover barriers to trade.⁴ Barriers to investment are more difficult to encapsulate in a single indicator. Moreover, even if such an indicator were available, a somewhat arbitrary decision would have to be made about the importance, or weight, that should be assigned to the various restrictions.⁵

The goods and services that international trade make available to Australian residents are indicators of openness. This section focuses on how Australia’s openness to imports provides Australians with wider choices of goods and services. The graph below shows the ratio of imports of goods and services to GDP from 1984–85 to 2004–05. The ratio generally rose over the period, from 18% in 1984–85 to peak at 22% in 2000–01. In 2004–05 the ratio was 21%.

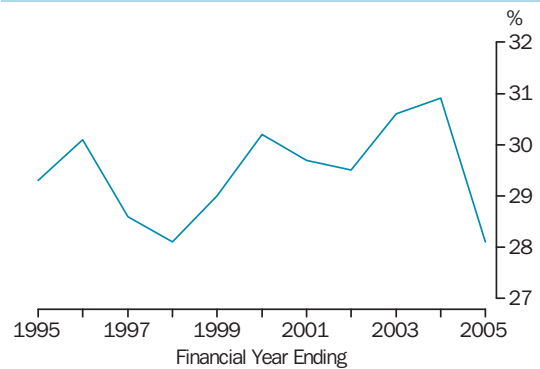
This indicator is affected by a range of factors aside from the openness of the economy. For instance,

Ratio of imports to GDP



Source: Balance of Payments and International Investment Position, cat.no. 5302.0⁶

Foreign ownership of Australian enterprise



Source: Balance of Payments and International Investment Position, cat.no 5302.0⁶

fluctuations in the exchange rate of the Australian dollar and changes in world commodity prices can result in changes in the prices of Australia’s imports relative to GDP.

Investment flows into and out of Australia are another important aspect of openness. Outward investment builds up Australia’s income-generating assets abroad. Inward investment can provide opportunities for local businesses to access new technologies and management skills, as well as funds for capital formation.⁷ To measure this aspect of openness, a relevant indicator is the proportion of foreign ownership of equity in Australian enterprises, shown in the graph above. The volatility in the graph can be seen as a further indicator of openness, as it reflects the ease with which equity can be invested or withdrawn.

Factors influencing change

The increased openness of Australia’s economy has been brought about by a combination of factors. For some years now, Australia has been lowering the level of barriers to the imports of goods and services and capital inflows. This is shown in part by the decrease in the average tariff rates applied by Australia, which fell from almost 16% in 1988 to around 5% a decade later.⁸ Multilateral, regional and bilateral trade negotiations have played an important part in this gradual dismantling of border protection.

Another way in which economic policy has led to an increase in openness in Australia is through the liberalisation of capital flows. Since the mid-1980s and the deregulation of the financial system, capital transactions, including foreign investment in Australia, have greatly increased.

Links to other dimensions of progress

Enhanced international competitiveness in both foreign and domestic markets tends to improve Australia’s international trade balance and increase national income.

Reduced rates of inflation (including wage inflation) relative to Australia’s trading partners

Types of foreign investment in Australia

There are various ways in which foreign residents and companies can invest funds in the Australian economy:

- ◆ direct investment – when a foreign investor has an equity interest of 10% or more in an Australian enterprise, and so has influence over its operations
- ◆ portfolio investment – refers to equity and debt transactions which, unlike direct investment, do not offer the investor any influence over the operation of the enterprise
- ◆ other investment – transactions not included as direct or portfolio investment, such as trade credits.⁹

In June 2005, portfolio investment accounted for 58% of total foreign investment levels in Australia. Direct investment made up another 25%.

The industries recording the highest levels of foreign liability at the end of June 2005 were Finance and insurance, and Manufacturing.⁶

Australian imports of goods and services

Imports can be separated into goods and services. Imported goods can in turn be classified according to their end use; for example household items and non-industrial transport are classed as consumption goods, whereas machinery and industrial transport are classed as capital goods.

Over the last decade, one of the fastest growing areas of capital imports was telecommunications equipment. The nominal value of imports of these goods almost tripled between 1994–95 and 2004–05 despite general falls in prices. Imported services also increased throughout the decade. Expenditure on transportation and travel services in particular, which includes spending by Australians on travel abroad as well as their purchases overseas, almost doubled between 1994–95 and 2004–05.

and productivity improvements tend to enhance Australia's international competitiveness.

Increased openness to imports can be linked with greater competitiveness, and can affect consumption patterns here. Improvements in productivity can also be associated with greater openness to foreign investment.

See also the commentaries *National income*, *Productivity* and *Inflation*.

Endnotes

- 1 Data supplied by the Treasury. The data were derived from the Australian Bureau of Statistics, *Australian System of National Accounts 2004–05*, cat. no. 5204.0, ABS, Canberra.
- 2 Commonwealth Treasury data and *Balance of Payments and International Investment Position, Australia* September 2004, cat. no. 5302.0, ABS, Canberra.
- 3 Reserve Bank of Australia Media release – Trade-weighted index, 30 September 2005 <http://www.rba.gov.au/MediaReleases/2005/mr_05_12.html>
- 4 Productivity Commission 2001, *Trade and Assistance Review 2000–01*, Annual Report Series 2000–01, AusInfo, Canberra.
- 5 Lloyd, P.J. and MacLaren, D. 1998, *Measures of Trade Openness Using CGE Analysis*, Research Paper No. 659, The University of Melbourne, Melbourne.

- 6 Australian Bureau of Statistics 2005, *Balance of Payments and International Investment Position*, cat. no. 5302.0, ABS, Canberra.
- 7 Australian Department of Foreign Affairs and Trade 2001, *Exploding the Myths – Facts about Trade and International Investment*, Canberra <http://www.dfat.gov.au/publications/exploding_myths/index.html> last viewed 13 March 2002.
- 8 Australian Department of Foreign Affairs and Trade 1999, *Regional trends in tariffs*, Canberra <http://www.dfat.gov.au/apec/meetings/apec1999/regional_trends.html> last viewed 24 April 2006.
- 9 Australian Bureau of Statistics 1998, *Balance of Payments and International Investment Position: Concepts, Sources and Methods*, cat. no. 5331.0, ABS, Canberra.

Inflation

Inflation can have significant economic effects. For example, it can influence the distribution of national income and wealth. The relative rates of inflation in Australia and overseas affect international competitiveness. A low and stable rate of inflation is desirable both for the health of the economy and for individual welfare. There are many measures of inflation, each suited to a different purpose.

Inflation – a continuous upward movement in the general level of prices – can impose costs on individuals and the economy. Inflation affects the purchasing power of income and wealth.

When price changes are large, unanticipated or volatile, inefficiencies can occur such as those associated with frequently changing list prices in shops or re-advertising goods and services. Variable rates of inflation can also distort the behaviour of consumers and businesses, who may find it more difficult to predict the effects of their saving and investment decisions.

Although inflation is defined as a rise in the general level of prices, not all prices change by the same proportion or even in the same direction. For this reason, inflation can also affect the distribution of real income and wealth among individuals and households. A relatively steep increase in the prices of items that make up a large part of low income households' expenditure, for example, can cause greater inequality in the distribution of real household income.¹

Some changes in relative prices can have positive effects as well as the negative effects discussed above, and many economists believe that zero inflation might be undesirable. Changes in relative prices can act as a signal during times of economic restructuring. This restructuring might be brought about by, say, changes in tastes and technology, and can in turn lead to resources being allocated more efficiently.

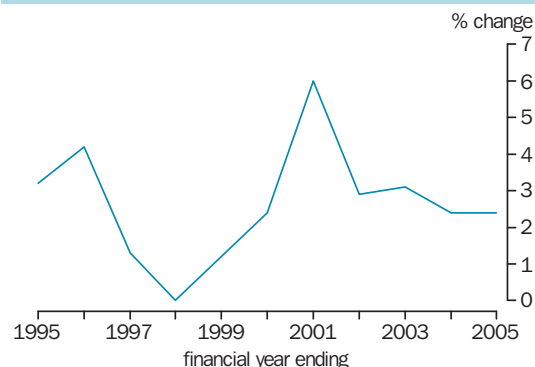
Ideally, an indicator of overall inflation would be comprehensive – it would cover price changes for all goods and services traded in the economy. But different measures of price change are suited to analysing different economic phenomena. Because of the different possibilities for weighting together the prices of various goods and services, there is no single correct measure of inflation.

Trends in inflation – 1995 to 2005

A commonly quoted indicator of inflation is the rate of change in the Consumer Price Index (CPI), which reflects the price of a fixed basket of goods and services acquired by households. Another important indicator is the national accounts chain price index for Domestic Final Demand (DFD). The DFD price index is more comprehensive than the CPI because it covers final purchases by businesses and government as well as households.

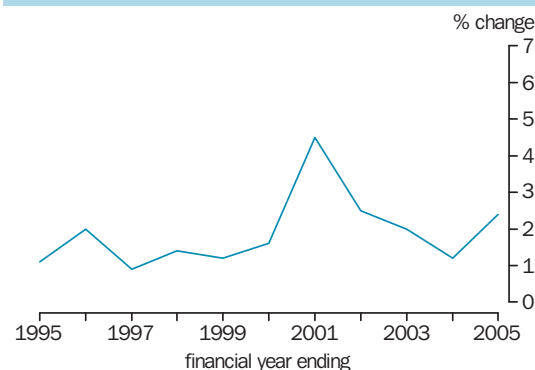
The graphs above show percentage changes in the CPI and DFD indexes for 1994–95 to 2004–05. The introduction of The New Tax System (TNTS) saw a large increase in both indexes between June 2000

CPI, percentage change from previous year



Source: Consumer Price Index, Australia, cat. no. 6401.0.

DFD chain price index, percentage change from previous year



Source: Australian System of National Accounts, cat. no. 5204.0.

and September 2001, the majority of which occurred in the September quarter of 2000. However inflation, measured by excluding items with volatile prices and price movements due to changes in tax regimes, is thought to have stayed relatively low during this period.

Trends in inflation – 1950 to 2005

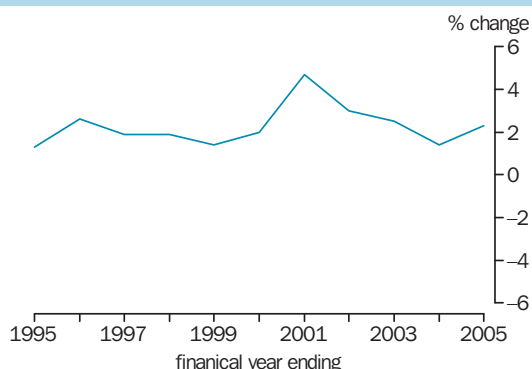
Inflation was relatively low from the mid-1950s to the late 1960s. The sharp rise in inflation in the first half of the 1970s was influenced by higher oil prices, wage growth and other factors. These inflationary pressures persisted into the 1980s, partly due to a second oil price shock.² Although at relatively high levels, inflation was fairly stable during the 1980s. It began to slow down in the early 1990s.

Components of inflation

The DFD chain price index can be split into capital and consumption components (for various reasons, the consumption component does not match the coverage of the CPI exactly).

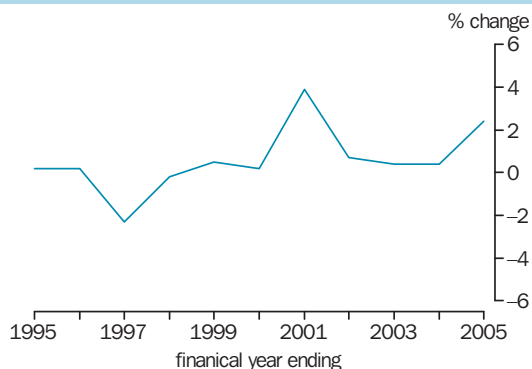
Final consumption expenditure and fixed capital formation involve a rather different mix of commodities, and the factors influencing price change are quite different – for example, changes in the exchange rate are likely to have a bigger impact on prices for fixed capital formation. And so

Chain price index of total final consumption expenditure, change from previous year



Source: Australian System of National Accounts, cat. no. 5204.0.

Chain price index of total gross fixed capital formation, change from previous year



Source: Australian System of National Accounts, cat. no. 5204.0.

one would not expect the two series to behave the same way.

The direction and magnitude of the year-on-year percentage change in the consumption series were often quite different to those in the capital series during most of the 1990s. However, the percentage movements for the two series were more similar in the 2000s.

Factors influencing change

The overall rate of inflation is the outcome of different rates of price rises (or, in some cases, price falls) for various goods and services.

Computer prices have been declining during the decade. At the same time, there have been large increases in the power and quality of computers.

Falling world prices for motor vehicles have also contributed to lower inflation during the past decade.³

Petrol prices contributed strongly to inflation during the 1990s (increasing 22.5% from March 1990 to December 1999) and more recently with prices increasing by 16.9% from March 2004 to

June 2005, due to a substantial rise in the international price of crude oil.

The introduction of TINTS made a large contribution to the rise in the CPI and other price indexes between June 2000 and June 2001 but the rate of increase in the CPI has slowed since then.

During 1999 and early 2000 there were increases in housing expenditure due in part to many Australians making property purchases and alterations and additions, before the introduction of the Goods and Services Tax (GST) on 1 July 2000. This in turn may have had an upward influence on house prices during the period.

Links to other dimensions of progress

Inflation is linked with almost all other indicators of economic progress. It affects the distribution of income and wealth, and hence the decisions of consumers and businesses. It also affects the external competitiveness of the economy. If rises in the prices of domestically produced goods are small relative to rises in the prices of overseas goods, Australia's international competitiveness improves, provided that nominal exchange rates do not appreciate in response. Improvements in productivity and increased competition in goods and services markets are thought to have contributed to the low inflation rates of the 1990s.⁴

Endnotes

- 1 University of Melbourne Research Paper 1996, *The Distributional Effects of Inflation in Australia*, University of Melbourne, Melbourne.
- 2 Economic Planning Advisory Council 1990, *Office of EPAC Seminar 1990: Australia's Inflation Problem*, AGPS, Canberra.
- 3 Commonwealth Treasury 1999, *Budget Strategy and Outlook 1999-2000, Budget Paper 1*, Commonwealth of Australia, Canberra.
- 4 Reserve Bank of Australia 2000, *Australian Macroeconomic Performance and Policies in the 1990s*, RBA Conference Volume 2000 <<http://www.rba.gov.au/PublicationsAndResearch/Conferences/2000/GruenStevens.pdf>> last viewed 25 April 2006.

The natural landscape

The Australian landscape comprises Australia's land, water and biodiversity (i.e. the native and introduced plants and animals that rely on them). They are inextricably linked. Changes in the condition of Australia's land, such as increased salinity, can affect inland waters and biodiversity. Changes in the health of our inland waters (such as reduced river flow) can affect biodiversity. The clearing of native vegetation can impact on biodiversity, and lead to land degradation and a decline in the health of inland waterways.

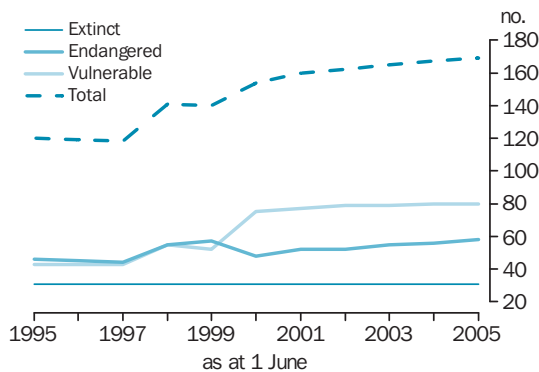
The commentary that follows comprises three subsections:

- ◆ **Biodiversity:** Our native plants, animals and ecosystems bring important economic benefits, are valuable to society and are globally important. Native bushland has cultural, aesthetic and recreational importance to many Australians. Most importantly, the ways in which organisms interact with each other and their environment are important to human survival: we rely on ecosystems that function properly for clean air and water and healthy soil. Headline indicators that consider changes in the condition of several groups of threatened species, and the annual area of land cleared, are presented. The commentary includes information about threats to Australia's biodiversity, as well as information about the action that is being taken to protect Australia's land and conserve biodiversity.
- ◆ **Land:** The condition of the soil covering Australia's land has a critical impact on our terrestrial ecosystems. Our soil resources are an important natural asset, and their health is a significant concern to Australian farmers, governments and the general public. Meanwhile the way in which Australia's land is used has a significant impact on our biodiversity and Inland waters. A headline indicator that considers the assets at risk of salinity is presented, and information on land use and forest cover is presented.
- ◆ **Inland waters:** Water is fundamental to the survival of people and other organisms. Apart from drinking water, much of our economy (agriculture in particular) relies on water. The condition of freshwater ecosystems has a critical impact on the wider environment. A headline indicator that considers the proportion of Australia's water management areas where water use is approaching or exceeding sustainable limits is presented. Information on Australian water use and water extractions from the Murray-Darling Basin is also included.

The commentary and statistics that follow use a range of information. Two sources that have been used considerably are *The State of the Environment Report* for 2001 (the latest available at the time of printing), and various publications from the National Land and Water Resources Audit.

The natural landscape: key points

Biodiversity: Extinct, endangered and vulnerable birds and mammals(a)

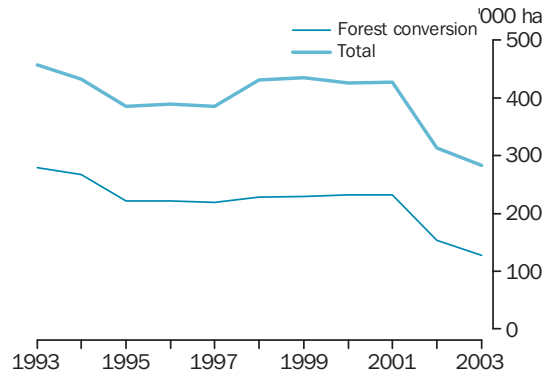


(a) Excludes seabirds, marine mammals and animals living on islands far offshore. Extinctions data have been backcast to take account of rediscoveries. Includes subspecies. There is likely to be a time lag between a species being identified as threatened and being listed.

Source: Data compiled from schedules to the Commonwealth Acts: the Endangered Species Protection Act 1993 and the Environment Protection and Biodiversity Conservation Act 1999.

Between 1995 and 2005 the number of terrestrial bird and mammal species listed as extinct, endangered or vulnerable rose by 41% from 120 to 169. Changes to the list of threatened species should be treated cautiously as species can be added to or removed from the list as their status changes or due to improved knowledge about their status.

Biodiversity: Annual area of land cleared (hectares)



Source: National Greenhouse Gas Inventory (NGGI), Australian Greenhouse Office 2005.¹ The 2004 NGGI is scheduled for release in late May 2006.

The rate of clearance decreased by about 38% between 1993 and 2003. Estimates indicate that about 283,000 hectares (ha) of land were cleared in 2003, with just over half (51%) in Queensland.

The relationship of biodiversity to progress

Our native plants, animals and ecosystems bring significant economic benefits, are valuable to society and are globally important. Most importantly, the ways in which organisms interact with each other and their environment are important to human survival: we rely on ecosystems that function properly for clean air and water and healthy soil.

About the headline indicators and their limitations: Extinct, endangered and vulnerable birds and mammals, annual area of land cleared

No single indicator can hope to encapsulate biodiversity, and so we focus on two aspects: the numbers of extinct and threatened terrestrial Australian birds and mammals; and the annual area of land cleared.

Although the numbers of threatened birds and mammals are only a small part of the overall biological diversity, a decline in these groups of species threatens ecological processes and can point to a wider decline in biodiversity.

Land clearing is a key threat to biodiversity.² The land clearing estimates include information about forest conversion (land cleared for the first time) and reclearing, both of which have environmental impacts. The figures do not distinguish between the kinds of vegetation cleared.

Biodiversity: Other indicators

Trends in threatened species; Proportion of ecosystems: area protected.

Some differences within Australia

The 2001 National Land and Water Resources Audit report that threatened birds are declining across 240 of Australia's 384 subregions and threatened mammals are rapidly declining in 20 subregions and declining in 174 subregions.

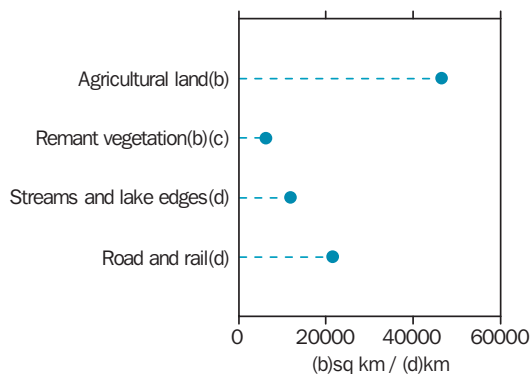
Land clearance since 1788 has mainly occurred in southern and eastern Australia. Just over half (51%) of land cleared in 2003 was in Queensland, but this is a reduction from 58% in 2002. Further decreases are expected as a result of ongoing policy initiatives by the Commonwealth and state Governments.

Links to other dimensions

See also the commentaries *The natural landscape – inland waters*, *The natural landscape – land*, *Oceans and estuaries*, and *National income*.

The natural landscape: key points

Salinity, assets at risk in areas of high potential(a) – 2000

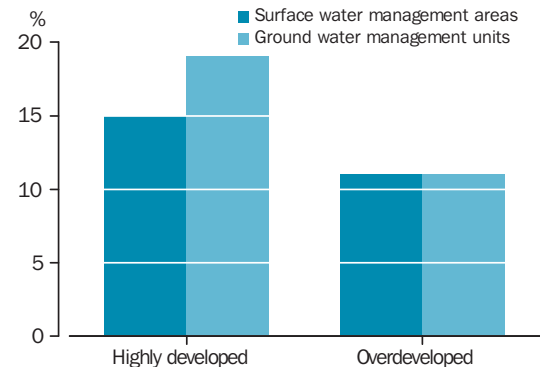


(a) The National Land and Water Resources Audit (NLWRA) defines land as having a high potential to be affected by salinity if groundwater levels are within two metres of the surface or within two to five metres with well demonstrated rising water tables. (c) Includes planted perennial vegetation.

Source: National Land and Water Resources Audit 2001, Australian Dryland Salinity Assessment 2000, NLWRA, Canberra.

In 2000, about 5.7 million hectares (ha) of Australia were assessed as having a high potential to develop dryland salinity through shallow or rising water tables.

Water management areas and units(a), proportion where use exceeded 70% of sustainable limits(b) – 2000



(a) Australia has 325 surface water management areas, based on the country's 246 river basins, and 538 groundwater management units (hydrologically connected water systems). (b) A highly developed water source is one where 70%–100% of the sustainable yield of water is extracted. An overdeveloped water source is one where more than 100% of the sustainable yield is extracted.

Source: National Land and Water Resources Audit 2001, Australian Water Resources Assessment 2000, NLWRA, Canberra.

The damming and regulation of waterways and extractions of both surface and ground water are leading to a continuing deterioration of the health of water bodies, while increasing salinity is causing deterioration in many areas. In 2000, about one-quarter of Australia's surface water management areas were close to, or had exceeded, sustainable extraction limits.

The relationship of land and inland water to progress

Our soil resources are an important natural asset. Degraded soil reduces agricultural productivity, while salinity can damage buildings and infrastructure such as water pipes, roads and sewers. Degradation can also damage habitat for wildlife, kill micro-organisms that live in the soil, and harm the quality of our inland waters.

Water is fundamental to the survival of people and other organisms. Apart from drinking water, much of our economy (agriculture in particular) relies on water. The condition of freshwater ecosystems has a critical impact on the wider environment.

About the headline indicators and their limitations: Assets at risk of salinity and water management areas exceeding sustainable limits

There are several forms of soil degradation in Australia. We focus here on dryland salinity, the impacts of which are wider than lost agricultural production and include damage to water resources, biodiversity, pipelines, houses and roads.

Ideally the headline indicator for inland waters would consider the health of Australia's freshwater ecosystems. But such data are unavailable for much of the country, so we focus on water use, and consider the proportion of Australia's water management areas within which water extraction is thought to exceed 70% of sustainable limits.

Land and water: Other indicators

Native forest area, Water diversions: Murray-Darling Basin; River condition biota index; Net water use; Total water storage capacity of large dams; River environment index.

Some differences within Australia

By 2050, more than half of Australia's dryland salinity problems are predicted to occur in Western Australia, with the south-west of that state particularly affected. New South Wales had more significantly, severely and extremely impaired river sites than any other state.

Links to other dimensions

See also the commentaries *The natural landscape – biodiversity, Oceans and estuaries*, and *National income*.

The natural landscape — biodiversity

Progress and the headline indicators

Our plants, animals and ecosystems bring economic benefits, and are valuable to society. Some believe that the other life forms we share the earth with also have intrinsic value, regardless of whether they are of benefit to humans. Our biological diversity is globally significant (Australia is recognised as one of 17 'mega-diverse' countries, with ecosystems of exceptional variety and uniqueness).³ Most significantly, the ways in which organisms interact with each other and their environment are vital to human survival: we rely on ecosystems that function properly for clean air and water and healthy soil.

Ideally, the headline indicator would consider all Australian biodiversity – the abundance and diversity of micro-organisms, plants and animals, the genes they contain and the ecosystems which they form. To measure change as comprehensively as this would be difficult, if not impossible, and so here we focus on two indicators. The first is changes in the conservation status of one small component of biodiversity – terrestrial mammals and birds (although it must be remembered that the conclusions drawn from these two groups cannot necessarily be applied to other animals and plants). The second indicator is the annual area of land cleared – a key threat to our biodiversity.

Mammals and birds

The numbers of threatened species are one aspect of biodiversity that can be measured. Mammals and birds are used as indicator species, as scientists have more information about these groups than many others, and they are often visible in the landscape and the most easily identified. Although the numbers of threatened birds and mammals are only a small part of overall biological diversity, a decline in these groups of species may point to a wider decline in biodiversity. Some species at the top of the food chain can highlight problems such as the accumulation of contaminants (e.g. pesticides), which can cause eggshell thinning in species like the white-bellied sea-eagle and the threatened red goshawk.^{4,5}

Changes to the list of threatened species should be treated cautiously. Species can be removed or added because of improved knowledge or sometimes new species are discovered, or those thought extinct are rediscovered. That said, over time, if the numbers of threatened birds and mammals increase substantially there is reason to believe that certain species are declining.

Between 1995 and 2005, the number of terrestrial bird and mammal species assessed as extinct, endangered or vulnerable rose by 41% from 120 to 169 (of which 67 were birds and 102 were mammals). In June 2005, just under half of these species were vulnerable, one-third were more seriously threatened (endangered) and the remaining fifth were presumed extinct. There were increases in the numbers of both endangered and

A longer term view

Declines in wildlife have occurred in most parts of Australia since European colonisation. Intensive land use, which has played a part in the decline, has been concentrated in the south and east of the country. Habitat loss, through cropping, grazing, forestry, mining and human settlements, has dramatically changed vegetation cover. Since 1788, around 20% of woodland and forest (over 700,000 km²) have been cleared or thinned, primarily for crops and grazing. Around 35% of mallee (130,000 km²) have been cleared since 1788, along with 45% of heath (20,000 km²), 10% of tussock grassland (over 60,000 km²) and smaller areas of other grasslands.⁶

Since European settlement, land clearance has been concentrated in certain areas and ecosystems. Generally those ecosystems found on the most fertile soil have suffered the highest levels of clearance, and about 90% of native vegetation in the eastern temperate zone has been removed.⁷ In other areas, pressures such as grazing (both from domestic stock and introduced herbivores), weeds and changed patterns of fire are having an impact on the land. More than 90% of land clearance has occurred in 25 of Australia's 85 bioregions (areas of land that contain linked ecosystems). These bioregions occur across south-west Western Australia, southern South Australia, most of Victoria and New South Wales, and central and southern Queensland.⁶

Wildlife has declined even in areas of Australia where the level of land clearing has been lower. In the arid zone, about one-third of mammal species are regionally extinct, the highest extinction rate on the Australian mainland, and many birds are declining.⁸ The extent of cattle grazing, effects of invasive species and changes to fire regimes are factors thought to have led to a decline in many animal species in these areas.

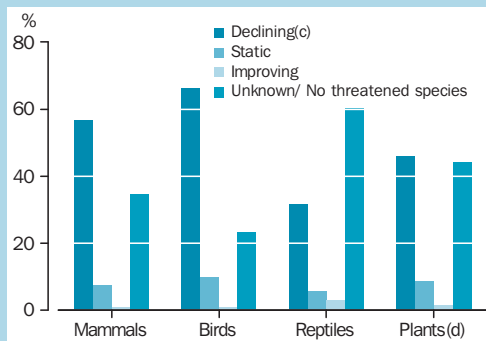
Over the past 200 years, 17 mammal species (out of around 270), and a further 7 sub-species, are thought to have become extinct in continental Australia. Fewer than 25 species are believed to have become extinct in the rest of the world over the same period, which means that Australia accounts for over 40% of the world's mammalian extinctions since 1800.⁹ Some other mammals, once widespread, now survive only in tiny areas (often islands free of foxes and cats); this isolation and loss of genetic diversity make species less adaptable and more vulnerable to threats such as disease.

More than 20 exotic mammals and 20 exotic birds have become established in Australia since 1788. But it is hard to compare these with the species we have lost. All of the Australian mammals to have become extinct, for example, were found nowhere else in the world. Most of Australia's exotic bird and mammal species, however, are common elsewhere in the world. Most have brought environmental problems with them since their establishment here.

Conservation status

Since 1993, the Commonwealth Government has maintained a list of threatened and extinct species and subspecies. A species is designated as *vulnerable* when there is strong evidence that it faces a high risk of extinction in the medium term, and *endangered* if it faces a very high risk of extinction in the near future. A species is classed as *critically endangered* if it faces an extremely high risk of extinction in the immediate future and *extinct* if there is no reasonable doubt that the last member of the species has died.¹⁰

Trends in threatened species(a), proportion of bioregions(b)



(a) Median trend in threatened species condition. (b) Australia has 384 subregions. (c) Includes the categories 'extinction' and 'rapidly declining'. (d) Vascular plants.

Source: National Land and Water Resources Audit, 2002.

Changes in the condition or status of threatened flowering plants, birds, mammals and reptiles are only a part of overall biological diversity, but a decline in these groups of species threatens ecological processes and can point to a wider decline in biodiversity.

In 2002, the National Land and Water Resources Audit (NLWRA) released an assessment of Australian biodiversity, that was based on a mixture of qualitative and quantitative data from around the country.¹¹ They reported the median changes in the condition of groups of threatened species in each Australian bioregion.

- ◆ Threatened flowering plants were declining across 177 of Australia's 384 subregions; static in 33 and improving in five.
- ◆ Threatened birds were declining across 240 subregions; had gone extinct in a further 14; were static in 38 subregions; and improving in three.
- ◆ Threatened mammals were declining in 194 subregions; had gone extinct in 24 subregions; were static in 29 subregions; and improving in four.
- ◆ Threatened reptiles were declining in 119 subregions; had gone extinct in 2 subregions; were static in 21 subregions; and improving in 11.

vulnerable species, but the rise in species assessed as vulnerable was much higher (86%) than those assessed as endangered (26%).

Australia's biodiversity: a world view

Australia's biodiversity is very rich. In 1998 Conservation International recognised 17 countries as *mega-diverse* because of their extraordinarily rich biodiversity, and together they account for some two-thirds of the world's species. Australia and the USA are the only two developed countries classed as mega-diverse.¹²

Australia is a large country and contains a great variety of habitats and ecosystems, from coral reefs and tropical rainforests to temperate woodland, deserts, semi-arid rangelands and alpine grasslands. It is, therefore, likely to have more species than many countries by virtue of size alone. But our fauna is highly endemic (that is, many

Australian species are found nowhere else on Earth). About 90% of our reptiles and frog species are endemic, as are about 80% of our mammals and 85% of flowering plants.^{8,13} We have 200 species of freshwater fish, 90% of which are endemic. Hooved animals, cats, canids (foxes and dingoes) and plants like thistles, for example, have been introduced and affected native biodiversity.

Far less is known about the world of invertebrates and micro-organisms, though Australia has several hundred thousand species of invertebrates.¹⁴ There remains much to be learnt about our biodiversity. In 2000, for example, scientists announced the discovery of a new type of antibiotic – as powerful as penicillin – in the eggs of an Australian shellfish.¹⁵

Extinctions

Over the past 200 years many elements of Australia's biodiversity have declined, and species of mammals, birds, frogs and plants are presumed to have become extinct. Our mammals have been affected particularly severely: 17 of the 270 or so species of mammal that lived in continental Australia in 1788 are now presumed extinct, under the *Environment Protection and Biodiversity*

Presumed mammalian extinctions(a) since 1788 – 2005

Species	Last record
Darling Downs Hopping Mouse	1840s
Big-eared Hopping Mouse	1843
White-footed Rabbit Rat	1845
Gould's Mouse	1857
Broad-faced Potoroo	1875
Eastern Hare-wallaby	1889
Short-tailed Hopping Mouse	1896
Long-tailed Hopping Mouse	1901
Pig-footed Bandicoot	1901
Lesser Stick-nest Rat	1933
Desert Rat-kangaroo	1935
Tasmanian Tiger	1936
Toolache Wallaby	1939
Lesser Bilby	1950s
Crescent Nailtail Wallaby	1956
Central Hare-wallaby	1960s
Desert Bandicoot	1960s

(a) Excludes subspecies and extinctions from Christmas and Lord Howe Islands.

Source: A Gap in Nature⁹, Mammals of Australia¹⁶ and schedules to the Environment Protection and Biodiversity Conservation Act 1999.

Seventeen species of mammals (and another 11 subspecies) are listed by the Commonwealth as presumed extinct in mainland Australia since 1788. Ten of these species were last seen alive in the twentieth century, ten of these animals are marsupials, and 14 of them were found predominantly in the inland arid zone. However, other groups of animals have fared rather better, at least in terms of losses through extinction.

Numbers of species in selected countries(a)

	Mammals			Birds			Reptiles		
	no.	Endemic species	Endemic %	no. breeding species(b)	Endemic species	Endemic %	no.	Endemic species	Endemic %
Australia	260	206	79	649	350	54	748	641	86
Brazil	417	119	29	1 500	185	12	491	201	41
Canada	193	7	4	426	5	1	41	0	0
India	316	44	14	926	58	6	390	188	48
Indonesia	457	222	49	1 530	408	27	514	305	59
New Zealand	10	4	40	150	74	49	52	48	92
South Africa	255	35	14	596	8	1	315	97	31
Tanzania	316	15	5	827	24	3	289	61	21
United Kingdom	50	0	0	230	1	0	8	0	0
United States of America	432	105	24	650	67	10	287	79	28

(a) Data are approximate only and have been drawn from the World Resources Institute for the purpose of making international comparisons. (b) Breeding species are used because some species are migratory.

Source: World Resources Institute 2001, World Resources 2000-2001.¹⁵

Conservation Act 1999. Ten of these species were lost in the past 100 years.

The table on the previous page lists the mammal species (but not subspecies) that are believed to have become extinct in Australia since 1788. A further seven subspecies are presumed extinct, and several other species now survive on offshore islands or Tasmania but are extinct on the mainland. This compares with three extinct birds from about 700 species (another four subspecies have also become extinct), four extinct frogs from over 200 species, and 61 species of flowering plants from over 15,000 species. No freshwater fish or reptile species are known to have become extinct, though other species may have become extinct before they were ever recorded.

Land clearing

The clearing of native vegetation is a key threat to Australia's terrestrial biodiversity,² and perhaps the most significant threat to species and ecosystems in eastern Australia.¹¹ Land clearing destroys plants and local ecosystems and removes the food and habitat on which other native species rely. Clearing helps weeds and invasive animals to spread, affects greenhouse gas emissions and can lead to soil degradation, such as erosion and salinity, which in turn can harm water quality. Native bushland has cultural, aesthetic and recreational importance to many Australians.

Land is cleared for many reasons (particularly agriculture and urban development). Native vegetation is sometimes completely cleared (if crops are sown, for example). At other times only a proportion of the native vegetation is removed from an area, which may occur when land is used for mining or urban development.

Ideally, the headline indicator would consider the area of native vegetation cover in Australia. Such an indicator would require a weighted measure of the extent and intensities of land clearance and modification: few accurate time series data are

available and so we use estimates of land clearance from the National Greenhouse Gas Inventory (NGGI). The estimates include the majority of intensive clearance of native vegetation. The estimates are based on continental satellite coverage. This allows distinctions to be made about whether the land has been cleared for the first time or not, however it does not distinguish between the kinds of vegetation that have been cleared – for example whether it formed part of a healthy or degraded ecosystem.

The estimated 283,000 ha of Australian land cleared in 2003 is 38% smaller than the 457,000 ha cleared in 1993. Of the land cleared in 2003, less than half (128,000 ha) was 'converted' (cleared for the first time), which is less than half the area (279,000 ha) converted in 1993.

Fire and biodiversity

There is a growing awareness of the links between fire regimes (the season, frequency, intensity and type of fires) and conservation of biodiversity. However, our knowledge of the responses of animals to fire is variable. Most research has focused on mammal and bird responses to fire, and mostly in forest, heathland and woodland ecosystems.

Experts believe that fires have tended to be less frequent since European settlement with more fuel to power them, and they have been more intense and, in some areas, more destructive as a result. In other parts of Australia, it is thought that a greater number of low intensity fires can be more damaging to biodiversity than fewer high intensity fires.

Data from NSW¹⁷ indicates that the number of bushfires is seasonal, increasing steeply between September and January. In 2002–03, the number of fires per month during this period ranged from 76 to 113. Fires that occur at this time (spring and early summer) can disrupt species' breeding seasons. Some animal species increase their abundance after fire, such as birds in the woodlands of northern Australia. And some species are dependent on fire or fire regimes for their survival, particularly in northern Australia.¹⁸

Threatened species and their conservation

Swift Parrot

The swift parrot (*Lathamus discolor*) is a threatened parrot that migrates between Tasmania, where it breeds, and the Australian mainland. There are estimated to be less than 2,500 individuals left, and the success of their breeding season is linked to the supply of nectar from flowering blue gums, their main source of food. Threats to the survival of the swift parrot include the widespread clearing and fragmentation of the woodlands and forests for agriculture, urban and coastal development. Forestry and firewood collection has depleted breeding (nest hollows) and feeding (nectar) resources by removing older trees, and swift parrots are also vulnerable to collisions with man-made structures such as vehicles. The National Swift Parrot Recovery Program was established in 2001, with one of the main aims to improve the quality of swift parrot habitat. An annual survey is undertaken as part of this Program to monitor swift parrots.¹⁹

Southern Corroboree Frog

The yellow and black southern corroboree frog (*Pseudophryne corroboree*) is restricted to the sub-alpine areas of Kosciuszko National Park, NSW. The frogs have experienced a gradual decline and their geographic range has contracted. Vegetation types such as sphagnum bogs, wet tussock grasslands and wet heath that have pools and seepages serve as breeding habitat. Threats to the frog include climate change, increased UV radiation, disease, former livestock grazing of the alpine region, construction activities associated with the Snowy Mountains Hydro-Electric Scheme and ski resorts, collecting by people, potential weed invasion, and feral animals. The Recovery Plan for the frog, implemented in 1999, had the main objective to downlist the species from critically endangered to endangered within ten years, and this has been achieved with the frog currently listed as endangered.^{20,21}

Mahogany glider

The Mahogany glider (*Petaurus gracilis*) is a relatively large gliding marsupial which lives in medium to low woodland in a severely restricted distribution in north-eastern Queensland (an area of approximately 720sq km between Crystal Creek and the Hull River in the Wet Tropics). The total population of this species has been estimated at 2,500. The main threats to this species are the loss and fragmentation of habitat through land clearing. Other threats include wild fires, disease, cyclones and transport corridors as well as habitat changes such as rainforest expansion and weed invasion. Much of the gliders habitat occurs outside of protected areas. Long-term survival of the species therefore requires a broad-based approach to habitat protection outside national parks and declared critical habitat areas. Engaging the community in the recovery of the mahogany glider through landcare programs, economic incentives, community education and further research are important to the survival of the species. Encouraging landholders to retain as much habitat as possible, and the linking of habitat fragments will assist in the creation of sustainable populations.^{22,23}

Macquarie Perch

The threatened Macquarie perch (*Macquaria australasica*) inhabits the Murray-Darling River system in Victoria, New South Wales and the ACT, along with coastal populations in the Nepean, Hawkesbury and Shoalhaven Rivers. Fish populations that have previously been translocated to other riverine sites rarely survived, and they are difficult to breed in captivity. For this reason, conservation stocking programmes are not viable for this species. Threats posed to the Macquarie perch include reductions in water quality from agriculture, forestry and urbanisation (particularly sedimentation), the modification of natural river flows and temperatures as a result of river regulation, spawning failures from cold water releases from dams, competition from introduced fish, diseases, and overfishing. There is currently a draft national recovery plan in preparation for the Macquarie perch. In addition, some of the major conservation objectives outlined by the ACT are to maintain viable populations of Macquarie perch, to maintain the species' potential for evolutionary development in the wild, and to protect habitat and sites crucial to survival.^{24,25,26}

Some differences within Australia

The numbers of extinctions in different states and territories depend on many factors such as the types of ecosystems within a state, the level of human disturbance and the impact of exotic species. But among the states and territories, South Australia has lost more mammals than any other state: at least 28 species of mammal are presumed extinct from that state (though here, as in other states, some of these animals continue to survive elsewhere in Australia). New South Wales has also lost many species (26), and Victoria (21). The Northern Territory has lost an estimated 14 mammal species, Western Australia has lost 11 and Queensland 6. The Australian Capital Territory does not maintain a list of extinct mammals, although in recent times only 1 species is believed to have been lost (the Brush-tailed Rock Wallaby), while Tasmania is thought to have lost the Thylacine but no other mammal species since 1788.²⁷

As well as considering individual species, it is useful to consider entire ecosystems, which are the result of long-term interactions between the physical environment and living species. The area of land in conservation reserves is one possible indicator of the extent to which ecosystems are protected. This has been increasing and just over 10% of Australia's land was protected in areas such as national parks in 2002.²⁸ Among the states and the territories, in 2002 the ACT had the largest proportion of land in conservation reserves (54%), followed by Tasmania (37%), South Australia (26%) and Victoria (15%). Only 4% of Queensland was in reserves along with 5% in the NT, 7% in New South Wales and 11% in Western Australia.²⁸

There are many examples of specific change, for the better or worse, in every state. For example, fox control in Western Australia helped the numbers of several threatened marsupials to increase over the 1990s, while in 2001 the NSW Government declared six woodland bird species to be vulnerable, primarily because of habitat clearing and fragmentation.²⁹ Many endangered species face

Invasive Species – animals

Many of Australia's most serious animal pests (invasive animals) were introduced deliberately, and species are still being introduced, deliberately and accidentally. Foxes, though present on the mainland were first sighted in Tasmania in 2001, the establishment of fire ants in Brisbane (now apparently under control), and the discovery of several species of exotic ants in the Northern Territory are new concerns. It was estimated that in 2002, 30 of the more serious animal pest species cost the economy at least \$420m a year (mainly in lost agricultural production).³⁰

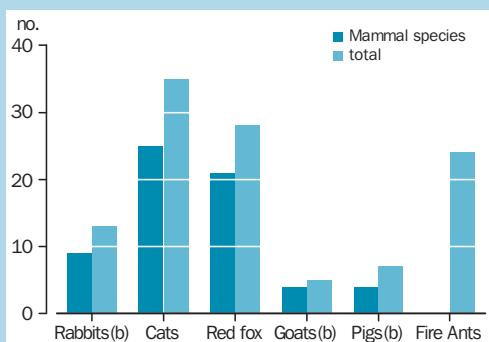
Invasive Species – plants

A plant which has, or has potential to have, a detrimental effect on economic, conservation or social values, is considered to be a weed.³¹ In 2001–02 weeds (invasive plants) were estimated to have cost the Australian economy \$4 billion, \$3.9 billion in lost agricultural production and cost of weed control, and \$100 million in weed control on national parks and Indigenous land.³² The economic impact of weeds on natural environments, beyond the cost of weed control are unknown.³²

Birds and mammals threatened by invasive species

The *Environment Protection and Biodiversity Conservation Act 1999* lists processes which threaten native species. This list of key threatening processes includes a number of invasive animals. The graph shows the number of bird and mammal species listed as threatened by these invasive animals (some native species are threatened by more than one invasive animal). In 2006, feral cats were listed as threatening 25 mammals and 10 bird species with extinction, while foxes threatened 21 mammals and seven bird species.

Species-threatening invasive animals, number of species threatened(a)



(a) Key threatening processes listed under the *Environment Protection and Biodiversity Conservation Act 1999*. Includes subspecies. Species threatened on Christmas and Norfolk Islands are excluded. (b) The threat includes associated threats such as land degradation.

Source: *Threat abatement plans, Department of Environment and Heritage, Australia, March 2006.*³³

more than one threat. The box on the previous page looks in more detail at four of Australia's endangered animals, and discusses why they are assessed as threatened and what is being done to protect them.

Just over half (51%) of land clearance in 2003 occurred in Queensland where an estimated

International comparison – annual rate of change of forest area

There is no OECD indicator available that is directly comparable to the MAP headline indicator for biodiversity: annual area of land cleared. An indicator available for OECD countries for a related concept is the change in forest area.

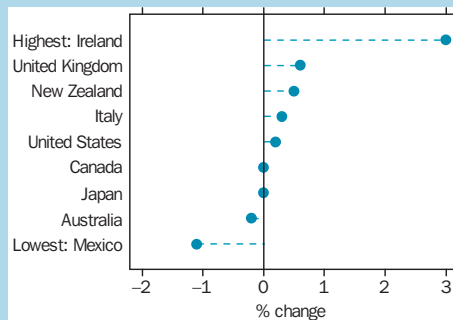
The change in forest area provides an indication of the balance between forest growth and forest harvesting or clearing. Forests are an important component of biodiversity, as they provide habitat for many plant and animal species, perform ecosystem functions such as water filtration, and act as carbon sinks. The change in forest area provides some indication of the sustainability of forest management and land clearing in a particular country.

