Australian
Bureau of
Statistics

MEASURES OF AUSTRALIA'S PROGRESS 2004

Measures of Australia's Progress 2004

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INQUIRIES

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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 almost 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.

Recent years have seen growing 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. In 1987, the World Commission on Environment and Development (the Brundtland Commission) called for the development of new ways to measure and assess progress towards sustainable development (often defined as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'). The 1992 Earth Summit in Rio de Janeiro was a further catalyst for discussion, as were calls from organisations such as the United Nations for better measures of social concerns to supplement the System of National Accounts. There is a great deal of interest as well in developing a broader set of economic statistics that give values to things hitherto left outside the traditional economic system. 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. In Australia a number of projects are underway to tackle these issues, such as the State of the Environment reports, and the Commonwealth Government's set of headline sustainability indicators.

In April 2002 the ABS published the first issue of Measures of Australia's Progress (MAP), then called Measuring Australia's Progress, as a contribution to this discussion. It was an intentionally experimental publication — I noted in the foreword that the project was ambitious, and one that would develop over time — and so we sought comments on the project. I'm very grateful to the many people that responded to that request. Much of the response to the publication was favourable, and I'm particularly pleased to see that this work is influencing similar initiatives around the world, in places like the United States and Ireland. There were some criticisms, mostly constructive, and we have made some adjustments to the publication in light of those criticisms. It was always our intention that the publication would evolve. This second edition of MAP incorporates a number of changes that strengthen the publication, including:

◆ A strengthened discussion of *governance, democracy and citizenship,* that uses a range of information to illustrate aspects of Australian life in this dimension, but does not assess overall progress.

◆ New material that paints a picture of the nation's families and communities and how they relate to social cohesion. This material goes beyond the information presented in MAP 2002, although, once again, we do not attempt to assess overall progress here.

◆ Replacing the headline progress dimension *Economic disadvantage and inequality* with *Financial hardship*, that covers material better suited to discussions of progress in this area.

◆ Combining several environmental progress dimensions into a new overarching dimension, *The natural landscape*, to better highlight the links between aspects of the Australian landscape.

◆ Elevating the *Productivity* dimension to headline status, to reflect its very important influence on Australia's economic performance, now and in the future.

◆ Including special articles that relate to, rather than measure, progress. Material about multiple disadvantage, and levels of progress in Australia and other OECD countries is included.

Many other changes have been made, including the title: the publication is now called Measures of — rather than 'measuring' — Australia's Progress, to ensure readers realise immediately that we are not claiming to have included everything that is important to progress in this country. A number of people assisted by reviewing material and I would like to acknowledge their valuable contribution to this issue.

Measures of Australia's Progress will be produced ever year from now on. It will continue to evolve and so we continue to seek your feedback to help us improve future issues of the publication. Your suggestions and comments would be very welcome. They should be sent to Jon Hall at the address below.

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April 2004

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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
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
UNFCC	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
^0C	degrees Celsius
'000	thousand
$	dollar
$b	billion dollars
$/cap	per capita dollars
$m	million dollars
%	per cent
*	subject to high sampling variability
* *	data suppressed due to unacceptably high sampling variability
. .	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

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 headline 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 indicator 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 of progress. And some readers will give greater importance to some progress indicators than others.

Progress: Individuals

Three headline indicators are associated with this area of progress. All three suggest progress during the past decade.

Health. During the past decade, Australians' health improved — children born in 2001 were expected to live three years longer than those born in 1991. Indigenous Australians, however, 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 1993 and 2003 the proportion of people aged 25–64 years with a vocational or higher education qualification rose from 45% to 55%.

Work. Since the last recession in the early 1990s the unemployment rate has gradually declined, and the unemployment rate in 2003 was 5.9%.

Progress: The economy and economic resources

Five headline dimensions are presented, although indicators are only available for four (National income, Financial hardship, National wealth, and Productivity). There appears to have been progress in these dimensions.

National income
Australia experienced significant real income growth during the past decade. Between 1992–93 and 2002–03, real net national disposable income per capita grew by around 2.8% a year.

Financial hardship
Between 1994–95 to 2000–01 the real income of less well-off Australians (those in the second and third lowest deciles of the income distribution) grew by 8%. But the incomes of better-off groups increased by proportionally more.