Change in forest area is expressed as the annual rate of change, and considers the net change in forest area in terms of the balance between the growth and use of natural forests, and includes the expansion of forest plantations. A negative change in forest area indicates that the harvesting or clearance of forest exceeds growth.

Between 1990 and 2000 the annual change in forest area in Australia was -0.2%. Australia was one of four OECD countries where the harvesting and clearance of forest exceeded growth. The largest annual loss of forest area occurred in Mexico (-1.1%). The majority of OECD countries experienced increases in forest area during the period between 1990 and 2000. Ireland experienced the largest annual increase of 3%.

See also the international comparison for Protected areas in the *Some international comparisons of progress* essay on page 189.

Forest area annual rate of change – 1990 to 2000



Source: *State of the World's Forests 2005, Food & Agriculture Organisation of the United Nations.*³⁴

145,000 ha were cleared. New South Wales cleared 75,000 ha and Victoria cleared 22,000 ha. Clearance in the other states and territories ranged from about 3,000 to 18,000 ha. Estimated rates of clearance before 1990 are less accurate, although the NGGI figures indicate that land clearance in Queensland was continually higher than in any other state between 1970 and 1990. Over a longer period, however, other states have cleared a greater proportion of their land than Queensland, which has cleared 18% of land compared to around 30% in New South Wales and the Australian Capital Territory and 60% in Victoria.⁶

Protecting Australia's land

While the pressures to clear land remain, Australians are responding to protect bushland. Ideally one would consider the total area of land that is being managed by government, organisations and individuals to conserve biodiversity. But current information on the area of all such land is not available. However, there are recent data on the area of land protected inside conservation reserves. This is growing, and, in 2002, over 77 million ha (just over 10% of Australia) were in protected areas. This is an increase of about 18 million ha since 1997. Some ecosystems are protected better than others: the chart right shows that, in 2002, 33 of Australia's 85 major biogeographic regions (IBRAs) had less than 5% of their area protected (down from 37 IBRAs in 1997); four of these regions had less than 1% of their area protected (down from 12 IBRAs in 1997) and one region had no area at all within the reserve system (down from two IBRAs in 1997).²⁸ Legislation, such as the native vegetation acts enacted in Queensland, New South Wales and South Australia in the 1990s, targeted at controlling the clearing of native vegetation are now in force.

Australia has international obligations concerning its protected land, such as World Heritage listed sites and Ramsar wetlands. World Heritage sites are nominated areas that have outstanding natural and/or cultural values. Australia has 15 World Heritage sites listed for natural values³⁵, with Kakadu National Park, Uluru-Kata Tjuta National Park, Willandra Lakes Region and the Tasmanian Wilderness also listed for cultural values.

Ramsar wetlands are wetlands of international importance. They are valued for their ecology, their plants and animals, or for the ponds or lakes themselves and the hydrological functions (such as water filtration) they perform. Australia has 64 Ramsar wetlands³⁶ and is signatory to international conventions to protect migratory species that use these wetlands, such as the Japan-Australia Migratory Bird Agreement and the China-Australia Migratory Bird Agreement.³⁷

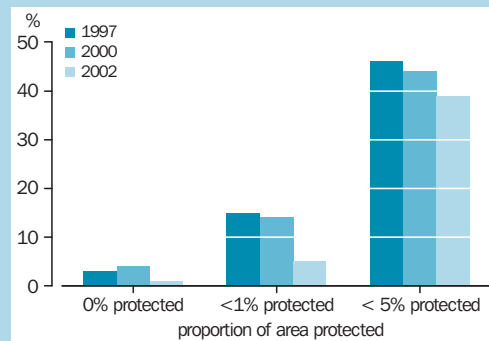
With 63% of Australian land in private ownership,³⁸ efforts to protect biodiversity now extend beyond the reserve system into some of this private land. This occurs through community landcare groups and conservation agreements made between landholders and the government. Some companies and community groups also operate conservation reserves. Indigenous communities are involved in managing land, with Kakadu, Uluru-Kata Tjuta and Booderee National Parks all managed jointly with traditional owners and the Australian government through the Director, National Parks. This provides an emphasis on maintaining and strengthening traditional ties with the land, which relies heavily upon ensuring the land and the ecosystems it supports are in good shape.³⁹

Factors influencing change

Many factors threaten biodiversity. Species are often affected by more than one threat, and one threat can affect many species.

Change and disturbance are a natural part of every environment. But human activity almost invariably affects the direction and pace of change and the extent of disturbance, challenging the ability of ecosystems and species to respond.⁴⁰ Over the past 200 years, change in Australia has, by world standards, been great and rapid, and has had a profound effect on our biodiversity. The change has taken many forms, including large scale land

Proportion of ecosystems(a), area protected



(a) Interim Biogeographic Regionalisation for Australian areas. Source: Commonwealth Protected Areas Databases.²⁸

clearance and the introduction of many exotic species, while the use of water, primarily for agriculture, has damaged the health of freshwater ecosystems.

A change to one part of the system can have important, sometimes unforeseen consequences elsewhere. The removal of native vegetation is an example: clearing plants removes the food that herbivores rely on, and consequently impacts on the carnivores higher up the food chain. Removal of plants can lead to soil erosion or the loss of soil nutrients: both processes reduce the biodiversity present among the vast array of minute species that live in the soil. And as a patchwork of vegetation is cleared, the remaining islands of native vegetation can be more vulnerable to damage from threats such as weed invasions, while the animals left within these islands may be isolated and so more vulnerable to events such as the bushfires in south-east Australia in recent years.

In 2002, the NLWRA concluded that vegetation clearing is the most significant threat to species and ecosystems in eastern Australia. Overgrazing, exotic weeds, feral animals and changed fire regimes are additional key threats across the country. And fragmentation of remnant native vegetation, increased salinity and firewood collection are threats to biodiversity in the highly modified regions of southern and eastern Australia.¹¹

Another factor influencing biodiversity is invasive species. Invasive species occur in all habitats and many invasive plants and animals are increasing in number and spreading across Australia. In 2002, 25 mammals, 20 birds, 4 reptiles, 1 amphibian and at least 23 freshwater fish species introduced from overseas were established in Australia,^{11, 30} along with about 2000 plants.⁴¹

Introduced predators like the fox and cat have spread over much of Australia and have contributed to the decline or extinction of some native species, through predation or the spread of disease. Cane toads have advanced through Queensland to Cape York, south to Port Macquarie

Conserving biodiversity

Although Australia's biodiversity continues to be threatened by many factors, much is being done to protect our flora and fauna. Governments, non-governmental organisations, the private sector and local communities all play a part. Conservation is promoted in many ways including legislation, the mitigation of threatening processes (such as fox and weed control), land rehabilitation, scientific research and education. And the comprehensiveness of the nation's system of conservation reserves improved in the 1990s.²

The state and territory parks and wildlife services are working to conserve native flora and fauna, and in some areas endangered species are being reintroduced to areas where they were formerly present. Bridled Naitail Wallabies and Yellow-footed Rock Wallabies have been reintroduced, for instance, to Idalia National Park in central Queensland. Operation Western Shield in Western Australia has significantly reduced fox numbers in parts of the State, and marsupials like the Numbat, Woylie (or Brush-tailed Bettong) and Chudditch (or Western Quoll) have increased in numbers. Other states and the territories are working on similar schemes, while nationally, urban conservation initiatives are involving more Australians in projects focused close to where they live and work. The recent *Bush Forever* initiative by the Western Australian Government is a good example: it identified regionally significant urban bushland to be retained and protected.² The area of land in protected reserves has increased over the past decade. Species recovery plans and threat abatement plans are also addressing many issues, though it is too early in some cases to gauge their effectiveness.

About 63% of Australia is held in private hands, either freehold or leasehold, and is managed for commercial use, and so private landowners can play a significant part in helping to conserve biodiversity.³⁸ Indigenous Australians' role in land management is increasingly recognised as important. Indigenous Australians manage around 15% of the country and they have an extensive understanding of Australian ecology from which others are learning.

Some industries are also beginning to show greater concern for protecting biodiversity. The mining industry, for example, has developed codes of practice for environmental management, and is employing biologists to help assess and minimise the impacts of mining operations.

The National Heritage Trust was set up by the Australian Government in 1997 to help restore and conserve our natural resources. It is the largest environmental rescue plan undertaken in Australia, and is expected to have spent \$2.7 billion by 2007. Thousands of community groups have received funding for environmental projects.⁴⁰ Meanwhile other work, such as the National Action Plan for Salinity and Water Quality is underway to address Australia's natural resources, and some of these initiatives are discussed elsewhere in the Natural landscape commentary.⁴²

Woodland restoration and birds

Ongoing commitment from government, community and industry is seen as the key to long-term success in the restoration of woodland habitats. Australians are volunteering their time, land and expertise to help reinstate woodland habitats.

The restoration of habitat for particular bird species is the focus of many current projects. Species such as the threatened Regent honeyeater and the Grey-crowned babbler are the focus of planting projects in New South Wales and Victoria respectively.

The success of some past revegetation projects has been assessed by Greening Australia ACT and South East NSW. In the 1990s Greening Australia invested substantial resources in revegetation projects in the local area. Extensive surveys conducted in these areas during the Birdwatch project in 2001 found that 109 bird species are now using revegetated areas, including threatened woodland species such as the Hooded robin, Speckled warbler and the Diamond firetail.

While many projects focus on revegetating land, it is recognised that retaining existing habitat is more effective for the conservation of woodland birds. Our knowledge of enhancing habitat on agricultural land has increased in recent years. We now know that:

- ◆ Even small (0.5ha) patches of remnant 'old growth' woodland provides habitat for a significant number of bird species.
- ◆ Logs provide habitat for ground dwelling and ground foraging species.
- ◆ Understory shrubs provide habitat for a variety of woodland species.
- ◆ Even where only a few trees remain, there will be a greater diversity of bird species than where all trees have been cleared.⁴³

and into the Northern Territory. As well as preying on insects, small mammals and snakes, they are also poisonous, killing many animals that prey on them, such as goannas, quolls and birds.³⁰ Rabbits have at times reached plague proportions over much of Australia, competing with native animals for resources, overgrazing vegetation and damaging soil structure (through the digging of holes).

The National Weeds Strategy (last updated in 1999) identifies 20 weeds of national significance and another 28 species which pose a potential threat to biodiversity. About 350 weed species in Australia have been declared noxious.⁴⁴

The National Weeds Strategy states that weeds are among the most serious threats to Australia's primary production and natural environment, and are increasingly moving into or towards almost all ecosystems of immediate economic, social or conservation value.³¹ They displace native species, and the effects flow on to animals, such as insects and birds, that rely on native plants for food and shelter. Many weeds also interfere with agricultural production.

Weeds also cause environmental damage that is difficult to quantify. Some species cover very large areas. Blackberry ranges over 9% of Australia. Weeds also affect important conservation regions. Mimosa, which threatens the Kakadu World Heritage Area, can grow to a height of six metres, and produces so many seeds that it can double in area every year, turning species-rich tropical wetlands of northern Australia into a Mimosa

monoculture.⁴⁵ These weeds, and many more, pose a serious threat to biodiversity.

So-called sleeper weeds (weeds that are established or newly arrived but are not as yet a widespread problem) are now recognised to be of major concern.² For years Athel Pine did not pose a problem until the wet year of 1974, when thousands of seedlings, washed from homestead gardens, sprouted along inland waterways.⁶ It now grows along water courses in central Australia, changing the river flow, displacing red gums and raising water tables thereby contributing to salinity.⁸

Weeds such as Gamba grass and Buffel grass interact with fire regimes and can displace native vegetation in northern Australia. These grasses produce fuel loads much larger than native grasses, and in the case of Gamba grass have a different life cycle. This results in fires of greater intensity and different timing that native trees, shrubs and grasses are unable to withstand.⁴⁶

Weeds also cause flow-on effects. Some weeds are either more flammable or more fire retardant than the species they displace, and can alter the fire patterns of the communities they invade (which may have effects on native animals living in those communities). Other weeds provide food and shelter for invasive animals.

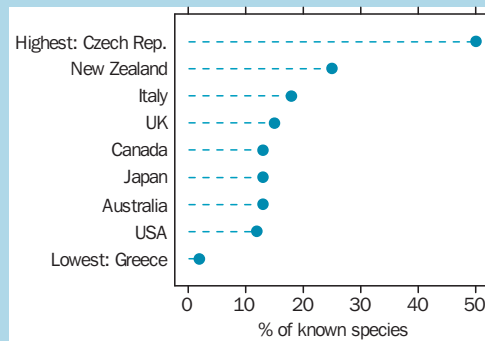
Outside their natural range or in increased numbers, native species may be as serious a threat to biodiversity as exotic ones. Many are spreading or increasing in abundance because of recent human activity. For example, large areas of grass and crops, together with more watering points have encouraged galahs to expand their range and colonise much of Australia, competing with other native birds for nesting sites.⁸

The problems caused by invasive species are widely recognised and work is being done to combat them. Effort for invasive plants is being focussed through the National Weeds Strategy. Threat abatement plans have been developed for the fox, rabbit, cat, pig and goat to combat their threat to endangered native species. A threat abatement plan for dieback fungus was adopted in 2001 to address this major threat to biodiversity.⁴⁷ And the Australian Quarantine and Inspection Service continues to develop new ways to prevent potentially invasive species from entering Australia.

Although in 2000 it was found that the growth of cities and towns has only affected land cover over a small area (less than 0.1%),⁴⁸ it can have regional effects. Most of the urbanisation has occurred around the coast, sometimes in regions of high biodiversity, while future housing development in some areas may entail clearing threatened (now remnant) woodland communities such as the Cumberland Woodland around Sydney.⁴⁹

However, agriculture has been responsible for the majority of land clearance in Australia. Although about 60% (460 million hectares) of Australia is used for agriculture, clearing has been selective,

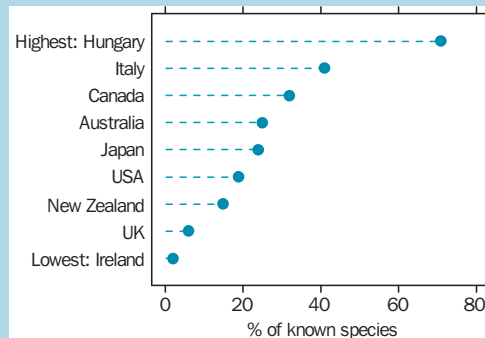
International comparison: threatened bird species – 2005(a)



(a) The information refers to the latest year for which data are available, which differs between countries.

Source: *Environment at a Glance, OECD Environmental Indicators 2005*.⁵⁰

International comparison – threatened mammal species 2005 (a)



(a) The information refers to the latest year for which the data are available, which differs between countries

Source: *Environment at a Glance, OECD Environmental Indicators 2005*.⁵⁰

Threatened species are one key indicator of the health of biodiversity. The threatened bird and mammal species indicators are expressed as the number of threatened species compared to the number of known or assessed species. "Threatened" refers to species which are classified as critically endangered, endangered or vulnerable.

In 2005, the proportion of bird species that were threatened is highest in the Czech Republic where 50% of the 220 known bird species in the Czech Republic are considered threatened. Hungary has the highest proportion of threatened mammal species with 71% of Hungary's 83 mammal species classified as threatened. Ireland (2%) and Greece (2%) reported the lowest levels of species under threat for mammals and birds respectively.

In Australia, 13% of bird species are considered to be threatened. This is relatively low in OECD terms, with 22 other OECD countries having a higher proportion of threatened bird species. A quarter (25%) of Australian mammal species are considered threatened, the 11th highest proportion in the OECD.

See also the international comparison for Protected areas in the *Some international comparisons of progress* essay on page 189.

with the vegetation occupying the better soil and gentler slopes cleared first. For example, in 1996 79% of the Victorian south-east coastal plain had been cleared.⁸ The most intensive agricultural land clearance has occurred in areas where crops or sown pasture have been planted.

Links to other dimensions of progress

Headline indicators of land affected by salinity, inland waters, air quality and atmosphere, and greenhouse gases each relate to areas of concern that affect our plants and animals as well as other aspects of progress. Oceans and estuaries and land use are also discussed. Another factor, discussed in the box on page 102, is changes to the patterns of fire.

Wildlife is important to many Australians – aesthetically, recreationally and culturally, particularly for many Indigenous Australians.

Biodiversity brings income and employment to Australia, through tourism for example (in 1995 half of international visitors went to a national park),⁵¹ while agriculture relies on a variety of services provided by biodiversity to keep soil healthy, water clean and crops pollinated. But economic activity – including land clearance for agriculture and flow-on effects like salinity – has been a major reason for the decline of many species. Invasive species have also played a role.

The vast majority of land that has been cleared has been used in economic production, in particular agriculture, which has generated income and employment. But land clearance has economic impacts too. It can, for instance, lead to costs associated with reduced flood control, the improvement of water quality, or increased salinity and soil erosion.

About 7% of Australia's total greenhouse emissions are estimated to arise from land clearance (greenhouse gases are released from the burning and decay of vegetation and from the disturbance of soil which releases carbon). Clearing vegetation plays an important role in the spread of invasive species, land degradation and declining water quality (which are important to the environment and can impose costs upon the economy).

See also the commentaries *National income, Work, The natural landscape – inland waters, The natural landscape – land, and The air and atmosphere*

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The natural landscape – land

Progress and the headline indicator

Our soil resources are an important natural asset, and their degradation is a significant concern to Australian farmers, governments and the general public. There are several forms of soil degradation in Australia. Salinity, sodicity and acidity are all naturally occurring conditions of Australian soils, which have been exacerbated by agricultural activities. High salt levels in soils can cause the death of many plant species and sodic soils are prone to waterlogging. Acidity, or high concentrations of hydrogen ions in the soil also kills many plants. When left untreated, degraded soil reduces agricultural productivity, while salinity can damage buildings and infrastructure such as water pipes, roads and sewers. Degradation can also damage habitat for wildlife, kill micro-organisms that live in the soil, and harm the quality of our inland waters.

Ideally, the headline indicator would measure the land area affected by different types of degradation, and perhaps value their cost to agriculture, infrastructure and the environment. It might also measure whether the ways we use the land that lead to degradation are continuing. But many forms of degradation overlap one another, and there is no single measure of the area of degraded land in Australia. Moreover, some of these concerns (such as acidity) predominantly affect farm profits and so are primarily a financial concern to one part of the economy, rather than a key influence on the natural landscape.¹

We focus here on dryland salinity which is linked to other forms of soil degradation, such as erosion. The impacts of salinity are also wider than lost agricultural production and include damage to water resources, biodiversity, pipelines, houses and roads.² Australia's rivers and landscapes are under threat to rising salinity, particularly in Western Australia, South Australia and in the Murray-Darling Basin. Some of the practices that have led to salinity have raised agricultural production and brought economic benefits. However, once established, salinity can have adverse effects on agriculture. In 2005, some 2.5 million hectares of land on farms were already affected by salinity, and there is potential for this to increase to 15 million hectares. Much of this is Australia's most productive agricultural land. The area damaged by salinity to date represents about 4.5% of present cultivated land, and estimated costs in 2000 include \$130 million annually in lost agricultural production; \$100 million annually in damage to infrastructure; and at least \$40 million in loss of environmental assets. Salinity affects regions in all parts of Australia.³

The cost to agricultural productivity from salinity, estimated at \$187m in 2000, is less than the cost of some other forms of degradation such as acidity, estimated at over \$1b in 2000. But the cost of salinity goes further.¹ Salinity harms flora and fauna (primarily through loss of habitat), while saline

Salinity

Australia's soils are old and shallow, and are susceptible to degradation by agricultural activities. Even in a continent as dry as Australia, salinity occurs when there is too much water. Salinity occurs when the water table rises, bringing natural salts to the surface (in sufficient quantity, these salts are toxic to most plants). In the quest to prepare Australian soils for agriculture, trees were cleared by the billion.

Yet trees played a crucial role in maintaining the water balance in our ancient soils. It was the success in clearing trees that has led to the development of dryland salinity. (Irrigated-land salinity is caused by a similar effect – the application of excess water to land causes the water table to rise).² European farming practices which replaced native vegetation with shallow-rooted crops and pastures have caused a marked increase in the expression of salinity in our land and water resources.

Impacts of salinity

Salinity and rising water tables incur significant and costly impacts. Salt is being transported to the root-zones of remnant vegetation, crops, pastures, and directly into our wetlands, streams and river systems. The rising water tables are also affecting our rural infrastructure including buildings, roads, pipes and underground cables.

While Australia's salinity problem is significant, and is expected to increase as a result of past and present practices, different attempts to quantify the extent of the problems have produced different results. In 2001, the National Land and Water Resources Audit estimated that 5.7 million hectares (not all of it agricultural land) had a high potential for the development of dryland salinity, and predicted this to rise to 17 million hectares by 2050. The 2002 ABS Survey of Salinity on Australian Farms found that about 20,000 farms and 2 million ha of agricultural land (rather than all land as reported by the NLWRA) showed actual signs of salinity.⁵

For many farms affected, dryland salinity has meant loss of productivity and income. There are also many off-farm impacts, the most significant of which appears to be the salinisation of rivers, which affects drinking and irrigation water (e.g. in Western Australia some surface water is already too saline for domestic use).²

Wagga Wagga is one of the worst affected towns in New South Wales, where salinity is damaging roads, footpaths, parks, sewerage pipes, housing and industry. Other provincial towns in New South Wales and Victoria (such as Dubbo and Bendigo), as well as western Sydney, are also affected. Predictions suggest that about 30 rural towns in Western Australia will be threatened by rising water tables by 2050.²

Dryland salinity also threatens biodiversity, through loss of habitat on land and in water. Areas near water are often worst affected because they occupy the lowest parts of the landscape where saline groundwater first reaches the surface. Areas of remnant and rehabilitated native vegetation are under threat in Western Australia, South Australia, New South Wales and Victoria.² In the Western Australian wheatbelt, salinity has caused a 50% decrease in the numbers of wetland bird species and 450 plant species are threatened with extinction through salinity.⁴

Assets in areas at high risk from shallow watertables or with high salinity hazard

	Year		
	2000	2020	2050
Agricultural land ('000 ha)	4 650.0	6 371.0	13 660.0
Remnant and planted perennial vegetation ('000 ha)	631.0	777.0	2 020.0
Length of streams and lake perimeter ('000 km)	11.8	20.0	41.3
Roads ('000 km)	19.9	26.6	67.4
Rail ('000 km)	1.6	2.1	5.1
Towns (number)	68	125	219
Important wetlands (number)	80	81	130

Source: National Land and Water Resources Audit 2001, Australian Dryland Salinity Assessment 2000, NLWRA, Canberra.

water damages bitumen and concrete.² In 2000 some 1,600 km of rail, 19,900 km of road, 68 towns, and 80 important wetlands were at risk of damage from salinity.

The 2002 ABS Survey of Salinity on Australian Farms found that about 20,000 farms and 2 million ha of agricultural land (rather than all land as reported by the NLWRA) showed signs of salinity.

Some 800,000 ha of this land could not be used for agricultural production.⁵

Land use: Agriculture

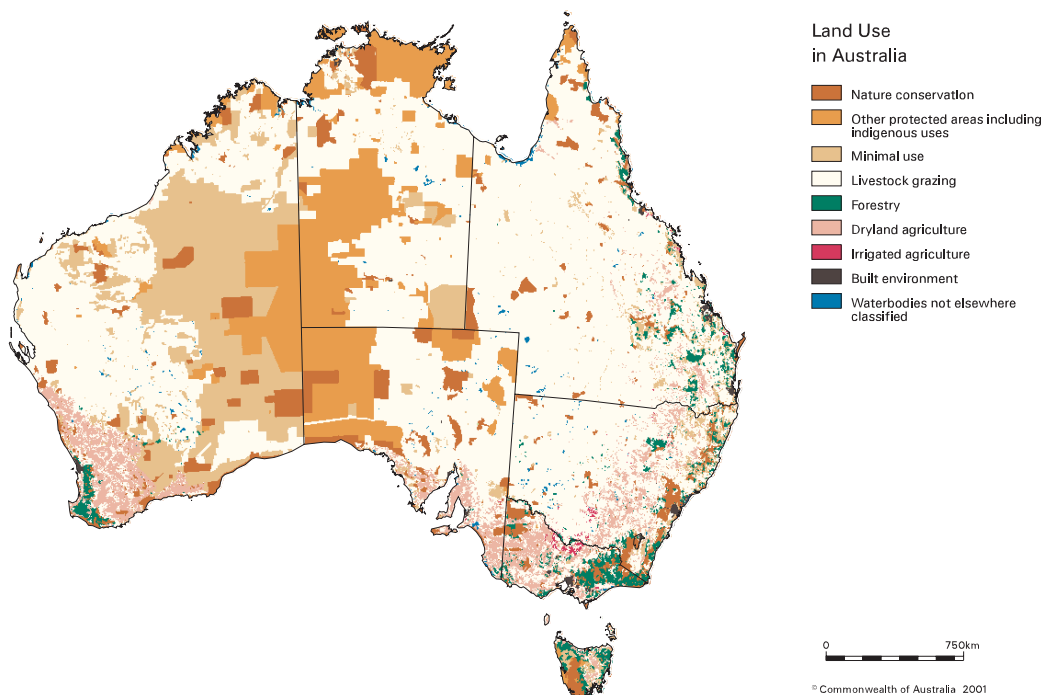
Since European settlement of Australia, land management has usually been focussed on specific human requirements such as agricultural production, urban development, transport, industry, recreation or biodiversity conservation.

Agriculture is the major form of land use in Australia. In 2004, 57% of Australia was used for agricultural activity: 3% for crops, 3% for pastures and grasses⁶, with the remaining 52% of land holdings mainly used for grazing. Different agricultural activity affects the land in different ways, and the effects of land clearance (a necessity if crops are to be grown or pasture sown) are discussed in the *Biodiversity* section of *The Natural landscape* dimension.

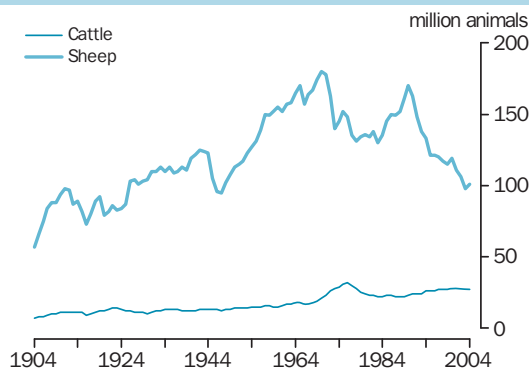
Once land has been cleared of native vegetation, the impacts of agriculture on the environment depend on the crops grown and farming practices used. While 26 million hectares (ha) of Australian land were used for growing crops in 2004, far more of Australia was used for grazing sheep and cattle.⁶

Until recently, interest in the links between changes in land use and the conservation of Australian biodiversity have focused on southern and eastern Australia where broad-scale clearing has been widespread.⁷ There is now a growing appreciation of the effects of changes in land use on central, western and northern Australia.

Australian land use, 2001



Cattle and sheep numbers



Source: ABS Historical selected Agriculture Commodities, cat no. 7124.0.

Although the number of cattle has increased from 7 million cattle in 1904 to 27 million in 2004, the number of cattle has stabilised in more recent times, increasing from 26 million in 1994. Numbers of sheep were 77% higher in 2004 than they were in 1904 (about 101 million sheep in 2004 compared to 57 million in 1904). But sheep numbers in 2004 were considerably lower than periods in the 1960s, 1970s and late 1980s. The national flock peaked in 1970 at almost 180 million animals.⁸

Grazing by stock and wildlife in arid and semiarid regions exerts a pressure on the land and is one of the major threats to native vegetation (along with grazing by feral animals and change in fire frequency).⁹

Altered fire and hydrological regimes and invasive species (including exotic grasses introduced in an attempt to improve pasture) may have had significant effects on the biodiversity of arid and semi-arid Australia. Increases in the number of large herbivores (such as kangaroos) have also had a direct impact. Domestic and feral livestock remove vegetation cover and break up the soil surface, exposing it to wind and water erosion, while an increase in pasture and numbers of watering points, and a reduction in dingoes, appear to have helped some species of kangaroos to increase in numbers in some areas. Kangaroos also put pressure on vegetation cover.

Land use: mining

There are many mines throughout Australia, and about 5,000 square kilometres or 0.06% of our total public land area is 'mining reserve' – Crown lands held in reserves for mining.¹⁰ The extractive nature of mining operations create a variety of impacts on the environment before, during and after mining operations and are dependent on a range of factors associated with each mine.

It is difficult to assess changes in the effects of mining on the Australian environment over recent years. The amount of 'rehabilitation' to an area disturbed by mining can range from restoration, where an area is brought as near as possible to pre-mining condition, to recontouring and

revegetating to a state that is non-polluting and compatible with environmental regeneration and community expectations.¹¹ A key industry initiative is Enduring Value – the Australian Minerals Industry Framework for Sustainable Development. This initiative builds on the Australian Mineral Industry Code for Environmental Management and seeks to maximise the long-term benefits to society that can be achieved through the effective management of Australia's natural resources.¹²

Land use: nature conservation reserves

Some 524,100 square kilometres or 6.9% of public land area in Australia are classified as nature conservation reserves throughout Australia.¹⁰ These reserves (for example national parks, nature reserves and recreation areas) are Crown lands reserved for specific environmental conservation purposes such as protection of wildlife, protection of a type of habitat or preservation of an area with natural features of scientific or recreational value.

National parks are generally large areas of scenic or other natural significance to the general public. Three of the six Commonwealth National Parks, namely Kakadu National Park and Uluru – Kata Tjuta National Park in the Northern Territory and Booderee National Park in the Jervis Bay Territory are managed jointly by the Australian government with their Aboriginal traditional owners. The other three Commonwealth national parks protect unique island ecosystems within Cocos (Keeling) Islands and Christmas Island (located in the Indian Ocean) and the Norfolk Island Territory (in the South Pacific).

Land use: native forests

In 2004, there were an estimated 164 million hectares of forest in Australia (162.7 million hectares native forest and 1.7 million hectares plantation forests) – covering 21% of the continent. More than 13% of native forest was in nature conservation reserves. The largest areas of native forests in Australia are dominated by eucalypts (78%), followed by acacias (10%) and melaleucas (4%).¹³

Old growth forests are ecologically mature forests where the effects of disturbances are largely negligible. The total area of old growth forest in Australia is unknown. In Regional Forest Agreement (RFA) areas where assessments of old growth were undertaken, more than 5.2 million hectares, or 22% are classified as old growth and about 70% of these old growth forests are protected in nature conservation reserves, with some of the remaining 30% available for timber production.¹³

Nearly 22 million hectares or 13% of Australia's forest estate is formally protected in nature conservation reserves. This is an increase in the area of forest in nature conservation reserves of 22%, since the last national assessment in 1998. Forests are also conserved within leasehold land, multiple-use forest or private land (via covenants or other management arrangements).¹³

Plantation forests

Plantation forests are an important source of timber and currently supply more than half the logs for Australia's domestic timber requirements and exports. In 2004, Australia had more than 1.7 million hectares of timber plantations, which is approximately 1% of Australia's total forested area.¹⁴ Of this total, 715,500 hectares (40%) were hardwood species and 1,000,600 hectares (60%) were softwood species.¹⁵

The area of plantation forests in Australia increased by 60% from 1995 to 2004. New plantations have been established at an average rate of 75,000 hectares per year for the five years from 2000 to 2004.¹⁴ About 25.4 million cubic metres of logs were harvested in 2003–04, of which about 60% were from plantations (the remainder were from native forests).¹⁵ When planted on land that was previously cleared, plantations can bring environmental benefits, such as lowering the water table (and hence reducing salinity), reducing erosion, providing wind shelters or acting as carbon sinks to offset carbon dioxide emissions.

However, plantations (whether exotic or native) have vastly simplified ecosystems – with fewer species of plants and animals – when compared to forests that have matured over thousands of years. Plantations can also assist the spread of pests and disease, and can increase the risk of exotic species invading nearby areas of natural forest. Therefore we focus here on the progress of Australia's non-plantation forests.

Our forests act as carbon sinks (i.e. they absorb the greenhouse gas CO₂, as discussed in the commentary on *The air and atmosphere*). Forests are also used for many purposes, including recreation, biodiversity conservation, timber harvesting (the forestry industry and associated wood and paper manufacturing are a source of income and work in Australia, particularly for some towns), water catchment protection and honey production. All of these uses have impacts on the natural landscape, but the extraction of timber has attracted most attention.

Area of Australian forest types – 2004

Forest type	'000 ha
Acacia	16 488
Callitris	2 330
Casuarina	2 039
Eucalypt	127 025
Mangrove	749
Melaleuca	7 056
Other	2 780
Rainforest	4 214
<i>Total native forest</i>	162 680
Hardwood plantation	715
Softwood plantation	1 001
<i>Total plantation</i>	1 716
Total forest	164 396

Source: Bureau of Resource Sciences, *Australia's forests at a glance*, 2005.¹³

Regional Forest Agreements

The Commonwealth government signed 10 Regional Forest Agreements (RFAs) with four state governments between 1997 and 2001. The 20-year agreements in Western Australia, Victoria, Tasmania and New South Wales cover regions where commercial timber production is a major forest use. They seek to provide a balance of the full suite of environmental, social, economic and heritage values that forests can provide for current and future generations.

The agreements set out to establish a forest conservation reserve system of nearly 10.4 million hectares. More than 8.5 million hectares are within formal dedicated conservation reserves, the remainder are within informal reserves for conservation purposes (such as special protection zones in State forests) and areas where values are protected by prescription (for example: very rare values, values with a fragmented distribution, or values naturally occurring in a linear form such as riparian vegetation).¹⁵

The environmental impacts of timber harvesting are of greatest concern in native forests, where clearfelling and associated fire regimes frequently result in major changes to the species composition and structure of forests.¹⁶ Forestry can damage soil structure, cause siltation of streams and rivers, and assist invasive plants and animals to spread.

One major impact of timber extraction is on animals that live in tree hollows. About one in seven of our vertebrate species (mammals, birds, frogs and reptiles) depend on tree hollows.¹⁷ Suitable large hollows tend only to develop in trees older than 150 years, but sections of forests are typically logged every 55–120 years,¹⁷ which means that large hollows will not develop in logged forests unless habitat trees are retained by forest management agencies.

The number of trees left standing to develop hollows has increased in recent years because of changes to the Codes of Forest Practice during the Regional Forest Agreement process (see box). In south-east NSW for example, only one hollow bearing tree was retained on every three hectares in 1991. By 1997, this had risen to 15 trees retained on every three hectares.¹⁸

Some differences within Australia

Dryland salinity coincides with those agricultural zones in which natural vegetation has been replaced – often many years ago – with land use systems that do not use water to the same extent as the natural vegetation. The largest areas of dryland salinity are in the agricultural zone of south-west Western Australia. Groundwater levels in this zone are still rising and over 4 million hectares have areas at risk; an area that could double by 2050. Large areas are also at risk of dryland salinity in South Australia, Victoria and New South Wales, mainly in the Murray-Darling Basin where groundwater levels are still rising. The salinity hazard assessment for the Northern Territory concluded it was relatively low. Also the bulk of the non-agricultural area of Western Australia, and far

western New South Wales were considered to currently have a very low salinity risk.¹⁹

Factors influencing change

Australia's soils are naturally saline in places. Salinity has been exacerbated by human activity, mainly agriculture. In some regions, problems originated over 100 years ago, from factors including excessive land clearance and large scale planting of pasture and crops that used relatively little water, pressures which remain today. In other areas salinity is coming to light after more recent land use changes. Because some of the problems began so long ago it is unlikely that they can be repaired easily. Salinity problems, for instance, only become apparent after long time lags, often 100 years or more (depending on the soil type).²

The National Action Plan for Salinity and Water Quality was endorsed in 2000 by the Council of Australian Governments. Under the plan, 21 priority regions have been targeted and governments and communities are working together to prevent, stabilise and start to reverse trends in dryland salinity, and improve water quality.

The National Dryland Salinity Program (NDSP) has been researching salinity for the past decade. In recent years, the focus of this research has shifted from salinity as largely an issue for agriculture, to its impact on infrastructure, and on integrating salinity management with other natural resource management strategies.²⁰

Links to other dimensions of progress

In parts of Australia, land-related changes that result from human activities can take a long time to

Sustainable land management

Land is often managed for multiple benefits, such as agricultural production, biodiversity conservation, water quality, soil health and supporting human life. To ensure long-term sustainability, land managers need to consider economic, social and environmental factors. Sustainable land management means managing land without damaging ecological processes or reducing biological diversity.²¹

Biophysical degradation trends across agricultural and cleared regions of Australia indicate that many established land management practices are unsustainable. Many landholders are taking action to improve their practices in response to land degradation problems. However, some believe that change is needed on a still wider front to achieve long-term sustainability.

Since the late 1990s there has been substantial investment in landcare and bushcare programs. The Natural Heritage Trust has provided funding for environmental activities at a community level, a regional level and a National/State level.²² Success is likely to depend on achieving consensus about the respective rights and obligations of individual landholders and the broader community, and development of mechanisms that provide for an equitable sharing of costs and benefits.

show themselves. The response time depends on a complex interaction of climate, geology and patterns of land use. Some forms of agricultural production, land clearance and other factors such as the weather can all contribute to salinity. National income and wealth are also affected, not just through the loss of agricultural production but also because of damage to roads, rail and buildings (the severity of these effects varies considerably from region to region). Salinity is a major threat to the health of many inland water systems. Soil erosion, another form of degradation, can affect inland waters too, as well as estuaries and inshore marine environments, such as the Great Barrier Reef.

Land clearing contributes to the enhanced greenhouse effect²³ and is also implicated in algal blooms and other problems associated with inland waters. Soil from agricultural land is washed into streams and dams, adding to the nutrient load.

See also the commentaries *National income*, *National wealth*, *The natural landscape*, *Oceans and estuaries* and *The air and atmosphere*.

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The natural landscape – inland waters

Progress and the headline indicator

Water is fundamental to the survival of people and other organisms. Apart from drinking water, much of our economy (agriculture in particular) relies on water. The condition of freshwater ecosystems has a critical impact on the wider environment.

Freshwater is a finite and scarce resource in many areas of Australia. Some 80% of the country is classed as semi-arid, making this the driest inhabited continent. However, our low population density means we have more water than many countries in per-capita terms.¹ At the same time though, we have one of the world's highest levels of water consumption per head,² and water supply and demand vary considerably across the country. In the tropics, for example, only a fraction of available fresh water is used by people. In other areas, such as the Murray-Darling Basin, pressure on water resources is acute.

Ideally the headline indicator would consider the health of Australia's freshwater ecosystems. Changes in the quantity and quality of all surface and groundwater would be measured, together with impacts from factors such as exotic species and changes to river flow. But such data are unavailable for much of the country, so we focus on water use, and consider the proportion of Australia's water management areas within which water extraction is thought to be sustainable.³

In 2000, the National Land and Water Resources Audit found that about 11% of Australia's surface water management areas were overdeveloped. Another 15% were approaching sustainable extraction limits (i.e. highly developed). Some 11% of groundwater management units were over-developed, and a further 19% were highly developed.⁴

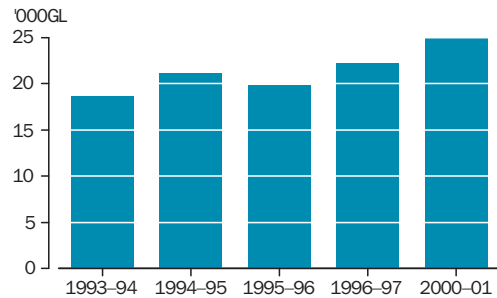
A variety of information from around the country points to a decline in some water resources. In some regions, the physical and biological condition of the rivers, wetlands and groundwater dependent ecosystems has been degraded by the extraction of water for agriculture, industrial, and household use.

Net water use

In 2000–01, Australian agriculture, industry and households consumed 24,909 GL of water. A further 47,522 GL of water was extracted from the environment, used mostly in-stream (mainly for hydro-electricity generation) and returned further downstream.⁵

Agriculture was by far the largest consumer of water in 2000–01, accounting for 67% (16,660 GL) of total water use in Australia. Households were the next highest consumers of water, accounting for 9% (2,181 GL) of water use. Total water use in households in 2000–01 was 19% greater than in 1996–97 (1,829 GL). The average household water use was 115 kilolitres/person in 2000–01, compared with 102 kilolitres/person in 1996–97. The water supply, sewerage and drainage services

Net water use(a)



(a) Data not available for the years 1987–98 to 1999–2000. Source: Water Account for Australia, 1993–94 to 1996–97 and Water Account 2000–01 (ABS cat. no. 4610.0).

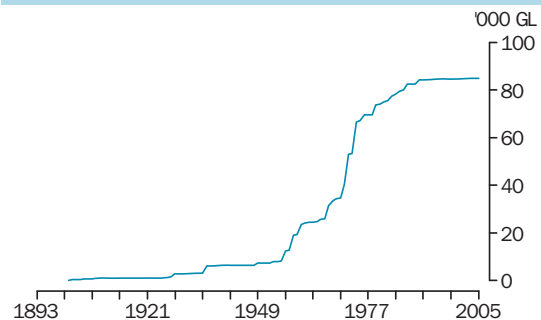
industry was also a significant consumer of water, accounting for 7% (1,794 GL) of water use, as was the electricity and gas supply industry which consumed 7% (1,688 GL), excluding in-stream water use for hydro-electricity generation.⁵

Water and Australia's development

Our rivers and groundwater resources played a major role in the early European settlement and development of Australia, often determining the location and viability of population centres and areas of agricultural production.⁶ However, the high year-to-year and seasonal variability of Australia's river flows has led to the extensive regulation of rivers and groundwater resources to accommodate irrigated agriculture and domestic water demands.

The level of demand and reliability expected by Australian water users, combined with the high levels of evaporation in Australia, has led to relatively high water storage volumes. Following World War II, a massive nationwide program of dam-building has given Australia over 500 large dams with a storage capacity of 84,793 GL or over 4,000KL per person, the highest per capita capacity in the world.⁶ Around 80 of these dams have a capacity of over 100GL (the volume of water contained in 100,000 Olympic-size swimming

Total water storage capacity of large dams



Source: Water Account, Australia, 2000–01 (ABS cat no. 4610.0) and ABS Year Book 2006.

Groundwater

Groundwater is water that occurs beneath the surface of the earth. It is available over most of Australia and in many parts of the country, especially the arid and semi-arid inland, it is of critical importance.⁷ Greater regulation of surface water resources, opportunities for irrigated agriculture, and prolonged periods of drought have all contributed to our increased use of groundwater as a supplementary or alternative, water resource.⁸ In 1996–97 approximately 5,000 GL of groundwater were extracted from groundwater sources.⁹ Up to 4 million Australians are totally or partly dependent on groundwater for domestic water supplies.¹⁰

Groundwater and surface water systems are connected to each other to varying degrees in different parts of the country. Fundamental in all areas is the need to manage groundwater and surface water as two parts of one hydrological system.¹¹

Household water use

In 2000–01, average household water use was 115 kilolitres/person. The majority of household water was used for outdoor purposes such as gardening (44%), followed by indoor uses, including bathrooms (20%) and toilets (15%).⁵

During the three years to mid-2004, the majority of Australia experienced drought conditions. This led to the introduction of water restrictions in most capital cities around Australia during 2002–03. Water restrictions varied from voluntary reductions of water use to mandatory restrictions. Sydney, Melbourne, Perth, Hobart and Canberra all experienced water restrictions during 2002–03. Brisbane had permanent restrictions on the times residents were able to use sprinklers.¹²

pools). While most of Australia's dam capacity has been built since 1970,⁵ only one dam with a storage capacity of greater than 100 gigalitres was constructed between 1995 and 2005. Australia's large dam storage capacity is more than four times annual surface water diversions.⁹

Use of groundwater has also grown significantly since World War II and there are now more than 500,000 wells and groundwater assets valued at \$6.5 billion.⁶ Without groundwater much of inland Australia could not have been developed.

Effects of development

All river basins, like the Murray-Darling Basin, are naturally comprised of a set of interconnected physical, chemical and biological elements, which revolve around the flow of water. This interconnectedness and the limited amount of water in the basin means that the flow needs along the river, and the outcomes of activities and management decisions in one place have implications elsewhere in the basin. A 2001 assessment of the ecosystem services provided by the rivers, wetlands and floodplains of the Murray-Darling Basin estimated their value as \$187.3 billion per annum.¹³ Thus, these rivers are a particularly valuable resource. To provide the ecological goods and services that are fundamental to sustaining the uses to which they are put, these rivers need to be in good condition.

River condition has not been systematically assessed across Australia to identify the degree and extent of problems. In 2002, the NLWRA produced an Environment Index that assessed river condition depending on the nutrient and sediment in the water, the hydrological and catchment disturbance, and the condition of streamside vegetation.¹⁴ The degree of modification depends on the extent of change from these factors. A moderately modified river, for example, has a catchment dominated by land uses that disturb the river, with associated water extraction, habitat changes (such as a reduction in streamside vegetation of 50%–75% of original cover) and loads of sediment or nutrients above natural levels.

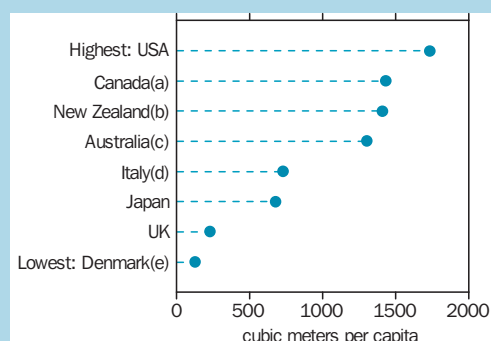
International comparison – water abstractions per capita

There is no OECD indicator available that is directly comparable to the headline indicator for water, i.e. The proportion of water management areas where use exceeded 70% of sustainable yield. An OECD indicator that illustrates the concept of intensity of water use is water abstractions per capita.