National wealth
National wealth, as measured in Australia's balance sheet, grew during the 1990s. Real wealth per person increased by about 0.6% a year between 1993 and 2003.

Headline dimensions of progress

Individuals	The economy and economic resources	The environment	Living together
Health	National income	The natural landscape	Family, community and social cohesion
Education and training	Financial hardship	The human environment	Crime
Work	National wealth	Oceans and estuaries	Democracy, governance and citizenship
	Housing	International environmental concerns	
	Productivity		

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 rates of productivity growth. During the decade 1992–93 to 2002–03, Australia's multifactor productivity rose 1.3% per year on average.

Progress: The environment

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 40% between 1991 and 2001. 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 human environment
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 improved during the past decade, despite increased motor vehicle use.

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.

International environmental concerns
Australia's total greenhouse gas emissions in 2001 were about 4% higher than they were in 1991. 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.

Our heavy reliance on fossil fuel burning for energy rather than other forms of power (such as nuclear or hydro-electricity), the structure of our economy and our changes in Australian land use are three influences behind our high emmissions.

Living together

Three dimensions of progress are covered here, although there is no attempt to assess overall progress in two of them.

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 prevalence rates for personal crimes between 1998 and 2002 showed an increase from 4.8% to 5.3%. Most of these people were assaulted. Between 1993 and 2002, there was little change in the proportion of households that were the victim of a household crime (an actual or attempted break-in or motor vehicle theft) and it remained at a little below 9%.

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 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 next issue of *Measures of Australia's Progress* is planned for mid-2005. The ABS hopes to continue to improve the publication in the future, recognising that it will doubtless evolve: important measures of progress may have been omitted, people's views about progress will change, and new data will become available.

Measuring progress — an ABS approach

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

Recent years have 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.

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?

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.

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 material, physical, social 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; MAP I expressed its aim as 'providing 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 ABSs 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.

Alternative core concepts

Core concept	Publication and author(a)
Wellbeing/ Quality of Life	*Quality of Life Counts*, United Kingdom Department of the Environment Transport and the Regions
Progress	*The Genuine Progress Indicator*, The Australia Institute
Sustainability	*Are We Sustaining Australia: A Report Against Headline Sustainability Indicators for Australia*, Australian Commonwealth

(a) See Appendix II for more information.

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.

◆ Just three headline indicators — national income, national wealth and productivity — are used to encapsulate economic progress. They consolidate major flows and stocks relevant to national progress.

◆ There is no similarly compact set of indicators to encapsulate progress in the social and environmental domains. When seeking indicators of social progress, we have examined the various areas of social concern; when seeking indicators of environmental progress, we have examined the various environmental subsystems or resources.

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 avoided aspects 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. Moreover, people's subjective wellbeing should be influenced to some degree by the changes in objective wellbeing that are included here.

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.

Alternative values and preferences

Whose values and preferences	Publication and author(a)
Community priorites	*Tasmania Together*, Tasmanian Parliament
Government policy priorities	*The European System of Social Indicators*, The European Union
International priorities	*The Human Development Index*, 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.

In the ABSs 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 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).

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	*Quality of Life Counts*, United Kingdom Department of the Environment Transport and the Regions
One number	*The Genuine Progress Indicator*, 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 overleaf).

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 produced a publication *Quality of Life Counts*.

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 13 headline dimensions, most of which use one headline indicator. Although we explain the criteria we have used to select 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. 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 (such as a human capital indicator) 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.

◆ 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.

We adopted the three-domain view when developing the publication, although the dimensions are arranged around four areas that relate to the individual, the economy, the environment and people's interactions with others.

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.

The choice of a view is largely a matter of presentational convenience; the view is a tool to help choose areas of concern and identify progress indicators. 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 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 to other domains — 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. A balance had to be struck — if we showed too many indicators, 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 indicators seemed about right, and the choice of those 10–20 headline dimensions was guided by a wide variety of people from inside and outside the ABS.

During the design of MAP, our selection of aspects of life and indicators 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 indicators 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 indicators to express these dimensions of progress. Our selection of indicators was guided by expert advice and by the criteria described in the box overleaf.