Freshwater resources are essential to human development and economic activity, and are also of environmental importance. Irrigation, industry and household water use are the drivers of demand for freshwater world wide. Water abstractions per capita is an indicator of the level of water use in a particular country. However, this indicator does not provide information on water quality. The water abstraction indicator is expressed as cubic metres per capita, per year.

The distribution and use of water resources varies greatly among the OECD countries. In the early 2000's the United States had the highest level of annual per capita water abstractions (1730m³). Canada (1430m³), New Zealand (1410m³) and Australia (1300m³) also had levels of per capita water abstractions well above the OECD average of 920m³. Denmark recorded the lowest level of water abstraction per capita (130m³) of all OECD countries.

Water abstractions per capita, 2000



(a) Data are for 1996. (b) Data are for 1999. (c) Data are for 1996–97. (d) Data are for 1998. (e) Data are for 2001.

Source: *Environment at a Glance, OECD Environmental Indicators 2005*.

The Murray-Darling Basin

The Murray-Darling Basin extends across one-seventh of the continent, from north of Roma in Queensland to Goolwa in South Australia and includes three quarters of New South Wales, all of the ACT and half of Victoria. It is the catchment for the Murray and Darling Rivers and their many tributaries, containing more than 20 major rivers, as well as important groundwater systems, and has a population of nearly two million people.

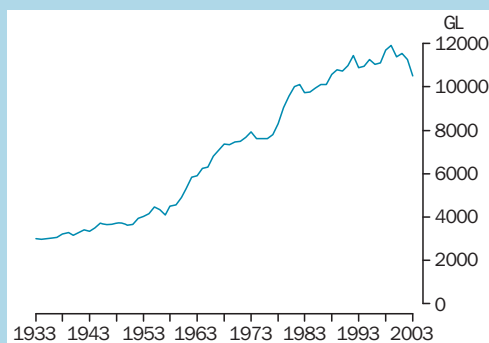
The Murray-Darling Basin is an important source of fresh water for domestic consumption, agricultural production and industry.¹⁷ It generates about 40% of the national income derived from agriculture and grazing. It supports one quarter of the nation's cattle herd, half of the sheep flock, half of the cropland and almost three-quarters of its irrigated land.

Much of the Basin's natural resources are of high environmental value. Its wetlands are extensive, a number of which are recognised under the Convention on Wetlands of International Importance (otherwise known as the Ramsar Convention).

In the last 100 years, the Murray-Darling Basin has been transformed by the construction of major water storages on the rivers. The total volume of water storage capacity of major dams in the Basin is nearly 35,000 gigalitres. These storages have made it possible to store water during wet periods and release it as needed during summer or in droughts. Water diversions (mostly for irrigation) have increased steadily since 1930. The amount of water diverted increased substantially in the early 1950s. More recently, average annual diversions between the periods 1989–1993 and 1999–2003 fell by 3%, largely driven by a decline in water use in Victoria and New South Wales (where use fell by 13% and 7% respectively), partially offset by an 8% rise in use in South Australia and a 9% rise in Queensland.

In the late 1990s, environmental degradation and increasing water demand led to a 'Cap' on river diversions in the Murray-Darling Basin, aimed at achieving a better balance between production and the environment. In 2003, 500 GL of water was made available for environmental flows as part of a major initiative called 'Living Murray'.

Water diversions(a), Murray-Darling Basin



(a) Data smoothed using a 5-year moving average. Source: Data available on request, Murray-Darling Basin Commission 2004.

Some 90% of Australian rivers were assessed. Among these rivers, the index found that:

- ◆ 66% of river length was moderately modified
- ◆ 19% was substantially modified
- ◆ 1% was severely modified.

Two-thirds of river length assessed in the Northern Territory is in largely unmodified condition, as is about two-fifths of Tasmanian river length assessed. In the other states and territories, less than 20% of assessed river length was unmodified.¹⁴

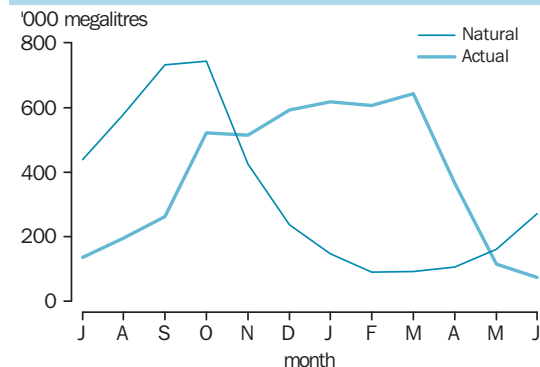
While at a national level only 15% of the nation's groundwater resources are being used, local overuse is becoming a major concern, as it is often not possible to restore a ground water system to its natural state. This overuse is creating resource degradation through processes such as depletion, salt intrusion and pollution.¹⁵

The removal of streamside vegetation allows increased sediment into the river, which can add nutrients and pollution harmful to aquatic species and overall river health. Vegetation is degraded in many catchments from clearing, grazing and salinity: in some areas of Western Australia, for example, 48% of rivers and 34% of creeks have lost much of their streamside vegetation and fewer than 10% of wetlands have healthy fringing vegetation.¹⁶

Irrigation and tree clearing have caused rising water tables and increased the salt in groundwater in many places. This increasing salinity is a threat to the health of our aquatic ecosystems and our water supplies.¹⁰ Erosion from land surfaces and stream banks has also resulted in widespread degradation of aquatic habitat.¹³ In addition, dryland salinity is seen as a growing problem that is threatening agricultural production, infrastructure and the ecological integrity of the rivers.

Drinking water for most of South Australia and many inland towns in New South Wales is at risk from increasing salinity.¹⁰ If salinity is not

Natural and actual flows per month, River Murray at Albury — 1999–2000



Source: Murray-Darling Basin Commission.

Algal blooms

Algae, a natural component of aquatic environments, are an important part of the food chain, and even when they are abundant this is not necessarily a problem. Often a proliferation of microscopic algae can have beneficial effects on fisheries and aquaculture industries such as oyster or mussel farms by increasing the amount of food available.

However, there are times when algal blooms, the rapid excessive growth of algae, can poison the water, affecting people, wildlife and livestock. Some types of algae can cause liver damage or tumour growth, and skin and eye irritation.

The amount of phosphorus present is a key factor in whether or not an algal bloom develops, but blooms also depend on a number of other factors, including flow rates, turbidity, light, salinity and nutrient loads. The extra algae in the water outcompetes other plant life and absorbs oxygen from the water. Aquatic animals die and create more phosphate for the algae, intensifying the problem. They are most common in storages, lakes, wetlands and stretches of rivers that have still waters and are enriched with plant nutrients, nitrogen and phosphorus (these substances can enter water from fertiliser run-off, fish farms, sewage and stock manure as well as from urban storm water). They are a significant problem in reservoirs and other water storage areas because of the increased costs of treatment, management and sometimes provision of alternative water supplies.

Algal blooms are not a new phenomenon but they are now far more common than they used to be. Blooms are often indicative of a decline in the ecological health of freshwater systems, and can occur in urban or rural areas. It has been estimated that freshwater algal blooms (excluding blooms in estuarine or coastal waters) cost Australian water users between \$180m and \$240m annually.²¹

controlled in the River Murray, Adelaide's drinking water has been predicted to exceed guidelines for salinity on two days in five by the year 2020.¹⁰

Nationwide, 80 of 851 nationally important wetlands are affected by salinity, and this is predicted to rise to 130 by the year 2050. Many of these wetlands contain species at risk from salinity.¹⁰ The causes of salinity and its impact are discussed in the commentary *The Natural Landscape – Land*.

Water resource development has altered the seasonal characteristics, rate and variability of flows in many river systems. For example, the flow of the River Murray through Albury would naturally peak in spring and be at its lowest in February. Now water is stored in dams in winter and atmospheric released for irrigation in summer and autumn. As a result, peak flows, which are reduced, occur in summer, with minimum flows in the winter.¹⁸ These changes resulted in inappropriate water regimes for a number of ecological communities, including Barmah-Millewa forest, with unseasonal and unnatural wetting and drying having marked effects on plant and animal communities with many in-stream habitats, floodplains and wetlands becoming permanently flooded.¹⁹ This, in tandem with the overall decrease in flows, led to a reduction in the available habitat and also reduced the reproductive cues of many aquatic species.^{19,20}

The release of cold water from storages has also affected the reproductive cycle of many aquatic species,¹⁸ while changes in flow patterns have helped exotic species, such as carp, to spread and out-compete native species.²⁰ Reduced flows are one factor that can lead to more severe algal bloom outbreaks because of stagnation (see box). A water management strategy has been developed for the Barmah-Millewa forest which allowed for the usage of an environmental water allocation (EWA) (100 GL / year). The release of the EWA is normally timed to supplement floods already occurring in the forest, to allow high water levels to remain longer in the forest by slowing the recession of the flood. In 2000, it prolonged the forest flooding and created suitable conditions for the successful breeding of a wide number of species.²¹

Native freshwater fish

Over the past 100 years, populations of native fish species have suffered serious decline in both distribution and abundance. Many factors have contributed to the deterioration of fish habitat and native fish populations. These include significant

River condition

Use of Australia's land and water places pressures on the river systems. In 2001, the National Land and Water Resources Audit (NLWRA) assessed river condition for those rivers in the more intensively used parts of the country. The data focussed on the diversity of macroinvertebrates (bugs) that inhabit different stretches of river. Because these animals are sensitive to changes in river catchments (e.g. land clearing) and to changes in the condition of the river (e.g. water quality), they are good indicators of river condition.

The data showed that 23% of assessed sites were significantly impaired, having lost 20–50% of macroinvertebrates expected to be present. A further 6% were severely impaired (having lost 50–80% of expected macroinvertebrates) and 2% were extremely impaired and had lost more than 80% of expected macroinvertebrates. The majority of impaired rivers were in New South Wales.¹³

River condition (biota index), by state

	% of sites assessed where biota was		
	Significantly impaired	Severely impaired	Extremely impaired
	%	%	%
NSW	34	13	3
Vic.	20	3	1
Qld	17	2	1
SA	12	1	4
WA	29	6	1
Tas.	20	3	2
NT	10	2	..
ACT	29	7	..
Aust.	23	6	2

Source: National Land and Water Resources Audit, 2001.

Wetlands

Australia probably has the most variable wetland and floodplain systems in the world, reflecting the nature of our climate, particularly in the inland. They protect our shores from wave action, reduce the impacts of floods, absorb pollutants, purify our water, and provide habitat for animals and plants. They also form nurseries for fish and other freshwater and marine life and, because of this, they are critical to Australia's commercial and recreational fishing industries.²⁹ According to the international Ramsar Convention, Australia currently has 64 Wetlands of International Importance, covering a total of approximately 7.3 million hectares.³⁰

Wetlands include swamps, marshes, billabongs, lakes, saltmarshes, mudflats, mangroves, coral reefs, fens, peatlands, or bodies of water – whether natural or artificial, permanent or temporary. Water within these areas can be static or flowing, fresh, brackish or saline.

The National Land and Water Resources Audit (NLWRA) reported on the condition of 851 nationally important wetlands in 2001. Some 58% of the wetlands assessed were in good condition (recovery in short-term with minimum intervention) and were mainly found in northern and eastern Australia. Those assessed as near pristine occurred in several subregions – on Cape York Peninsula, Tasmania and parts of the Channel Country. Those in the rangelands and south-west of Western Australia, and most of New South Wales were in fair (recovery requires significant intervention) or degraded (recovery unlikely in the medium term) condition.

Changes in the condition of wetlands were also assessed. The condition of wetlands in 59% of subregions was static and was declining in 37% of subregions assessed in 2001. The NLWRA estimated some 50% of wetlands to have been destroyed since European Settlement.¹³

Riparian zones (riverbanks) were assessed as fair in 38% of subregions and degraded in 31% of subregions. The trend in the condition of riparian zones across 73% of Australia was one of decline, with over grazing, exotic weeds, changed water regimes, increased fragmentation, feral animals and changed fire regimes all listed as common threats.¹³

changes to water flow, thermal pollution, the degradation of in-stream and riverbank habitats, barriers to fish passage, the introduction of exotic fish species and fishing pressures.²³ The extent of each threat varies according to differences in water resources and urban and agricultural development. While fishing has played a role in the decline of fish populations, the modification and degradation of fish habitats have had the most substantial impact.²⁴

Of over 200 native species of freshwater fish in Australia, the Commonwealth lists 11 species as endangered and 10 as vulnerable to extinction.²⁵ Some 35 exotic fish species have become established in inland waters, with eight identified as having a significant impact.¹⁰ Many were introduced into Australia for ornamental or fishing purposes.²⁶ Some, such as trout and carp, are harming native fish. Carp feed by uprooting and killing aquatic plants which native species feed on. The carp thereby disrupt the river bank and stir up sediments which free nutrients that enhance toxic algae (they also contribute to algal blooms by preying on the species which feed on the algae).

This also reduces the number of aquatic invertebrates which native fish feed on.²⁷

Estimates of the present levels of native fish communities in the Murray-Darling Basin are 10% of the pre-European settlement level. This level is not considered to be sustainable in the long-term.²³ In order to address this decline, a Native Fish Strategy has been developed by the Murray-Darling Basin Commission, which aims to rehabilitate native fish communities back to 60% of their estimated pre-European settlement levels within 50 years.²³

Some differences within Australia

Rainfall, or the lack of it, is the single most important factor determining land use and rural production in Australia. Agriculture was by far the largest consumer of water in 2000–01, accounting for 67% of total water use in Australia. Australian agricultural establishments applied 10,404 GL of irrigation water to 2.4 million hectares (ha) of crops and pastures in 2002–03. The largest volume of irrigation water that was applied was on pastures for grazing purposes (2,827 GL), followed by cotton (1,526 GL), sugar cane (1,293 GL) and cereal crops for grains or seed (1,002 GL). Rice required the highest application rate of irrigation water (14.1 ML/ha), followed by cotton (6.5 ML/ha).²⁸ The majority of Australians (80%) rely on mains or town water for drinking. This reliance on mains or town water for drinking is more pronounced in the capital cities (89% of households in 2004) than outside capital cities (67% of households).¹²

Protecting Australia's inland waters

Although there is still much to learn, research and reporting into Australia's water resources by the National Land and Water Resources Audit, the CSIRO – Water for a Healthy Country Flagship, the ABS *Water Account, Australia*, State of the Environment Reports and state and territory water management agencies are improving our knowledge of this valuable resource.

In 2003, the Council of Australian Governments (COAG) agreed to review its 1994 water reform framework through a new National Water Initiative which plans to set the water policy agenda for the next ten years and beyond. The agreement was signed in 2004 by the Australian Government and all state and territory governments, with the exception of Western Australia.

The National Water Initiative aims to:

- ◆ encourage water conservation in our cities, including better use of stormwater and recycled water
- ◆ ensure ecosystem health by implementing regimes to protect environmental assets
- ◆ improve the security of water access entitlements, including the return of allocated systems to sustainable allocation levels, and
- ◆ ensure that water is put to best use, involving clear rules for trading, robust water accounting arrangements and pricing based on full cost recovery principles.³²

Factors influencing change

Australia is the driest inhabited continent, even though some areas of Australia receive annual rainfall of over 1,200mm. Rainfall in Australia is variable and uneven. Patterns of low rainfall vary over the years, and so climatic variation is a major influence on water availability. Over the longer term, population growth has led to increased water use, but its contribution has been small in recent times. The main changes since the 1990s have come from increased agricultural and industrial use (to a large degree, these are independent of population growth). Most of the 12% rise in total water consumption between 1996–97 and 2000–01 was due to the agricultural sector. However, more recently (2002–03) due to drought conditions, a lower level of water use by this sector has been apparent.³¹

Changes in economic activity affect water use, with each industrial sector using water according to its size and needs, so the economy's industry composition is important. New industries, such as those in the growing service sector, use water much less intensively than agriculture, manufacturing and mining, and so the economy as a whole is now less reliant on intensive water use. Meanwhile, a greater focus on efficient use of water has led to an increase in the volume of waste water re-used. In 2000–01 approximately 517 GL of water were reused, up from 134 GL in 1996–97.⁵ At less than 4% of the total water supplied by water providers in 2000–01, this figure has the potential to grow significantly.

Across Australia, catchment land use and diverting water are considered the most serious changes to the ecological condition of Australia's rivers, wetlands and groundwater dependent ecosystems. Australian governments are working on a framework for 'water reform' aimed at halting degradation in inland waters and minimising unsustainable use. Its main elements include provisions for water entitlements and trading, environmental requirements, institutional reform, water pricing, research and public education.

Links to other dimensions of progress

Economic production, in particular agriculture, is the major user of water. Water degradation is strongly linked to inappropriate land management (often in the past) such as land clearance and forms of soil degradation, while much of our biodiversity depends on healthy freshwater ecosystems.

The quality of our inland water and changes to the land are linked to one another. For example, increasing river salinity caused by dryland salinity can result in water becoming too saline for drinking or irrigation. It can also kill streamside vegetation. This, in turn, can increase erosion in river banks, which can cause further deterioration in water quality and loss of aquatic species.

Contaminated water can affect the health of ecosystems, people and livestock, while managing contamination involves a significant economic cost (e.g. the total costs of managing algal blooms were estimated to be in the order of \$200m a year during the late 1990s).²²

See also the commentaries *Health, National income, The natural landscape – biodiversity, The natural landscape – land, and Oceans and estuaries*.

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The air and atmosphere

The atmosphere surrounding our planet is composed of a number of different gases, mostly nitrogen and oxygen, with traces of other gases, such as carbon dioxide, ozone, plus minute particles like dust. These gases each play a role in supporting life on earth, for example: oxygen is required to sustain living animals; a layer of ozone, some 15 to 30 kilometres above us in the stratosphere, shields us from harmful ultraviolet rays from the sun; and greenhouse gases, predominantly carbon dioxide, maintain the surface temperature of the earth at an average 15°C. Some human activities change the nature of the atmosphere, impacting on air quality, the levels of UV radiation reaching the earth, and climate.

The commentary that follows comprises two subsections:

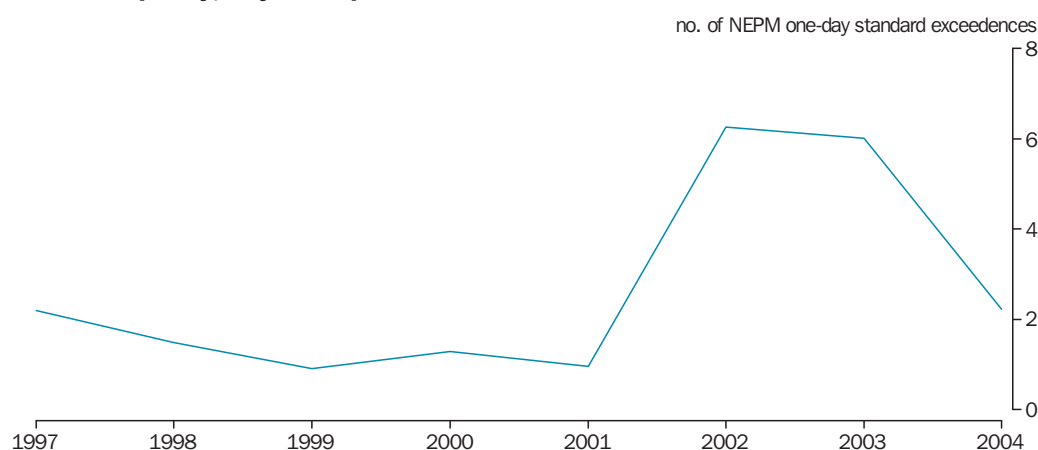
- ◆ **Air quality:** Air quality has direct impacts on human health and enjoyment of life, and is particularly an issue in urban areas. Ideally, a headline indicator would encapsulate all aspects of air quality, but pollution takes many forms and there is, as yet, no agreed way in which different pollutants could be combined into just one measure. The headline indicator considers urban air quality expressed as the concentration of fine particle pollutants in the atmosphere. Their distribution is monitored over time in all large cities and is a measure of the form of air pollution about which many health experts in Australia are most concerned. Other pollutants also have negative impacts. The highest one hour averages of sulfur dioxide in selected regional centres and the number of days when ozone concentrations exceeding guidelines in selected capital cities are also included as supplementary progress indicators. The commentary includes information about the impact of industrial activity and the growth in fossil-fuel dependent traffic on the air.
- ◆ **Atmosphere:** The atmosphere is an essential component of all ecological systems on Earth. Global warming and climate change are potential threats to biodiversity and to all ecosystems, economies and societies. Australia's net greenhouse gas emissions is the selected headline indicator. While Australian emissions are only a small contributor to the global emissions, our environment can be influenced by the actions of other countries, and we, in turn, can influence other countries' environments. The commentary also considers the important factors behind the growth in our emissions and considers these changes alongside the changes in per capita emissions and emissions per dollar of GDP. Renewable energy resources and the consumption of ozone depleting substances in Australia are also discussed.

The commentary and statistics that follow use a range of information from the Australian Bureau of Statistics and other sources. Three sources which we have used considerably are the National Environment Protection Council's ambient air quality measures, the National Pollutant Inventory database, and the National Greenhouse Gas Inventory (NGGI). The 2004 NGGI is scheduled for release in late May 2006. These are three of the most significant sources of detailed environmental data for Australia on air and atmosphere.

For this 2006 edition of MAP, the content of the Environment chapters was reviewed and some reorganisation of the chapters has occurred. Two key issues, the quality of our air and the Earth's atmosphere, were previously spread across two separate chapters (*The human environment* and *International environmental concerns*). These issues have now been brought together in this chapter on *The air and atmosphere*, along with their two headline indicators. The chapter on International Environmental concerns, which appeared in the 2004 edition of MAP, focussed exclusively on the issues of greenhouse gas emissions and climate change and has been completely subsumed into this new chapter. Some of the commentary in *The Human environment*, which did not relate to *The Air and atmosphere*, now appears in other areas of MAP 2006.

The air and atmosphere: key points

Urban air quality, days fine particle health standards were exceeded



(a) Data are from representative sites in Sydney (Liverpool), Melbourne (Footscray), Brisbane (Rocklea), Perth (Duncraig) and Adelaide (Thebarton for 1997–2002 and Netley for 2003–2004), and have been combined in proportion to each city's population. (b) Number of days when the National Environment Protection Measures (NEPM) average daily PM10 standard is exceeded.

Source: State environmental protection agencies, 2006

Fine particle health standards were exceeded in the selected urban areas on average between one and two days each year between 1997 and 2004.

The relationship of air quality to progress

Australians consistently rank air pollution as a major environmental concern. The state of our air is an important factor in the quality of life in Australian cities, where the main source of pollution is from motor vehicles (in regional centres industry and woodheaters have the largest impact). Poor air quality has a range of negative impacts: it can cause health problems, damage infrastructure, reduce crop yields and harm flora and fauna.

About the headline indicator and its limitations: Urban air quality

Ideally, a headline indicator would encapsulate all aspects of air quality, but pollution takes many forms and there is, as yet, no agreed way in which different pollutants could be combined into just one measure. Fine particles and ozone are the air pollutants of concern in Australia, having peak concentrations at or above national air quality standards and showing no consistent downward trend in some major cities. For this reason, the headline indicator considers urban air quality based on the concentration of fine particles in the atmosphere.

Most pollutants are more common in urban and industrial areas than in rural Australia, and so the graph summarises data from Sydney, Melbourne, Adelaide, Perth and Brisbane. Meteorological conditions, for example still air, can slow down the removal of pollutants and increase the impacts of this pollution. In some regions of Australia, particularly during the cooler months, woodsmoke from woodheaters results in elevated particle levels. Further, high concentrations of fine particles from irregular events, such as forest fires, can obscure the longer trend in levels produced by regular sources, like car emissions.

Air quality: Other indicators

Number of days when ozone concentrations exceed guidelines, selected capital cities; Highest one hour averages of SO₂, selected regional centres.

Some differences within Australia

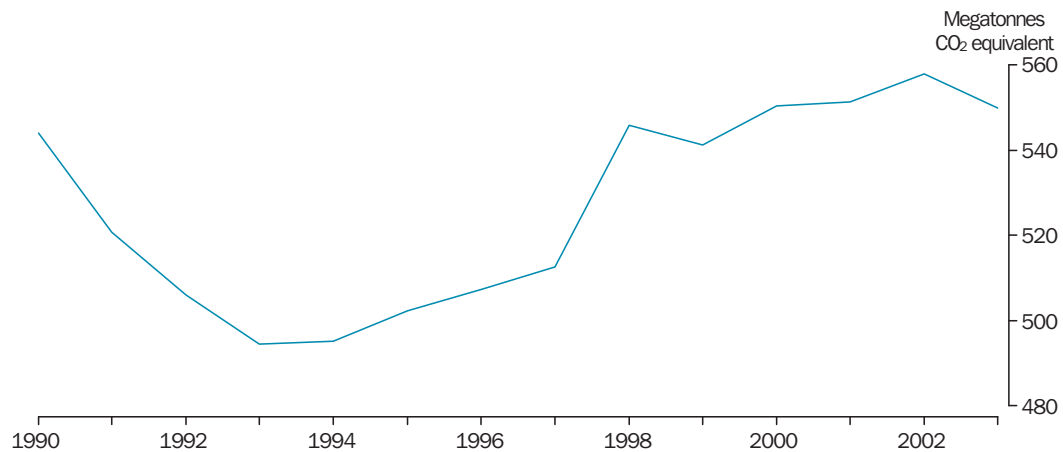
Different parts of the country experience different types and levels of air pollution, but air quality outside the major cities seems generally good, and levels of pollutants are generally well below actual or proposed standards.

Links to other dimensions

See also the commentaries *Health*, *National income*, *The natural landscape*, and *Oceans and estuaries*.

The air and atmosphere: key points

Australia's net greenhouse gas emissions(a)



(a) Kyoto-based estimates, expressed in millions of tonnes (megatonnes) of carbon dioxide equivalent.

Source: Australian Greenhouse Office, *National Greenhouse Gas Inventory 2003*. The 2004 NGGI is scheduled for release in late May 2006.

Under the Kyoto accounting provisions relating to Australia's internationally agreed target, Australia's net greenhouse gas emissions in 2003 totalled 550.0 Mt of carbon dioxide equivalent. Total net emissions were 1.1% (5.9Mt) higher in 2003 than in 1990.

The relationship of the atmosphere to progress

Some of the things humans do change the nature of the atmosphere – impacting on air quality, the levels of UV radiation reaching the earth and the climate that all plants and animals depend on. Unlike air quality issues, which are generally localised, ozone depletion and climate change are global problems that the whole world contributes to, and feels the effect of.

The effects of global warming are very difficult to predict. Global warming could – if certain scenarios of the Intergovernmental Panel on Climate Change prove correct – have profound consequences for our economy and society (increasingly frequent and severe floods and rising sea levels, for instance, have the potential to cause damage and have significant consequences for low lying islands and coastal settlements). Australia's biodiversity and freshwater ecosystems might also be affected by climate change.

About the headline indicator and its limitations: net Greenhouse gas emissions

The headline indicator assesses Australia's total net greenhouse gas emissions. Net emissions are estimated using information about total emissions, less any credits from forest sinks (the credits are estimates of how much carbon dioxide has been absorbed by new and expanding forests established in Australia since 1990).

Atmosphere: Other indicators

CO₂-e emissions, total, per capita and per \$GDP; Australia's greenhouse gas emissions for selected sectors, Carbon dioxide measurements, and Consumption of ozone depleting substances.

Some differences within Australia

Climate change may have different impacts on different parts of Australia, but the regional impact of climate change is very difficult to predict.

Links to other dimensions

See also the commentaries *National income*, *The natural landscape*, and *Productivity*.

The air and atmosphere – Air quality

Progress and the headline indicator

Poor air quality has a range of negative impacts: it can cause health problems, damage infrastructure, reduce crop yields and harm flora and fauna. Air pollution occurs both naturally and as a result of human activities. On occasion, natural events such as dust storms and bushfires can cause severe air pollution. Health effects from elevated levels of air pollution may be acute, when caused by short-term peaks, or chronic, from prolonged exposure to lower levels. A 2001 report estimated fine particle pollution had been linked to the deaths of up to 2,400 people a year in Australia, with an associated health cost of \$17.2b.¹

Australians consistently rank air pollution as a major environmental concern.² Ideally, a headline indicator would encapsulate all aspects of air quality. Pollution takes many forms and there is, as yet, no agreed way in which different pollutants could be combined into just one measure. Fine particles and ozone are the air pollutants of most concern in Australia, having peak concentrations at or above national air quality standards and showing no consistent downward trend in some major cities.³ The headline indicator considers the concentration of fine particles in the atmosphere (see box), a measure of the form of air pollution about which many health experts in Australia are most concerned.⁴

The common air pollutants are found at higher levels in urban and industrial areas than in rural Australia. As there is little long-term information about air quality over much of Australia, the headline indicator graph summarises data from continuous air monitoring stations in Sydney, Melbourne, Adelaide, Perth and Brisbane.⁵ It is important to note that daily changes in air quality depend on ambient conditions, like wind direction and the monitoring station's proximity to pollution sources. Further, high concentrations of fine particles from irregular events, such as forest fires, can obscure the longer trend in levels produced by regular sources, like car emissions.

Overall, air quality in Australia is relatively good and has generally improved during the 1990s. Fine particle health standards were exceeded in the selected urban areas on average between one and two days each year between 1997 and 2001. There was a rise in 2002 and 2003, mainly due to severe forest fires and dust storms around the Sydney and Melbourne areas which caused the National Environment Protection Measure (NEPM) goal to be exceeded on 13 days in Sydney in 2002 and 10 days in Melbourne in 2003. The goal was also exceeded on seven days in Brisbane in 2002. Sydney and Brisbane recorded one and two day's exceedences, respectively, in 2004.

The station in Melbourne recorded air quality exceeding guidelines on ten days in 2003 and three days in 2004, but on only two days or fewer per year between 1999 and 2002.

Fine particles

Fine particles in the atmosphere come from a wide variety of sources, including soil (dust), vegetation (pollens and fungi), sea salt, fossil fuel combustion, biomass burning (including bushfires) and industry. Particles suspended in air have the ability to penetrate the lower airways of the lung if smaller than 10 micrometres in diameter (referred to as PM10).

Increasing evidence suggests the acute health effects may, in fact, be the result of exposure to very fine particles, such as those smaller than 2.5 micrometres in diameter (referred to as PM2.5).⁶ It is these finer particles that are the main cause of urban haze, which typically appears white. Most of these particles are generated by people, rather than occurring naturally. The human health effects are many and depend on the size and chemical composition of the particles. Particles can aggravate existing respiratory and cardiovascular disease and asthma, can affect eyesight and cause allergies.

Some plants and animals are particularly sensitive to fine particle pollution. Lichens for example are often among the first life forms to be affected, while particles can cover the leaves of larger plants and damage their ability to photosynthesise.

Air quality in Brisbane exceeded guidelines on seven days in 2002, and on no or only one day in other years between 1997 and 2001. The Perth station recorded four days exceedences in 1997, but no more than a single day's exceedence in each year between 1998 and 2003. The station in Adelaide recorded air quality guidelines were exceeded on two days in both 1997 and 1998, and five days in 1999 and 2004, and six days in 2003. Between 2000 and 2002, the levels of fine particles in the air met the NEPM standard every day.

Some differences within Australia

Different parts of the country experience different types and levels of air pollution, but air quality outside the major cities is generally good, and levels of pollutants are generally well below actual or proposed standards.⁷ Fine particles (particularly wind blown dust) are often the principal air pollution problem in most of our regional centres.⁷ In some places like Armidale, Canberra and Launceston, high particle levels are more likely to occur during winter and autumn when people are using open fires and wood heaters for heating.¹ Some areas, far from major sources of pollution, can suffer from the long range transport of pollutants.

In the past year breaches of air quality have occurred in the latter part of the year due to drought conditions, and atmospheric and weather conditions.⁸ Dust storms can also occur when there is a rapid change of wind speed and direction. Bushfires and controlled burn-offs also pollute.⁷

Other air pollutants

The headline indicator for air quality focuses on one form of air pollution: fine particles. Other substances released into the air can be harmful to both people and the environment. Some

substances pollute directly and are known as primary pollutants. The most widespread of these apart from fine particles are carbon monoxide, volatile organic compounds, hydrocarbons, oxides of nitrogen, sulfur dioxide and lead. Some pollutants can interact in the presence of sunlight to form secondary pollutants, called 'smog'.

There has been less and less lead in Australia's air since the introduction of unleaded petrol in 1986 and the phase out of leaded petrol which was completed by January 2002. Lead levels in major cities and towns are now very low, in some instances less than 10% of the level specified in the national air quality standard. Lead remains a problem where smelters are located close to urban areas and the national standard is exceeded on occasions in these locations.⁹

In most Australian towns and cities, the levels of carbon monoxide in air are below levels that are hazardous for human health. Only larger cities, like some of our capital cities, have the potential to have harmful levels of carbon monoxide.¹⁰ Similarly the levels of nitrogen dioxide reached in most Australian towns and cities are thought to be acceptable for humans. However, in some of Australia's larger cities, it is possible that the concentration of nitrogen dioxide sometimes increases for a short time to levels that have an adverse health effect on people who are most at risk.¹¹ The incidence of photochemical smog has remained more or less stable and is discussed below.⁷

Ozone and photochemical smog

Ozone (O₃) is formed when oxides of nitrogen react with sunlight in the atmosphere. It is a natural part of the upper levels of the atmosphere or 'stratosphere' where it absorbs harmful ultraviolet radiation, preventing it from reaching the earth. Near the ground, ozone is a secondary pollutant, often formed by the reactions of primary pollutants, such as oxides of nitrogen and volatile organic compounds in the presence of sunlight. These primary pollutants arise mainly from motor vehicle emissions, stationary combustion sources and industrial and domestic use of solvents and coatings. Ozone is strongly oxidising and can irritate the eyes and the respiratory tract and it also damages plants. Ozone is one of the irritant pollutants in photochemical smog and is often used as a measure of it. As sunlight is an important factor in the formation of ozone (and hence smog), smog is more likely on sunny days in cities.

Ozone has been monitored in most cities since the late 1970s. Peak ozone levels have declined significantly over that period although in recent years the trends are not as apparent. There is significant year-to-year variability in peak ozone levels due to weather variability. Exceedance of the current ozone standards are occasionally observed in most major Australian cities, with more frequent exceedances observed in Sydney.¹² Sydney often records more than five exceedance days per year; partly due to the topography of the Sydney Basin.

Number of days when ozone concentrations exceed NEPM standard(a) in selected capital cities(b)



(a) Ozone concentrations 4 hour average. Exceedance of 0.08ppm allowed on one day a year — the NEPM standard to be achieved by 2008. (b) Data are for Sydney, Melbourne, Brisbane, and Perth and have been weighted together in proportion to these cities' populations.

Source: State environmental protection authorities, 2006.

Sulfur dioxide emissions

Sulfur dioxide (SO₂) is a colourless, irritating and reactive gas with a strong odour. In Australia emissions of sulfur dioxide come primarily from industrial operations that burn fuels such as coal, oil, petroleum and gas and from wood pulping and paper manufacturing. It is also emitted by vehicles. It irritates the eyes, nose and throat, and people with impaired lungs or hearts and asthmatics are particularly at risk of exacerbating existing health problems.¹³

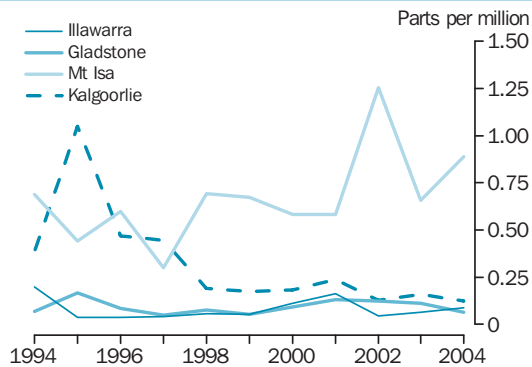
Ambient sulfur dioxide concentrations are generally low.¹⁴ Sulfur dioxide levels vary between regions due to varied geographical distribution of major sources and different topographical and meteorological conditions. Sulfur dioxide levels in Australian cities are low compared to the USA and Europe because of the limited number of major sulfur dioxide emitting industries and low sulfur fuels.¹⁴

Sulfur dioxide pollution has been an issue in some mining areas, but is improving. Due to improvements in mineral extraction and processing activities at Kalgoorlie in Western Australia, sulfur dioxide levels have been reduced dramatically over the last 12 years. In New South Wales the copper smelting operations at Port Kembla which resulted in significant emissions, have recently ceased and sulfur dioxide levels are expected to reduce.¹⁴ In recent years, one hour sulfur dioxide levels have been below NEPM standard levels at Gladstone, the Lower Hunter and La Trobe Valley (power generation areas using coal).⁷

Factors influencing change

Air pollution is a problem in every major city of the world, although the degree of the problem varies. Air has always contained natural substances like sea-salt or gases from decaying plants and animals, but industrial activity and the growth in fossil-fuel

Highest one-hour averages of SO₂ in selected regional areas(a)



(a) The National Environmental Protection Measure standard for SO₂ concentrations is 0.2 parts per million.

Source: State environmental protection authorities, 2006.

dependent traffic have released millions more tonnes of pollutants into the air (for example, over a million tonnes of PM₁₀ emissions in 2002–03).¹⁵ Most of these emissions (20%) are from the use of fossil fuels.

Motor vehicles are Australia's single largest source of air pollution.⁷ For example, in Melbourne in 2004, their emissions contributed 83% of the carbon monoxide (which can affect memory and vision, cause heart disease and harm unborn children), 41% of hydrocarbons and 63% of nitrogen oxide levels (which contribute to photochemical smog formation) and were a major contributor to many volatile organic compounds (which contribute to smog).¹⁷ Cars and trucks generate fine particles directly through burning fossil fuels, especially diesel. Diesel generates far more fine particles than petrol per litre, and generates more of the finest particles (smaller than 2.5 micrometres) which have serious health implications for humans.¹⁸ Vehicles also generate fine particles when tyres lose rubber, while tyre and air turbulence wear away road surfaces.

To combat pollution from traffic in our cities government policy has aimed to cut emissions from motor vehicles through the Fuel Quality Standards Act 2000, paving the way for improved engine technology and tighter emission controls. Cleaner fuel for cleaner engines is expected to help cut pollutants associated with respiratory and cardiovascular diseases by up to 76% in metropolitan areas by 2015.¹⁹

Technology and strategies designed to control air pollution appear to have countered the rises which could have been expected given the increases in pollution sources.² Despite industrial activity and the numbers of cars growing during the 1990s, measured air quality has not deteriorated significantly. So far the improvement in air quality is mainly due to the phasing in of cleaner motor vehicles, controls on industrial emissions and the increasing adoption of cleaner processes and technology by industry, and the banning of backyard incineration in many regions. Projections

prepared for the National Road Transport Commission suggest that by 2015, despite significant growth in numbers of diesel vehicles (light commercial vehicles in particular), fine particle emissions from all diesel vehicles will fall in the major cities to about 70% or less of their 1996 levels.²⁰ The main reason for the predicted fall is that older vehicles will be replaced by newer, less polluting vehicles. Cars and trucks are becoming cleaner in other ways too. For example, the switch to unleaded petrol and the use of catalytic converters has led to significant reductions in lead pollution in some areas (lead concentration at Mascot, inner Sydney, fell by some 60% between 1993 and 1996).²¹ A greater use of renewable power sources to generate electricity could also reduce some forms of air pollution.

Links to other dimensions of progress

Air quality is linked to human health. While the full effects of pollutants like fine particles are still poorly understood, Australian studies are consistent with those overseas which show that days of high pollution levels have increased mortality rates, hospital admissions and emergency room visits for respiratory and cardiovascular disease.²

Polluted air can harm biodiversity: smog and acid rain can affect many plants and animals.²²

Air quality is linked to the generation of income. Economic activity, especially among the more energy-intensive industries, creates pollution. But in turn, air pollution has financial impacts, such as the cost of cleaning buildings, while acidic gases in the atmosphere can corrode iron and steel. Agriculture can also be affected: polluted air can harm crops and livestock. Land clearance and degradation contribute to air pollution: fine particles are created when vegetation is burnt, and when eroded soil is blown into the air.

See also the commentaries *National income*, *Transport*, *Health* and *The natural landscape*.

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- 3 Department of the Environment and Heritage, *Air Quality in Australia* <<http://www.deh.gov.au/atmosphere/airquality/pollutants.html>> last viewed 23 March 2006.
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- 10 micrometres may be more important in relation to asthma and respiratory illnesses.
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The air and atmosphere – Atmosphere

Progress and the headline indicator

Greenhouse gases are a natural part of the atmosphere. They trap the sun's warmth, and maintain the Earth's surface temperature at the levels able to support life. However human actions – particularly burning fossil fuels (coal, oil and natural gas) and land clearing – are increasing the concentrations of these gases that trap more heat and change the climate. This is known as the greenhouse effect.¹

Global warming is widely perceived as one of the most significant international environmental concerns. Australia's contribution to these international concerns is an important aspect of progress. Australia's greenhouse gas emissions are the focus of the headline indicator. This commentary also looks at Australia's ozone depleting emissions.

According to meteorological records, the global average surface temperature has increased. Global temperatures in 1998, 2002 and 2003 show these were the three warmest years since 1861 – when reliable direct weather recording began.² Global-average surface temperature has increased over the past 100 years by about 0.6°C.² In Australia annual mean temperatures have increased, although this has not been uniform.³

The effects of global warming are very difficult to predict. Australia will be hotter and drier in coming decades according to CSIRO's climate change estimates.⁴ In its Third Assessment Report released in 2001, the international body, the Intergovernmental Panel on Climate Change (IPCC), presented a range of scenarios that provide projections of future climate change, some of which suggest significant global warming. The construction of IPCC scenarios is ongoing, and some have expressed concerns about their economic and statistical underpinning.⁵

The headline indicator presents Australia's total net greenhouse gas emissions. The indicator is based on estimated total emissions from human sources including fossil fuel burning and land clearing, less credits from carbon sinks (such as forests). These credits are estimates of how much carbon dioxide has been consumed by plantations established in Australia since 1990.⁶ It is particularly difficult to measure and estimate the exchanges between the biosphere and the atmosphere accurately, such as emissions from land clearing and credits from reforestation.⁶ Recent research findings about the methane emissions of plants may impact on these measures.⁷

Estimates of Australia's emissions vary according to the accounting conventions used. Unless otherwise indicated, the emission estimates produced using the Kyoto accounting rules are used here. These estimates are higher than those calculated for the United Nations Framework Convention on Climate Change (UNFCCC), although changes over time are broadly similar (the main difference relates to the treatment of forest sinks).⁶

For 2003, Australia's net greenhouse emissions were estimated to be 550.0Mt carbon dioxide-equivalent (CO₂-e).⁶ According to UNFCCC data for 2003 emissions, Australia accounts for 3.9% of total industrialised countries emissions.⁸ The net amount emitted in Australia in 2003 was a 1.4% decrease on net emissions in 2002, largely reflecting decreases in emissions from Land use, land use change and forestry, and from Waste. Australia's net emissions in 2003 were 1.1% above 1990 levels. Emissions rose gradually over the period, with the sharpest rise between 1997 and 1998 when emissions from land use change rose rather than fell as they had done during most of the decade.⁶

Carbon dioxide is the major greenhouse gas in Australia's 2003 inventory with a share of 74% (404.6Mt) of the total CO₂-e emissions, followed by methane which comprises 20% (108.5Mt CO₂-e). The remaining gases make up 7% (37.0Mt CO₂-e) of Australia's greenhouse gas emissions.⁶

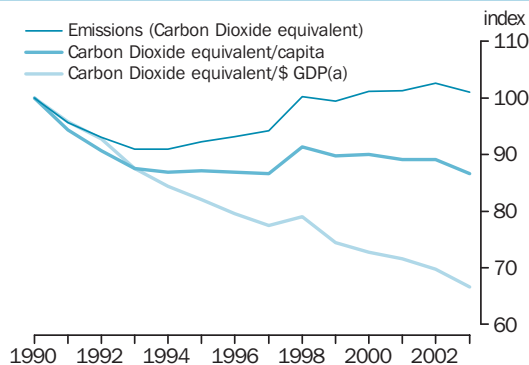
In order to compare countries of different population size, one can consider per capita emissions of greenhouse gases. According to UNFCCC estimates Australia has the highest net greenhouse gas emissions per capita in 2003 of all OECD countries. At 27.5 tonnes of CO₂-e per person, emissions by Australians are 32% higher than the USA and more than double the average for most OECD countries. In Australia, per capita emissions declined by almost 10% between 1990 and 2003.⁸ This decline is accounted for by a large reduction in emissions from land-clearing. The fall in emissions from land clearing has masked the increase in emissions from other sources, especially energy.⁹

Australia's large per capita emissions in part reflect our heavy use of coal in electricity generation: according to OECD estimates for 2003, about 57% of Australia's carbon dioxide emissions arose in the production of public electricity and heat, a higher proportion than any other OECD country, with the exception of Poland (57%). Some 38% of the OECD's entire CO₂ emissions were generated for this purpose.¹⁰ Unlike most OECD member countries, Australia does not use nuclear power to generate electricity. As well, the impact of international trade patterns result in Australia producing many goods with high associated emission levels, which are destined for export and consumption in other countries.

Some differences in Australia

As the effects of global warming are very difficult to predict at a broad level it is even harder to predict the impacts for regions, although some attempts have been made. Over most of the continent, annual average temperatures are predicted to be 0.4°C to 2°C greater in 2030 compared to 1990. Temperatures are predicted to further increase, but the warming won't be the same everywhere. It is expected that there will be less warming in some

CO₂-e emissions, net, per capita and per \$ GDP



(a) GDP is a chain volume measure. In accordance with Kyoto Protocol Base year = 1990.

Source: Australian Greenhouse Office (2005), National Greenhouse Gas Inventory - Analysis of Recent Trends and Greenhouse Indicators 1990-2003, Australian Greenhouse Office, Canberra.

Australia's relatively high rates of population and economic growth are important factors behind the growth in our emissions, and it is interesting to consider the changes in overall net emissions alongside the changes in per capita emissions and emissions per dollar of GDP. Emissions of greenhouse gases per capita decreased by 13% between 1990 and 2003, and emissions per \$ of GDP fell by 33%. The reduction in land use, land use change, and forestry emissions accounted for about 72% of the decline in emissions per dollar of GDP. As well there were structural changes in the economy, with stronger growth in the services sector than in the manufacturing sector. There has also been an improvement in the efficiency of energy use.⁶

coastal areas and Tasmania, and slightly more warming in the north-west.¹¹

Although there has not been much change in the overall level of rainfall the patterns have changed. South-western Australia has experienced decreases in rainfall, as has parts of south-eastern Australia and Queensland. Wetter conditions have occurred in northern Australia in summer and inland Australia in autumn.

Factors influencing change

The size of the economy, its structure and the energy intensity of industries are important determinants of greenhouse gas emissions. And it is informative to consider changes in the contribution of different sectors over time.

The rise in emissions over the period 1990 to 2003 has primarily been driven by a larger rise (31%) in emissions from the energy-sector. This rise has been partially offset by a significant decline (76.6Mt) in net emissions attributable to land use and land use change (this in turn comes from a reduction in emissions from land clearing).

In 2003, the energy sector (mainly power stations and transport) accounted for 68% (374.3Mt) of net emissions. Energy sector emissions were 1% (4.2Mt) higher than in 2002, and 31% (88.2Mt)

higher than in 1990.⁶ ABS figures from the mid-1990s show that more than half of this sector's greenhouse gases were emitted as a consequence of the production and/or consumption of goods and services used by households (particularly domestic electricity and motor vehicle fuel), and about a quarter of emissions were generated in the production of goods and services for export.¹²

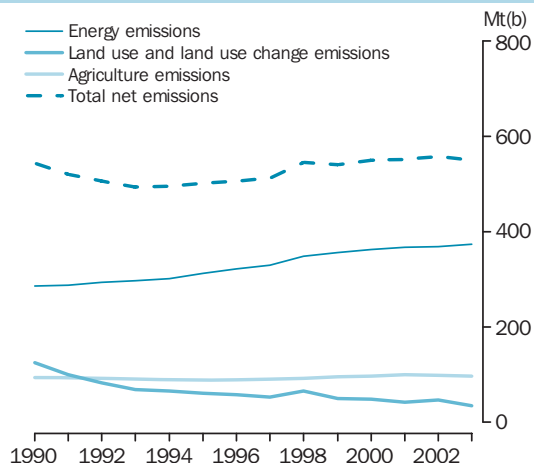
Agriculture was the second largest emitter of greenhouse gases, and accounted for 97.3Mt CO₂-e emissions or 18% of total net emissions in 2003. The agriculture sector is the major source of both methane and nitrous oxide — accounting for 68% and 77% respectively of the net national emissions for these two gases. Land use and land use change activities emitted about 49.6Mt CO₂-e, which represents a decline of 76.6Mt since 1990, and forest sinks consumed about 15Mt CO₂ during 2003. (Strictly speaking however, the credits from plantations established in Australia since 1990, are not officially accounted for until 2008-2012).⁶

Other things being equal, economic growth arising from industries that are emissions-intensive (such as iron, steel and aluminum smelting) will increase greenhouse gas output more than growth in sectors such as service industries which are less energy, and emissions, intensive.

The price of energy also has an influence in managing demand. Electricity prices fell in Australia during recent years, while the relatively low cost of vehicle fuel here helps to explain why our cars are larger, less fuel efficient and driven more than in many other countries.¹³

Reducing greenhouse gas emissions has become the subject of major international negotiations. In 1992, Australia ratified the UNFCCC, which sought to stabilise greenhouse gas concentrations in the atmosphere. The convention was updated by the Kyoto Protocol of 1997, which Australia signed but has not yet ratified. Under the protocol, developed countries are committed to reducing their greenhouse gas emissions by at least 5% below

Australia's greenhouse gas emissions(a) for selected sectors



(a) Kyoto-based estimates. (b) Million tonnes (megatonnes) of carbon dioxide (CO₂) equivalent.¹⁴ Source: Australian Greenhouse Office.

International comparison – Net greenhouse gas emissions

An OECD indicator comparable to the MAP headline indicator for atmosphere: net greenhouse gas emissions is available from United Nations Framework Convention on Climate Change (UNFCCC) reporting. However, the accounting provisions of the UNFCCC are broader in scope than those of the Kyoto Protocol, which is the basis on which net greenhouse gas emissions are reported in Australia's National Greenhouse Gas Inventory. This variation in accounting provisions is the reason for any differences in the data presented for Australia's net greenhouse gas emissions in this international comparison, compared with the headline indicator graph and commentary.

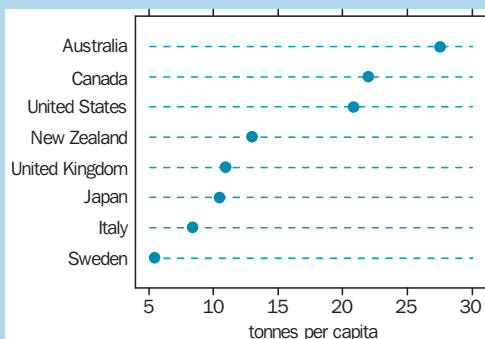
Increased greenhouse gas emissions from industrialisation and the potential for climate change are an environmental issue of international concern. The level of greenhouse gas emissions are indicative of the relative contribution of different countries to the global level of emissions. The change in greenhouse gas emissions per capita over time provide an indication of the response of different countries to the issues of reducing greenhouse gas emissions and climate change.

Two indicators are presented here – net greenhouse gas emissions per capita – 2003, and the change in net greenhouse gas emissions between 1990 and 2003 (based on the aggregate level of emissions). Net greenhouse gas emissions is the sum of the six greenhouse gases of the Kyoto Protocol expressed in CO₂ equivalents. The data include CO₂ emissions and CO₂ removals attributable to land use, land use change, and forestry.

In 2003, Australia had the highest per capita level of net greenhouse gas emissions of OECD countries (27.5 tonnes). Sweden had the lowest per capita level of emissions (5.5 tonnes).

Around one third of OECD countries experienced a decline in net greenhouse gas emissions during the period 1990–2003. The largest declines occurred in Poland (40% between 1988–2002) and the Slovak Republic (33%). Among OECD countries that experienced an increase in net greenhouse gas emissions during the period 1990–2003, the largest increase occurred in Canada (58%). Net greenhouse gas emissions increased by 5% in Australia during this time.

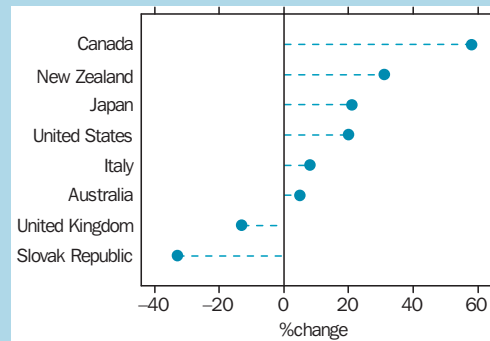
Net greenhouse gas emission per capita(a) – 2003



(a) Includes emissions/removals from land use, land-use change and forestry.

Source: *Per capita greenhouse gas emissions levels calculated from UNFCCC, National greenhouse gas inventory data for the period 1990-2003 and status of reporting, 2005*,⁸ using population estimates from *National Accounts of OECD countries, Volume 1, 2006*.

Change in net greenhouse gas emissions(a) 1990 – 2003



(a) Includes emissions/removals from land use, land-use change and forestry.

Source: *UNFCCC, National greenhouse gas inventory data for the period 1990-2003 and status of reporting, 2005*.⁸

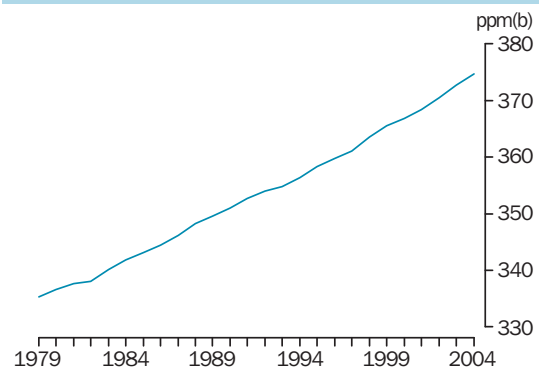
1990 levels by the first Kyoto commitment period (2008–12). However, at Kyoto, Australia negotiated an 8% increase in emissions.

Ozone depleting emissions

Ozone near the Earth's surface can be a harmful pollutant, but in the upper atmosphere (the stratosphere) it absorbs most of the harmful ultraviolet (UV-B) radiation in the sun's rays. When excessive UV radiation reaches the Earth's surface it can cause health problems to people and other organisms, including damage to the eyes, skin and immune system. It can also affect crop yields and marine plankton (which might have flow-on effects to many marine ecosystems). Radiation can degrade plastics, wood, paper, cotton and wool.

Certain substances trigger the destruction of ozone. Human activity has been responsible for

Carbon dioxide concentrations(a)

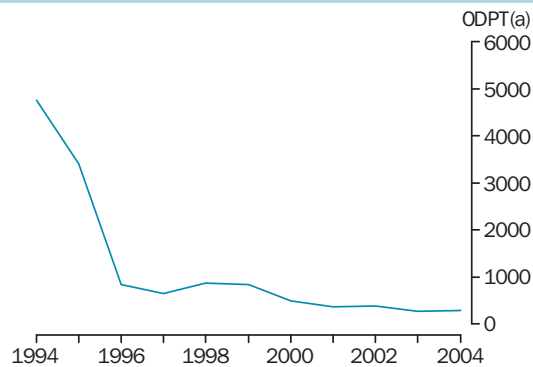


(a) Annual averages recorded at Cape Grim Baseline Air Pollution Station, Tasmania. (b) Parts per million.

Source: *CSIRO, 2005*.

Increasing greenhouse emissions are reflected in findings from atmospheric weather stations, such as the data from Cape Grim in Tasmania. The concentration of atmospheric CO₂ has increased steadily since 1979.

Consumption of ozone depleting substances in Australia



a) Ozone depleting potential tonnes are an aggregated scale of measurement which allows the addition of quantities of different gases and weights them according to the amount of ozone each could potentially deplete.

Source: The Department of Environment and Heritage.

increasing the concentrations of these substances in the upper atmosphere: the main ozone depleting emissions are chlorofluorocarbons (CFCs) used in refrigeration, and halons and methyl bromide, used in many industries. As a result of these emissions, between 2% and 4% of ozone over Australia has been lost each decade since the 1950s, and we are now exposed to greater levels of UV radiation than in the past.¹⁵

Global consumption of these substances is now limited by the Montreal Protocol on Substances that Deplete the Ozone Layer to which Australia is a signatory. Concentrations peaked in the mid-1990s and are now declining. But the substances already in the atmosphere continue to destroy ozone, and because of these time lags, the depletion of ozone over Australia and Antarctica may not yet have peaked, although ozone levels may not decline much further.¹⁵ The largest losses of ozone have been observed over Antarctica (more than 60% of natural levels).¹⁵ These losses have led to the so-called Antarctic ozone 'hole', an area of the stratosphere within which ozone concentrations are well below the levels as at the beginning of the 20th century.

Health effects linked to ultraviolet exposure

Australia has high levels of UV radiation and the highest per capita incidence of melanoma in the world, 46 per 100,000 persons in 2001, an increase of 60% since 1990.²² Since 1980, UV exposure in tropical regions of Australia has increased by 20% as a result of simultaneous depletion of ozone and decreases in cloud cover. At mid-latitudes, no significant net increases per year were found because of increasing levels of cloud cover but clear day levels of UV radiation rose. The increase in the incidence of melanoma is mainly thought to stem from people spending more time outdoors but the increase in UV radiation will also affect skin cancer rates. And exposure is directly linked to cataracts. Awareness campaigns have been put in place encouraging people to adopt protective measures.²³

Renewable energy resources

Most of the energy produced in Australia depends on the burning of fossil fuels, a significant source of greenhouse gases and air pollution. Increasing the energy generated from renewable resources is one way of decreasing or slowing the expansion of emissions. The Australian Government has set a mandatory renewable energy target of 9,500 gigawatt hours of renewable electricity by 2010.¹⁶

Data from the International Energy Agency show that the proportion of Australia's overall energy consumption that came from renewable resources was 8% in 2003, up from 6% in 1994. Although Australia's renewable energy consumption grew by one-quarter over the period, total energy consumption grew by one-third.¹⁷

Green power is the generic name given to electricity generated from clean, renewable energy sources that is available for use by consumers. Green power sources can include solar (photovoltaic and thermal), wind power, new hydro on existing dams, biomass, wave energy and landfill gas. In September 2005, around 180,000 (or 2% of) households and 6,500 commercial users belonged to a green power scheme.¹⁸

Some forms of renewable energy come with problems of their own. For instance, large hydro-electric schemes have had detrimental effects on river flows and have flooded river valleys, displacing people and animals and destroying flora. Some people find wind turbines aesthetically unpleasant.

Ozone depletion is not an irreversible problem and it appears that the achievements of the Montreal Protocol will result in the eventual recovery of the ozone layer. It is expected that the first signs of ozone recovery will be noticed in ten to fifteen years. Total recovery may occur as early as 2050, but could be delayed as long as 2100.¹⁵

Estimates of Australia's total consumption of ozone depleting substances, weighted according to the ozone depleting potential of each, are presented in the graph above. Consumption in 1994 was over 4,700 ozone depleting potential tonnes (ODPTs: an aggregated scale of measurement which allows one to add together quantities of different gases and weights them according to the amount of ozone each could potentially deplete). In 2004, it had fallen, in response to international restrictions, to 282 ODPTs, composed mostly of methyl bromide and hydrochlorofluorocarbons (HCFCs).

Australia stopped production of CFCs during the 1990s, and we are ahead of the Montreal Protocol's schedule in reducing our use of HCFCs, which are the minor ozone depleting substances used as interim replacements for CFCs.

Links to other dimensions of progress

Climate change has been identified as one of the numerous pressures on the world's wildlife. It has led to some 25% of the world's mammals and 12% of birds being at significant risk of extinction.¹⁹

A major study of the likely impact of climate change on plants and animals concluded that minimal climate-warming scenarios for 2050 could lead to extinction of approximately 18% of species.

Mid-range and maximum warming could lead to extinction of 24% and 35% of species, respectively, by 2050.¹⁹

Australian research has found that the bioclimates of some species of plants and vertebrates will disappear with a warming of just 0.5°C–1.0°C.¹⁹ The endangered Mountain Pygmy Possum could lose its entire alpine habitat with such a rise in mean annual temperature.²⁰ It also appears that many corals in the Great Barrier Reef are living close to their survival limits in terms of sea temperature.²¹

Greenhouse gas emissions and climate change are more than an environmental concern. While Australia's biodiversity and freshwater ecosystems might be affected by climate change, global warming could – if certain scenarios of the International Panel on Climate Change prove correct – have profound consequences for our economy and society (increasingly frequent and severe floods and rising sea levels, for instance, have the potential to cause significant damage). Emissions are linked to economic activity, through the burning of fossil fuels, certain industrial processes, agriculture and forestry. However, the development and adoption of new low-emissions technology, such as wind power, might play an important role in reducing emissions in the future.

See also the commentaries *National income*, and *Transport*.

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Oceans and estuaries

Australia's coastal and marine regions support a large range of species, many of them found only in Australian waters. These regions are also important to Australian society and the economy.

Most Australians live near the coast. There are economic benefits from marine industries such as shipping, tourism, fisheries, and offshore oil and gas. Many of the ways we use our oceans, beaches and estuaries can affect the quality of the ocean's water and coastal habitat and the diversity of life these environments support.

There are very few nationwide time series data suitable for assessing the progress of Australia's marine environments. At some time in the future, perhaps, better progress indicators might become available. For the time being, this commentary:

- ◆ recognises the importance of the oceans, coasts and estuaries;
- ◆ describes some of the important influences on the health of our seas; and
- ◆ presents some contextual data on aspects of the marine and coastal environment that are relevant to progress.

However, it does not attempt to assess overall progress among Australia's marine ecosystems.

Australia has one of the longest coastlines of any country — a length of 59,736 kilometres, including islands in its jurisdiction. Australia's Exclusive Economic Zone is among the largest of any country in the world. This area surrounding Australia's coast for which Australia has exclusive responsibilities and to which it has exclusive rights, covers 10 million square kilometres — an area considerably larger than that of the Australian continent (7.7 million square kilometres). It is not surprising then, that beaches, estuaries and wider marine ecosystems play an important role in Australian life.

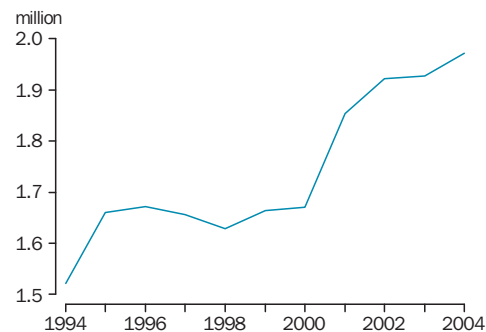
Australia's oceans are diverse, ranging from tropical seas, through temperate to polar waters; and from shallow coastal waters to ocean trenches that can be six kilometres deep. This diversity is reflected in a vast array of marine life. More than 4,000 species of fish live in Australian waters, and about one-quarter of them are found nowhere else in the world. Australian waters provide a home to at least 43 species of whales and dolphins and 110 species of seabirds. Australia has the world's largest seagrass bed (in Shark Bay, Western Australia), the largest area of coral reefs and highest diversity of mangrove species, (41 of the 68 mangrove species in the world).¹

Factors influencing change

There are substantial pressures on Australia's marine environment. Over 80% of the population live within 50 kms of the coast,² and 97% of the volume of Australian trade is carried by ships.³ In 2003–04 Australian fisheries produced about 267,000 tonnes of fish.⁴

Over fishing places strains on a number of species, and may also affect other species through

Visitors to the Great Barrier Reef(a)



(a) Figures based on Environment Management Charge (EMC) returns.

Source: Great Barrier Reef Marine Park Authority, GBRMP Reef Wide Visitor Days.

disruptions to the food chain or accidental catching of other fish, birds, mammals, and turtles. The release of waste water, other nutrients and sediments can also disrupt marine ecosystems, while the introduction of foreign species into Australian waters also has the potential to cause great harm.

Our interest and enjoyment of marine areas can also place pressure on them and create challenges for their management. For example, visitor numbers to the Great Barrier Reef have been increasing over the past decade. In 1994 there were around 1.5 million visitors aboard tourism vessels in the Great Barrier Reef while in 2004, there were a total of 1.9 million visitors on such vessels.⁵

Coastal and marine management

Australia's coastline has significant environmental, social and economic value. Since European settlement, the coast and beaches have been central to our culture and lifestyle, and provide for many recreational opportunities. Many of us live on or near the coast. Economically, the coast is valued for activities such as tourism, mining (for example sand and gravel), and aquaculture. The environmental value of the coastal landscape includes scenic amenity, habitat for native plants and animals, and the physical functions of beach dunes and foreshore in providing a dissipative barrier to erosive forces.

Land on the coast is a valuable and limited resource with a continuing demand for residential, resort and marina development. Some coastal management plans aim to consolidate existing urban development rather than create new extensive urban developments.⁶

Developments on the coast can affect the coastal landscape. Our understanding of coastal processes has improved greatly over the past 20 years. For example we know that the natural movement of sand along the coast is altered by building on sand dunes, building structures such as seawalls along

Marine and coastal World Heritage areas

Half of Australia's 16 World Heritage areas have a marine or coastal feature. These are: Fraser Island, Kakadu National Park, Lord Howe Island, Heard Island and McDonald Island, Shark Bay, Great Barrier Reef World Heritage Area, Macquarie Island, and the Wet Tropics.

World Heritage status can result in strengthened management and improved interpretation and visitor facilities. It can also help cultivate local and national pride in a property and develop feelings of national responsibility to protect the area. For each Australian World Heritage area, management plans have been produced or are planned as a part of Australia's obligations under the World Heritage Convention.⁷

Increased tourist visitation due to World Heritage status can bring economic benefits and increased employment to local communities.⁷ However, a higher level of tourism can also place pressure on the condition of these areas which needs to be managed. As available data on visitor numbers to World Heritage Areas shows, the numbers of visitors to Fraser Island, Lord Howe Island and Great Barrier Reef World Heritage Area have been increasing.^{5, 8, 9}

Fraser Island

Stretching over 120 kilometres along the south east coast of Queensland, Fraser Island (184 000 hectares) is the largest sand island in the world. Fraser Island features complex dune systems that are still evolving, and an array of dune lakes that is exceptional in its number, diversity and age. Forty perched dune lakes, half the number of such lakes in the world, can be found on the island.¹⁰ Visitors to Fraser Island have been steadily increasing from around 235,000 visitors in 1992 to over 300,000 by 2000.⁸

Shark Bay

Shark Bay is located on the most western point of the coast of Australia and covers an area of 2.3 million hectares. The Shark Bay region is an area of major evolutionary, geological and zoological importance. For example, of the 26 species of endangered Australian mammals, four (rufous hare wallaby, banded hare wallaby, the Shark Bay mouse and the western barred bandicoot) are found only on Bernier and Dorre Islands in this area.

The Shark Bay region is also renowned for:

- ◆ Bird species with over 230 species, or 35 per cent, of Australia's bird species represented
- ◆ Diversity of amphibians and reptiles, with nearly 100 species represented, and
- ◆ Marine ecosystems including a population of about 10 000 dugong, and large populations of dolphins and turtles, and the largest seagrass bed in the world.¹¹

Monkey Mia (part of the Shark Bay) famous for its dolphins receives between 80,000–100,000 visitors per year.⁸

the foreshore, and by the loss of seagrass. This can increase natural erosion rates leading to the need for beach replenishment programs. Coastal planning and management now attempt to take into account more fully these physical coastal processes and avoid development on erosion prone areas.^{6, 12}

Bitou bush

The management of native vegetation is a significant coastal management issue. Bitou bush is a highly competitive environmental weed which reduces the abundance and diversity of native plant communities. Bitou bush invades native coastal heathlands, grasslands, woodlands and forests. It grows quickly and forms dense stands, replacing native plants and destroying the habitat of native animals. Numerous threatened species and plant communities have been affected. Bitou bush is a problem in coastal areas in a number of states, with NSW the most affected. Bitou bush is listed as a weed of national significance.¹³ NSW now has containment lines for Bitou bush and has extensive management programs in place.

Other coastal management issues include:

- ◆ management of coastal vegetation
- ◆ management of Indigenous and non-Indigenous cultural resources, and
- ◆ protection of coastal wetlands, dune systems, and significant wildlife habitat.

Estuaries

The Estuarine Condition Index was developed by the National Land and Water Resources Audit (NLWRA) to provide a snap shot of estuary health. The index assesses the condition of about 1,000 estuaries around the Australian coast. Because estuaries occur at the borders of marine and freshwater ecosystems, they are influenced by the tides and also by fresh water from the land. Thus measuring the condition of estuaries not only reports on the state of our oceans; it sheds light on how land use around the water that flows into the estuary is affecting the sea. The more modified an estuary, the greater the pressures on it; in a 2002 assessment of a large proportion (979) of Australia's estuaries, the NLWRA found their condition was:

- ◆ near-pristine – 50%
- ◆ largely unmodified – 22%
- ◆ modified – 19%
- ◆ extensively modified – 9%.¹⁴

Fish and fishing

Australia's major fisheries target prized species such as lobsters, prawns, abalone and tuna, which, despite modest production tonnage in world terms, are subject to high fishing pressure.¹⁵

In 2004, for fish stocks managed by the Australian Commonwealth, 17 of the 74 principal species that are classified were overfished or subject to overfishing. This compares with 3 species a decade earlier. Overfished species are those for which the current stock is below a reference point set by scientists and managers.¹⁶ Overfishing occurs when the fishing pressure is too heavy to allow the fish

population to replenish itself, or when too many small fish are taken, and therefore too few grow to a size that provides the largest yield from that fishery.

Of the 17 species that are classified as overfished or subject to overfishing, the Eastern gemfish and Southern bluefin tuna have been classified as overfished for the past two decades. The School shark has been classified as overfished for the past decade. The Pink ling and Pacific ocean bigeye tuna were newly classified as subject to overfishing in 2004.

In contrast, some progress has been made in reducing overfishing for some species. In the Northern Prawn Fishery, stocks of Grooved and Brown tiger prawns have recovered in recent years to the extent that these species are no longer classified as overfished.

Comparable information for overfished species at a state level is not available, but some state managed fisheries are also subject to heavy fishing pressure.

Curbing excessive fishing and rebuilding overfished stocks are fundamental to the long-term viability of fisheries. In 2005, the Commonwealth Government announced plans to buy back about up to 600 Commonwealth commercial fishing licences in an effort to ease overfishing pressures.¹⁷ The status of most of the species caught incidentally to primary species (bycatch) is uncertain. The introduction of bycatch action plans for threatened or endangered species (mandatory for fisheries managed by the Australian government) has increased their protection from fishing. For example, Northern Prawn Fishery vessels must use turtle-excluder and bycatch-reduction devices. The use of these devices has resulted in the turtle bycatch decreasing from around 5,500 per year to a reported 120 per year since 2000.¹⁷

Introduced species

Introduced organisms can place native species at risk. More than 250 species are known to have been introduced into Australian waters. Most are not believed to pose a large threat, but a few have substantially altered habitats and ecosystems, for example the crown of thorns starfish.¹⁸

The accidental introduction of organisms can occur via ballast water. When a ship's hold is empty, ballast water is taken on board to balance the ship. When the ship next loads cargo at port, the ballast water may be discharged along with any organisms living in it. In 2001, Australia introduced new regulations making it mandatory for vessels entering Australian waters to undertake some form of treatment of ballast water before discharging it in any Australian port.

Coral reefs

Australia has two major coral reefs: the Great Barrier Reef in Queensland, which at 2,500 km long is the largest coral reef system in the world, and Ningaloo Reef in Western Australia which stretches for 230 km. There are several other coral

Illegal fishing

Illegal, unreported and unregulated fishing (henceforth called illegal fishing) is considered to be one of the most serious threats to the health of the world's fisheries and oceans. Fishing on the high seas has increased over recent decades as a result of overfishing of coastal waters and in response to growing market demand for seafood products.

The increasing prevalence of illegal fishing is making it more difficult for the international community to effectively conserve and manage fisheries on the high seas. Not only does illegal fishing impact on management and overfishing but it also has broader ecosystem impacts such as the bycatch of seaturtles, seabirds and sharks in the longline fisheries for tunas and Patagonian toothfish.¹⁹

A recent report by the Marine Resources Assessment Group roughly estimated that the annual value of illegal fishing on the high seas could be in the vicinity of \$US1.2 billion.¹⁹

One Australian fishery targeted by illegal fishing is the Patagonian toothfish in the Southern Ocean around Antarctica. Illegal, unregulated and unreported fishing is the biggest threat to the conservation of toothfish stocks.

Patagonian toothfish is a high value quality fish mainly sold to restaurants in Europe, the United States and Japan. High consumer demand and the consequent high prices for toothfish and other white fleshed fish not only places pressure on the fishery from legal fishin, but also encourages illegal fishers to supply products to these markets.²⁰

reefs in Australian waters. These coral reef systems are biologically diverse marine environments, and provide commercial benefits to Australia, mainly through tourism and fishing.

Coral reefs are potentially at risk from a range of natural disturbances such as cyclones and floods, and from the impacts of human activity. Severe cyclones can strip reefs of coral and other organisms. Floods cause large quantities of sediment laden freshwater to be discharged, which can cause the death of coral. However, in the absence of further severe disturbance, coral reefs can recover from these events.

The amounts of nutrients, sediments, and other pollutants flowing to the Great Barrier Reef have increased greatly since European settlement. Low salinity, high nutrient levels and high turbidity can stress corals, and in severe cases cause death. More localised damage to coral reefs can occur from other human activities such as anchoring, diving and snorkelling, tourist facilities, pollution and shipping, and dredging at ports.²¹

Rising sea temperatures believed to be associated with climate change may place coral reefs at greater risk from coral bleaching. When coral bleaching occurs, corals become stressed and eject the brownish coloured algae that live within their tissues. The white coral skeleton is then visible and the corals appear bleached white. The corals can die if the stress is persistent or extreme.

In 1998, sea temperatures in some parts of the Great Barrier Reef were between 1°C and 2°C

Whales and dolphins

In 2004 Australian waters were home to 45 species of whales and dolphins, a little over half of the world's 79 species. Five whale species are currently listed as nationally threatened: Blue Whale; Southern Right Whale; Sei Whale; Fin Whale; and the Humpback Whale.²²

Current threats to species recovery or survival include:

- ◆ prey depletion from overfishing for both great whales and smaller whale and dolphin species;
- ◆ climate change for great whales;
- ◆ fishing interactions (bycatch and entanglement) for some coastal species of small whales and dolphins.²³

Other activities which can impact on whales and dolphins include: noise pollution, coastal development, vessel collisions, ingestion of marine rubbish such as plastic bags, incidental catch in fishing operations or shark nets, and whale and dolphin tourism. Mesh net strandings are thought to be a significant cause of mortality for inshore dolphin species.²⁴

We know little about the population size of most species of whale. In Australia there are ongoing efforts, through a number of joint university and community projects, to record whale sightings and the abundance of different species of whale. An annual Humpback Whale count has been conducted from Cape Byron since 1978, becoming a more substantial whale research project in 1995.²⁵ Dwarf minke whale management in the Great Barrier Reef is the focus of another project, which reported its most successful year in 2004, with between 216–238 dwarf minke sightings reported in the six week study period.²⁶

The *Environment Protection and Biodiversity Conservation (EPBC) Act (1999)* provides strong protection for all marine and terrestrial species including whales, dolphins and porpoises in Australian waters. The Australian Whale Sanctuary includes all Commonwealth waters from the 3 nautical mile state waters limit out to the boundary of the Exclusive Economic Zone (i.e. out to 200 nautical miles and further in some places). Within the sanctuary it is an offence to kill, injure or interfere with whales and other marine mammals, with severe penalties applying to anyone convicted of such offences.²⁷

Whale-watching is a developing industry, estimated to be worth up to \$29 million a year in Australia.²⁸ Whale watching activities range from simply watching whales from the shore to organised boat tours and 'swim with whales' activities. Whale and dolphin tourism has the potential to impact on the use of habitat, as well as critical behaviours such as reproduction, feeding, resting and group cohesion.²⁵ National guidelines for whale-watching and for swimming with whales activities have been developed. These guidelines aim to minimise harmful impacts, while allowing people to enjoy and learn about the animals.²⁹

above average temperatures for that period. Almost 90% of inshore coral reefs surveyed were bleached, with 25% experiencing extreme bleaching.

In 2002 mass coral bleaching, the largest on record for the Great Barrier Reef, occurred. The coral bleaching event in 2002 was more severe than that of 1998 with bleaching spread across a much larger area of the Great Barrier Reef. Between 50%–90%

of corals were killed by bleaching on reefs around Bowen in 2002.²¹

Water quality

In 2001, experts on the State of the Environment Committee indicated that the maintenance or restoration of water quality, particularly in coastal waters, is a critical marine environmental issue in Australia. Although they assessed that many coastal areas have excellent water quality, they also assessed that many areas do not.³⁰

Poor water quality can be attributed to many sources. Sometimes land use practices far inland add nutrients to inland waters (such as land clearance or overgrazing which can enhance erosion or the use of agricultural chemicals).

Nitrogen and phosphorus are found naturally in inland and coastal waters, but in large quantities they contribute to the increase in estuarine algal blooms. Toxic algal blooms kill fish, and plants can die because of decreased sunlight. They also affect human health by making seafood unsafe to eat and water unfit for recreational purposes.

Sewage and stormwater discharged into seas releases nutrients and, sometimes, disease-causing micro-organisms, which can make water dangerous to swim in or seafood dangerous to eat. High levels of disease-causing bacteria and viruses can cause problems such as gastroenteritis, respiratory infections and hepatitis.

The improvements in the disposal and treatment of sewage at Sydney's sewage outfalls saw a reduction in levels of certain bacteria (bacteria called coliforms) between 1989–90 and 1999–2000. None of the 23 beaches tested had a coliform density above health guidelines in the summer of 1999–2000. In 1989–90, 11 had exceeded the limit.³¹

Oil spills

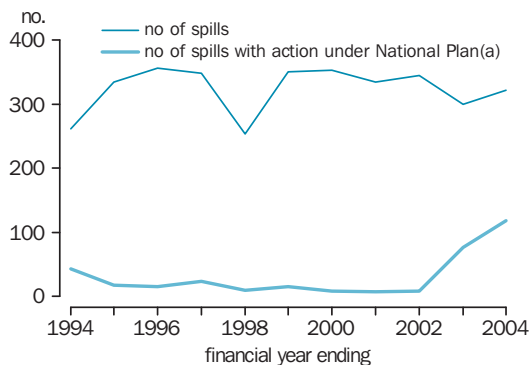
The environmental impact of oil spills depends largely on the size of the spill, the location of the accident and the prevailing weather conditions at the time: oil spills close to the coast or near areas of high conservation value are likely to cause the greatest damage.

In the decade to 2003–04 around 300 oil spills were reported each year. In 2003–04, 322 oil discharge sightings and oil spills were reported and 118 of these incidents required a response action under the National Plan arrangement.³²

Oil spills affect marine wildlife, in particular birds and marine mammals, by coating their bodies with a thick layer of oil that sticks to fur or feathers, damaging the insulation and waterproofing properties of their feathers or fur, often resulting in hypothermia. Birds can sink or drown because of the weight of their oiled feathers.

Oil in the environment can cause problems by poisoning wildlife higher up the food chain, and can also cause a range of health problems

Number of reported oil spills



a) Criteria applied from 2003 is different to previous annual reports in that it now includes all incidents where a response was undertaken regardless of whether direct costs were claimed from the National Plan.

Source: Australian Maritime Safety Authority, National Plan Reports.³²

including: irritation or ulceration of skin, mouth or nasal cavities; damage to and suppression of a marine mammal's immune system. It may also damage estuaries, coral reefs, seagrass and mangrove habitats which are the breeding areas of many fish and crustaceans.³³

The effect on wildlife of one particular oil spill in Australian waters has been extensively studied. The bulk ore carrier *Iron Baron* ran aground on Hebe Reef off northern Tasmania in 1995. One study of the effects on little penguins estimates that between 10,000 and 20,000 penguins were killed as a result of this oil spill.³⁴

Some differences within Australia

Although the particular issues may vary from region to region, most Australian states, and the Northern Territory face similar pressures and issues with regards to ocean and coast management.

Pressure on fisheries is an issue for most Australian fisheries. That said, not all fisheries are experiencing overfishing and the numbers and specific species affected by overfishing vary with the location of the fishery. In the South-East Trawl, there are six overfished species. In the Southern Bluefin tuna fishery off South Australia, the Southern bluefin tuna is overfished. In 2004, the Heard Island and McDonald Island fisheries did not have any over-fished species.¹⁶

Many of the states have experienced problems such as seagrass depletion in coastal waters, and weed invasions by plant species such as Bitou bush in coastal areas. The use of beaches for recreation is popular all around Australia. However, the demand for land for development in coastal areas is more intense in the more populous states and in areas of high tourism activity.

Links to other dimensions of progress

A range of economic benefits come from our use of coastal and marine resources, through activities such as tourism, fishing, trade (shipping) and mining. In turn, these economic activities can place pressure on the condition of our marine and coastal environments. Fishing activity can impact on biodiversity by placing pressure on the stocks of fish, and contributing to the depletion of prey fish species for marine mammals and birds.

Human activities and land use patterns that increase nutrients and turbidity in inland waterways (which ultimately flow into the sea), can alter marine habitat by causing a deterioration of water quality. This can lead to other changes in the

Seagrass and dugongs

Seagrasses are flowering plants that grow in marine or estuarine areas. Australia has the highest number of seagrass species in the world, with around 30 species. Australia has an estimated total area of around 51,000 square kilometres of seagrass.³⁵ The recent discovery of further deepwater seagrass beds in the Great Barrier Reef World Heritage Area indicates that our knowledge of seagrass is still incomplete.³⁶

Seagrasses provide food for marine animals including green turtles and dugongs and provide habitats and nursery areas for many fish. Large scale destruction of seagrass areas could impact on the commercial viability of nearby fisheries. Seagrasses also helps trap sediment and stabilise the sea floor to avoid erosion.³⁵

Although there are few accurate data, the best available estimate is that some 50% of our seagrass beds have been lost since European settlement, though patterns vary around the country. In New South Wales an estimated 50% of *Zostera* seagrass beds have been lost in recent decades; and at Cockburn Sound in Western Australia, 97% of seagrass beds have been lost.³⁵

Water quality is important for the health and extent of seagrass communities. Increased turbidity, from soil erosion, is believed to be one factor behind the decline in seagrass beds. Turbidity affects light penetration, and may prevent sunlight from reaching the sea bed.³⁵

Dugongs are marine mammals, that can grow to about three metres in length and weigh as much as 400 kilograms. They are the only marine mammals in Australia that feed mainly on plants. Most of the world's population of dugongs is now found in northern Australian waters between Shark Bay in Western Australia and Moreton Bay in Queensland.³⁷

Dugong numbers have declined dramatically in the past 40 years in the part of the Great Barrier Reef World Heritage Area south of Cooktown. The decline in dugong numbers is thought to be caused by human-related causes such as: habitat loss or degradation; commercial mesh nets (fish nets), shark nets set for bather protection; Indigenous hunting; boat strikes; defence activities; and illegal take.³⁷ Government departments, community groups and industry organisations are working to minimise the number of dugong deaths from human-related causes. Actual or possible loss of seagrass feeding areas is a significant issue for the long-term survival of dugongs. Seagrass loss is thought to be a major cause of death of dugongs in Hervey Bay in 1992 following a cyclone and flood.³⁸

Regional marine planning and Marine protected areas

Australia's oceans policy is designed to improve outcomes of marine management in estuaries, coastal and offshore waters. A number of initiatives are underway to provide greater protection and ensure better management of Australian oceans.

Regional marine planning is a key component of Australia's oceans policy. A regional plan has been completed for the South-East marine region, and two more plans are in progress for The Northern Planning Area and the Torres Strait.³⁹

The National Representative System of Marine Protected Areas (NRSMPA) is setting up a system of marine protected areas established under law to protect biodiversity and natural and cultural resources. Developed cooperatively by the Commonwealth, the states and the Northern Territory, the NRSMPA aims to build a system of marine protected areas that is

- ◆ Comprehensive: sampling the full range of Australia's ecosystems.
- ◆ Adequate: to ensure the conservation of marine biodiversity and integrity of ecological processes.
- ◆ Representative: including marine protected areas that reflect the marine life and habitats of the area they are chosen to represent.

Scientists are working to gather better information about the condition of existing protected areas.

In 2003–04, for instance, the Commonwealth trialled a new approach of monitoring its marine protected areas, by developing key indicators of ecosystem health in six coral reef reserves.

The protected areas of both the Great Barrier Reef Marine Park and the Ningaloo Reef have been enhanced. In 2004, the highly protected zones of the Great Barrier Reef were increased and now encompass around 33% of the Great Barrier Reef Marine Park. The high level protection of Ningaloo Reef in WA has also increased to encompass around 34% of the reserve.

marine habitat such as the loss of seagrass. Sea temperature increases are considered to be an associated with greenhouse gas emissions. Sea temperature increases can also alter marine habitat making it less suitable for some species.

Invasive species also put pressure on coastal and marine environments, for example invasive plant species can replace native coastal vegetation communities, altering the habitat and making it less suitable for native animal species.

The marine environment and our coast are a source of recreation or leisure for many Australians. Many of us prefer to live near the coast. Many of us enjoy going to the beach, and

Sea level and climate change

The Bureau of Meteorology is responsible for the Australian Baseline Sea Level Monitoring Project. The ultimate goal of the project is to identify sea level changes over long periods, with a particular emphasis on the enhanced greenhouse effect on sea level. The project produces monthly data reports for a range of parameters including sea level from 15 sites around the Australian coastline, and one on Cocos Island.⁴⁰

visiting coastal National Parks and other reserves as part of our leisure time activities.

See also the commentaries *The natural landscape, National income, The air and atmosphere, Culture and leisure*.

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Family, community and social cohesion

Family and community are important aspects of society, but the way in which they contribute to progress is difficult to define and measure. The quality and strength of people's relationships and bonds with others – their family, friends and the wider community – are important ingredients of the level of social cohesion. And a more cohesive society is one in which communities are strong and inclusive, and where fewer people fall through the cracks.

Rather than present a single indicator, this commentary presents some measures which illustrate aspects of family and community life in Australia, particularly those that are important to social cohesion.

People are social beings. They require love, companionship and agreeable engagements with others to flourish. The absence of family, friendship or other caring or cooperative social relationships at any stage of life, but particularly when people are least able to care for themselves, can have a serious impact on personal wellbeing. And there are often high costs to the wider community associated with assisting people with poor or broken social relationships.

People's relationships and bonds with one another – be it their family, friends or the wider community – together with their shared values contribute to social cohesion. Families provide guidance on the social values underlying civil society and the care generated within the family supports the development of healthy functioning individuals. The vast range of services provided within communities by groups, clubs and charitable organisations are a crucial adjunct to support the role of the family. Some community care and support functions are provided by governments because the scale and complexity of the service is beyond families or communities to provide.

The discussion here focuses on the contribution that family and community functioning makes to social cohesion. There is no single indicator that captures all that might be important. Therefore, a selection of indicators is presented that paints a picture of the way our families and communities function, and the cohesiveness of Australian society.

Bonding: Families and family functioning

The family can be seen as the wellspring from which some of the dimensions crucial to social cohesion develop, such as trust, social support and the extension of social networks. It is the place where, through the everyday performance of family life, people make an enormous contribution to those who require special assistance. Care, nurture and economic support are usually provided by related people who live in the same house – by fathers, mothers, spouses and siblings. Most families also interact beyond the bounds of a single household. Parents who separate or divorce can still provide support and continue to raise children

Social capital and related concepts

Social capital consists of networks, together with shared norms, values and understandings which facilitate cooperation within and among groups. It is a contributor to community strength, and can be accumulated when people interact with one another formally and informally, for example informal interaction with family and friends and formal interaction in groups and organisations in the wider community.¹

There are many ways to examine social capital. In relation to progress, we have chosen to focus on the cohesiveness of Australian society. *Social cohesion* refers to the social ties and community commitments that bind people together.² In part, it depends on a balance of bonding, bridging and linking ties.

Bonding – These are your closest relationships with family and friends, often people like you. It produces strong 'in-group' loyalty.³ Bonding ties are described as strong ties that develop between people of similar background and interests, usually including family and friends, provide material and emotional support, and are more inward-looking and protective.

Bridging – These are relations with friends, associates and colleagues with different backgrounds, for example different socio-economic status, age, generation, race and ethnicity.³

Linking – refers to the relations within a hierarchy of different social layers, where power, social status and wealth are accessed by different groups.⁴ Linking social capital involves relationships with those in authority and positions of power and is useful for gathering resources.⁵ Relationships between the government and communities are included here.

Social exclusion is a form of social disadvantage encompassing economic and non-economic factors. Excluded individuals and groups are separated from institutions and wider society, and consequently from both rights and duties.⁶

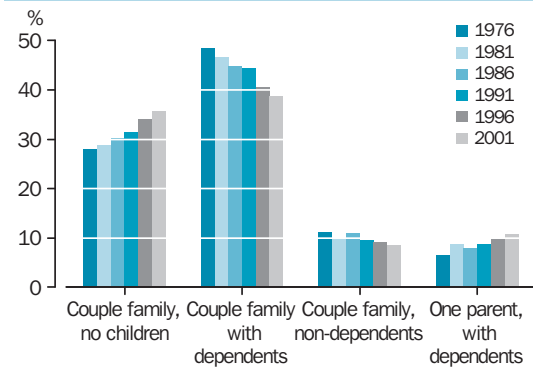
Desired directions of change

Well established research suggests that there are positive health outcomes, such as greater longevity, from having high quality relationships with close family members and friends. It also suggests that other aspects of life (such as employment outcomes) are better for people with wide social networks.¹

Families have long been viewed as the core social unit that serves to maintain people's welfare. Over recent decades, the emphasis of debate has shifted from the maintenance of the ideal family form (earlier viewed as the so-called traditional family involving a married couple and their children), to one in which the quality of relationships between family members, irrespective of form, is viewed as being more important. Yet, to members of the community who hold traditional values, the decline of traditional family structures may be viewed as regress.

While views about ideal levels of social cohesion vary, for some aspects of social cohesion there is likely to be general agreement that change in a particular direction is good or bad. For instance, most would agree that decreases in the suicide rate, in the incidence of drug-induced deaths, or in the level of homelessness, represent improvements. But for many other aspects of social cohesion, the choice and interpretation of indicators may be problematic.

Selected family types within a household(a)



(a) One parent families with non-dependents and other families (e.g. siblings only) are not shown here.

Source: De Vaus 2004, using ABS Census data

who may not live with them. Parents may also provide financial and in-kind support to adult children living away from home. And families can provide care and support, such as meals or transport, for their elderly or disabled relatives who live elsewhere. It is difficult to measure this complex web of interactions, so in many ABS and other collections the unit of observation is the members of a family living within the same dwelling.

According to the 2001 Census of Population and Housing, 83% of people lived in a household with members of their family, 3% lived in group households, 9% lived alone, less than 1% were boarders living in a family home, and 4% were residing in institutions such as prisons, nursing homes, and hostels.

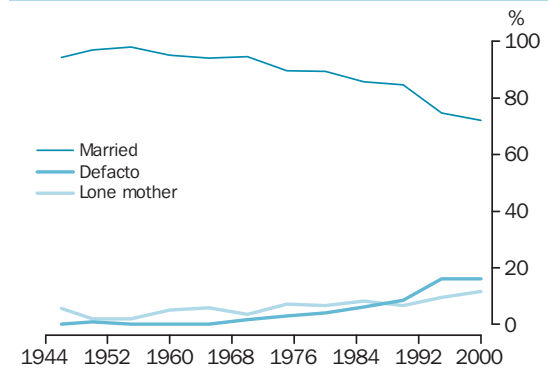
Types of families in Australia

Over recent decades there have been extensive changes in the way families are structured and function. These trends have a range of social implications. Later partnering, later child bearing and the tendency to have fewer children have implications for the size and age profile of the population. The increasing propensity for people to live alone has implications for housing and support.

Largely due to the ageing of the population creating ‘empty nesters’, but also including trends towards later child bearing and childlessness, since 1976 the proportion of couples without children in the household has increased from 28% to 36%. In 2001, 70% of people in couple families without children in the household were aged over 45.⁷

While couple families are the most common family type, there have been increases in the proportions of one parent families over recent decades. One parent families with dependent children have increased from 7% of families in 1976 to 11% in 2001. The growth in one parent families and couples without children means that couple families with children make up a smaller proportion of all families. In 1976, couples with

Family type into which children are born



Source: HILDA, 2001⁷

children of any age in the household made up 60% of all families. By 2001, it had fallen to 47% of all families.

Assuming these trends continue, by 2021 the most common family type is projected to change from couples with children to couples without children. Lone person households will also become more common. The number of lone person households is projected to increase from 1.6 million households in 1996 to between 2.4 million and 3.4 million households in 2021, increasing from 9% of the population to between 11% and 15% of the population.⁸

Transitions for children

There is considerable interest in determining whether families are undergoing more transitions than in the past and what the implications of this might be. The impact of divorce and family breakup on families is of concern, as is the quality of relationships between children and parents, and children and step-parents.⁹

Due to the greater diversity of family types and the changing nature of family structures, many children are likely to experience a range of living arrangements during their childhood. In the 1950s, 2% of children were born to unpartnered mothers; by 2000 this was 12%. Since the 1970s, the proportion of children born into defacto married couple families rose from 2% to 16%. There has also been an increase in the proportion of children living in two different family living arrangements in the course of their childhood. Research based on the HILDA survey shows that 6% of children born in 1946–55 experienced two living arrangements. For the children born in 1981–85 it was 16%. Of children born in 1981–85, 11% experienced three or more living arrangements. This was an increase from 2% since the group of children born in the earlier post-war period.¹⁰

One of the impacts of increasing family diversity and increases in family transitions is to create fewer families where children live with both natural parents. The proportion of intact families with children under 18 has declined from 76% in 1992, falling to 72% in 1997 and 71% in 2003.¹¹ Over the same period, while the proportions of

Proportion of children ever in lone mother family by birth cohort(a) – 2001

Birth cohort	Due to		Total
	At birth	parental separation(b)	
1946–55	2.6	6.3	8.9
1956–62	3.2	7.8	11.0
1963–75	3.0	15.0	18.0
1976–80	3.8	18.4	22.2
1981–85	6.5	18.4	24.9

(a) By age 15. (b) This category is the difference between the proportion of children in total ever in lone mother family and the proportion of children in a lone mother family at birth.

Source: HILDA, 2001¹²

step families and blended families with children under 18 stayed fairly steady (at around 4% for step families and 3% for blended families), the proportion of one parent families grew.

Of the group of children born in 1981–85, 25% have lived in a lone mother family at some stage by age 15. This has risen from 9% of children born in 1946–55. Lone parents are more likely to be at risk of disadvantage in a number of areas, and this is discussed in the article *Multiple disadvantage* in MAP 2004. They have higher levels of unemployment, they are more likely to experience financial hardship, and to be the victim of an assault or break-in than people in couple families.

Divorce and separation of couples is a disruption to family life. In some cases, there is family conflict before, during and after the transition. For others, conflict is reduced once the divorce or separation has taken place. In some families, the divorce or separation is managed so as to minimise the negative impacts on family members, particularly children. Nonetheless, the process of adjusting to the new family circumstances can take differing lengths of time, with some adults and children feeling stressed by the divorce or separation years after it occurred.

Researchers have suggested that there is an increase in the risk of poor outcomes for children who experience such family related transitions.¹³ However, research also suggests it is family processes such as showing warmth, loving care, good parent-child relationships and monitoring children's behaviour which are important for outcomes, and these family processes can be largely independent of family structure.¹⁴

Stress to families

Families and communities play a key role in raising capable and functioning people. When considering the relationship of the family to progress it might be ideal to find indicators which measure how effectively families undertake this role. Such data are difficult to collect, although some key outcomes of family life, such as whether people behave well in society, or achieve good educational and work outcomes are measured by other

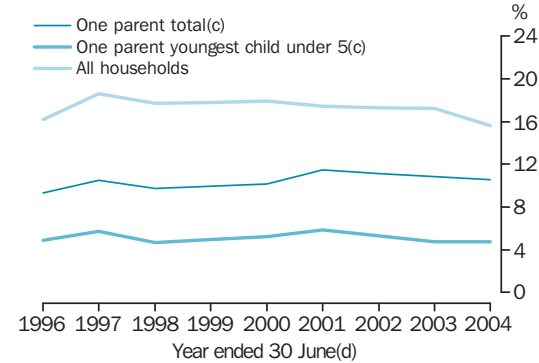
indicators in this publication (*Crime, Work, and Education and training*).

There are stresses which can threaten the optimal functioning of the family unit. Families can experience a range of pressures: the dissolution through relationship breakdown has already been discussed. Other factors widely regarded as key include: the quality of parent-child relationships (both resident and non-resident), financial stress, conflict between parent figures, parental mental health and substance use, and abuse or neglect of children.¹⁵

A family cohesion indicator is a measure of the quality of relationships and the quality of the social environment in which children are being raised. In the 1998 Child and Adolescent component of the ABS Mental Health Survey, parents were asked to rate their family's ability to get along with one another on a five point scale from 'poor' to 'excellent'. Most families reported high levels of family cohesion (93% of intact families reported good to excellent, as did 88% of blended families and 87% of lone parents).¹⁶

Feeling pressed for time is an important stressor to family life. Parents with young children feel the greatest amount of time pressure. In 1997, according to the ABS Time Use Survey, over 60% of mothers living in couple relationships, with a youngest child aged 0–4 years old, felt very pressed for time. For fathers in the same family type, it was 52%. The reporting of feeling time stressed decreased as children aged, with 48% of mothers and 34% of fathers in couple families, whose youngest child was aged 15–24 years old reporting feeling very pressed for time. By the time the children were over 25 years of age, 35% of mothers and 23% of fathers reported feeling very time stressed. For fathers this was in line with the experience of adults who live in households with no children present.¹⁷

The job of raising children is complex. And if one or both parents suffer from illness or psychological distress, this may result in poor outcomes for children.¹⁸ In the 2004–05 ABS National Health Survey, 14% of mothers and 9% of fathers in couple families reported high or very high psychological distress. For lone mothers the proportion expressing high or very high psychological distress was almost double that of mothers in couple families (24%). While some mothers with very young children suffer from post-natal depression, the proportion of mothers with children younger than five reporting high or very high psychological distress was much the same as that for mothers with children aged 10–14 (17% and 18% respectively).

Children(a) without an employed parent(b)

a) Those less than 15 years of age. (b) Refers to the labour force status of parent(s) living in the same household as the children at the time of interview. (c) As a proportion of all households. (d) No survey was conducted in 1998–99 and 2001–02.

Source: *Surveys of Income and Housing*.

Children without an employed parent

Children living without an employed parent are of concern, both because the joblessness is an indicator that the children may be at greater risk of experiencing financial hardship and because the joblessness may also have impacts on their long-run personal development. The number of children living without an employed parent is related in part to the structure of the labour market, and in part to the changing structure of Australian families.

While studies have shown that there are links between someone's childhood circumstances and adult outcomes, there is ongoing debate about the causal relationships involved. It is difficult to obtain all the data needed to fully examine the impacts of and inter-relationships between inherited capabilities, parental and other care, role-models (both parental and other), education, childhood health, and income levels. It is also important to note that while studies point to a higher incidence of poor outcomes for children from jobless households, the results do not suggest simple deterministic patterns – that is while there may be higher risks, such childhood experiences do not necessarily result in adverse outcomes.¹⁹

Since the mid-1990s, the proportion of children living without an employed parent in the same household has been relatively steady at between 16% and 18%. In 2003–04, based on data from the ABS Survey of Income and Housing, the number of children who lived without an employed parent was approximately 620,000. Around 67% of these children lived in one parent families, and approximately 36% lived in one parent families in which the youngest child was under five.

Across all family types, mothers have lower levels of labour force participation when children are young. In 2004, 52% of women with children under 5 did not participate in the labour force.

In 2003–04, of children living in lone parent families where the youngest child was under 5, 69% lived with a parent who was not employed

(that is they were unemployed or not in the labour force). For children in lone parent families where the youngest child was aged between 5 and 14, 48% lived with a parent who was not employed. In contrast, 7% of children living in couple families with the youngest child under 5 had no employed parent, while 6% of children in couple families with the youngest child aged between 5 and 14 had no employed parent.

For the parents of children under 15, those who were lone parents were more likely to want to be working than those with partners. Lone parents were more likely to be actively looking for work and if not participating in the labour force in 2004–05, almost half (48%) were more likely to indicate they would like a paid job, compared with 35% of partnered parents who were not in the labour force.²⁰

The longer term effects on children are likely to be greater if the period of joblessness is extended, and may differ depending on the circumstances of the joblessness. For example, if a parent undertakes study, the economic wellbeing of the household may be improved later on. Also, the impact of parental joblessness may be offset if other household members are employed.

Caring role of families

The care and support a family provides to individual members is a foundation for people's health and effective social functioning. Care and guidance take place within the family across the life cycle, beginning with parents (and sometimes grandparents) caring for children, and often ending with children caring for parents.

Raising children is a time consuming job. Figures from the 1997 ABS Time Use Survey indicated that parents spent on average 6.5 hours a day caring for children; for mothers this was over 8.5 hours a day while for fathers it was about 4 hours a day. The largest component (65%) was low intensity, child minding activities.

Developmental activities such as playing with children took, on average, an hour of a parent's day, with mothers and fathers spending proportionally the same amount of their child care time playing with their children (15%). On the other hand mothers spent 14% of their child care time providing such physical care as feeding, bathing, and dressing children, compared with 8% for fathers.

When mothers work outside the house, in paid employment, the contact time they have with their children reduces. On the whole, Time Use data has shown that mothers choose to maintain the time spent on developmental activities while substantially reducing low intensity, child minding activities. As mothers' hours of paid work increase, fathers increase slightly the time they spend with children in developmental activities and in low intensity care.²¹

Primary carers of the elderly and disabled – 2003

Relationship to recipient	Recipient of care	no. 2003	% change since 1998
Wife	Lives with	114,700	9
Husband	Lives with	81,000	-5
Mother	Lives with	88,600	8
Daughter	Does not live with	47,400	-1
Daughter	Lives with	40,200	10
Son	Lives with	18,800	23
Son	Does not live with	16,200	31
Other female relative	Does not live with	10,600	-3
Other female relative	Lives with	10,000	12
Father	Lives with	7,300	-30
Total(a)		474,600	5

(a) Total Includes other relationships not defined in list above. Source: Survey of Disability, Ageing and Carers 1998 and 2003.

Families also often care for elderly and disabled relatives. In 1998, the ABS Survey of Disability, Ageing and Carers identified that there were over 450,000 people who were primary carers. By 2003, this had increased by 5% to 474,600. A primary carer is a person of any age who provides the most informal assistance, in terms of help or supervision, to a person with one or more disabilities. Most of these carers (78%) lived with the person requiring care. And it is a role that most often falls to the immediate family: 91% of primary carers were either a partner, parent or offspring. While many husbands, fathers and sons do provide care, 71% of primary carers were women.

Given some of the trends outlined in this chapter and in the *Population* and *Work* chapters (ageing of the population, declining fertility rate, increased female labour force participation and relationship breakdown) there are some concerns about the future availability of primary carers.²²

Bonding: People’s contact with family and friends

Relationships with family and friends are the basis of the informal networks operating in society. Interaction is key to the maintenance of these networks and provides the opportunity to generate trust. Strong networks in turn act as a reservoir for support.

In the 2002 ABS General Social Survey, most people (95%) reported having contact in the previous week (either in person or via telephone, mail or email) with family or friends outside their household. There was little variation across age groups or between men and women. Less than 1% of people had had no contact with family or friends outside the home, in the previous month.

As discussed earlier, more people are living alone, and time spent alone has also increased. Between 1992 and 1997, the average waking time per week spent alone among people aged 15 years and over increased from a little under 18.5 to a little over 21 hours. The increases occurred in most age groups, but were typically greater among men than women, and greatest among people who lived alone.²³

Some people experience loneliness during their lifetime through the loss or absence of a significant relationship. Others experience loneliness as social isolation brought about by a lack of social networks, by not having membership of social groups, and through feeling marginalised.²⁴

Bridging: networks

Closely bonded groups perform a useful role in creating social capital, as they are most likely to be trusting, share common values, and provide material and emotional support to members of the group. For social cohesion to flourish, relationships also need to be formed with friends, associates and colleagues of different backgrounds, for example, relationships formed with people of different socio-economic status, age, generation, race and ethnicity.³

Bridging relationships are expressed through networks, which are a set of people or groups of people, with some pattern of interactions or ties between them.²⁵ The creation and maintenance of networks is based on relationships of exchange characterised by reciprocity. Reciprocity can be defined as any relationship between two people (or groups of people) where there is a giving and taking. It can be regarded as the general expectation that assistance or support may be returned at some undefined time in the future.

Reciprocity is important to social cohesion: a society in which reciprocity is strong may also encourage the sharing of support, knowledge, and ideas between individuals, groups and communities. In a community where reciprocity is strong, people care for each other's interests. The expectation of reciprocity may make people more willing to behave cooperatively or altruistically.²⁶

At this stage of social research, there are no single indicators that fully describe networks or bridging relationships. Instead, we have made a selection of indicators which shed light on some aspects of networks. For example, we consider people’s ability to access support, people’s participation in social groups such as sport and religious activities, and participation in paid and voluntary work. Local communities, workplaces, schools and voluntary organisations play a role in networking people, through bringing a diverse range of people together for a common purpose.

In 2002, the ABS General Social Survey showed that most people (93%) felt they could ask people outside their household for small favours, such as looking after pets, collecting mail, watering

Community

The term community refers to an inter-connected group of people who can influence one another's wellbeing. Communities are commonly thought of as being groups of people living within particular geographic areas. There are other connections between people which are not geographically based but which indicate the existence of communities. These include connections relating to shared values, traditions and lifestyles. Thus, people with a shared culture or heritage such as groups of Indigenous people, people belonging to religious groups, or groups of people born in particular countries who maintain associations with each other, are often viewed as belonging to a community. Communities may also be defined in terms of people with a shared set of interests or activities, for example 'school communities' or 'arts communities'. Notwithstanding the many possible connections between people that may be used to define communities, there is an important sense that the wellbeing of the members of a community is influenced by their connections to others.

Like a family, a community may be an important source of support and care for individuals, and individuals can gain a sense of identity and security from belonging to a community. The organisations and institutions surrounding and supporting a community (e.g. political, business, educational, religious, welfare and other institutions) provide work and education opportunities, infrastructures for health care and leisure pursuits, the opportunity for companionship, and also provide a means for delivering guidance on, and shaping, social values.

Communities can be composed of diverse groups, with competing interests and rights; but they can also be reasonably homogeneous.

gardens, minding a child for a brief period, or borrowing equipment. Overall, there were no significant differences between men and women in being able to ask for small favours.

The picture is much the same for people's ability to access support from outside the household in times of crisis, with 94% of people reporting they would have support. The greatest source of potential support is family members (82% of people thought their family would help), followed by friends (66%), neighbours (34%) and work colleagues (22%).

Involvement in paid employment provides an important means of meeting, and developing relationships with, a more diverse range of people. As noted in the commentary *Work*, there have been changes in the levels of labour force participation of both men and women (decreasing for men and increasing for women) resulting in women having more work-related social contacts than in the past. In 2002, only fairly small proportions (4%) of working people had had no contact with friends and family outside the household in the previous week (4%). In contrast, 8% of unemployed people and 6% of people not in the labour force had had no contact. Unemployed people were also much more likely to feel they did not have the ability to ask for small favours from persons outside the household (12% compared with 5% for employed people).

Social participation

Social participation provides the opportunity both to take part in an enjoyed activity and to interact with others. There is evidence that high levels of social participation and social connectedness may contribute to overall wellbeing of society as well as contributing to resilience of individuals and communities.²⁶ (See the *Culture and leisure* chapter for more details)

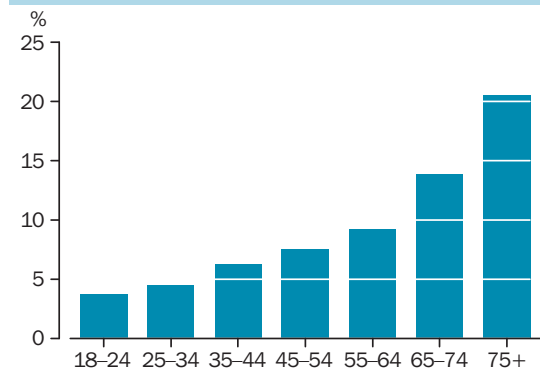
While social participation such as participation in community groups, attending sporting events and cinemas, and visiting restaurants are regarded as beneficial, recent research has also indicated that it is active membership in groups that is strongly linked with social capital.²⁷

Not surprisingly, as people age they are less likely to participate in social activities. Data from the 2002 ABS General Social Survey indicate that by 75 years and over, 21% of people did not participate in any of a range of social activities (as listed in the graph below) in the previous three months. It should be noted that, though called social activities, individuals can attend places such as museums and art galleries on their own. Furthermore, while people over 75 are less likely to participate in these selected social activities they may have participated in other social activities, and may have had visits in their home by family, friends or social services.

Many people participate in organised and non-organised social sport or physical activities. In 2002, 65% of men and 60% of women had participated in sport or physical activities at some time during the previous 12 months.

According to the 2002 General Social Survey (GSS), 23% of Australian adults participated in church or religious activities during the three months prior to interviewing. Women (26%) were more likely than men (20%) to have participated in church or religious activities. Female participation was higher than male participation among all age groups but

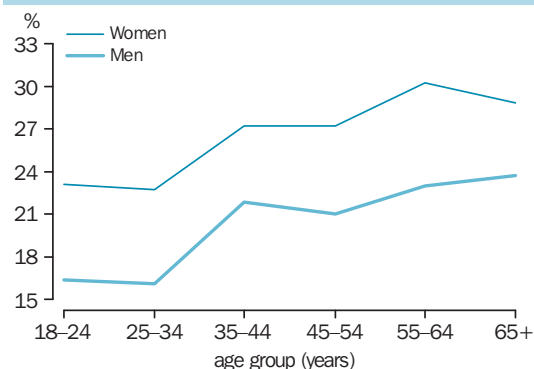
No participation in selected social activities(a)(b) – 2002



(a) Social activities include: visiting restaurants, movies or theatre; attending or participating in sport; visiting parks, gardens, zoos, libraries, museums, art galleries; participating in religious activities, recreational groups and community groups. b) In the previous three months.

Source: General Social Survey, 2002.

Participation in religious activities, 2002(a)



(a) In the 3 months prior to the survey.

Source: General Social Survey, 2002.

for both, participation generally increased with age.

Volunteering and donating

Strong community bonds can be formed through things like volunteering and donating money to groups and organisations in the community. Such networks may involve people who do not normally associate with one another, and in this way help to form bridging relationships between these community members.

The likelihood that people will voluntarily give their time to do some work for an organisation or group might be regarded as one of the stronger expressions of social capital, as it involves providing assistance, fulfilling needs and providing opportunities in the community. Participation in voluntary work also reinforces networks and adds to the richness of community life. Between 1995 and 2002, the proportion of people aged 18 years and over who reported in ABS surveys that they did some voluntary work during the previous 12 months increased from 24% to 34%. The increases occurred for both sexes and across all age groups, but were proportionately greater for those in the age groups 18–24 (17% to 28%) and 55–64 (24% to 38%).²⁸

Another indicator of community involvement is the willingness of businesses to donate money or goods to community groups or charities. The 2002 ABS Business Generosity Survey showed that 36% of operating businesses made donations, 4% participated in supporting community projects, and 11% sponsored individuals or charities. Some businesses did all three.

Cultural diversity, participation and networks

Australia, is often described as a 'settlement country' and of all OECD countries, it has the highest proportion of population who were born overseas (23% in 2001). According to the 2001 Census, 41% of Australians were either born overseas or have a parent who was. We have experienced successive waves of immigration over

Indigenous social networks

To various extents the relationships formed through complex traditional systems of law and kinship ties still exist across contemporary Indigenous society. Thus while Indigenous people identify as being culturally distinctive within the wider Australian population they are also diverse within their own culture. As a result, Indigenous people may require numerous bridging networks.

Indigenous social networks may not be equally useful in progressing all the interests of individuals, or, indeed, the group. For example, even if Indigenous job seekers have well-developed social networks within the Indigenous community, these contacts may not be useful in securing work in the mainstream job market.²⁹

Given the level of disadvantage that many Indigenous people experience, government policy focusses on changing the circumstances of and increasing opportunities for Indigenous people. Some recent policy has emphasised the establishment of linking relationships that are culturally appropriate and involve Indigenous governance.³⁰ (see *Democracy, governance and citizenship* chapter)

the past century, and each wave has been characterised by a different predominant region of origin, often related to world events of the period (see *Population* chapter). Thus, Australian society is made up of a wide range of cultural groups, linguistic groups, and groups with different religious affiliation.

Added to the complexity of the long history of various countries of origin, there is also diversity in the skills and socioeconomic characteristics of recent migrants due to selection criteria used in migration policy. Settlers are drawn from different streams – skilled migration, family reunion, and the humanitarian program. Over all, skilled migrants experience better health, education and employment than the general population. However, many of those coming to Australia through the humanitarian program have low levels of income, larger families, low levels of education and low levels of English proficiency.³¹

In 2003–04, the number of new migrants who settled permanently was around 149,000 people. There have been changes over time in the proportions of different streams of immigration. From 1996–97 to 2003–04, the proportion of skilled migrants rose from 37% to 62%, while the family stream fell from 49% to 37%. The humanitarian program is established on a quota basis, which has remained roughly the same (about 12,000 people per year) for the past seven years.

The ability to participate in Australian society is highly dependent on English proficiency. In the 2001 Census, of those who reported that they spoke a language other than English at home, 14% spoke English 'not well' and 4% 'did not speak English at all'. In 1991, these proportions were 16% and 4%.

In the 2002 ABS General Social Survey, people who were born overseas and not proficient in English were more likely to report an inability to access

support in time of crisis than people born in Australia (14% felt they could not access support compared with 5%). And 18% of people who were born overseas and who were not proficient in English reported that they felt unsafe or very unsafe at home alone after dark, compared with 8% of the Australian born population. In addition, 12% of overseas born people with low levels of proficiency in spoken English reported that they often had difficulty getting transport to places they needed to go compared with around 4% of the Australian born population. They were also less likely than the general population to participate in sport (17% compared with 62%).³²

Break down of social cohesion

When the bonds between people are sufficiently weakened by stresses such as mental illness, abuse, destructive and self-destructive behaviours, individuals may permanently or temporarily become alienated or marginalised from families and social support networks. Furthermore, conflict expressed along racial lines can be an expression of a break down in social cohesion.

Homelessness

Homeless people are without settled accommodation and do not have access to the economic and social support that a home normally affords. Of course, there are many, often interrelated, personal and situational factors that may cause people to become or remain homeless. These include family breakdown, drug abuse, gambling, mental health problems, domestic violence and poverty.

People experiencing homelessness can stay in any number of places, including sleeping rough, staying in stop gap accommodation (with friends or in community refuges for those in crisis situations) or in other low cost accommodation (such as rooms in boarding houses). As a result it is very difficult to measure the numbers of people involved. Nevertheless, there have been some attempts to provide authoritative estimates. Those prepared by Chamberlain, MacKenzie and the ABS, based on the 2001 Census of Population, estimated

almost 100,000 homeless people in Australia on Census night 2001. Of these, approximately 14,200 were sleeping rough and nearly half (48,600) were staying with friends and relatives.³³ Analysis of the 1996 Census showed a similar number of homeless people (105,300), although it should be noted that other techniques have produced much lower numbers.³⁴

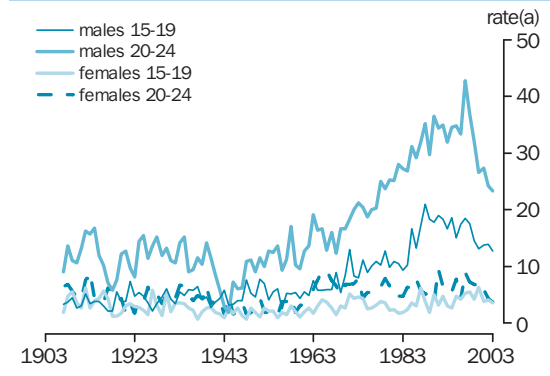
Information obtained from community organisations providing crisis accommodation and support services (compiled by the Australian Institute of Health and Welfare) indicate that greater numbers of clients received daily support in 2004–05 (about 21,900 to 24,900 per day) than in 1996–97 (about 13,000 to 14,000 per day).³⁵ These numbers are understood to represent only a fraction of homeless people in Australia on any one day, and may be influenced by an increased willingness to use such services.

Suicide

The suicide rate is one widely used indicator of social cohesion.³⁶ While many complex factors might influence a person’s decision to take his or her own life, suicide points to a loss of will to live as part of society and an inability of others to ensure that the person’s sense of wellbeing was maintained. The prevalence of drug-induced deaths is used as another indicator of social cohesion for similar reasons. While such deaths can occur for many reasons, their occurrences point to individuals who may not be well integrated into a supportive community.

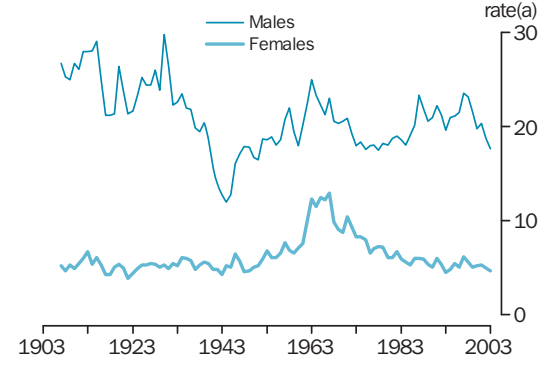
The annual, age standardised, suicide rate has fluctuated substantially over the last century, with the long term ups and downs being more the result of changes in the male suicide rate, which has been more volatile and consistently higher than the female rate. There is a general shift in the male suicide rate from the relatively low rates recorded through the 1970s to higher rates in the late 1980s and 1990s. This stands in contrast to the downward shift in female rates since the 1970s. Some component of the recent downward trends in suicides may be associated with issues of data quality.³⁸

Youth suicide



(a) Rate per 100,000 people. Source: AIHW Australian long term trends in mortality workbooks, GRIM BOOKS 2005

Suicide(a)



(a) Age-standardised rate per 100,000 people.³⁷ Source: AIHW Australian long term trends in mortality workbooks, GRIM BOOKS 2005

For young people, the suicide rate showed a period of steady increases for young males beginning in the late 1960s through to the peak in 1997 for young males aged 20–24 of 42.8 suicides per 100,000 people. For young males aged 15–19 the highest rate of suicides was in 1988 of 21.0 suicides per 100,000 people. In 2003, the rates were lower at 23.3 and 12.7 suicides per 100,000 people for males aged 20–24 and 15–19 respectively, however there are concerns about the quality of this data.³⁸

Drug-induced deaths

Drug-induced death rates are mostly due to the use of opiates such as heroin.³⁹ As with suicide, ABS statistics on deaths show the drug-induced death rate for women has been relatively low and stable over the last two decades, but for men the trend has been quite different. Starting at similar levels as for women in 1982 (about four deaths per 100,000 people), by 1990 the male rate had grown close to seven deaths per 100,000. After remaining stable at about the 1990 level for several years, it rapidly doubled to 13 deaths per 100,000 men in 1999, falling to 6 deaths per 100,000 men in 2004.

For women, on the other hand, the drug-induced death rate at the end of the 20-year period was the very similar to the beginning (around 4 per 100,000 women in 1982 and 3 per 100,000 in 2004) and throughout the period the rates were relatively stable.

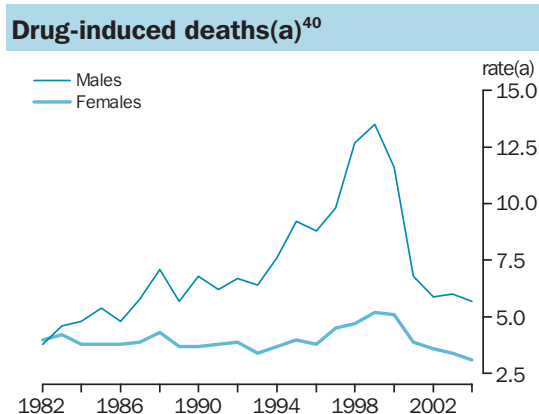
Cultural issues

One indicator of the breakdown of social cohesion is conflict between people and groups. As a settlement country, Australia is made up of diverse groups and cultures and sometimes tension, resulting in conflict, arises in our society. When this conflict is expressed along racial or cultural lines we refer to it as racism. Experiences of racism can be at the individual or at the group level and they can include discrimination (e.g. where an employer may use race as a reason for exclusion from jobs), as well as verbal and physical expressions of hostility. Some expressions of hostility are directed at property in the form of graffiti or physical damage, while other acts of hostility are directed at individuals and periodically result in group conflict.

There is debate about the prevalence and nature of racism in Australia. Experiences of racism, racial conflict and discrimination can be reported to the police, the Human Rights and Equal Opportunity Commission, and various interest groups. However, there is no systematic or centralised way of collecting these reports.

Links to other dimensions of progress

See also the commentaries *Crime, Health, Work, Economic hardship, Culture and leisure*, and *Democracy, governance and citizenship*.



(a) Age-standardised rate per 100,000 persons.³⁷

Source: ABS Causes of Death collection.

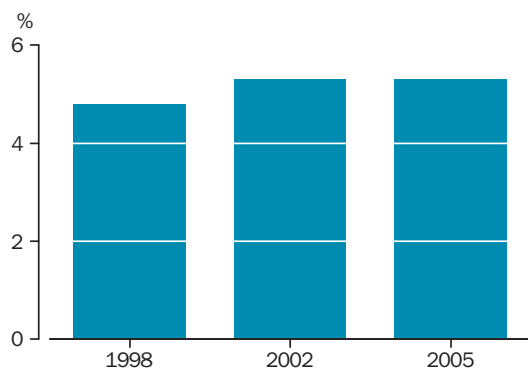
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 - 38 Data quality issues with Suicide – There has been an increase in recent years in the number of open coroners' cases. Where cases are not finalised and the findings are not available to the ABS in time for publication of causes of death statistics, deaths are coded to other accidental, ill-defined or unspecified causes rather than suicide. The causes of death statistics are not revised once a coronial enquiry is finalised. The number of deaths coded to Intentional self-harm (suicides) has declined in recent years which may in part reflect the increase in the number of coroners' cases that were still open when the statistics were finalised.
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- Deaths from 1980 to 1998 were classified according to the International Statistical Classification of Diseases Ninth Edition (ICD–9), while deaths from 1999 were classified according to the Tenth Edition (ICD–10). The drug-induced deaths from these different classifications have been matched to facilitate comparisons over time.

Crime: key points

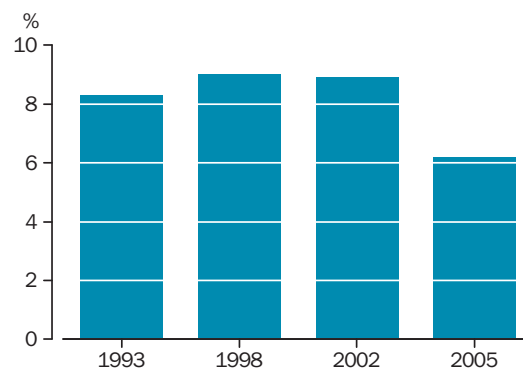
Victims of personal crimes(a)



(a) Assault and robbery among people aged 15 and over. Sexual assault among people aged 18 and over.

Source: *Crime and Safety, Australia, 2005 cat. no. 4509.0.*

Victims of household crimes(a)



(a) Actual or attempted break-ins; and motor vehicle theft.

Source: *Crime and Safety, Australia, 2005 cat. no. 4509.0.*

Though small, the victimisation prevalence rates for personal crimes showed an increase between 1998 and 2005 from 4.8% to 5.3%, the same level as in 2002. Most of these people were assaulted.

Between 1993 and 2005, the proportion of households that were the victim of a household crime (an actual or attempted break-in or motor vehicle theft) fell from 8.3% to 6.2%, after remaining at about 9% in 1998 and 2002.

The relationship of crime to progress

Crime takes many forms and can have a major impact on the wellbeing of victims, their families and friends, and the wider community. Those most directly affected may suffer financially, physically, psychologically and emotionally, while the fear of crime can affect people, restrict their lives in many ways, reduce levels of trust and impact on social cohesion. There are other costs as well, including the provision of law enforcement services by the police, courts and associated legal services, and corrective services.

About the headline indicator and its limitations: Household crimes, Personal crimes

Although it would be desirable to have a single indicator of the cost of crime to society, one does not exist (for further discussion see following page). Instead the headline indicators are two measures of common criminal offences: 'household crimes' and 'personal crimes'. The former refers to actual or attempted break-ins and motor vehicle theft. The latter refers to an assault, sexual assault or robbery. Personal crimes are not restricted to crimes committed in the victim's home, and so include crimes at people's place of work or study and so on.

The victimisation rates for personal crimes are for assault and robbery among people aged 15 or over, and sexual assault among people aged 18 and over.

The victimisation rates for household crimes are for actual or attempted break-ins and motor vehicle theft across all households.

Crime: Other indicators

Homicide rates, imprisonment rates.

Some differences within Australia

Crime rates tend to be higher on average in metropolitan centres than in non-metropolitan areas, but can vary considerably within those areas. Very high rates are observed in some small rural localities with high levels of disadvantage.

Links to other dimensions

In the absence of clear evidence one can only speculate as to whether changes in crime rates have been associated with other indicators of progress presented in this publication. Some areas of progress that are worth considering for associations with crime are: *Work, Economic hardship*, and *Family, community and social cohesion*.

Crime

Progress and the headline indicators

Crime takes many forms and can have a major impact on the wellbeing of victims, their families and friends, and the wider community. Those most directly affected may suffer financially, physically, psychologically and emotionally, while the fear of crime can affect people, restrict their lives in many ways, reduce levels of trust and impact on social cohesion. There are other costs as well, including the provision of law enforcement services by the police, courts and associated legal services, and corrective services. Although government agencies take on the major responsibility for law enforcement, many businesses and householders also bear costs in protecting against or paying for the consequences of crime. Such costs include those associated with taking out insurance policies, and the provision of surveillance and security equipment or services.

Measuring the full cost of crime might provide a single number approach to measuring progress in this area. But there is no well established way of doing this nor are there comprehensive data. Although information about expenditures on crime-related services provides some idea of the financial costs of crime to the community, the full impacts on victims, or the subsequent costs to the wider community, might never be fully known.¹ This is partly because the full extent of crime cannot be measured through available information systems. Indeed, it is well known that many crimes are never brought to the attention of the police. Estimating the costs of crime, even for those crimes that are known, is also fraught with difficulties: each offence has different consequences for those affected and these can be difficult to value.

Another way, albeit limited, of looking at progress in this area is to consider crime victimisation rates. These indicators, collected in the Crime and Safety survey, are incidents of crime regardless of whether they had been reported to the police. The survey focused on those categories of more serious crime that affect the largest number of people. There are two groups of offences – 'household crimes' and 'personal crimes'. The former refers to the theft of a motor vehicle and actual or attempted break-ins. The latter refers to assaults, sexual assaults and robbery. Crimes such as non-violent theft, fraud and property damage are not included.

The proportion of households experiencing a household crime between 1993 and 2005 decreased. In 1993, just over 8% of households were the victim of a at least one household crime. In 2005, just over 6% of households experienced a crime. Break-ins were the most commonly reported household crime in 2005 (3.3% of households), while 2.6% of households reported an attempted break-in and 1.0% reported a motor vehicle theft.

Households experienced almost three-quarters of a million household crimes in 2005. About 209,000 households experienced just one break-in, but a further 36,000 households experienced two break-ins that year, while over 15,000 experienced

three or more such crimes. Almost 75,000 households had a motor vehicle stolen in 2005.

Though small, the changes in the prevalence rates for personal crimes between 1998 and 2005 showed an increase. In 1998, 4.8% of Australians reported being the victim of at least one personal crime. In 2005 the figure stood at 5.3%, the same level as in 2002. Assault was the most commonly reported personal crime, with 4.8% of people reporting at least one assault in 2005. Some 0.4% of people reported at least one robbery, and 0.3% reported sexual assault.

Almost 2.8 million personal crimes were experienced by individuals in 2005. About 370,000 people reported being the victim of a single assault in 2005. Another 146,000 people were the victim of two assaults, while 252,000 people were the victim of three or more assaults. Some 40,000 people were the victim of one robbery, 11,000 were the victim of two and approximately 8,000 were the victim of three or more.

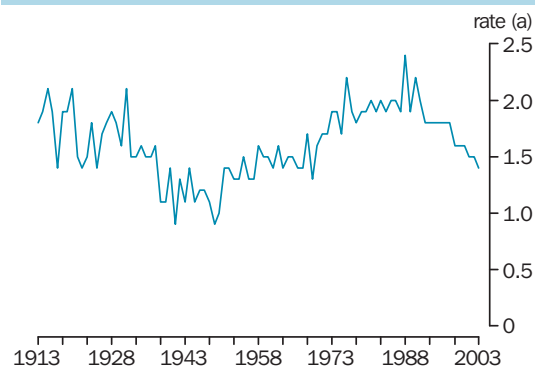
Homicide rates

The homicide rate (here based on cause of death statistics rather than police statistics) offers a longer term view of the prevalence of crime in Australia.² While representing only a small fraction of overall crime, homicide (referring in this context to murder and manslaughter) is one offence category for which generally consistent statistics have been available for many years, and it is also a crime that does not often go unreported.

Homicide rates for the period 1913 to 2003 have fluctuated, often substantially from one year to the next, but overall within a relatively small range, i.e. between extreme lows and highs of 0.9 and 2.4 homicides per 100,000 people per annum.

Despite the annual fluctuations and some decades of relative stability, there were some longer periods over which the rates tended to rise and fall. Broadly described, these include a decline in the rates after the 1920s, down to lows recorded during the 1940s – around the time of World War II. After that, there was a long-term upward trend

Homicide rate



(a) Age-standardised rate per 100,000 people.
Source: AIHW GRIM books 2003.

International comparison of homicide

Crime statistics suitable for international comparison are not widely available. However, as the definition of homicide is similar in most countries, comparisons of homicide rates help to reveal some of the differences in levels of crime among countries. Such data compiled from police records by researchers for the Home Office of the United Kingdom, are presented below.

For the period 1999 to 2001, the average homicide rate for the 17 member states of the European Union was 1.6 per 100,000 persons (the rates ranged from a low of 1.0 in Norway to a high of 2.7 in Northern Ireland). Australia's rate (1.9) was slightly higher than the European Union average and similar to Canada (1.8). Higher homicide rates were recorded in some other parts of the world. For instance the rates in the USA and South Africa were 5.6 and 55.9 respectively.

Homicide rates(a) – 1999 to 2001

Selected countries	Homicide rate
European Union member States	
Norway	1.0
England and Wales(b)	1.6
France	1.7
Northern Ireland(b)	2.7
Italy(c)	1.5
<i>European Union – average for 17 member states</i>	1.6
Other countries	
Australia	1.9
Canada(c)	1.8
Japan(d)	1.1
New Zealand	2.5
South Africa	55.9
USA	5.6

(a) Homicides per 100,000 people, three year average. (b) Data relate to financial years beginning 1 April of each year. (c) Includes murder, manslaughter and infanticide. (d) Includes attempts.

Source: Barclay G & Tavares C. 2003, *International Comparisons of Criminal Justice Statistics, 2001*. Home Office, United Kingdom.

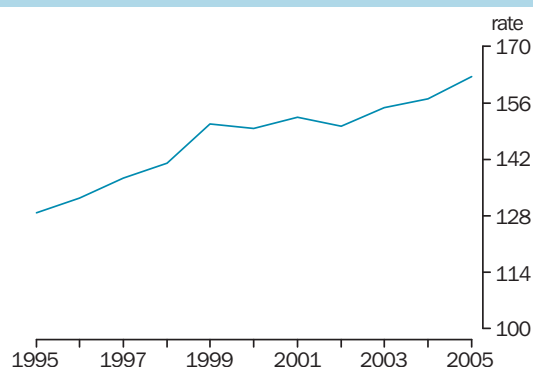
which reached a peak of 2.4 homicides per 100,000 people in 1988.

After falling back to 1.8 homicides per 100,000 people in 1992 the annual rates through the 1990s have fallen slightly further. In 2003, there were 278 homicides recorded in the cause of death statistics: 1.4 homicides per 100,000 people. Similar data compiled from police records since 1993 indicate little change through the 1990s.³

Indigenous and non-Indigenous imprisonment rates

Although courts may impose various penalties for people convicted of criminal offences (fines, community service orders and the like) imprisonment is the most severe social response to

Imprisonment rate per 100,000 adults⁴



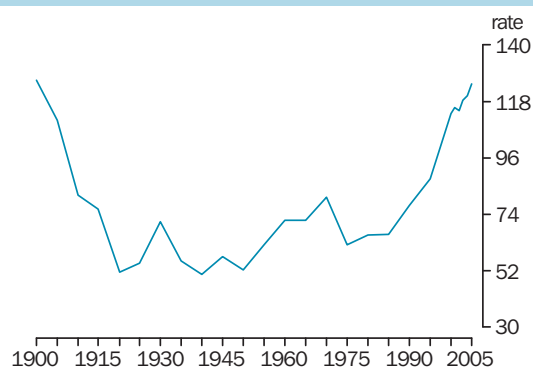
Source: *Prisoners in Australia, 2005*, cat. no. 4517.0.

crime in Australia. Changes in the imprisonment rate (the number of people in prison relative to a measure of the total population) do not necessarily measure changes in the level of crime or success in catching and convicting criminals, although they may be related. They can reflect changes in community attitudes (played out through the court system) as to how tough the community's response to crime should be, as well as changes in prison capacity.

Overall, the rate of imprisonment has increased over the decade 1995–2005 so that by 2005, 163 adults in every 100,000 were serving a prison sentence – up from 129 per 100,000 in 1995.

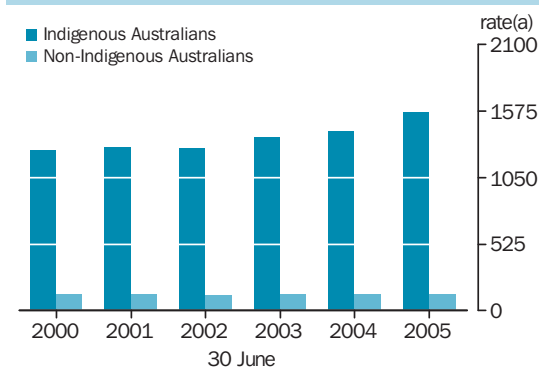
Historical data compiled by the Australian Institute of Criminology show that this trend has been part of a longer term trend over the last 20 or so years. There had also been an increasing trend during the 1950s and 1960s. Measured as a proportion of the total population rather than the adult population (those aged 18 years or over), it also shows that imprisonment rates in 2005 stood at levels higher than in most other years of the 20th century. Following the upward trend seen over recent decades, the rates have now returned to the levels observed at the beginning of the 20th century: in

Imprisonment rate per 100,000 people(a)



(a) Rate per 100,000 people of all ages. Source: Graycar A. 2001, *Crime in twentieth century Australia*, in *Year Book, Australia, 2001*, cat. no. 1301.0; *Australian Demographic Statistics, June 2000*, cat. no. 3101.0; and *Prisoners in Australia, 2005*, cat. no. 4517.0.

Indigenous and non-Indigenous imprisonment rates, per 100,000 adults⁴



(a) Age standardised rate per 100,000 adults.

Source: *Prisoners in Australia, 2005*, cat. no. 4517.0.

2005 there were 125 prisoners per 100,000 people (of all ages) compared to 126 in 1900.

The imprisonment of Indigenous Australians has been a major issue of social concern in Australia, with imprisonment rates much higher than those of the non-Indigenous population. There have also been related concerns about the high proportion of Indigenous Australians in prisons dying of unnatural causes, especially by suicide.⁵

In 2005, the age-standardised imprisonment rate for adults of Aboriginal or Torres Strait Islander origin was over 12 times the rate for non-Indigenous people (1,561 prisoners per 100,000 adults compared with 129 prisoners per 100,000 adults). The Indigenous imprisonment rate increased over the 5-year period, and in 2005 it was higher than in 2000 when the rate was 1,265 prisoners per 100,000 adults. In June 2005, there were close to 5,700 Indigenous prisoners in Australia; they represented 22% of the 25,353 people in prison at that time.

Some differences within Australia

Crime rates tend to be higher on average in metropolitan centres than in non-metropolitan areas, but can vary considerably within those areas.⁶ Very high rates are observed in some small rural areas with high levels of disadvantage.⁷ There are likely to be many reasons for the differences. Places with high crime rates tend to have interrelated problems of disadvantage (such as low income, high unemployment, low levels of educational attainment, family relationship problems, and high levels of drug use). Differences between areas may also relate to the opportunities to commit crime in those areas and the extent to which people and properties are protected. Comparisons among the states and territories are of interest because the criminal justice system, including police, courts, and correctional services, is primarily administered by state and territory Governments. Comparing the different outcomes across the jurisdictions may be useful in evaluating the effectiveness of various crime prevention and reduction strategies.⁸

Crime victimisation rates (from the ABS Crime and Safety Survey) and murder and kidnapping/abduction rates (as recorded by police) varied considerably among Australia's states and territories and to some extent from year to year. Murder and kidnapping/abduction are crimes which are experienced much less frequently than other crimes such as assaults, break-ins and motor vehicle threats. In 2004, murder rates were below 2.0 per 100,000 adults 18 years and over in all states, with the exception of the Northern Territory with a rate of 4.5. For kidnapping/abduction the rates varied from 1.3 to 3.0 across all states except New South Wales, which experienced a rate of 6.9.³

In 2005, total household crime victimisation rates were lowest in Tasmania and Victoria, as were total personal crime victimisation rates. No single state

Victimisation rates for selected offences(a) – 2005

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	rate	rate	rate	rate	rate	rate	rate	rate	rate
Personal crime(b)									
Assault	4.8	4.1	5.7	4.7	5.2	4.4	5.9	5.5	4.8
Robbery	0.4	0.2	0.4	*0.3	0.5	**0.1	**0.5	*0.3	0.4
Total personal crime(c)	5.4	4.5	6.1	5.0	5.6	4.7	6.6	5.8	5.3
Household crime									
Break-in/attempted break-in	5.9	3.9	5.4	5.5	7.2	3.8	12.8	6.6	5.4
Motor vehicle theft	1.1	0.7	0.8	1.3	0.9	*0.9	np	np	1.0
Total household crime(c)	6.8	4.6	6.1	6.6	7.8	4.5	13.0	7.6	6.2

(a) Victims refer to individual people for personal crimes, or households for property crimes per 1,000 people/households. (b) Excludes murder and kidnapping/abduction. (c) The total is not a sum of each of the components as people/households can experience more than one crime.

* estimate has a relative standard error of between 25% and 50% and should be used with caution.

** estimate has a relative standard error greater than 50% and is considered too unreliable for general use.

np not available for publication but included in totals where applicable, unless otherwise indicated.

Source: *Crime and Safety, Australia, 2005* cat. no. 4509.0.

had the highest (or lowest) rate for all offence categories shown, however the Northern Territory had the highest crime rates for assault and break-ins.

There are likely to be many factors accounting for the differences. States differ in their demographic and socioeconomic profiles: some population groups are more likely to be either perpetrators and/or victims of crime and some of these groups are more highly represented in certain states. For example, states and territories with younger populations tend to have higher crime rates than states with older population profiles, as a high proportion of offences are committed by young people (particularly young men).⁹ Differences in the representation of population groups with other characteristics more likely to be correlated with crime (such as those with low levels of educational attainment, high unemployment rates and low income) may be a factor. Differences in the level of drug and alcohol use in each community may also be important, as may other factors, such as the level of policing activity.

Victims of personal crimes

The chance of being the victim of a robbery or an assault decreases with age. In 2005, 9.9% of 15–19 year olds were the victim of an assault compared to 0.8% of those aged 65 or over. Similarly 1.2% of 15–19 year olds were the victim of a robbery compared to approximately 0.1% of those aged 65 or over.

Data from the General Social Survey in 2002 shows that the unemployed, lone parents and people living alone were also more likely to be victims of personal (and household) crimes than their married, and employed or not in the labour force, counterparts.

In 2005, almost one-third of assaults happened in the victim’s home, with a further 26% in their place of work or study. A weapon was used in 12% of assaults, and in over three-quarters of assaults the victim was not physically hurt. About 78% of assaults were carried out by men, and the victims knew their assailants 59% of the time.

Recent trends

Changes in crime rates in recent years within each of the states and territories show some quite different trends, which also differ according to the nature of the offences involved. Such differences are illustrated by focusing on the two major offence categories presented as the headline indicators (household and personal crimes).

Household crimes

National rates of household crimes decreased between 1993 and 2005, and this trend was observed in all states and territories except the Northern Territory, where there was no significant difference in the rate.

Personal crimes

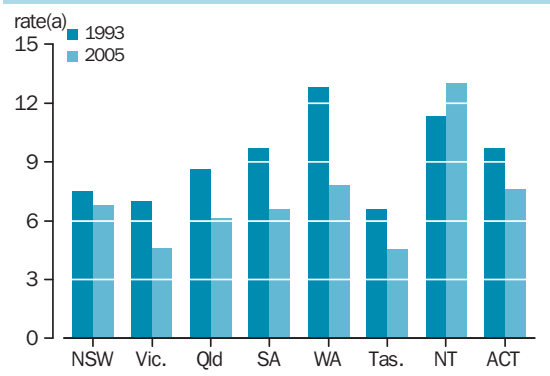
Comparative data relating to the prevalence of personal crimes cover a shorter time period than for household crimes, and while the rate at the national level has increased between 1998 and 2005, this trend was not uniform. Among the states and territories, the victimisation rates for personal crimes rose in New South Wales from 4.6% of people experiencing a crime in 1998 to 5.4% of people in 2005, and in Queensland (5.1% to 6.1%). The rate fell in the Australian Capital Territory, from 7.7% of people in 1998 to 5.8% in 2005, and also in Tasmania from 5.7% to 4.7%. Rates remained broadly unchanged in the other states.

Factors influencing change

Law breaking occurs within all societies, and all have systems of policing and justice to help minimise its spread and to maintain social order. Many factors influence a person's risk of criminal behaviour, and many also affect differences in crime rates among areas and changes in crime rates over time.

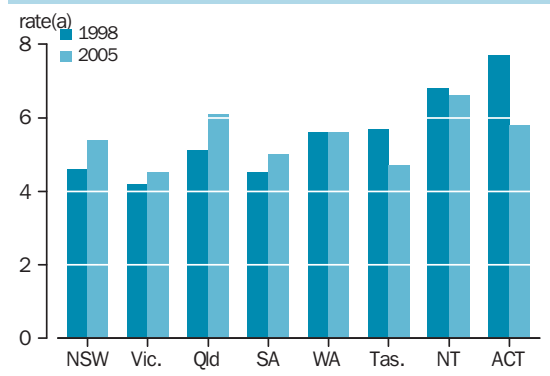
Differences in crime rates between areas have also been associated with poverty, unemployment and income inequality. Over time, changing levels of drug dependence may have been a factor in changes in crime rates.¹⁰ The prevalence of crime may also depend on available opportunities and the size of the potential rewards, perhaps weighed

Household crime victimisation rates



(a) Rate per 100,000 households. Source: Crime and Safety, Australia, 2005 cat. no. 4509.0.

Personal crime victimisation rates



(a) Rate per 100,000 people. Source: Crime and Safety, Australia, 2005 cat. no. 4509.0.

Crimes recorded by police

Most of the statistics in this commentary are based on people's responses to ABS surveys, although some data come from police figures. Crimes recorded by police are offences that became known to police and are recorded by them. These offences may have been reported by a victim, witness or other person, or may have been detected by police.

Care should be taken in interpreting police statistics as many crimes are not reported to the police (see next paragraph). Changes in recorded crime may be a reflection of changes such as:

- ◆ community attitudes to reporting crime
- ◆ policing resources and strategies
- ◆ crime recording systems

rather than changes in the incidence of criminal behaviour.

Crime reporting rates

National crime and safety surveys conducted by the ABS estimate the extent to which incidents of crime were reported to the police. Whether the most recent incident in the last 12 months has been reported is widely used as a guide to the overall preparedness of victims to report crime. As such it is sometimes used to provide an indication of whether there are particular issues with respect to reporting incidents in individual states and territories, or in relation to particular types of offences.

Crime reporting rates(a) – 2005

	Break-in	Assault(b)
	%	%
NSW	75.0	31.3
Vic.	77.4	31.8
Qld	65.7	32.4
SA	72.9	37.4
WA	79.7	25.9
Tas.	75.0	27.7
NT(c)	*67.4	*35.7
ACT	74.9	26.6
Aust.	74.2	31.4

(a) The proportion of victims in each offence category who told police about the most recent incident. (b) Persons aged 15 years and over. (c) Refers to mainly urban areas only.

* estimate has a relative standard error of between 25% and 50% and should be used with caution.

Source: *Crime and Safety, Australia, 2005, cat. no. 4509.0.*

The national reporting rate in 2005 for break-ins was 74%, with Western Australia having the highest rate (80%) and Queensland the lowest rate (66%). Victims were much less likely to report assault to the police – the national reporting rate was 31%, ranging from 37% in South Australia to 26% in Western Australia.

One of the known factors for the difference in reporting patterns for different offence types is the requirement to report property crimes for insurance purposes, whereas for assault victims a common reason for not telling police was that the incident was either seen as too trivial or that it was a personal matter.

against the risk of detection, apprehension and punishment.

Family factors, such as conflict with parents and family disruption, parental neglect, deviant parental behaviours and attitudes, are also considered to be strong predictors of juvenile involvement in crime.⁹

Common responses to increasing levels of crime include increasing prevention and detection activities, and increasing penalties, such as terms of imprisonment. Significant investigation into the longer term impact of these responses is necessary in order to properly assess the influence of these factors on changing levels of crime.

Links to other dimensions of progress

In the absence of clear evidence one can only speculate as to whether changes in crime rates have been associated with other indicators of progress presented in this publication. There are strong links to levels of economic hardship when comparing crime rates among population subgroups, but the association between crime rates and changes in unemployment over time is considered to be weak.¹¹ It is believed that the effect of changes in levels of economic hardship on crime may be indirect, for example, by disrupting the parenting process and increasing the likelihood of neglect and abuse of children, making them more susceptible to the influence of delinquent peers.¹¹

Drug addiction, a major health concern, is also associated with criminal activity (both in terms of dealing with prohibited drugs and sometimes in having to commit other crimes to support what can be expensive drug habits). To the extent that the prevalence of crime affects people's trust of others there may also be a link between crime rates and levels of social cohesion.

See also the commentaries *Work, Economic hardship*, and *Family, community and social cohesion*.

End notes

- 1 See, for example, Mahew, P. 2003, 'Counting the costs of crime in Australia', in *Trends and Issues in Crime and Criminal Justice*, No. 247, Australian Institute of Criminology (AIC), Canberra. Also, for contemporary data on expenditures on policing and community safety and support services, see Steering Committee for the Review of Commonwealth/State Service Provision (SCRCSSP) 2006, *Report on Government Services 2006*, Vol. 1. Ausinfo, Canberra.
- 2 For a recent study on producing homicide rates using different data sources see, Mouzous, J. 2003, 'Australian Homicide Rates: A comparison of three data sources' in *Trends and Issues in Crime and Criminal Justice*, No. 261, Australian Institute of Criminology (AIC), Canberra.
- 3 The rate of murder and manslaughter offences recorded in national police statistics fluctuated between 1.7 and 2.0 per 100,000 people between 1993 and 2003 with no apparent trend. See Australian Bureau of Statistics 2004, *Recorded Crime*

- *Victims, Australia, 2004*, cat. no. 4510.0, ABS, Canberra.
- 4 In some jurisdictions the adult population comprises those people aged 18 and over, in others it is those people aged 17 and over.
 - 5 Royal Commission into Aboriginal Deaths in Custody (RCIADIC) 1991, *Royal Commission into Aboriginal Deaths in Custody, Volume 1* (Commissioner, Elliot Johnson), AGPS, Canberra. Annual figures for Aboriginal deaths in custody are available from: Joudo, J, and Veld, M. 2005, *Deaths in Custody in Australia: 2004 National Deaths in Custody Program (NDICP) Annual Report*, Australian Institute of Criminology, Canberra.
 - 6 National statistics relating to differences between 'metropolitan' and 'non-metropolitan' areas have been published in Australian Bureau of Statistics, *Crime and Safety, Australia, 2002 and 2005*, cat. no. 4509.0, ABS, Canberra. Differences within states have also been published in the following state-based publications: see Australian Bureau of Statistics 2001, *Crime and Safety, New South Wales, 2003*, cat. no. 4509.1, ABS, Canberra. Australian Bureau of Statistics 2001, *Crime and Safety, South Australia 2000*, cat. no. 4509.4, ABS, Canberra and Australian Bureau of Statistics 2001, *Crime and Safety, Western Australia, 1999*, cat. no. 4509.5, ABS, Canberra.
 - 7 For example, see Losoncz, I., Carcach, C., Blake, M., and Muscat, G. 2000, *Atlas of Crime in Australia, 2000*, Australian Institute of Criminology, Canberra. Differences can also be seen in tables 9.1 and 9.2 in: Australian Bureau of Statistics 1999, *Crime and Safety, Supplementary National and Standard Tables, Australia, 1998*, cat. no. 4509.0.40.001, ABS, Canberra.
 - 8 It should be noted that comparisons of the criminal justice systems of the states and territories, and their impact on crime rates, may be affected by differences in legislation and administrative or organisational arrangements.
 - 9 See Weatherburn, D. 2001, *What Causes Crime?* (Crime and Justice Bulletin B54) at <<http://www.Lawlink.nsw.gov.au/bocsar1.nsf>> last viewed 27 March 2006.
 - 10 While it is difficult to gather an accurate measure of levels of drug dependence due to the reluctance of people to identify as drug users, if we consider drug-induced deaths (see *Family, community & social cohesion* chapter) there was a sharp increase in drug-induced deaths over the past 15 years, which was later followed by a sharp decline.
 - 11 Weatherburn, D., Lind, B., and Ku, S. 2001, 'The Short-Run Effects of Economic Adversity on Property Crime: An Australian Case Study', in *The Australian and New Zealand Journal of Criminology*, Vol. 34 No. 2, pp. 134–148.

Communication

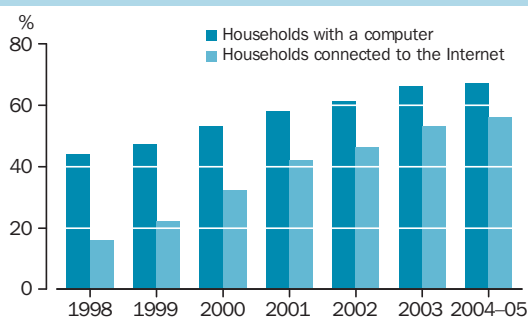
Access to the Internet among Australian households grew rapidly between 1998 and 2004–05, and 56% of households were using the Internet at home by 2004–05. However, there are substantial differences in levels of access between different groups of the population.¹

The communication of information, ideas and knowledge is important to many aspects of Australian progress, such as education and economic efficiency. Many aspects of communication – including the freedom and quality of Australia's press, television and radio, and how much we communicate and with whom – are important. This commentary focuses on the Internet, an increasingly important form of communication. Those who have access are able to take advantage of an increasingly diverse range of activities and they can communicate with a broader range of people. Many companies, organisations, universities, political parties and individuals have web sites. Online services include education, banking and shopping. And the Internet helps people to work from home or to stay in contact with family and friends.

The number of households with home Internet access has increased significantly since 1998. In 1998 about 16% of households (1.1 million) had home access to the Internet. By 2004–05 this figure had risen to almost 56% (4.4 million). The percentage of households with access to a home computer also continued to increase, but at a much slower rate than home Internet connections over the same period (from 44% in 1998 to 67% in 2004–05). Of the 7.8 million adults aged 18 and over accessing the Internet at home, 36% used it every day, 49% used it at least on a weekly basis and 13% used the Internet at least once a month. Of those adults accessing the Internet at work, 59% reported accessing the Internet everyday.¹

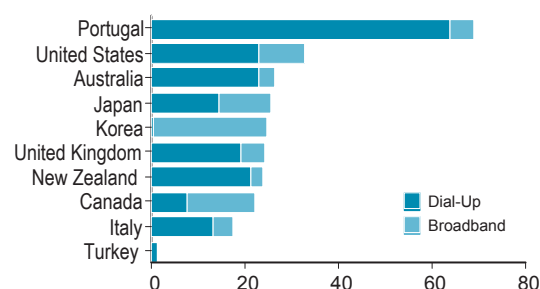
Australians are increasing their use of information technology, in particular making more use of the Internet to purchase or order goods or services. In 2004–05, of all Australian adults, an estimated 31% purchased or ordered goods or services via the Internet for private use. Travel, accommodation or tickets were identified as the most popular product purchased.¹

Household computer and Internet access



Source: Household Use of Information Technology 2004–05, cat. no. 8146.0.

Total Internet, dial-up and broadband subscribers, selected OECD countries, 2003(a)



(a) per 100 people

Source: OECD Communications Outlook, 2005

Broadband access – defined by the ABS as an ‘always on’ Internet connection with an access speed equal to or greater than 256 Kilobits per second – provides much faster access to the Internet than other services such as dial-up modems. The development and use of broadband communications technologies can influence the way people live, work and do business.² While the number of broadband services provided to all types of customers (including both businesses and households) in Australia increased significantly between June 2002 (258,100 services) and June 2005 (2,183,300 services),³ dial-up access remained the most popular method of Internet connection for households during 2004–05. Of the 4.4 million households accessing the Internet at home in 2004–05, 69% had a dial-up connection while 28% reported a broadband Internet connection.¹

The importance of broadband technologies is being recognised across the world.² Internet connectivity continues to expand rapidly in the Organisation for Economic Cooperation and Development (OECD) member countries. By the end of 2003, there were roughly 259 million subscribers to fixed Internet connections and 84 million broadband subscribers across these countries. By August 2004, the number of broadband subscribers had passed 100 million, equating to an average annual growth rate of 77% since 2000. Korea continued to be a leader in the adoption of broadband technology, with more than 24 broadband subscribers per 100 people. Australia's level of broadband access (3.5 per 100 people in 2003) is well below the OECD average of 7.2 per 100 people.⁴

More generally, access to communication networks continues to expand in all OECD countries. However, there appear to be large shifts between the different segments of the market for a number of countries including Australia.⁴ While the number of mobile phone services is continuing to grow in Australia (in 2004–05 around 90% of the population had a mobile phone service compared to 42% in 1999–00), the number of fixed line telephone services is declining (the number of

fixed services in operation fell from 11.7 million in 2003–04 to 11.5 million in 2004–05 despite population growth and a trend towards smaller, and therefore more, households).⁵

Television broadcasting is another means by which many Australians receive information. In June 2005 approximately 1.7 million households subscribed to pay TV services, which represents around 26% of TV viewers (or around 21% of households).⁵

Some differences within Australia

Although Internet use has increased rapidly since 1998, access to the Internet differs according to household characteristics – data show that people on low incomes, living outside metropolitan areas, aged over 65, and particular population groups (e.g. Indigenous Australians) are less likely to use the Internet.¹ The term ‘digital divide’ is used to describe unequal access to information and communications technology within parts of the community.⁶

In 2004–05, households with incomes between \$40,000 and \$80,000 were nearly twice as likely to have access to the Internet at home than those with incomes under \$40,000 (63% compared to 32%) and metropolitan households were more likely than those outside the cities to have access to the Internet at home (59% compared to 51%).¹

In 2003, 29% of people aged 60 or over reported having used a computer in the last 12 months, with a slightly smaller proportion of people in this age group reporting having used the Internet during the same period (21%).⁷ By comparison, most children aged 5–14 used a computer (95%) and accessed the Internet (64%) in the 12 months to April 2003. Computer usage by children increased with age from 90% for 5–8 year olds to 99% for children aged 12–14. Internet usage by children also increased with age, from 37% of 5–8 year olds to 88% for 12–14 year olds.⁷

In 2002, 56% of Indigenous people aged 15 or over reported they had used a computer in the last 12 months and 41% reported they had use the Internet over the same period. Indigenous people in non-remote areas were almost twice as likely to have used a computer or the Internet as those in remote areas.⁷

Among the states and territories, the Australian Capital Territory had the highest proportion of households with home internet access (65%) in 2004–05, possibly because of the ACT's relatively high average incomes and younger age profile. Tasmania had the smallest proportion with home internet access, at 46%. People accessing the Internet in the ACT are also more likely to purchase or order goods or services via the Internet.¹

Businesses use of the Internet is discussed in the *Productivity* commentary.

Factors influencing change

Many factors affect whether people decide to connect to the Internet at home. These include cost, interest in the Internet and ownership of a computer.

Interest in the Internet is likely to rise as the breadth of online services increases and people become more accustomed to using them. The number of businesses with a web presence – a website, homepage or entry on another entity's website – continues to increase. In 2003–04 the number of businesses with a web presence rose to 25%, up from 16% in 1999–00.⁸ Australian adults are also using the Internet more to purchase or order goods or services. In 2004–05, 31% of Australian adults purchased or ordered goods or services via the Internet for private use – this proportion has increased from 5% in 1999 and 15% in 2002.¹ In 2002, 21% of adult Australians accessed government services via the Internet, with about half of this proportion reporting the main reason was to pay bills.⁹

Of the 4.1 million households without access to the Internet in 2002, 41% reported a lack of interest in the Internet or no use for the Internet as the main reasons they didn't have home access. A further 26% reported the costs for home Internet access were too high. But households with high income (\$100,000 or over) were more likely to report having access elsewhere, rather than cost, as a reason for not having the Internet at home.⁹

The notion of digital inclusion recognises that equitable Internet access is not just a matter of physical access to an Internet connected computer

Social networks and the Internet

Information and communications technology (ICT) impacts on the communities in which we live and the way individuals, business, government and civil society interact and develop. As the use and impact of ICT increases, so does the prospect that ICT can influence community development and an individual's social networks.¹⁰

The Internet may be used to supplement existing social relationships by providing another means of communication. It allows people to keep in touch with established contacts, and disseminate information simultaneously to whole networks and provides greater opportunity for extending social networks within a community.^{10,11}

ICT may also provide access to new social networks – expanding the concept of community to those groups that are not bounded by geography through chat rooms and subscribing to or linking in with e-mail networks. These networks can be particularly important for communities and groups isolated by geography or circumstance.^{10,11}

However the Internet has also been identified as having the potential to diminish some social relationships as it can draw some people away from family and friends and reduce social participation and physical interaction. Some people find that as global communication and involvement increases, interest in local community and politics decreases.¹⁰

Internet security

The ability of individual users to feel confident about releasing personal information, such as credit card details, into the network, or authenticating and verifying the information that they access is of critical importance to the success of the Internet. Security threats such as computer viruses, identity theft and spyware reduce user confidence and trust.⁵

Of the 9.5 million Australians accessing the Internet in 2004–05, 4.9 million chose not to purchase or order via the Internet – 27% of these people reported security concerns or concerns about providing credit card details on-line as the reason.¹

or digital device.⁵ Information technology skills and the capacity or even the willingness to use the Internet to access government, business and personal communications services are also important factors in an individual's level of participation in the information economy.^{5,12} As more services and activities become Internet based, groups with limited access may not have the full opportunities to participate in social, economic and political life.

Factors believed to be a barrier to effective Internet access or use include lack of skills and training, limitations on the awareness of the benefits and uses of ICT, the availability of technical support and concerns over security. The quality of the available services (ie access to broadband) also impacts on an individual's ability to access information. The use of the Internet in the workplace has the potential to stimulate people to become connected at home, while children who use the Internet at school or a friend's house could to provide a push to their own households to become connected.

Links to other dimensions of progress

The Internet can be used for education; it is a powerful research tool and many education institutions are developing distance learning courses over the Internet. Education also plays a part in driving change: people's knowledge of and ability to use the Internet help determine whether they choose to connect at home.

The Internet can be used for cultural or recreational pursuits, and can save time (through activities such as Internet banking) which can be spent on other things. The growth of Internet use might also act as a catalyst for greater social cohesion and improved governance: it can provide better links across a local community while also offering access to national and international resources.

The flow of knowledge and information over the Internet can stimulate innovation. It also allows consumers a way of comparing the prices of, and even purchasing, goods and services from outside their local area, or outside Australia. This access to other markets might make Australian industry more competitive, both domestically and internationally.

See also the commentaries *Productivity; Education and training; Family, community and social cohesion; Democracy, governance and citizenship*.

End notes

- 1 Australian Bureau of Statistics 2005, *Household Use of Information Technology 2004–05*, cat. no. 8146.0, ABS, Canberra.
- 2 Department of Communications, Information Technology & the Arts 2003, *Australia's Broadband Connectivity*, National Office for the Information Economy, Canberra
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Transport

Many aspects of transport relate to progress. Transport and transport links connect businesses with marketplaces, and, in so doing, give people access to different goods and services. Greater access to transport also gives individuals more choice in where to live, work and spend free time.

It is difficult to develop an indicator reflecting national progress in the transport dimension. An ideal indicator might focus on whether people have access to efficient and affordable transport. Within some of our major cities, an indicator might measure whether people have access to acceptable public transport networks or uncongested roads. In remote parts of Australia, an indicator might measure whether the roads are in good repair or whether those who need a car can afford to own and use one. But whether transport is acceptable or affordable is a matter of personal opinion and is a difficult concept to measure. Even if data were available, there is no obvious way in which these aspects could be combined into one number.

This commentary focuses on access to transport, and access to the motor car is important to many Australians. Statistics on motor vehicle registrations can tell us how access to cars might be changing over time. Environmental concerns associated with motor vehicle use, primarily some types of air pollution and greenhouse gas emissions, are discussed elsewhere in this publication by indicators relating directly to these concerns.

In March 2005 there were over 10.9 million registered passenger vehicles in Australia, up from around 8.6 million in 1995. In 2005, passenger vehicles accounted for almost 80% of the vehicle fleet, with trucks, buses, motorcycles and light commercial vehicles comprising the rest (another 3 million vehicles).

The number of motor vehicles grew more quickly than the population in the 1990s. By 2005 there was just over one passenger vehicle for every two Australians – 537 passenger vehicles for every 1,000 people, up from 478 vehicles per 1,000 people in 1995.^{1,2}

The total number of kilometres travelled by passenger vehicles rose from 127,586 million in

Air, rail, sea and freight

Rail, sea and air transport are all important in Australia. Rail and light rail/trams move a considerable number of passengers within urban areas (588.9 million passenger trips in 2003–04). Rail also carries a good deal of freight, particularly bulk commodities like coal and mineral ores. In 2003–04, rail moved 594.7 million tonnes of freight.³

Sea transport moved 53 million tonnes of domestic freight in 2002–03.⁴ Domestic sea transport focuses on long distance movement of bulk commodities such as metal ores, petroleum and petroleum products, coal and cement.⁵ Large quantities of goods were also transported long distances for export and import.

Air transport takes passengers over long distances quickly and transports small volumes of freight, complementing the other transport modes that provide for short trips and slower travel. In 2003–04, about 31 million domestic passenger journeys were made by air and passengers were carried over 37 billion passenger-kilometres.⁴ Domestic air freight carried 0.2 million tonnes of freight in 2000–01.⁵

1998 to 147,728 million in 2004. However, there was only a small change in the average distance travelled by each passenger vehicle over the same period (13,400km in 1998 rose to 13,900km in 2004).^{6,7}

Some differences within Australia

In 2005, the highest levels of passenger vehicle registrations were in Victoria, with 585 vehicles per 1,000 residents, up from 514 vehicles per 1,000 people in 1995. The Northern Territory reported the lowest level of passenger vehicle registrations in 2005, with 354 vehicles per 1000 people.^{1,2} These data are influenced by the level of

Fuel consumption and air pollution

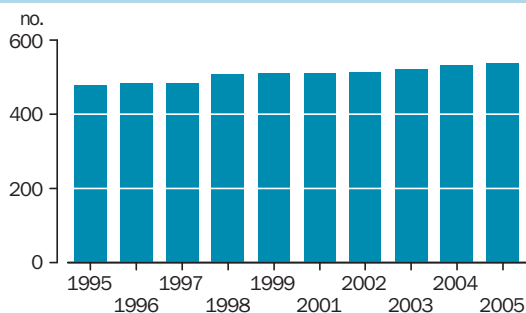
The combustion of fossil fuels by motor vehicles is an important source of air pollution and greenhouse gases. In 2003, the Australian transport sector accounted for 15% of Australia's total emissions – 79.8 million tonnes up from 61.9 million tonnes in 1990.⁸

As different fuels contain varying amounts of carbon and energy, greenhouse emissions can be reduced by changing to fuels with lower emissions and also by the use of more fuel efficient vehicles.

For every litre of petrol used 2.5kg of carbon dioxide is released from the exhaust, for diesel this figure rises to 2.7kg, but is significantly lower for LPG (1.6kg).⁹ In 2004, 88% of the fuel consumed by passenger vehicles was petrol, with LPG consumption accounting for a further 7% and diesel 5%.⁶ Emissions from vehicles, especially those that use diesel fuels, also include very fine particles that contribute to air pollution.¹⁰

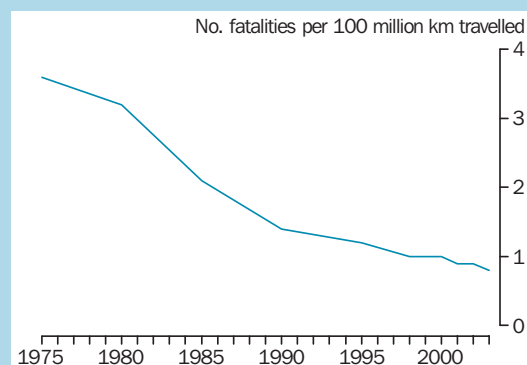
While new vehicles are considerably more fuel efficient than older vehicles, average passenger vehicle fuel consumption has remained around 11 to 12 litres per 100kms over the 1998 to 2004 period.^{6,7} This is in part due to the relatively slow drop in the average age of the passenger vehicle fleet which has inhibited efficiency gains.¹⁰ In 1995, the average age of the passenger vehicle fleet was 10.3 years, while in 2005 this figure had fallen 4% to 9.9 years.^{1,2}

Passenger vehicles per 1,000 people



Source: Motor Vehicle Censuses, Australia, 1995–2005, cat. no. 9309.0. Census was not conducted in 2000.

Fatalities per 100 million vehicle kilometres travelled 1975–2003



Source: Australian Transport Safety Bureau, *International Road Safety Comparisons, The 2003 Report*. Australia.

Road safety

Australia, along with many western countries, has worked hard to reduce deaths and injuries from motor vehicle accidents. Considerable gains have been achieved, despite increased motor vehicle use. For example, the number of annual road accident fatalities per 100,000 persons has fallen from 26.6 in 1975, to 8.0 in 2004.¹¹

In 2003, this figure was 8.2 per 100,000 people, which reflected a total of 1,621 fatalities in Australia that year, compared to an OECD median rate of 9.3 per 100,000 people. Australia was ranked 11th safest among the 24 members of the OECD for whom there were data in 2003. For example, we had fewer fatalities per capita than the USA (14.7 per 100,000 people) and New Zealand (11.5), but we had more fatalities than Japan (7.0) and the UK (6.1).¹²

Korea had more fatalities per capita than any other reporting OECD country (15.0 per 100,000 people). The lowest number of fatalities were recorded in Sweden (5.9 per 100,000 people).¹²

ownership within each state as well as by the numbers of vehicles, such as hire cars, that might be registered within a state but used elsewhere.

In 2004, passenger vehicles registered in the ACT travelled the furthest, on average 14,800 kms a year, while Tasmania-registered vehicles recorded the lowest average distance travelled, of 12,400 kms.⁶

Factors influencing change

Levels of car ownership are affected by many factors including incomes, interest rates, car prices and demographic trends. Improved roads have probably also played a part. As cars are often shared by a household, a trend to more single person households is likely to boost car numbers.

Whether and when people use their cars depends in part on the availability of alternative transport, anticipated levels of congestion and the price of fuel. Factors affecting the amount of freight moved, and how it is transported, include the structure and size of the economy, and changes in the cost

and quality of competing modes of freight transport.

Governments and industry have introduced a number of changes aimed at improving road safety, such as compulsory seat belt requirements; the installation of red light and speed cameras; the upgrading of roads and improvements to vehicle designs (including airbags).

Links to other dimensions of progress

While access to transport, including motor vehicles, helps to determine where people work and what goods and services they can purchase, motor vehicles remain the largest single source of fine particle air pollution in Australia, and are also an important source of greenhouse emissions.

See also the commentaries *National income; Work; Family, community and social cohesion; and The air and atmosphere*.

Endnotes

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Democracy, governance and citizenship

National life is influenced by both the wellbeing of individual citizens in terms of tangible factors such as income, wealth, health and education and by less tangible factors such as the quality of our public life, the fairness of our society, the health of democracy and the extent to which citizens of Australia participate actively in their communities or cooperate with one another.

For a long time these latter qualities, although often publicly agreed to be of critical importance, were seldom measured statistically. This was largely because they were harder to define and measure than more tangible aspects of life, where more statistics are gathered, e.g. the value of goods purchased or the rate of infant mortality.

Since 1990, the United Nations has published the Human Development Report, which includes a range of indicators relevant to democracy, governance and human rights. More recently several projects from academics and national and international organisations including the World Bank, Organisation for Economic Co-operation and Development (OECD), and the European Union, have been trying to measure this area of progress.¹

Australia is a democracy. Democratic government has been characterised as having two underlying principles: popular control over public decision making and decision makers (through democratic elections); and equality between citizens in the exercise of that decision making. But the strength and health of our democracy in practice is the product of many factors, such as the effectiveness of political institutions like Parliament, fair elections, an independent judiciary, equal laws and a free press.² Other important factors include the confidence that citizens have in government and public institutions, and the degree to which they participate in civic and community life and understand and uphold their rights and duties as citizens.

While democracy is widely supported, there are many different views about the ways to measure progress in this dimension. There are many possible indicators that relate to governance, democracy and citizenship. We have drawn on a framework developed by the International Institute for Democracy and Electoral Assistance (IDEA) to organise and select the indicators that follow (see box opposite).² IDEA is an intergovernmental organisation, that works with both new and long-established democracies, aiming to help to develop and strengthen the institutions and culture of democracy. Australia is a member of IDEA. The IDEA framework has been used to assess the state of democracy in nine countries.

Our ongoing consultations and research as MAP continues to develop have brought to light a wide range of views about what aspects of governance, democracy and citizenship are most important to Australia's progress. We expect that this commentary will continue to develop in future issues of MAP and we welcome readers' views.

The IDEA framework for democracy assessment

The International Institute for Democracy and Electoral Assistance (IDEA) was founded in 1995 and is an intergovernmental organisation with 21 member states including Australia, Canada, India, Mexico, Spain and Sweden. IDEA's role is one of supporting sustainable democracy in both new and long-established democracies and they have developed a framework for the assessment of democracy. The IDEA framework is built around 14 key dimensions.²

- ◆ Nationhood and citizenship: Is there public agreement on a common citizenship without discrimination?
- ◆ The rule of law and access to justice: Are state and society consistently subject to the law?
- ◆ Civil and political rights: Are civil and political rights equally guaranteed for all?
- ◆ Economic and social rights: Are economic and social rights equally guaranteed for all?
- ◆ Free and fair elections: Do elections give the people control over governments and their policies?
- ◆ Democratic role of political parties: Does the party system assist the working of democracy?
- ◆ Government effectiveness and accountability: Is government accountable to the people and their representatives?
- ◆ Civilian control of the military and police: Are the military and police forces under civilian control?
- ◆ Minimising corruption: Are public officials free from corruption?
- ◆ The media in a democratic society: Do the media operate in a way that sustains democratic values?
- ◆ Political participation: Is there full citizen participation in public life?
- ◆ Government responsiveness: Is government responsive to the concerns of its citizens?
- ◆ Decentralisation: Are decisions taken at the level of government which is most appropriate for the people affected?
- ◆ International dimensions of democracy: Are the country's external relations conducted in accord with democratic norms, and is it itself free from external subordination?

The material in this commentary draws heavily on the IDEA framework, although it does not, by any means, cover the whole framework.

The discussion that follows needs to be read with some qualification. It is not intended as a comprehensive discussion of all the elements of democracy set out in the IDEA framework (partly because data are not available for some elements, and others are not regarded as significant issues for Australia). It is intended only to illustrate some issues where reasonably good data already exist; it does not imply that these issues have a higher priority than others not discussed.

The material that is included in this commentary covers:

- ◆ nationhood and citizenship
- ◆ political participation
- ◆ civil society and civic participation
- ◆ environmental citizenship
- ◆ women in leadership and decision-making positions
- ◆ Indigenous participation in democracy and governance
- ◆ young people and governance, democracy and citizenship

Nationhood and citizenship

Citizenship is a common bond which brings together the people of Australia. It brings rights and responsibilities. Citizens have additional rights beyond those offered to permanent residents of Australia, including the right to vote, the right to stand for public office, and the right to hold an Australian passport. But they also have additional responsibilities: citizens are, for example, required to enrol on the electoral register and vote in elections, serve on a jury if required, and expected to defend Australia should the need arise.

With some exceptions, only Australian citizens can vote in elections,³ and so the proportion of long-term residents who are citizens is one measure of support for democratic decision making in Australia (although people become citizens for many reasons, not necessarily to vote in elections).

In 2002, around 95% of the people living in Australia were citizens. The number of people taking out Australian citizenship each year between 1991 and 2001 ranged between 115,700 (in 1992) and 86,300 (in 2002), but these numbers are

influenced by the number of non-citizens in Australia on long-term visas who are not eligible to apply for citizenship.⁴

When considering progress it is more informative to consider the changing proportion of overseas born Australian residents who have lived here for at least two years (those generally eligible for citizenship) that are citizens. In 1991, about 65% of long term overseas-born residents were Australian citizens. This had risen to just below 73% by 1996 and by 2001 almost three quarters of overseas-born residents who had lived in Australia for at least two years were Australian citizens. However, changes in this indicator may be affected by changes in the number of long-term residents who are eligible for citizenship.

Political participation

Political theory recognises three powers of government: the legislative power to make laws; the executive power to carry out and enforce laws; and the judicial power to interpret laws and to judge whether they apply in individual cases.⁵ Powers are separated to prevent oppressive government by ensuring three bodies – the Legislature, the Executive, and the Judiciary – act as checks and balances on each other.

Also, as in all democracies, regular elections are held to give society control over governments and the policies they make. Elections make government accountable to the electorate through offering the opportunity to vote in an alternative government.

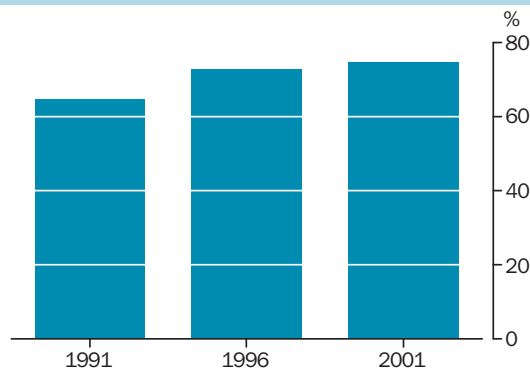
Participation in elections is important to the functioning of a democracy. And statistics on voter turnout, or the extent to which those entitled to vote do so, are often used to shed light on how representative governments are of the electorate.

It has been argued that a healthy democracy needs citizens who care, are willing to take part, and are capable of helping to shape the common agenda of a society.^{2,6,7} And so participation – whether through the institutions of civil society, political parties, or the act of voting – is seen as important to a stable democracy. That said, while there may be a widespread belief that participation in political life is good for the workings of democracy, there is less agreement on what constitutes a ‘good’ or ‘democratic’ level of turnout. Low turnout might represent a weak democratic system or the alienation of the electorate from the electoral process.⁸ Alternatively it might represent widespread contentment among voters.

In June 2005, the Australian Electoral Commission (AEC) estimated that around 95% of eligible Australians were enrolled to vote. There were, however, differences in the proportions enrolled among different age groups and the AEC estimates that 81% of eligible 18–25 year olds were enrolled.⁹

Voter turnout has not dropped below 94% after the general election in 1955 (when it was about 88%).¹⁰ But in Australia, where enrolment and voting in state and federal elections and local

Proportion of overseas born residents(a) who were citizens – 1991 to 2001



(a) Residents who had lived in Australia for two years or more. Source: Data available on request, Australian Census of Population and Housing, cat. no. 2015.0

Voter turnout and informal votes cast, federal elections – 1972 to 2004

Federal election	Voter turnout	Informal votes
	%	%
1972	95.4	2.2
1974	95.4	1.9
1975	95.4	1.9
1977	95.0	2.5
1980	94.4	2.4
1983	94.6	2.1
1984	94.2	6.8
1987	93.8	4.9
1990	95.3	3.2
1993	95.8	3.0
1996	95.8	3.2
1998	95.2	3.8
2001	94.9	4.8
2004	94.3	5.2

Source: Data compiled by IDEA international¹⁰ and Australian Electoral Commission 2005, *Behind the scenes, AEC 2004 Federal Election Report*.¹¹

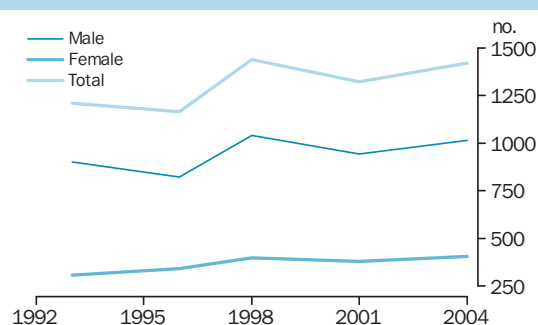
government elections in some states is compulsory and enforced, it is perhaps more informative to consider the proportion of informal votes cast.

In most countries an 'invalid vote' is used to describe a vote where the ballot paper was completed incorrectly and so not included in the final count. In Australia the term 'informal vote' is used to describe this. An informal vote may be cast for several reasons. These include the complexity of the electoral system, confusion between state and federal voting systems and the deliberate casting of an informal vote as a form of protest or expression of disillusionment under a system of compulsory voting.¹²

The proportion of all votes cast in federal elections that were informal remained at about 2% during the 1970s and early 1980s. In 1984, a new method of voting for the Senate was introduced, which appeared to cause confusion among voters and led to a rise in the proportion of informal votes to 6.8%. It has since declined but still remains at levels above those seen at the beginning of the period. In the 2004 federal parliamentary election, just over 5% of the vote was informal.

Voting in local government elections is not compulsory in some states and it is interesting to note the differences in voter turnout rates in such elections. In New South Wales and Queensland, for example, where voting is compulsory, turnout rates were more than 85% in 2004 elections. But in other states, where voting in the local government elections is not compulsory, turnout rates were much lower. For example, only about 58% of enrolled people voted in Tasmania's 2002 local election and only 38% did so in Western Australia's May 2001 local election.¹³ There is concern from

Federal parliamentary election candidates – 1993 to 2004



Source: Australian Electoral Commission, *Behind the scenes, AEC Federal Election Reports 1996, 1998, 2001 and 2004*.¹¹

some parts of the community about the relatively low voter turnout at local government elections. For example, increasing the voter turnout at local government elections is one of the targets embodied in South Australia's Strategic Plan.¹⁴

Standing for public office is one form of political participation. The number of candidates who stand for public office can be considered an indicator both of public interest and motivation in standing for election, as well as commitment from political parties in selecting and supporting candidates to stand in elections. It is not possible however, to gauge the diversity or quality of candidates from information on the number of candidates.

Between 1993 and 2004, the number of candidates standing for election at Australian federal elections increased. Over 1,400 candidates stood for election (1,091 for the House of Representatives and 330 for the Senate) at the 2004 federal parliamentary election, compared with 1,200 in 1993. During this period the number of seats in the House of Representatives increased by three from 147 to 150 accounting for some of this change.¹¹

There has also been an increase in the number of political parties supporting candidates in these elections. In 2004, 51 political parties fielded candidates, compared with 35 in 1993.¹¹

Civil society and civic participation

Some people suggest that active citizen engagement is important for better government. Researchers and commentators, such as Robert Putnam have argued that civic engagement is associated with better government in two ways: citizens in civic communities expect better government, and (in part through their own efforts) get it, and the performance of representative government is improved by the social infrastructure of civic communities and by the democratic values of both officials and citizens.^{7,15}

Civil society has been defined as 'the non-government and not for profit groups and organisations that have a presence in public life,

expressing the interests of their members and others in society'.¹⁶

Civic participation can be considered as a mechanism by which citizens' concerns, needs and values can be incorporated into government decision making. The overall goal is for better decisions, supported by the public and fostering the increased wellbeing of the population.¹⁷

Civic participation describes activities reflecting interest and engagement with governance and democracy. Civic participation involves both collective and individual activities, including the membership of civic organisations, such as political parties and trade unions, serving on committees of clubs, voluntary organisations and associations, contacting members of parliament, participating in demonstrations and rallies, and attending community consultations. These activities often extend the social networks of those participating, and can help people develop important skills for participating in democracy and governance.¹⁸

More recent forms of civic participation include support for global or local advocacy groups or campaigns, email networks, or one day activities such as 'Clean Up Australia' events (680,000 people signed up for Clean Up Australia day in 2005).¹⁹

Information about civic participation will be collected by the ABS as part of the 2006 General Social Survey. Information will be collected on active involvement in civic groups and organisations such as political parties, trade unions and professional organisations, human rights groups, and community councils.

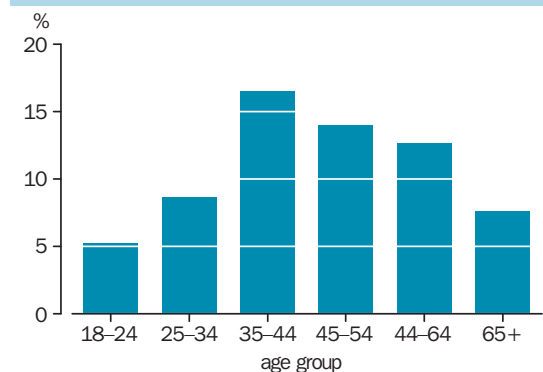
Information will also be collected on participation in individual or collective civic activities such as contacting a member of parliament, attending protests and demonstrations, signing a petition, writing a letter to the editor of a newspaper, and participating in a community consultation.

Engaging in leadership roles in groups and organisations such as being an office holder or committee member is an aspect of civic participation. In 2000, in the ABS Voluntary Work Survey, 11% of adults reported volunteering for management work, to sit on committees or manage a service or program (the sorts of voluntary work often most closely linked to civic participation). This was about the same level as in 1995.²⁰

In 2000, people in the 35–44 year age group reported the highest rates of such voluntary work at over 16% (this age group also reported the highest rate for all voluntary work, see the commentary *Family, community and social cohesion* for more information). The higher volunteering rates among this group were associated with the higher rates of volunteering among people with children younger than 15. This largely reflects parental involvement in child development related activities.

People with higher levels of educational qualifications, such as a bachelor degree or higher

Volunteering rates for management, committee, and coordination work (a) – 2000



a) People aged 18 or older.

Source: *Voluntary Work, Australia 2000 cat. no. 4441.0.*²⁰

(18%), were most likely to volunteer for this sort of work, as were people in management (21%) and professional (20%) occupations. These tended to be the same groups of people most highly represented among volunteers in general, all with volunteering rates of over 40%.²⁰

Some civic participation activities involve engaging with government. For example, the federal parliament (both the House of Representatives and the Senate) conducts inquiries into specified matters of public or policy interest. The inquiry process involves a parliamentary committee taking submissions, hearing witnesses, sifting evidence, discussing matters in detail and formulating reasoned conclusions. Public input is important to inquiries. Inquiries provide a public forum for the presentation of the various views of individual citizens and interest groups.²¹ Royal Commissions are another type of inquiry where the input of members of the public and relevant organisations is important.

Federal and state governments conduct public consultations on policy and program proposals. These consultations provide a further opportunity for members of the public and interest groups to make their views known and input into policy development.

Some differences within Australia

Women in leadership and decision-making positions

Increasing women's participation in leadership and decision-making roles in business, government and the wider community is a focus of policy for Australian state and territory governments and the Commonwealth government.^{14,22}

One of the principles underpinning democratic government is that parliament should represent and express the will of the people. It is not clear how best to judge how effectively this occurs. An aspect of particular interest to the United Nations when agreeing on the Millennium Development

Environmental citizenship

There is interest in the role of citizenship in achieving sustainable development. Some people argue that stronger commitment to the responsibilities of citizenship may help to enhance environmental care. Environmental citizenship is reflected in the things that citizens can do when motivated by social understanding, rather than purely by financial incentives.²³ Some examples of environmental citizenship include donation of time and money to protect the environment, the purchase and use of environmentally friendly products, participating in recycling, and the use of water and energy conservation measures.

Many Australians take a range of actions out of interest and concern about the environment. Over half (57%) of Australians (aged 18 years and over) were concerned about environmental problems in 2004 according to an ABS survey on environmental issues. Over 1 million Australians (7%) took action by formally registering an environmental concern in 2004, compared to 10% in 1992. People most commonly signed a petition (36% of those who expressed a concern) or wrote a letter (30%), while attending a demonstration for an environmental cause was relatively rare (4%).²⁴

Some Australians choose to donate money or time to help protect the environment. In 2004, almost 3 million Australians, or one in five, chose to help to protect the environment in this way.²⁴

Australians also make choices about household management which reflect their concern about the environment. Information collected in 2003 in the ABS survey on environmental issues showed that almost all Australian households engaged in some form of recycling (95%) or reuse of waste (83%).²⁵ Nine out of ten households in 2004 used at least one type of environmentally friendly product, with recycled paper products and products with refillable containers the most commonly used.²⁴ In late 2005 181,000 (or around 2% of) households and 6,500 commercial users belonged to a green power scheme, whereby consumers opt to pay for electricity that is generated from clean, renewable energy sources (such as solar, wind power, new hydro on existing dams, biomass, wave energy and landfill gas).²⁶

Australians are also concerned about the conservation of water resources. As a response to drought conditions and consequent water use restrictions, close to a half (46%) of all Australian households used measures to conserve water in 2004. Using full loads when washing dishes or clothing, and taking shorter showers were the most popular measures.²⁴

Goals was the representation of women in parliament.²⁷

The proportion of federal government parliamentary candidates who are women is an indicator of women's political participation. It is also an indicator of the support for female candidates from political parties. At the 2004 federal parliamentary election, 29% of candidates were women, compared with 25% in 1993.¹¹ The proportion of female candidates at federal parliamentary elections is reflected in the proportion of women elected to the parliament.

The proportion of federal government members of parliament and senators who are women has risen over the past 20 years. On 1 January 1986, one in

twenty (5%) of members of the House of Representatives were women, as were close to one in five (18%) of senators. By the beginning of 2006, one in four (25%) of members of the House of Representatives were women, and a little over one in three (35%) senators were women.

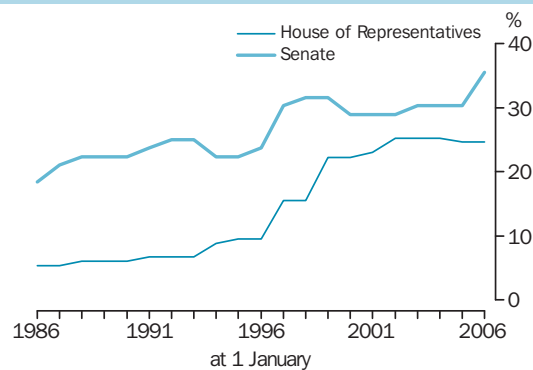
In the current federal government ministry (as at end of January 2006) there are eight female ministers and parliamentary secretaries (representing 20% of ministers and parliamentary secretaries) of whom three are Cabinet members. Currently around 30% of shadow ministerial positions are held by women.²⁸ This is generally consistent with the overall level of representation of women in the federal parliament.

Corporate leadership is an important aspect of governance in Australian society. This is because the business sector not only drives our economy, but also influences policy, and has the opportunity to provide leadership and support in the community. Gender diversity in corporate leadership and access and support for women to take up business leadership roles are indicative of the progress of women in one area of leadership and governance.

The Commonwealth Equal Opportunity for Women in the Workplace Agency (EOWA) collects information on women in executive management and board director positions, by conducting a census of Australia's top 200 companies listed on the Australian Stock Exchange (ASX200). In 2004, 10% (174) of executive managers of ASX200 companies were women, compared with 8% (113) in 2002. In line with this increase, more companies listed as part of the ASX200 are now employing women executive managers. In 2004, 58% (101) of ASX200 companies employed at least one female executive manager, compared with 47% (72) in 2002.²⁹

However, the progress evident in the increasing proportion of executive managers of ASX200 companies who are women has not been replicated for female board directors. The proportion of board directors in ASX200 companies who are women remained unchanged

Proportion of federal parliamentarians that are women



Source: Parliament of Australia, 2006.²⁸

Proportion of executive managers and board members of ASX 200 companies(a) who are women



a) The ASX 200 is an index that tracks the top 200 companies listed on the Australian Stock Exchange. The top 200 companies are based on their market capitalisation. Market capitalisation is the number of shares on issue multiplied by the current share price.

For the purposes of the Australian Census of Women in Leadership, trusts and investment entities with a small number of employees, and companies based overseas with few employees in Australia have been excluded. The census included 152 companies in 2002 and 174 companies in 2004.

Source: Commonwealth Equal Opportunity for Women in the Workplace Agency, *Australian Census of Women in leadership, 2002 and 2004*.²⁹

between 2002 (96) and 2004 (112) at 9%. 47% (82) ASX200 companies did not have any female board directors in 2004.

Women are represented in a range of other leadership and decision-making positions across Australian society. For example, in 2005 around one in five (21%) of Australia's ambassadors and heads of diplomatic missions were women. In 2005, in the Commonwealth Public Service women comprised almost one in three of senior executives (32%). Women also made up close to one third (32%) of members on Commonwealth government public sector boards and committees. In 2005, Indigenous women comprised just over a third (36%) of members of the National Indigenous Council, an Indigenous advisory body to the Commonwealth government.³⁰

Indigenous participation in democracy and governance

All Indigenous Australians have been entitled to vote in federal elections from 1962. However, complete enfranchisement of Indigenous Australians did not occur until 1965, when Queensland granted Indigenous people the right to vote in state elections. Queensland was the last state to grant this right.³¹

As a result of the 1967 Referendum, the Australian Constitution was amended to enable the federal government to assume legislative responsibility for Indigenous peoples in the states (as it does for the rest of the population) and to include Aboriginal peoples in estimates of the Australian population. The Referendum is regarded as a 'turning point' that brought many benefits, both symbolic and real, to Aboriginal peoples and was a major

milestone in Indigenous peoples' relationship with the Australian nation-state, alongside the right to vote which had been established a few years earlier.³²

The first Indigenous parliamentary representative was Neville Bonner AO (1922–1999) who was elected to federal parliament in 1971. Since then there have been a number of Indigenous parliamentarians in both federal and state parliaments.³¹

In June 2005, there were two Indigenous members of parliament in the federal parliament, one each in the House of Representatives and the Senate. There were eight Indigenous Australians who were members of state and territory parliaments and legislative assemblies. Six of these were women. In June 2005, there were five Indigenous members of the Northern Territory Legislative Assembly, resulting in one fifth of the Legislative Assembly electorates being represented by Indigenous Australians. There was one Indigenous member in each of the parliaments of New South Wales, Tasmania and Western Australia.³⁰

In 1989, the Aboriginal and Torres Strait Islander Commission (ATSIC) was created as Australia's nationally representative organisation of the Aboriginal and Torres Strait Islander peoples. ATSIC advised governments on Indigenous issues, advocated for Indigenous people at the local, regional, national and international levels and monitored how other government agencies provide services to their Indigenous clients. ATSIC was directed by a Board of Commissioners elected from amongst the membership of Regional Councils in each of the ATSIC zones, who were in turn elected by Indigenous people across Australia.³³

A major change to Indigenous governance and representation came with the recent abolition of ATSIC in March 2005. ATSIC regional councils were dissolved at the end of the June 2005.³³ ATSIC's functions were transferred to a mainstream Commonwealth government agency, the Department of Family and Community Services and Indigenous Affairs. A new body, the National Indigenous Council, was appointed by the Commonwealth government as a key advisory body on Indigenous affairs.³⁴

In almost all areas of Indigenous affairs, Indigenous leadership has been identified as a priority. There are a range of Indigenous leadership programs presently operating throughout Australia, all at varying stages of development, emphasis, and geographic reach and location.³⁶ Some of the organisations involved in leadership development include: the Australian Indigenous Leadership Centre; the Lingjara Foundation; Elders' leadership and cultural guidance programs; and the National Indigenous Youth Movement of Australia.

Young people and governance, democracy and citizenship

There is interest in the degree to which young people participate in democracy, governance and citizenship. Some research suggests that young people are less engaged with political and civic activity than those in older age groups, and that this may be indicative of a lower level of interest and commitment to civic participation and the responsibilities of citizenship.^{37,38}

In Australian schools over recent years there has been a recognition of the importance of civics and citizenship as an integral part of the school curriculum. Between 1997 and 2004, the Commonwealth government's *Discovering Democracy* program ran in Australian primary and secondary schools.³⁹ The program recognised that to be able to participate as active citizens throughout their lives students need a thorough knowledge and understanding of Australia's political heritage, democratic processes and system of government, and judicial system.

Young people in Australia are less likely to be enrolled to vote than older groups. The AEC estimates that in March 2005, 81% of eligible young Australians (18–25 year olds) were enrolled to vote, compared with 96% of all eligible Australians.⁹ It has been estimated that there were approximately 300,000 young Australians aged 18–25 who do not vote in elections because they are not registered.³⁸

A national survey of schools run in 2004 which surveyed 4,600 senior secondary school students at 154 schools (the Youth Electoral Study conducted in conjunction with the Australian Electoral Commission)⁴⁰ found that the intention of students to enrol on the Commonwealth Electoral Roll and to vote in federal elections was not universal. Of students aged under 17 around half intended to enrol to vote when they turned 17, while less than a third of students aged 17 had registered to vote. While, young people can enrol to vote at the age of 17 years, they are able to vote in elections only once they have reached 18 years of age. Almost nine out of ten students surveyed reported an intention to vote in federal elections after they reach the age of 18 years. However, when asked if they would vote in federal elections if it were not compulsory, only one out of two students said that they would.

While the intention to vote in federal elections was relatively high, half of students felt that they lacked sufficient knowledge to understand the issues, or the political parties, to make a decision about voting. Nevertheless, most students (81%) considered voting to be important.³⁸

Many senior secondary school students participate in political and civic activities. Over half (55%) of students surveyed in 2004 had signed a petition, 21% had collected signatures for a petition, and 15% had taken part in rallies or demonstrations. Students differentiate between the various social

movements and causes they would support by taking part in a demonstration.³⁸

The 2004 survey found that students who participated in political and civic activities such as signing petitions, attending demonstrations, contacting politicians, contacting the media, doing voluntary work, or being involved in a civic organisation such as Rotary were more likely to report an intention to vote in federal elections (if voting was not compulsory), than those students who had not participated in political and civic activities.³⁸

Links to other dimensions of progress

People's participation in democracy, governance and citizenship is related to social capital. Further discussion of social capital and related concepts such as voluntary work can be found in the *Family, community and social cohesion* commentary. The growth in the use of the Internet has helped people to access information and register opinions with government and so the use of 'e-government' also sheds light on people's engagement with government. This is discussed in the commentary *Communication*.

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Life satisfaction and measures of progress

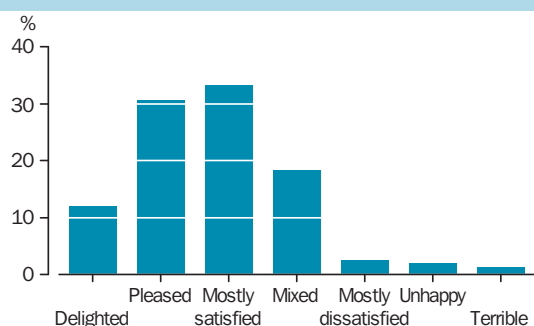
Measures of Australia's Progress was developed to help Australians address the question "Has life in our country got better or worse, especially during the past decade?". To help answer this question, MAP looks beyond Gross Domestic Product (GDP), which has traditionally been a key measure of national progress, to provide a selection of statistical evidence about aspects of Australian life across the economy, the environment and society. Within these domains, dimensions of progress encompass national income, wealth and productivity, the quality of our environment, the wellbeing of the population in terms of health, education, work, housing and economic resources, and the way we live together in society.

However, some would argue that just as important as knowing whether these aspects of life in Australia are improving, is knowing whether people actually feel that their wellbeing has improved, that is whether we are actually happier or more satisfied with our lives.¹ In the late 18th century, welfare economists debated the role that improving people's utility (a concept closely related to happiness) can play in improving population wellbeing. In recent years, this focus on happiness has enjoyed a resurgence with interest focussing in particular on people's opinions and feelings about their lives as being relevant to our understanding of national wellbeing.

Progress is closely related to the concept of wellbeing, with the idea that enhanced population wellbeing is one of the outcomes of improving life in Australia. The current indicators in MAP tend to focus on the more objective elements of wellbeing, that is the conditions and aspects of people's lives and the society they live in. Public policy tends to be aimed at improving or enhancing these conditions. However, it does not always follow that improving particular living conditions will make a person happier or more satisfied, as people place different importance on the different aspects of their lives (and on life in Australia generally) and in many instances these aspects are in competition with one another.

In 2001, the ABS collected some information on people's overall life satisfaction in the National Health Survey. When asked about how they felt

Levels of life satisfaction of persons aged 18 and over – 2001



Source: ABS 2001 National Health Survey

Life satisfaction and happiness, and how they are measured

Notions of happiness and life satisfaction are concerns for a wide range of disciplines, including economics, psychology, sociology, neuroscience and public policy. Psychologists often distinguish between the two concepts, with happiness relating to the more temporal concept of positive affect (i.e. positive mood, feelings of pleasure, joy etc.) and life satisfaction constituting the more cognitive concept of an individuals' appraisal of his or her life situation overall – the totality of pleasures and pains, or quality of life.² However, the term happiness is often used in a broader context (for example by economists in their discussion of 'utility') and in many fields, data on happiness and life satisfaction are used interchangeably, as are the terms themselves.

Life satisfaction and happiness both fall under the umbrella term *subjective wellbeing* which relates to the way people feel about their lives. Subjective wellbeing complements the more objective aspects of wellbeing which relate to the actual circumstances and conditions of people's lives (for example their health or income). This essay focusses mainly on the concept of life satisfaction. To date, the most common method used to measure life satisfaction, and indeed happiness, has been the use of survey questions asking people to report on their perceived levels of life satisfaction.

Based on the findings of such surveys, it is generally agreed that life satisfaction and happiness are closely correlated. However, life satisfaction surveys produce greater variation over time and are the more commonly used, with respondents being asked questions such as "All things considered, how satisfied are you with your life as a whole these days?" or something similar. Respondents are given a scale of between two and ten points against which to rate their level of satisfaction. A four-point scale, for instance, would include responses such as 'Very satisfied', 'Quite satisfied', 'Not very satisfied' or 'Not at all satisfied'. In our 2001 National Health Survey, the ABS used a seven point scale with responses ranging from 'Delighted' to 'Terrible'. Some studies into life satisfaction ask people questions about whether they believe that circumstances have or will improve. Others focus on the concept of domain satisfaction which refers to people's level of satisfaction with particular aspects of their lives (such as work or family life) or with aspects of the society in which they live (such as the economy or the state of the environment).

about their lives as a whole, 76% of Australian adults indicated they were delighted, pleased or mostly satisfied with their lives. Less than 6% of people combined indicated that they felt mostly dissatisfied, unhappy or terrible about their lives.

There is no established long-term time series of life satisfaction (or happiness) in Australia, although findings from various surveys conducted since the 1950s produced results within a fairly narrow range, that is average life satisfaction of around 6.5 to 7.5 on a scale of one to ten, indicating general satisfaction with their lives. This is despite the many changes in the social, economic and environmental conditions of Australian's lives during these decades. Surveys in other Western countries have produced similar results.³ For these reasons (which largely reflect the nature of life satisfaction or happiness itself, discussed in the following section), many researchers in this area

agree that measures of overall life satisfaction and happiness are most useful when analysed in conjunction with other data about people's quality of life or life circumstances.

There are still many challenges in understanding the nature and quality of these life satisfaction measurements and how they relate to the social and economic conditions and outcomes which shape Australian life. For these reasons, it is not clear, as yet, that any particular measure of life satisfaction would meet the criteria for inclusion as an indicator of progress in MAP, even if time series data were available. However, the ABS acknowledges that there is growing interest in life satisfaction (or happiness) as an important aspect of life in Australia. This essay outlines some of the recent research into life satisfaction and the issues associated with its measurement so that readers can consider how Australians' feelings about their lives might relate to the picture of progress presented by the indicators in MAP.

Interpreting measures of life satisfaction

Several characteristics of general human behaviour (or human nature) are believed to influence our sense of wellbeing. All of these characteristics have a regulatory effect on life satisfaction levels (although this operates in very different ways for each) and therefore impact on the way data on this topic can be interpreted and related to other aspects of people's lives, such as their social and economic circumstances. These are:

- ◆ *a natural tendency to feel good about ourselves and our lives.* While a person's happiness levels can fluctuate over time in response to changing circumstances, trauma or crises, there is a tendency for levels of overall life satisfaction in Western countries to return to a fairly narrow range clustered around 70 on a 100 point scale.⁴ This phenomenon is referred to as homeostasis.
- ◆ *the ability to adapt to our circumstances be they good or bad.* Just as our bodies can make physiological adjustments to things like heat or cold, it is believed that we adjust psychologically to both good or bad events so that we do not remain in a state of elation or despair.⁵ For example, studies in the 1970s and 1980s found that winning the lottery or suffering a spinal cord injury resulting in paraplegia or quadriplegia, did not significantly impact on people's levels of happiness over time.⁵ While the ability to adapt varies between individuals, it has also been found that, on average, some circumstances take longer to adapt to than others.
- ◆ *the tendency to compare ourselves with others, with our past circumstances, with our own aspirations, or some other benchmark.* Sometimes referred to as discrepancy theory, this relates to the way that people make such comparisons and then judge their own

Individuals and life satisfaction

What one person feels is important may not be so to someone else. This individual nature of life satisfaction contributes to many of the difficulties associated with its measurement, the ability to interpret those measurements, and to use the findings to improve overall wellbeing at the societal level. For those interested in national wellbeing, an approach which focusses on the external determinants of wellbeing has obvious appeal. It is based on the idea that there are basic and universal human needs, and if one's circumstances allow a person to fulfill these needs, he or she will be happy.⁵ The approach considers the net sum of experiences and circumstances across the various aspects of life such as health, work, family life, income and leisure. At its broadest level, this approach draws from a similar underlying framework to the ABS system of social statistics used to measure the wellbeing of our population.

Analyses of the relationship between life satisfaction and various demographic, social and economic variables suggest that in many cases the relationship is not strong. At the same time, certain personality traits have been found to be strongly associated with high levels of life satisfaction or general happiness. Over the years, considerable research (predominantly in the field of psychology) has focussed on the relationship between life satisfaction and internal characteristics of the individual, such as personality or temperament. Such research has found the following characteristics are positively correlated with high levels of self-reported life satisfaction:

- ◆ extroversion;
- ◆ optimism; adaptability;
- ◆ high self esteem;
- ◆ the ability to set compatible goals and progress towards them;
- ◆ the ability to understand and interpret the world;
- ◆ a sense of meaning in life (or spirituality); and
- ◆ a sense of personal control or agency.

At the other end of the spectrum, neuroticism (or a tendency to worry) has been found to have a negative relationship with life satisfaction.⁵

wellbeing in relation to them. If these comparisons favour an individual, they are more likely to express higher levels of life satisfaction, than if the comparison is an unfavourable one. Thus a particular level of income may contribute to the satisfaction of someone who is well-off relative to those around that person, but not to someone who is earning less than those around him or her.

- ◆ *the ability to make trade-offs.* As well as the ability to adjust our expectations to our circumstances or level of resources, people have the ability to change their preferences and/or the priorities they place on various aspects of their lives.

Income (or standard of living) has conventionally been regarded as a key determinant of wellbeing, and so many studies of happiness or life satisfaction have focussed on changes in relation to changes in an individual's economic circumstances. For example, research suggests that people's life

satisfaction subsides as they get used to higher income levels over time, a phenomenon referred to as the 'hedonic treadmill'. Another example is that the diminishment of life satisfaction caused by a loss of income has been found to be considerably larger than the enhancement of life satisfaction caused by an equivalent gain.⁶

Comparing life satisfaction across nations

For those interested in looking beyond GDP for measures of national wellbeing, much interest has focussed on the fact that since the 1950s, while estimated levels of life satisfaction and happiness across the population have not changed greatly in many of the wealthier developed nations, these countries have sustained strong economic growth. For example, in the United States (the country for which the longest time series is available), while measures of subjective wellbeing have consistently produced life satisfaction levels for Americans of around 70%, real GDP per capita has more than doubled over the same period.⁷

One major area of research into alternative measures of wellbeing has been the comparison of levels of wellbeing and happiness across nations. Initiatives such as the World Bank's Human Development Index are designed to provide information on how quality of life differs across nations (with a view to improving it – particularly for developing nations), using a small set of data about the conditions of life in each nation. Other initiatives attempt to provide a complementary or alternative view of wellbeing by focussing on subjective measures. The World Values Survey⁸ and the World Database of Happiness³ are two major initiatives of this type.

People from different cultures bring different meaning to the notions of life satisfaction and happiness based on differing cultural values, structures, histories and circumstances. This, combined with the individual nature of life satisfaction and some of the other more universal human phenomena which characterise subjective wellbeing, are factors which should be considered when interpreting international comparisons of life satisfaction. Differences in survey conditions, methodologies, and response rates will also influence the reliability and interpretation of results. At the same time, international comparisons allow us to consider ourselves in a broader context and to consider other ways of being or achieving similar outcomes.

The Erasmus University of Rotterdam's World Database of Happiness contains data on life satisfaction for 90 nations. These data have been collected at different times using a variety of survey methodologies. Overall life satisfaction scores collected from these countries in the 1990s ranged from 3.2 to 8.0 on a scale of one to 10.³ Australia's average score of 7.3 was among the highest scores, comparing favourably among countries with high levels of per capita income. Countries such as the United Kingdom, New Zealand and the USA all had

Utility and wellbeing

In the past few years, economists have increasingly looked beyond conventional measures of growth to the field of psychology and subjective concepts when considering wellbeing in society. However, the focus on happiness, as it relates to utility, in economics dates back to the 18th century, evolving from debates around the role of public policy in maximising utility across society as a whole. Utility was defined as people's ability to meet their needs, thereby optimising their wellbeing, and was regarded as measurable, and comparable across the population, with conventional analysis focussing on income (which in turn reflects consumption possibilities) as its main determinant.

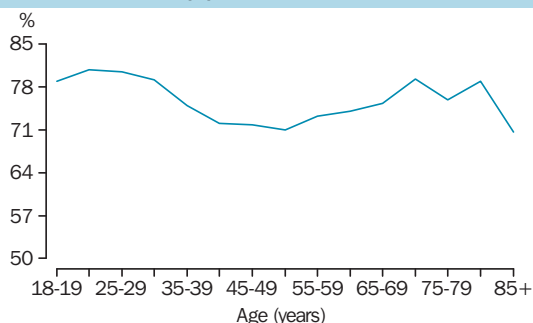
In 2004, the Australian Government Department of the Treasury produced a Wellbeing Framework.⁹ In seeking to 'improve the wellbeing of the Australian people', the framework draws on the premise of early utility-based welfare economics that maximising aggregate utility corresponds to maximising overall wellbeing. In doing so, it recognises a range of determinants for utility (beyond just income and GDP), but broadens the constituents of utility (beyond just individual happiness) to include elements of the more contemporary capabilities framework. The capabilities framework takes into account not only the primary goods the persons respectively hold, but also the capabilities needed for people to use these resources to lead the lives that they value. Accordingly, Treasury's Wellbeing Framework comprises five dimensions:

- ◆ the level of opportunity and freedom that people enjoy (i.e. the capacity to choose the lives they want to live)
- ◆ the level of consumption possibilities (i.e. people's command over resources to obtain goods and services to satisfy their needs and wants)
- ◆ the distribution of consumption possibilities (i.e. the spread of all aspects of consumption across the population, including across different groups in society, across different geographic regions and across generations)
- ◆ the level of risk people are required to bear (which optimally should match their risk preferences) and
- ◆ the level of complexity people are required to deal with (with an emphasis on matching this to community preference so that opportunities are not limited by it).

very similar levels of life satisfaction to Australia. There was a tendency for poorer countries to report lower levels of life satisfaction, and for levels to be higher as income increased (as measured by GDP per capita, Purchasing Power Parity), for levels up to \$US15,000. Across countries where GDP per capital exceeded this, satisfaction levels across countries tended to be more similar.

A 1996 analysis of these measurements from the 1990s and other data relating to 48 countries found a range of characteristics were associated with high levels of life satisfaction.¹⁰ Examples of these included purchasing power, respect of civil rights, social participation, industrialisation, perceived freedom in life, literacy, tolerance, and participation in work. Conversely characteristics associated with low levels of life satisfaction included high murder rates, lethal accidents, and incidence of corruption.¹⁰

Proportion of persons who were satisfied with their lives(a) – 2001



(a) Persons who felt Delighted, Pleased or Mostly satisfied with their lives based on a scale of Delighted, Pleased, Mostly satisfied, Mixed, Mostly dissatisfied, Unhappy, and Terrible.

Source: ABS 2001 National Health Survey

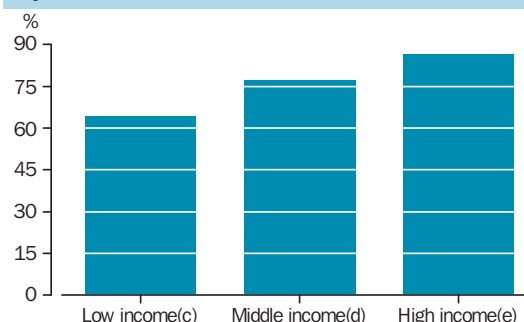
Life satisfaction and dimensions of progress

National progress is one of a cluster of related concepts, which include wellbeing and quality of life. In embracing the social, economic and environmental aspects of Australian life, it is natural then that many of the indicators included in MAP focus on particular aspects of life that are 'of fundamental and direct importance to human wellbeing'. Thus, because the selection of these indicators of progress relates directly to their relationship with human wellbeing, it might be expected that changes in them would also be reflected as changes in measures of life satisfaction.

However, as discussed earlier, the very nature of human responses to changing circumstances and to the world around us is believed to regulate our overall sense of wellbeing over time to some degree. Further, across the population, a decrease in the wellbeing of some (whether in Australia or in other nations) might lead to an increased sense of wellbeing for others (because of the tendency for humans to judge their own wellbeing in relation to others'). Thus, the relationship between 'external' measures of progress (i.e. those that focus on changes in aspects of people's lives) and overall life satisfaction is not a direct one.

That said, studies over the years have found that many social and economic characteristics are partially correlated with self-reported wellbeing. Some of these relationships are evident when looking at life satisfaction (or quality of life) data collected in the ABS 2001 National Health Survey. In considering these data we look at the proportion of people who reported that they were satisfied with their lives, that is they indicated they were delighted, pleased or mostly satisfied with their lives. As noted earlier, on average, 76% of Australian adults fell into this category. The proportion of people who were satisfied with their lives remained above 70% across all age groups. More people in their 20s reported they were satisfied with their lives than for any other age

Proportion of persons aged 18 and over who were satisfied with their lives(a)(b): equivalised income – 2001



(a) Persons who felt Delighted, Pleased or Mostly satisfied with their lives based on a scale of Delighted, Pleased, Mostly satisfied, Mixed, Mostly dissatisfied, Unhappy, and Terrible. (b) Age standardised. (c) People in income units in the 2nd and 3rd income deciles from the bottom of the distribution. (d) People in income units in the middle income quintile (5th and 6th deciles). (e) People in the income units in the highest income quintile (9th and 10th deciles).

Source: ABS 2001 National Health Survey

group, while those between 35 and 64 were less likely than average to indicate satisfaction with their lives. Those aged 85 or over were the least likely of all age groups to indicate they were satisfied (71%).

Conventional economic analysis of wellbeing (or utility) often assumes level of income as the prime determinant of wellbeing for individuals within society. In MAP, there are several dimensions which focus on the economic resources of Australians, at both the national and household levels. In the commentary on *Economic hardship*, we identify low income as a key indicator for this area. Taking into account the age structures of different income groups, 64% of people in income

Life satisfaction and the environment

Very little data exist on the relationship between happiness, or life satisfaction, and the environment, but it is clear that many people gain pleasure from natural environments.

In considering the value of conservation of the world's natural resources, most frameworks allude to the enjoyment people gain from recreational activities, but also recognise that people gain satisfaction simply by knowing that the natural environment exists (even if they never experience parts of it themselves). Many cultures, including those of Australia's Indigenous peoples, have strong spiritual links to the land and its wildlife. In 2000, research into the fundamental aspects of human capability included an ability "to live with concern for and in relation to animals, plants and the world of nature" as one of these.¹¹

At the same time, consideration for the conservation of our natural environment can involve trade-offs in relation to our lifestyles and use of resources. In 2004, the ABS Environment Household Survey found that 57% of Australians aged 15 and over were concerned about environmental problems

Proportion of persons aged 18 and over who were satisfied with their lives(a)(b): selected characteristics – 2001

	%
Never married	71.7
Married	80.6
Separated/divorced	63.1
Non-dependent child in couple family	78.0
Non-dependent child in one parent family	63.6
Partner in couple, no children	82.0
Parents in couple families with children	75.3
Lone parents	59.9
Living alone	67.7
With a long-term health condition	74.6
No long-term health condition	82.6
With mental and behavioural problems	45.6
With high/very high levels of psychological distress	33.8
With a non-school qualification	78.4
Without a non-school qualification	72.5
Employed	79.7
Unemployed	56.2
Not in the labour force	68.1
All persons aged 18 years and over	75.7

a) Persons who felt Delighted, Pleased or Mostly satisfied with their lives based on a scale of Delighted, Pleased, Mostly satisfied, Mixed, Mostly dissatisfied, Unhappy, and Terrible. (b) age standardised.

Source: ABS 2001 National Health Survey

units in the low income group felt delighted, pleased or mostly satisfied with their lives in 2001 compared with 77% of people in income units in the middle income group and 86% of people in income units in the high income group.

The quality of a person's close relationships is one factor that most researchers agree has a fairly strong association with high levels of subjective wellbeing. As we note in the chapter on *Family, community and social cohesion*, people require love, companionship and agreeable engagements to flourish. In 2001, 81% of people who were married felt pleased or mostly satisfied with their lives compared with 63% of people who were separated or divorced. Lone parents and the adult children living with them were the people least likely across all living arrangements to feel pleased or mostly satisfied with life (60% and 64% respectively).

Participation, be it social, educational or in the workforce has also been associated with higher levels of life satisfaction. In MAP, *Work and Education and training* are both headline dimensions for individuals. In 2001, people who were employed and those with non-school qualifications had higher than average life

The Australian Unity Wellbeing Index

The Australian Unity Wellbeing Index is a joint development of Australian Unity, Deakin University and the Australian National University which focusses on people's views on life in Australia and on their own individual wellbeing.

The main premise on which the index is based is that life satisfaction is normally held within a narrow positive range, and that this homeostasis operates at a non-specific or abstract level, and is highly personalised. This means that a person will generally answer fairly positively to broader questions around wellbeing, regardless of most events occurring at the time the measurement is taken. At the same time, this narrow positive band is more likely to be maintained for questions about the individual than those about family or friends or, to a greater extent, about society in general. On the basis of this theory, questions about specific aspects of society or life in Australia would be more sensitive to external happenings than broad questions about a person's current level of satisfaction with their own life as a whole.

The Australian Unity Wellbeing Index consists of two indices: the personal wellbeing index, which measures people's satisfaction with their own lives (or with seven aspects or domains of their personal lives); and the national wellbeing index, which measures people's satisfaction with life in Australia (or with six aspects or domains of life in Australia). Between April 2001 and July 2005, respondents tended to report higher levels of satisfaction with their personal lives than with life in Australia, with the personal wellbeing index consistently showing average satisfaction levels at around 75%, compared with 60% for the national wellbeing index. Over the period, people responding to questions on national wellbeing tended to report lower satisfaction (albeit at levels above 50%) with the state of the environment than they did about social conditions in this country. However, reported levels of satisfaction with our economic situation were higher (since March 2002 and gradually increasing over the period to July 2005). It should be noted that these results are based on overall survey response rates of less than 25%.¹²

satisfaction levels. Conversely, people who were unemployed were considerably less likely than the population as a whole to report that they were pleased or mostly satisfied with their lives (51%).

The ACER Longitudinal Survey of Australian Youth, also collects information on the life satisfaction of Australia's young people. Between 1999 and 2002, the survey found that of a cohort of young people who had been in Year 9 in 1995, those who were involved in full-time work, study or combination of both activities equating to a full-time load, consistently reported higher levels of life satisfaction than those whose total participation equated to a part-time load, or those not participating at all.¹³

Lastly, *Health* is a key dimension of progress for individuals. While a higher proportion of people without long-term health conditions indicated they were pleased or mostly satisfied with their lives (83%) in the 2001 National Health Survey than those who had long-term conditions (75%), differences were more evident in relation to indicators of mental health. Unhappiness is a symptom of many mental health conditions and so

it can be expected, that the presence of mental illness would lead to a lowering of self-reported life satisfaction. In 2001, the proportions of people with mental and behavioural problems, and those with very high or high levels of psychological distress who reported they felt pleased or mostly satisfied in life was below half – 46% and 34% respectively.

End notes

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Some international comparisons of progress

Introduction

Measures of Australia's Progress (MAP) presents information on a range of issues that are of concern or interest to Australia and Australians. We can gain a greater understanding and an additional insight into Australia's progress by comparing our progress with that of other countries. Comparing Australia's progress with that of other countries allows us to make our own individual assessment of how particular aspects of life in Australia compare with those in other countries.

International comparisons for each of the headline indicators, or where an international comparison for the headline indicator is not available, a closely related indicator, are presented in the commentary for each of the dimensions, so are not repeated here.

This essay compares aspects of Australia's progress with that of other countries in the Organisation for Economic Cooperation and Development (OECD). Information about a range of progress dimensions – *Health; Education and training; National income; National wealth; The natural landscape; and Governance, Democracy and Citizenship* – is presented. A core set of countries are included in each comparison – Canada, Italy, Japan, New Zealand, the UK and the USA – together with the highest and lowest performing OECD member states in each area. Most of the data used here come from the OECD.

The essay also draws out the relationship between the selected indicators and the headline indicators for these dimensions where applicable.

There are difficulties in drawing comparisons between countries. Perceptions of progress may differ between countries. An indicator that is viewed as key to progress in one country may be considered less important in another country.

Data comparability is an issue for international comparisons. For some indicators, say life expectancy at birth, where there is an agreed international definition, comparisons are most valid. For other indicators, say crime rates, differences might be influenced by compiling practices, or differences in law. For other indicators, say the number of people with degrees, differences might be influenced by university curriculum standards.

There are other factors that complicate statistical comparisons between countries. While there are agreed concepts, definitions and classifications for some data items collected, for many others the concepts, definitions and classifications used will vary. The time at which particular data are collected can also vary considerably between countries so it can be difficult to make an international comparison for a set point in time. This can be particularly so for less frequently collected data.

Health – infant mortality

Infant mortality is an indicator of the quality of a nation's antenatal care, the effectiveness of its obstetric services and the quality of its infant care in hospitals and the community.¹ The infant mortality rate is also indicative of socio-economic conditions in a country. The infant mortality rate is expressed as the number of deaths of children under one year of age expressed per 1,000 live births.

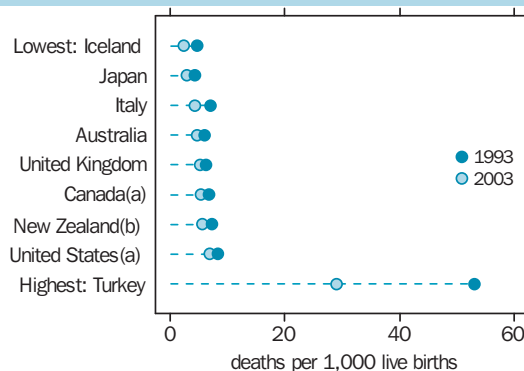
Infant mortality is closely related to the MAP headline indicator for *Health*: life expectancy at birth. A high infant mortality rate can lower average life expectancy, while a low infant mortality rate can contribute to increased average life expectancy. An international comparison for life expectancy at birth is presented in the *Health* commentary on page 34.

In 2003, the infant mortality rate in Australia was around the median for the OECD at 4.8 per 1,000 live births. However, the infant mortality rate is not consistent for all population groups in Australia. The infant mortality rate for Indigenous Australians is three times the rate for non-Indigenous Australians for the period 1999–2003.² In keeping with this, higher infant mortality rates are also observed in rural and remote areas, and in areas characterised by higher levels of disadvantage.¹

The OECD country with the lowest infant mortality rate in 2003 was Iceland with a rate of 2.4 per 1,000 live births. All of the other Nordic countries (with the exception of Denmark) which have historically had low infant mortality rates, were among the five OECD countries with the lowest infant mortality rates in 2003. The two countries with markedly higher infant mortality rates than any other OECD countries were Turkey and Mexico with infant mortality rates of 29.0 per 1,000 live births and 20.1 per 1,000 live births respectively.

Given its wealth and level of development, the United States has a relatively high infant mortality rate at 7.0 per 1,000 live births, the fifth highest

Infant mortality rate



(a) Data are for 2002 not 2003. (b) Data are for 2001 not 2003. Source: OECD in Figures 2005.³

rate in the OECD. Factors such as the high level of teenage pregnancy and lack of free prenatal and perinatal care in the United States have been suggested as contributory factors underlying the higher observed infant mortality rate.⁴

During the decade between 1993 to 2003, Australia achieved a 21% reduction in infant mortality rate, from 6.1 to 4.8 per 1 000 live births. The introduction of a public education campaign about Sudden Infant Death Syndrome (SIDS) in the early 1990s has been successful in contributing to a substantial reduction in deaths from SIDS. Consequently, recent reductions in the infant mortality rate have been due to better treatment and the implementation of interventions such as the promotion of a prone sleeping position to prevent SIDS.¹

All OECD countries achieved reductions in their infant mortality rate in the period between 1993 and 2003. The Czech Republic, Portugal and Iceland all at least halved their infant mortality rate during this period. Infant mortality in the Czech Republic went from 8.5 to 3.9 per 1 000 live births, in Portugal from 8.7 to 4.1 per 1,000 live births and in Iceland from 4.8 to 2.4 per 1,000 live births.

Considering change over a longer period, Japan has achieved a very substantial decrease in its infant mortality rate from 30.7 per 1,000 live births in 1960, to 3.0 in 2003. Japan has changed from a country previously in the bottom half of OECD countries in terms of infant mortality rates in 1960 to currently being one of the countries with the lowest rates, along with the historically low Nordic countries.⁴

Education and training – at least upper secondary educational attainment

Education plays a key role in contributing to the economic prosperity of the nation. Education also contributes to the social fabric of a society, and helps shape the values and norms of that society. At the individual level, education helps provide the capacity for individuals to reach their full potential in an academic, professional, economic and personal sense.

One educational attainment indicator is the proportion of 25–64 year olds who have completed at least upper secondary education. This indicator is presented in this essay along with the proportion of 25–35 year olds who have completed at least upper secondary education.

While the MAP headline indicator for education focuses on the proportion of people with a vocational or higher education qualification (an international comparison for this indicator is presented on page 46), the proportion of the population who have completed at least upper secondary school education is also useful as an indicator for education and training. Completion of upper secondary education is sometimes a prerequisite for entry into higher education and increasing numbers of young people are

completing upper secondary school education, increasing the pool of people potentially eligible to undertake and complete a higher education qualification. Further in Australia some vocational qualifications are regarded as a lower level of attainment than the completion of upper secondary school.

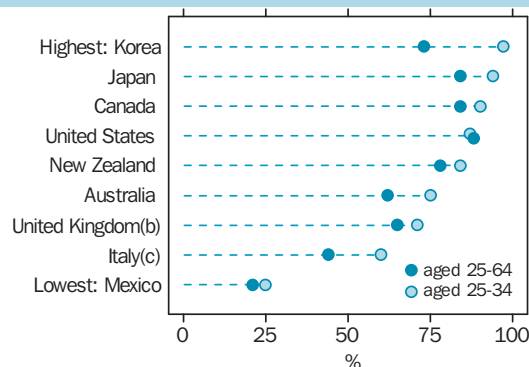
Focussing on the attainment of people aged 25–64 gives an indication of whether completion of upper secondary school education has been the norm in a particular country for past generations. Focussing on the attainment of the population aged 25–34 is indicative of generational change for the younger age cohort. These indicators also provide some sense of the skills available in the population and labour force.

In 2003, the rate of completion of at least upper secondary education in Australia for the population aged 25–64 years was 62%, slightly below the OECD average of 66%. The rate for 25–34 year olds was 75%, equivalent to the OECD average.

In 2003, the OECD country with the highest proportion of 25–64 year olds who had completed at least upper secondary education was the United States (88%). The Slovak Republic (87%), Norway (87%) and the Czech Republic (86%) had the next highest proportion of people with at least upper secondary educational attainment.

Korea had the highest proportion of 25–34 year olds with at least upper secondary school educational attainment (97%). Mexico had the lowest rate of upper secondary school attainment for both 25–64 year olds (21%) and 25–34 year olds (25%). Attainment of at least upper secondary education was also relatively low in Portugal and

Education attainment: at least upper secondary level(a) – 2003



(a) The OECD definition of at least upper secondary level education corresponds to the final stages of secondary education and above. In the Australian context, this includes completion of Years 11 or 12 of secondary school, Certificate III or IV, Diploma, Advanced Diploma, Bachelor Degree or above. Refer to *The International Standard Classification of Education: ISCED 97*, UNESCO, Paris, 1997 for more details

(b) Includes some ISCED 3C short programmes. (c) Data are for 2002.

Source: OECD Education at a Glance 2005.⁵

Turkey, with attainment rates of 23% and 26% for the population aged 25–64.

The completion of at least upper secondary school is increasing in almost all OECD countries. This is having a flow-on effect as the proportion of 25–34 year olds who had completed at least upper secondary education was higher in every country, with the exception of the United States, than for the population aged 25–64. The growing skill requirements of labour markets, an increase in unemployment in a number of countries in recent years, and higher expectations among individuals have contributed to an increase in the proportion of young people who obtain a higher education qualification (and therefore complete upper secondary school).⁵

In 2003, in OECD countries with high levels of at least upper secondary school attainment, the difference in education attainment between the 25–34 year old age group and the population aged 25–64 years was relatively small. This reflects a longer tradition of at least upper secondary school educational attainment in these countries. This was most noticeable in the Czech Republic, the Slovak Republic, Norway and Canada. The exception to this pattern was in Korea where 97% of 25–34 year olds had completed at least upper secondary education compared with 73% of the total population (25–64 year olds).

National income – consumption expenditure

Final consumption expenditure is a key indicator of the economic wellbeing of a population as it provides a measure of the level of goods and services a society is able to consume to meet their needs and wants. Households, including those non-profit institutions that serve households, and governments are the ultimate (final) consumers of goods and services within an economy. Household

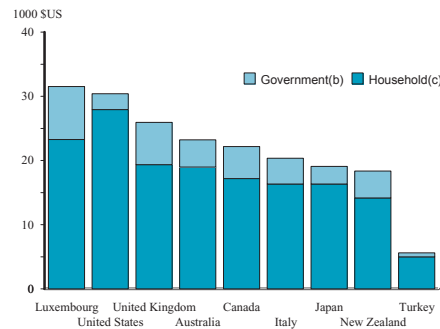
Actual individual consumption

Actual individual consumption is the total value of household final consumption expenditure, and government final consumption expenditure on individual goods and services.⁶

Household final consumption expenditure is the market value of all goods and services, (including durable products such as cars, washing machines, and home computers), purchased by households.⁷ Household final consumption also includes the value of goods and services produced by non-profit institutions serving households.⁷

Government final consumption expenditure is current expenditure by general government bodies on collective services such as defence and public order and safety which are consumed by the community as a whole, and on individual goods and services such as health and education which are consumed by individuals. Only that government expenditure on individual consumption goods and services is included in actual individual consumption. Transfer payments such as social assistance benefits are not included.⁸

Actual individual consumption(a) – 2004



(a) Expressed as US dollars at current prices and current Purchasing Power Parities (PPPs).

(b) Government final consumption expenditure on individual goods and services.

(c) Household final consumption expenditure

Source: *National Accounts of OECD Countries*, OECD Statistics On-line Database, 2006.⁹

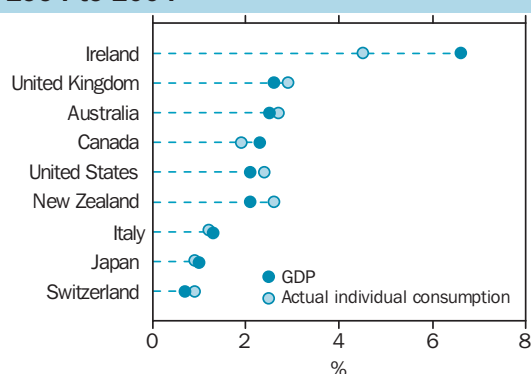
purchases of goods and services constitute the largest part of final consumption expenditure. Governments and non-profit institutions serving households generally provide a range of services to households either for free or at a low price. The cost to the government or the non-profit body that provides these services, in delivering these services, is also an important part of total final consumption expenditure.

Actual individual consumption (comprising household final consumption expenditure and government final consumption expenditure on individual goods and services) is a significant component of Gross Domestic Product (GDP). GDP is a measure of the economic value of production of those activities that fall within the boundary of the National Accounts system. There is an important relationship between GDP and household consumption expenditure.¹⁰

Household final consumption expenditure and government final consumption expenditure on individual goods and services are also closely related to real net national disposable income. As disposable income increases, so does the capacity for households to purchase additional goods and services, and for government to provide goods and services. For more detail, see the international comparisons for Gross National Income and growth in GDP on page 64, and the headline indicator for *National Income: Real Net National Disposable Income* on page 60.

The indicator presented here is actual individual consumption per capita, divided into its two components – household final consumption expenditure and government final consumption expenditure on individual goods and services, both expressed in US dollars. The average annual growth in GDP per capita between 1994 and 2004 is also presented in the following graph to show growth in actual individual consumption against growth in GDP.

Average annual growth in GDP and individual consumption expenditure(a) — 1994 to 2004



(a) Calculated using GDP and actual individual consumption estimates expressed as US dollars at constant prices and constant PPPs.

Source: Calculated from National Accounts of OECD Countries, OECD Statistics On-line Database, 2006.⁹

In 2004, Australia's actual individual consumption per capita was \$23,200, which was above the OECD average of \$21,000. This comprised household final consumption expenditure of \$19,000, and government final consumption expenditure on individual goods and services of \$4,200.

Luxembourg had the highest level of actual individual consumption per capita (\$31,500) of all OECD countries in 2004. The United States had the highest per capita level of household final consumption expenditure (\$27,900), while Luxembourg had the highest level of per capita government final consumption expenditure on individual goods and services (\$8,300). Turkey had the lowest actual individual consumption per capita (\$5,600), made up of household final consumption expenditure of \$5,000 and government final consumption expenditure on individual goods and services of \$600.

In 2004, the level of actual individual consumption per capita in most OECD countries was closely related to the level of GDP per capita. Countries with relatively high levels of GDP per capita such as Luxembourg, the United States and Norway also had relatively high levels of actual individual consumption per capita. Countries with low levels of GDP per capita such as Turkey, Mexico and Poland recorded the lowest levels of actual individual consumption. This pattern was also observed for household final consumption expenditure, which is the major component of actual individual consumption.

The level of government final consumption expenditure on individual goods and services in OECD countries is more likely influenced by factors such as government policy and societal attitudes to government spending than by the level of GDP. Sweden, a country with a moderately high level of GDP per capita in 2004 (\$31,100), has a tradition of a high level of government provision of

goods and services. In keeping with this Sweden had a relatively high level of government final consumption expenditure on individual goods and services in 2004 (\$7,200). In contrast, the United States with a higher level of GDP per capita in 2004, (\$39,700) is a country with societal expectations that individuals bear a much greater share of the provision of goods and services. The United States had a relatively low level of government final consumption expenditure on individual goods and services (\$2,500) in 2004.

As GDP increases, consumption expenditure also tends to increase. Increases in actual individual consumption per capita in OECD countries in the period between 1994 and 2004 generally reflected the magnitude of increases in GDP per capita. Countries that experienced high average annual rates of growth in GDP per capita such as Ireland (6.6%), Poland (4.5%) and the Slovak Republic (4.2%) also had substantial average annual growth in actual individual consumption per capita (4.5%, 4.0% and 4.9% respectively).

Countries with lower annual average growth in GDP per capita during the period 1994–2004 such as Switzerland (0.7%), Japan (1.0%) and Mexico (1.1%) experienced lower growth in actual individual consumption per capita (0.9%, 0.9% and 1.0% respectively). However, despite relatively low per capita growth in GDP and actual individual consumption, Japan experienced one of the highest average annual rates of growth (3.1%) in government final consumption expenditure on individual goods and services, the smaller component of actual individual consumption.

While increases in consumption expenditure generally reflected increases in GDP in the period between 1994 and 2004, the average annual rate of growth in actual individual consumption per capita was lower than the rate of growth in GDP per capita in more than half of OECD countries. However, there were a number of OECD countries where average annual growth in individual actual consumption expenditure per capita during this period was somewhat greater than growth in GDP per capita. For example, in the Slovak Republic actual individual consumption per capita grew on average by 4.9% and GDP by 4.2%. In Norway actual individual consumption per capita grew on average by 3.1% and GDP by 2.4%, and Iceland where individual actual consumption per capita grew by 3.2% and GDP by 2.7%.

Between 1994 and 2004 actual individual consumption per capita in Australia grew on average by 2.7% per year while GDP per capita grew by 2.5%. Australia's growth in both GDP per capita and actual individual consumption per capita was above the OECD average.

National income – household saving

Household saving is one of the main sources of funds within a country to finance investment, and hence, to promote long-term growth in increased national disposable income per capita. An

international comparison for a related indicator, Gross National Income per capita is presented in the *National income* commentary on page 64.

Household saving and investment represents the wealth accumulated by households, which is a component of national wealth.

Household saving is also important at the individual or family level. Saving for retirement recognises that income levels fluctuate over the life cycle, and that provision needs to be made for the time after an individual retires from the labour market. The wealth households have accumulated through saving and investment represents the wealth that can be used to generate future income and support future consumption.

Household saving is the component of household disposable income that is not consumed. The household saving rate is household saving divided by household disposable income. Household saving rates can be calculated as either a gross saving rate or net saving rate (see definitions of gross and net saving in the *National income* commentary on page 63). Many OECD countries, including Australia, calculate household saving on a net basis. The net household saving rate is the measure presented in this essay, and hence countries using gross saving rates such as the United Kingdom, Belgium and Sweden have been excluded from this analysis.

In 2003, Australia experienced a household saving rate of -2.2%. This negative saving rate was the result of both a slow down in the rate of growth of disposable income and the continued strength of household final consumption expenditure.¹¹ In 2003, New Zealand also experienced negative household saving or dissaving (-6.5%), making it the lowest household saving rate of all OECD countries. In 2003, Hungary had the highest household saving rate of all OECD countries, with 17.3% of household disposable income being saved.

Many OECD countries experienced a decline in household saving during the period 1990–2003.

Net household saving rate



(a) Data are for 1995, not 1990.

Source: OECD Factbook 2005.⁴

Australia, Canada, the United States, New Zealand and Finland all experienced sharp declines in household saving rates. Australia's household saving rate of -2.2% reflects a decline from 9.3% in 1990. However, in understanding the fall in Australia's household saving it is important to consider changes in the value of assets held by households.¹¹

Norway experienced the strongest growth in the household saving rate during the period 1990–2003, with household saving increasing from 2.2% to 7.6% of disposable household income during this period.

Factors that may influence the household saving rate include the legal and administrative arrangements within a country and the demographic characteristics of the population. The extent to which governments fund old-age pensions and provide insurance against unemployment and sickness may also influence the level of household saving.

The age composition of the population can influence the level of household saving. An ageing population may be accompanied by lower household saving rates as older people tend to run down the financial assets that they have accumulated during their working life.⁴ Countries with an ageing population and low fertility rates also experience a slow down in the rate of household formation, meaning less growth in the number of households to contribute to the household saving of a country.

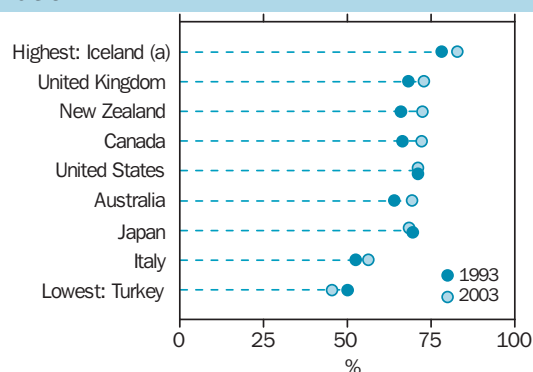
The purchase of household durables (such as washing machines, refrigerators etc), which households may consider to be an investment can also influence the level of household saving.¹²

National income – population in work

The proportion of the working age population (aged 15–64) who are employed provides information on the ability of the economy to create jobs.¹³ The size of the economically active population is also one of the determinants of economic growth. A limitation of this indicator is that it does not take into account those in employment who are older than the age that has traditionally been considered working age.

A high ratio means that a large proportion of the working age population is employed, while a low ratio means that a large share of the working age population are not directly involved in productive market activities, because they are either unemployed or more likely not in the labour force. This is the pool of people who potentially can be targeted by labour market policies to increase employment and participation. While a high employment to working age population ratio is generally considered positive, the indicator alone does not provide information on labour market issues such as under employment, earnings and working conditions.¹³

Employment to working-age population ratio



(a) Data are for 2002 not for 2003.

Source: OECD Factbook, 2005.⁴

The employment to working age population ratio is influenced in the short term by business cycles and the level of unemployment. Higher unemployment, all other things equal, will tend to decrease the employment to working age population ratio. An international comparison for unemployment rate is presented in the *Work* commentary on page 52.

However in the longer term, the population of working age people who are employed is affected by policies in areas such as higher education, income support, and policies that facilitate the employment of women.⁴

In 2003, Australia's employment to working age population ratio was 69%, above the OECD average of 65%. Iceland was the OECD country with the highest employment to working age population ratio in 2003, with 83% of the working age population in employment, followed by Switzerland with 78%. Along with Iceland, most of the other Nordic countries had relatively high ratios in 2003: Norway (76%), Denmark (75%), and Sweden (74%). This is due in part to the continuing high level of participation of women in paid employment in these countries.

Turkey had the lowest employment to working age population ratio (46%), followed by Poland (51%). High unemployment in Poland in recent years, attributed to rationalisation of the economy, relatively slow development of the services sector, and the level of labour market regulation, is likely to have contributed to the low ratio in that country.¹⁴ In Turkey, participation of both men and women in paid work has been declining. This, in combination with the continuing low proportion of women in paid work (25%), are factors likely to have contributed to the low ratio.

The employment to working age population ratio increased in the majority of OECD countries during the period between 1993 and 2003, along with economic growth. For further information on economic growth, see the international comparisons of change in GDP, and gross national

income in the *National income* commentary on page 64.

In Australia, the employment to working age population ratio increased from 64% to 69% between 1993 and 2003. This increase was driven by increasing female participation in paid work, with male participation in paid work actually declining during this period.

The largest increases in the ratio occurred in Spain, Ireland and the Netherlands. The employment to working age population ratio in Spain increased from 48% to 61%, in Ireland from 51% in 1993 to 65% in 2003, in and from 64% to 73% in the Netherlands. The increases in these countries were driven by substantial growth in the proportion of women in paid employment, and also in Ireland by substantial economic growth over this period.

Substantial decreases in the employment to working age population ratio occurred in Poland and Turkey during the period between 1993 and 2003. In Turkey the decline was from 50% to 46%, while in Poland from 59% to 51%.

Biodiversity – protected areas

Conservation of biodiversity is considered an integral part of sustainable development. Many are concerned about the impact of human activities on biodiversity. Human activities impact on biodiversity in ways such as habitat alteration, pollution, introduction of exotic species, commercial use of wildlife resources, degradation of ecosystems, loss of habitat, and the extinction of plant and animal species.¹⁵

Protected areas are a cornerstone of national biodiversity conservation strategies. They provide safe havens for the protection of plant and animal species. Protected areas also help to preserve

Protected areas

The protected areas indicator is expressed as the proportion of land territory that is in protected areas. The proportion of land territory in strict nature reserves, wilderness reserves and national parks is also presented.

The World Conservation Union (IUCN) defines a protected area as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." The IUCN provides six categories of protected areas according to the management regime of the area, ranging from a strict nature reserve where limited access is available to scientists only, to a managed resource protection area, which is managed for the sustainable use of natural ecosystems.¹⁶

Sea territory in protected areas is not included in this indicator. Globally less than 1% of marine environment is included in protected areas. Australia's Great Barrier Reef is one of two sites that accounts for a third of the global area of the marine environment in reserves. Marine protected areas help provide fish breeding grounds and maintain fisheries.¹⁶

genetic diversity of species, and preserve ecosystems, and in doing so help ensure the survival of the world's natural heritage. They also maintain vital ecosystem functions such as the regulation and purification of water flow. Protected areas are also important sites for scientific research and conserving biodiversity.

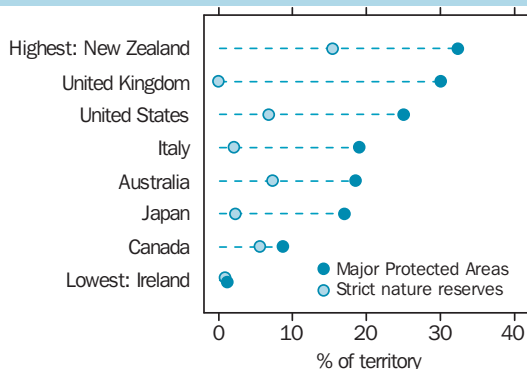
Protected areas provide places for indigenous human communities to continue traditional lifestyles. They provide protection for sacred sites, and are places for tourism, recreation and education. They are believed to act as natural buffers against climate change through the uptake and storage of carbon by forests.

Protected areas are set up with the conservation of species as one of the primary objectives. Therefore the proportion of a territory that is in protected areas reflects political and societal commitment to biodiversity conservation.¹⁷ However, the proportion of territory in reserves has limitations as an indicator of biodiversity conservation. The proportion alone does not tell us what range of ecosystems and habitats are being preserved in protected areas.

Changes over time in the number of extinct, endangered and threatened mammal and bird species is indicative of how well the strategies for the conservation of biodiversity, of which protected areas are a key part, are operating. International comparisons of threatened mammal species and threatened bird species is presented in *The natural landscape – biodiversity* on page 107.

The number and extent of protected areas has increased globally, in almost all OECD countries. While in 1962 there were around 10,000 protected areas, there are now over 100,000.¹⁶ In 2004, there were 5,700 sq km of protected areas in OECD countries accounting for 16% of the total territory of all OECD countries combined.

Major protected areas and strict nature reserves(a) – 2004



(a) Strict nature reserves includes the following IUCN categories Ia: strict nature reserves managed mainly for science, Ib: wilderness areas managed mainly for wilderness protection, and II: national parks managed mainly for ecosystem protection and recreation.

Source: *Environment at a Glance, OECD Environmental Indicators 2005*.¹⁵

In 2004, protected areas accounted for 19% of Australian territory. This placed Australia in the top third of OECD countries in terms of area in reserves.

In 2004, New Zealand was the OECD country with the highest proportion of its territory dedicated to protected areas (32%). Other OECD countries with greater than 30% of their territory in protected areas were Germany (32%) and the United Kingdom (30%). Ireland had the lowest proportion of territory dedicated to protected areas (1%). Other countries with less than 5% of territory in protected areas were Belgium (3%) and Turkey (4%).

New Zealand had the highest proportion (15%) of territory in strict nature reserves, wilderness areas and national parks in 2004. There were five other OECD countries with greater than 5% of territory in strict nature reserves, wilderness areas, and national parks: Sweden (8%), Australia (7%), Slovak republic (7%), United States (7%) and Canada (6%). In contrast, the United Kingdom, Luxembourg, Korea and Belgium did not have any territory in these categories of protected areas.

Air and atmosphere – renewable energy

Increasing the use of renewable energy sources has the potential to help reduce greenhouse gas emissions. Australia's net greenhouse gas emissions are the headline indicator for *The air and atmosphere*. An international comparison for a related indicator, net greenhouse gas emissions is presented on page 137.

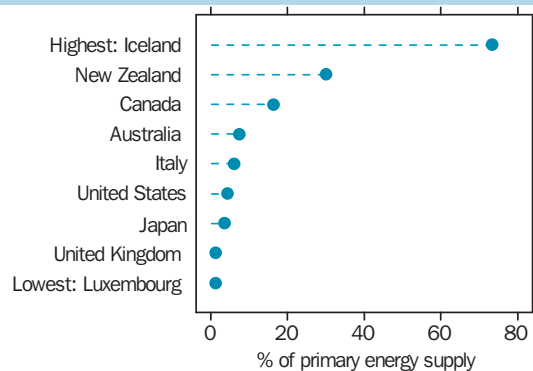
Governments around the world are recognising the importance of sustainable development and combating climate change when designing their energy policies.⁴ The use of renewable energy is part of energy policy responses to address climate change in many countries. Renewable energy includes wind, solar, hydro, geothermal, tide and wave. It also includes energy derived from biomass and from the combustion of industrial and municipal waste. In the 26 OECD countries that are members of the International Energy Agency, combustible renewables and waste, and hydropower currently represent the bulk of renewable energy supply.¹⁶

In 2003, 8% of Australia's primary energy supply came from renewable energy sources, above the OECD country average of 6%. Australia has vast reserves of low-cost energy resources and is a major energy exporter, particularly of coal.¹⁸

Primary energy supply in Australia is dominated by fossil fuels, with coal accounting for nearly half of total primary energy supply. Given this, the Australian government has determined that the development of low emissions technologies such as "clean coal" will be a central focus of climate change policy in Australia.¹⁹

Around three quarters of renewable energy used in Australia comes from biomass, with hydropower accounting for most of the remainder. There is also

Renewable energy as proportion of primary energy supply — 2003



Source: OECD Factbook, 2005.⁴

a small contribution from wind power and solar.¹⁸ Australia has set a mandatory target of generating an additional 9,500 giga watt hours (GWh) of electricity per year from renewable sources by 2010. This is enough power to satisfy the residential electricity needs of 4 million people. There are a variety of government programmes that provide support for renewable energy innovation, development and commercialisation.²⁰

In 2003, 73% of Iceland's total primary energy supply came from renewable energy sources (primarily geothermal), the highest proportion of all OECD countries. This was markedly higher than the next highest proportions of primary energy supply – in Norway (44%) and New Zealand (30%). The share of renewable energy supply in total primary energy supply is strongly linked to a country's resource endowments. It is also determined by technology development, policy choices and private sector investment. In Norway there are abundant hydropower resources that provide almost all of its electricity generation, and represent the bulk of renewable energy sources in Norway. However, there is also interest in expanding the use of wind power and heat from biomass. In New Zealand there are abundant geothermal and hydropower resources and these account for the bulk of renewable energy, together with some use of biomass.¹⁸

In 2003, there were eleven OECD countries where the source of 10% or more of total primary energy supply was from renewable energy. This was unchanged from nearly a decade earlier in 1994.

There were seven OECD countries where in 2003 less than 2% of total primary energy supply came from renewable sources (Hungary, Belgium, Ireland, Korea, Netherlands, the United Kingdom and Luxembourg). Total primary energy supply in these countries is also dominated by fossil fuels. Nuclear energy also plays a part in fulfilling energy needs in all of these countries (with the exception of Ireland and Luxembourg), particularly so in Belgium, Hungary, and Korea.¹⁵

However, around half of OECD countries experienced an increase in the proportion of their

energy supply coming from renewable energy between 1994 and 2003. In some of these countries the increase was relatively small, or was from a small base. Australia increased use of renewable energy from 6% of primary energy in to 8% over this period.

Some OECD countries that were already making considerable use of renewable energy sources in 1994 increased their use of renewable energy in the period from 1994 to 2003. During this period Iceland increased its use of renewable energy from 66% to 73%, Sweden from 23% to 26%, and Finland from 19% to 22%. Denmark experienced a marked increase in renewable energy use over this period, from 8% of primary energy supply to 13%.

Environment – municipal waste

Waste is generated at all stages of human activities. The volume of waste that a society produces is an indicator of resource use and of the by-products of consumption, and is determined by production and consumption patterns. The potential impacts from inappropriate waste management on human health and the environment (soil and water contamination, air quality, land use, landscape amenity, greenhouse gas emissions from landfill) are major concerns.⁸

Increasing waste generation challenges the capacity of current facilities to cope, and creates pressure for land on which to locate new waste disposal facilities. The location and social acceptance of new facilities, such as landfills, is also an issue. There is a recognition that waste minimisation through changes in consumption patterns and waste prevention, reuse, recycling and recovery, is an element of sustainable development and policy responses have focussed on strategies in these areas.

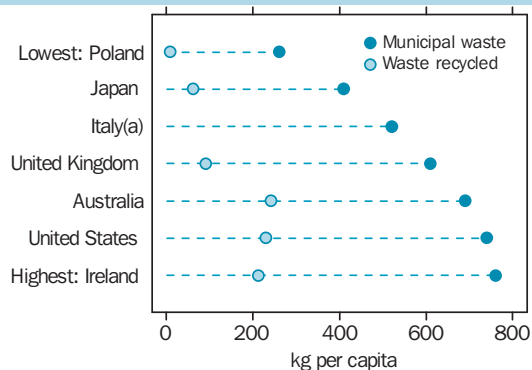
In 2003, Australia had the fifth highest rate of per capita municipal solid waste generation among OECD countries with 690kg per capita. This is partly because technologies and processes to avoid, reduce and recover waste are generally not used as extensively in Australia as in some other OECD countries.¹⁹

In 2003, the OECD country with the highest per capita generation of municipal solid waste was Ireland, producing 760kg of waste per capita. The United States and Iceland had the next highest rates of per capita municipal waste generation with

Municipal waste

The municipal waste indicator is expressed as municipal waste generated (kg/capita) per year and the amount of this waste that is recycled. Municipal waste is waste collected by or on the order of municipalities. It includes waste that originates from households, commercial activities, office buildings, institutions such as schools and government buildings, and small businesses that dispose of waste at the same facilities used for municipally collected waste.⁸

Municipal waste per capita — 2003



(a) No data are available for waste recycled.

Source: *Environment at a Glance, OECD Environmental Indicators 2005*.¹⁵

740kg and 730kg respectively. The OECD country with the lowest per capita municipal solid waste generation was Poland with 260kg per capita. The Czech Republic and Slovak Republic were the next lowest generators of municipal solid waste, with 280kg per capita and 300kg per capita respectively. Data for 2003 shows that the OECD countries with relatively high levels of consumption also had relatively high levels of municipal waste generation.

For the 20 OECD countries for which data exists on the change in municipal solid waste generation between 1990 and 2003, all but four countries recorded increases in municipal solid waste generation per capita. The largest increases were in Ireland and Spain, which recorded increases of 76% and 53% respectively, compared with the levels of municipal solid waste in 1990. Municipal solid waste generation intensity per capita has risen mostly in line with private final consumption expenditure and GDP, although a slight slow down has been observed in recent years.¹⁵

Recycling, incineration and energy recovery from waste are becoming more commonly utilised in a number of OECD countries. Nine European OECD countries and Japan now dispose of less than 30% of their waste to landfill, with Switzerland and Japan sending only 1% and 5% of their waste to landfill respectively. In Japan it has been a government priority to minimise the generation of waste and reduce landfilling, by means of recycling and combustion to generate electricity.²²

In 2003, Australia ranked tenth in terms of the proportion of municipal solid waste that is recycled, with 35% of waste being recycled. Four OECD countries recycle more than half of their municipal solid waste, Austria (61%), Belgium (60%), Germany (56%) and the Netherlands (56%). The relatively high cost of landfill in Europe, the prohibition of biodegradable and combustible material from landfill and renewable energy targets are factors likely to have encouraged greater use of recycling and energy recovery from waste.²¹

Governance, democracy and citizenship – voter turnout

In most developed democratic countries there is concern about increasing public alienation from politics.^{22, 23} Voter turnout rates are one easily quantifiable measure of political participation of the population. Voter turnout can be considered as an indicator of the extent to which citizens are a part of the political process, and the confidence the population has in, and importance they attach to, political institutions. However, higher or lower rates of voter turnout do not necessarily correlate with the characteristics or extent of democracy within a particular country.

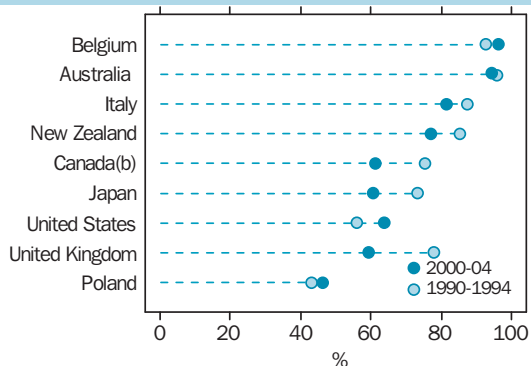
There are a couple of methods by which the voter turnout rate can be expressed. Voter turnout can be expressed as the number of votes cast divided by the number of registered voters for a parliamentary election. It is also possible to express the indicator as the number of votes cast as a proportion of the voting age population. The Australian Electoral Commission measures voter turnout as votes cast as a proportion of registered voters and this measure is used in this essay. The voter turnout indicator refers to turnout for national parliamentary elections.

In the most recent Australian Federal parliamentary elections of 2004, voter turnout was 94%, the second highest of all OECD countries. However, this was slightly lower than the voter turnout of 96% in the 1993 parliamentary election.

Belgium currently has the highest voter turnout rate of all OECD countries with 96% of registered voters casting a vote in the parliamentary elections of 2003. The lowest turnout was recorded in Poland with 46% of registered voters voting in the parliamentary elections of 2001.

The compulsory or voluntary nature of voting in different countries is one factor that may influence

Voter turnout(a)



(a) Electoral terms and election timetables vary between countries. The data presented for voter turnout is for the most recent national parliamentary election held in a country, for which data is available, and the election held as close to 10 years before that.

(b) Earlier data are for 1988.

Source: *International Institute for Democracy and Electoral Assistance (IDEA) Voter Turnout Database, 2005*.²⁶

voter turnout. Belgium and Australia are countries with long histories of compulsory voting, with compulsory voting introduced in 1892 in Belgium and 1924 in Australia. Australia and Belgium are also two of a small number of countries that have strict enforcement of compulsory voting. A strong association has been demonstrated between the level of enforcement of compulsory voting and voter turnout.²⁵ This is likely to be a contributing influence to consistently high voter turnout in Australia and Belgium over time.

High levels of political freedom and civil liberties are also considered to be factors that may contribute to the level of voter turnout.²⁷

Most OECD countries have experienced a decline in voter turnout in elections held over the past decade or so. The largest declines in voter turnout occurred in the Czech Republic, Korea and United Kingdom. Voter turnout in the Czech Republic declined from 85% in 1992 to 58% in 2002. Voter turnout in Korea declined between 1988 and 2000 from 76% to 57%, while in the United Kingdom voter turnout between 1991 and 2001 declined from 78% to 59%. The low turnout for the 2001 election in the United Kingdom has been attributed to a number of factors such as the failure of the election campaign to connect with the electorate, a perception on the part of some voters that voting was irrelevant and would not make a difference, and the absence of a co-ordinated national campaign to encourage voting.²⁴

The United States has experienced the largest increase in voter turnout, with turnout increasing from 56% in 1990 to 64% in 2000. A number of other countries have experienced a modest increase in voter turnout during this period. Small increases in voter turnout were recorded in Poland (from 43% in 1991 to 46% in 2001), Denmark (from 83% in 1990 to 87% in 2001) and Belgium (from 93% in 1991 to 96% in 2003).

Among OECD countries are a number of countries which have moved to a democratic system of government relatively recently. The first parliamentary elections were held in Poland in 1989, and in 1990 for the Czech Republic and the Slovak Republic. The voter turnout for the first parliamentary elections in these countries was considerably higher than the turnout in more recent parliamentary elections. Some argue that social conditions, such as high levels of inequality and distrust of political institutions, sometimes observed in newer democracies, can influence electoral participation.²⁸

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Appendix I: Criteria for selecting indicators

Headline indicators

Measures of Australia's Progress is designed for the Australian public, and the commentaries are meant to be easily understood by readers who may not be expert in either the subject matter or statistical methods. In many cases, our choice of indicator has had to strike a balance between considerations of approachability, technical precision, and the availability and quality of data.

The headline indicators in this publication are concerned with assessing dimensions of Australia's progress, not with explaining the underlying causes of change. The indicators are about the 'whethers' rather than the 'whys'.

In the view of the ABS, a good headline indicator should:

- ◆ be relevant to the particular dimension of progress
- ◆ where possible, focus on outcomes for the dimension of progress (rather than on say, the inputs or processes used to produce outcomes)
- ◆ show a 'good' direction of movement (signalling progress) and 'bad' direction (signalling regress) – at least when the indicator is considered alone, with all other dimensions of progress kept equal
- ◆ be supported by timely data of good quality
- ◆ be available as a time series
- ◆ be sensitive to changes in the underlying phenomena captured by the dimension of progress
- ◆ be summary in nature
- ◆ preferably be capable of disaggregation by, say, geography or population group
- ◆ be intelligible and easily interpreted by the general reader.

For some dimensions, it is not yet possible to compile our preferred indicator. So a proxy indicator has been used instead, pending further statistical development work by the ABS or other researchers.

Supplementary indicators

The supplementary indicators are intended to flesh out the information provided by the headline indicator. In some cases, they help bridge the gap between our preferred indicator and the best proxy indicator available today.

To choose the supplementary indicators, much the same criteria were applied – but we did not require that every supplementary indicator show unambiguously good and bad directions of movement or have an outcome focus.

Appendix II: Other initiatives

Many different approaches are used to measure progress and kindred concepts. Some are outlined here, together with some of the more significant measurement projects underway in Australia and overseas.

Pressure–State–Response model

Some analysts categorise their indicator sets according to the Pressure–State–Response (PSR) model. This model is often referred to in the environmental literature. It was developed primarily for considering sustainable development and the interactions between the environment and the economy – so it is less suited to *Measuring Australia's Progress* which focuses on progress in the economic, social and environmental domains, rather than on environmental sustainability.

Under this approach, indicators are classified according to whether they signal:

- ◆ a pressure on the natural environment
- ◆ the state or condition of the environment
- ◆ the extent of society's response.

The United Nations (UN) has replaced the term 'pressure' with 'driving force', though the UN's model is essentially the same.

The PSR framework implies causality: a pressure modifies the state of the environment and this triggers a response from society. The Organisation for Economic Co-operation and Development (OECD) warns that a PSR framework:

‘tends to suggest linear relationships in the human activity-environment interaction. This should not obstruct the view of more complex relationships in ecosystems and in environment-economy interactions.’

Aggregated indicators

Aggregated indicators seek to combine disparate measures of progress into just one number.

For example, to measure the quality of life in a nation, the United Nations Development Program compiles a Human Development Index (HDI). It is presented as an alternative to national accounting measures such as Gross Domestic Product (GDP) for measuring the relative socioeconomic progress of nations. The HDI is aimed primarily at measuring change in developing countries. A country's HDI is composed of life expectancy, educational standards and average incomes. Each of the components is given equal weight.

Other approaches, such as the Genuine Progress Indicator (GPI), attempt to adjust traditional measures of economic activity, such as GDP, to account for changes to environmental and social capital. For example, a GPI might begin with GDP, then make allowances such as:

- ◆ Spending to offset social and environmental costs ('defensive expenditure') is taken out.
- ◆ Longer term environmental damage and the depreciation of natural capital are accounted for.
- ◆ Changes in income distribution are included (reflecting the view that an additional dollar means more to the poor than to the rich).
- ◆ Estimates of the costs (financial, social and psychological) of unemployment, underemployment and overwork might be included.

There is not yet a consensus on how many of these things should be valued in dollar terms.

The Australia Institute has calculated a Genuine Progress Indicator for Australia. Details are at: <http://www.gpionline.net>.

National accounting frameworks

The System of National Accounts (SNA 1993) provides an international framework for economic accounting. Australia's national accounts record the essential elements of the Australian economy: production; income; consumption; accumulation of assets and liabilities; and wealth.

Some countries, including Australia, are beginning to explore ways of incorporating environmental and social effects into a national accounting framework. The System of Integrated Environmental and Economic Accounting (SEEA) complements the SNA by providing a common framework for examining interactions between the economy and the environment.

The Dutch Government has also made progress in compiling a System of Economic and Social Accounting Matrices and Extensions (SESAME). This system is an extension to the standard national accounts framework. For each variable, it permits analysis of both the national total value and its distribution among socioeconomic groups (categories of employed persons etc.) Key features in a system of accounting matrices are data integration and multiple classifications, which provide links (both conceptual and numerical) between monetary and non-monetary units. Such a system can be used to analyse the links between the structure of an economy, people and the environment.

The Ecological Footprint

The Ecological Footprint measures the land area and other resources affected by a population – both the land occupied directly by housing and the like, and the land and other resources used to produce goods and services, to take in the waste generated, and so on.

Balancing Act - a triple bottom line analysis of the Australian economy

Triple bottom line accounting is a term used to describe reporting that goes beyond a financial “bottom line” to assessing and reporting on the three spheres of sustainability: economic, social and environmental. In the CSIRO report, *Balancing Act*, the principle of triple bottom line reporting is applied at a national economic sector level for 135 sectors of the Australian economy (e.g. Electricity supply, Dairy cattle and milk, Retail trade, Banking). It uses an input-output analysis, which is an internationally accepted method of dealing with economic interdependencies. The analysis has merged the System of National Accounts input-output tables published by the ABS, with a range of social and environmental indicators. For more information see <<http://www.cse.csiro.au/research/balancingact/index.htm>>

Other triple bottom line reporting initiatives are:

The 2002 *Global reporting initiative guidelines* provide a framework for reporting on the linked aspects of sustainability: the economic, the environmental and the social. See <<http://www.globalreporting.org>>

The Australian Department of the Environment & Heritage publishes Australian guidelines for environmental reporting of organisations in *Triple bottom line reporting in Australia: a guide to reporting against environmental indicators* (2003). See <<http://www.deh.gov.au/industry/corporate/reporting>>

The Intergenerational Report

The *Charter of Budget Honesty Act 1998* requires the Treasurer to publish an Intergenerational Report (IGR) at least once every five years, assessing the sustainability of current government policies for the following 40 years, including taking into account the financial implications of demographic change. The first IGR was released in May 2002 with the 2002–03 Federal Budget, see Budget Paper No. 5 at:

<<http://www.budget.gov.au/2002-03/bp5/html/index.html>>

The next IGR is to be published not later than the time of the 2007–08 Budget, reflecting its focus on long-run issues.

Are we sustaining Australia

The Australian Government's 2002 report *Are We Sustaining Australia: A Report Against Headline Sustainability Indicators for Australia* is Australia's first report against a set of 24 headline sustainability indicators. The indicators were selected to collectively measure national performance against the core objectives of the National Strategy for Ecologically Sustainable Development (NSES D).

The Report, and the indicators against which it reports, were developed in consultation with all Australian Government agencies, other jurisdictions, key stakeholders and the general public. The Report is not intended to be comprehensive, but rather to give a broad view, reflecting on a wide range of issues with a relatively small amount of information.

It is not possible from this first report to assess whether or not our way of life is sustainable. This is because there are no time series data as yet for several of the indicators of ecological integrity and biodiversity. In addition, there are limited time series data for the indicators of natural resource management and for the environmental and some of the social aspects of individual and community wellbeing. Rather, this Report provides a snapshot against which future trends can be seen.

A table on the next page compares the ABS Measures of Australia's Progress with *Are We Sustaining Australia*.

The Report is available at: <<http://www.deh.gov.au/esd/national/indicators/report/index.html>>

Comparing dimensions and indicators, MAP and Are We Sustaining Australia

<i>Measures of Australia's Progress</i>		<i>Are We Sustaining Australia</i>	
<i>Headline dimension</i>	<i>Headline indicator</i>	<i>Dimension</i>	<i>Indicator</i>
Health	Life expectancy at birth	Healthy living	Disability adjusted life years
Education and training	Percentage of people aged 25–64 with a non-school qualification	Education and skills	Percentage of people aged 25–64 with non-school and/or upper secondary qualifications
Work	Unemployment rate		
National income	Real net national disposable income per capita	Industry performance	Real GDP per capita
Economic hardship	Average real equivalised weekly disposable income of households in the second and third deciles of the income distribution	Living standards and economic wellbeing	Gross per capita disposable income; Gross National Income per capita
National wealth	Real net national worth per capita	Economic security	National net worth (absolute and per capita)
Housing	No headline indicator		
Productivity	Multifactor productivity	Economic capacity	Multifactor productivity
The natural landscape (biodiversity)	Threatened species; Annual area of land cleared	Biodiversity and ecological integrity	Threatened species and endangered ecological communities; Proportion of sub-regions with a) greater than 30% of original vegetative cover; and b) greater than 10% protected
The natural landscape (inland waters)	Water management areas, proportion where use exceeded 70% of sustainable yield	Sustainable management of water	Water management areas, proportion where use exceeded 70% of sustainable yield
		Freshwater health	Sites with high in-stream biodiversity
The natural landscape (land)	Salinity, assets at risk	Land health	Catchment condition index
		Sustainable management of forests	Total area of all forest type
		Sustainable management of agriculture	Net value of rural land
The air and atmosphere (air quality)	Fine particles, days health standards exceeded in major urban areas	Air quality	Air pollutants, days health standards exceeded in major urban areas; SO _x , NO _x and particulate emissions
The air and atmosphere (atmosphere)	Total net greenhouse emissions	Climate change	Total net greenhouse emissions
		Management of energy	Renewable energy use as a proportion of total
Oceans and estuaries	No headline indicator	Coastal and marine health	Estuarine condition index
		Sustainable management of fish	Percentage of major Commonwealth harvested fish species classified as fully or under-fished
Family, community and social cohesion	No headline indicator		
Crime	Victims of household and personal crimes		
Democracy, governance and citizenship	No headline indicator		
		Economic and gender equity	Ratio of female to male full-time weekly earnings
		Economic and educational equity	Year 12 completions: top and bottom socioeconomic deciles
		Economic and health equity	Life years lost: top and bottom socioeconomic quintiles
		Locational equity	Year 12 completions: urban and rural

Growing Victoria Together

In November 2001, the Hon. Steve Bracks M.P., Premier of Victoria, launched *Growing Victoria Together*, a document that expresses a broad vision for the future of Victoria through a list of goals and priority actions. This Victorian State Government document also lists indicators or targets that will be used to demonstrate progress towards the articulated goals.

The ABS assisted the Victorian State Government with identifying priorities for indicator production through the *Indicators of Wellbeing in Regional and Rural Communities* project, which began in 2000. This consultancy had a particular focus on wellbeing indicators at the sub-State level and culminated in the delivery to the State Government of a Victorian Framework for Indicators of Regional Wellbeing in March 2002.

Since the launch of the project three annual reports have been published 2002–03, 2003–04, and 2004–05. More information on *Growing Victoria Together* can be accessed at:

<<http://www.growingvictoria.vic.gov.au>>

Tasmania Together

Tasmania Together is a long-term social, environmental and economic plan for the Tasmania's development for a period of 20 years. It provides an overarching framework for planning, budgeting and policy priorities for the government and non-government sectors.

The process of creating *Tasmania Together* was driven by the Community Leaders' Group (CLG), a 22 member group of Tasmanians representing a broad cross-section of the community. The role of the CLG was to consult widely with the Tasmanian community to identify their vision and goals and to oversee the development of benchmarks. The process was completed and the *Tasmania Together* document launched in September 2001.

The *Tasmania Together* document contains:

- ◆ A vision, 'Together we will make Tasmania an icon for the rest of the world by creating a proud and confident society where our people live in harmony and prosperity.'
- ◆ 24 goals in five groups (Community, Culture, Democracy, Economy and Environment).
- ◆ 212 benchmarks.

In October 2001, a nine-member Tasmania Together Progress Board was established to monitor, promote and report on Tasmania Together. The Tasmania Together Goals and Benchmarks are now integral to the State's budget process and the Board has been active in fostering initiatives by government, business and the general community. To date, three Progress Reports (2002, 2003, 2004) have been tabled and in 2006, a review of the project at the 5-year point was commenced.

More information on *Tasmania Together* is available at:

< <http://www.tasmaniatogether.tas.gov.au> >

South Australia's strategic plan

The South Australia Strategic Plan has been developed in an effort to improve the future wellbeing and prosperity of South Australians. It aims to provide better access to important services such as health and education, to preserve and improve the environment, promote innovation and creativity.¹⁴ The South Australian government is engaging the community to encourage support and commitment to the Plan.

Over the next ten years the South Australia Strategic Plan aims to reach 79 measurable targets to achieve these outcomes. These areas are concerned with growing economic prosperity, improving health and wellbeing, attaining sustainability of the use of natural resources, fostering creativity, building community participation, and expanding opportunities in education, for Indigenous people and for disadvantaged groups such as the homeless.

More information on *South Australia's Strategic Plan* is available at:

< <http://www.SAplan.org.au> >

Other initiatives

There are countless initiatives at the international, national and sub-national level around the world. A selection is mentioned below.

- ◆ The Australian Collaboration (a group of major national non-governmental organisation peak bodies including: Australian Conservation Foundation, Australian Council of Social Services, Australian Consumers Association, Australian Council for Overseas Aid, Federation of Ethnic Communities' Councils of Australia, and National Council of Churches) produced two reports *Where are we going: comprehensive social, cultural and environmental reporting*, and *A Just and Sustainable Australia*. They can be found at:

<<http://www.australiancollaboration.com.au/booksreports>>
- ◆ The OECD's report (2001) *The Well-being of Nations: the Role of Human and Social Capital* covers the integration of societal wellbeing measures with economic and environmental ones. It can be found at:

<<http://www.SourceOECD.org>>
- ◆ The Danish government report entitled *Structural Monitoring International Benchmarking of Denmark*, comparing Denmark's performance on a wide range of social, economic and environmental criteria with a number of countries, can be found at:

<<http://www.fm.dk/1024/vispublikationesForside.asp?artikelid=4503>>
- ◆ Statistics New Zealand's *Monitoring Progress Towards a Sustainable New Zealand*, at:

<<http://www.stats.govt.nz>>
- ◆ In 2004, the USA's General Accounting Office, as part of their Key National Indicators Initiatives (KNII) published a report *Informing our nation: Improving how to understand and assess the USA's position and progress*. More information is at:

<<http://www.gao.gov/mpi>>
- ◆ The Irish Central Statistical Office's *Measuring Ireland's Progress*, at:

<<http://www.cso.ie/publications/measuringprogress/indicatorsreportfull.pdf>>
- ◆ In March 2005, the UK Government launched a new Sustainable Development Strategy, called *Securing the Future*, which sets out the vision of sustainable development through to 2020. It builds on the 1999 strategy, *A better quality of life*.

The Strategy highlights four priority areas for action: sustainable consumption and production, climate change and energy, protecting natural resources and enhancing the environment, creating sustainable communities and a fairer world:

See: <<http://www.sustainable-development.gov.uk/progress/index.htm>>
- ◆ Other useful references are provided by the International Institute of Sustainable Development's web site, at:

<<http://www.iisd.ca>>

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ISSN 1445-7121

RRP \$55.00

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