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 included dimensions is measured using just one or two 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 fifteen dimensions (some dimensions have more than one 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. Some commentators have disagreed with our choice of headline indicators in MAP I, usually on the grounds of knock-on effects or interactions — that is, the good/bad direction of change may be ambiguous when one takes into consideration the real-world associations between movements in the headline indicator and movements in other indicators. 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 social, economic and environmental 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? Is it possible to sum or otherwise combine indicators?

Criteria for choosing progress indicators

When deciding which statistical indicators should be used to encapsulate each aspect of Australian life, we did not have such a comprehensive or longstanding corpus 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 MAPs criteria. But for other aspects — social attachment, 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.

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 such-and-such an amount, that variable goes down by such-and-such an 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 mislead readers of MAP into believing 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 the 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.

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 (occasionally) 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 1990–91 and 2000–01 the number of people employed in Australia rose by around 10%; some industries experienced much faster rises (for example in property and business services, employment grew by over 78%), while in other industries there was a fall (employment in electricity, water and gas supply fell by 36%). 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. and some of these issues are also examined in the article *Multiple disadvantage*. 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 currently not available and may be difficult to develop.

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. The ABS will consider further these important areas, and in future 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*, first issued in 2003 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. But we draw some comparisons when they are informative — for example, in the health dimension, where comparable international data on life expectancy 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 Financial hardship and Housing: studies have pointed to the link between financial 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.

Moreover, the term 'sustainable development' is still the subject of debate. This publication does not enter into any direct discussion of sustainability. 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 presentational 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 presentational convenience; the view is a tool to help choose areas of progress and identify 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 in the major domains (e.g. social, economic and environmental) and what dimensions of progress should be included?

◆ **Question 3**: What headline 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.

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. We used three domains of progress to organise our thinking and the publication:

◆ Economic Progress

◆ Environmental Progress

◆ Social Progress

Our choice is largely a matter of presentational convenience and a tool to help choose dimensions of progress. 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 environmental quality of settlements

◆ the environmental quality of oceans and estuaries

◆ Australia's contribution to global environmental concerns.

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: 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.

Human settlements have an impact on the landscape and seascape that surrounds them. They can also provide a home for native plants and animals. But the environmental quality of settlements is perhaps most important because it has an influence on those who live and work within them.

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.

Contribution to international concerns: While the quality of Australia's environment depends to a large extent on the actions of Australians, our environment is also influenced by the actions of other countries. The impact of these problems in Australia should (theoretically and eventually) be picked up by changes in indicators measuring the areas above. But we, in turn, can influence other countries' environments and our contribution to these international concerns is seen as an important aspect of progress.

Gaps?

The first three of these four dimensions cover all of Australia and her ecosystems (the landscape, the settlements within the landscape, and the seas that surround us). The final dimension covers those global environmental concerns which affect Australia and which we contribute to.

The environmental quality of the atmosphere is not included in this list of dimensions, although, as explained later, we focus on air quality as the headline indicator for *The human environment*. There do not, therefore, appear to be any conceptual gaps in this framework.

Social

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?

The wellbeing of the population

◆ Health

◆ Education and training

◆ Work

◆ Housing

◆ Financial hardship

Social cohesion

◆ Family and community

◆ Crime

Democracy

◆ Governance, democracy 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.

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

Families and communities are core structural elements in society — basic building blocks of national life. The family unit takes on a large part of the burden of caring for people in society, and the vast range of services provided by groups, clubs and charitable organisations are a crucial adjunct

Inequality

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. But information indicating changes in the risk of financial hardship is included as a headline dimension. Moreover, multiple disadvantage in Australia is considered in the middle of this publication in an essay considering the distribution of some of our headline indicators side by side — health, income, education, work and housing. In particular we look at patterns of different types of disadvantage among various population subgroups. No attempt is made, however, to describe progress in this area.

to the institutionalised care provided by governments. The family's role in providing guidance on social values is at the basis of a civil society. Day to day interactions between people in a community build trust and reciprocity: the strength of a society's community bonds often determines its resilience and cohesion.

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 and restrict their lives in many ways. 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 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 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. The *Family, community and social cohesion* dimension draws on the work of the ABS Social Capital Framework (*Measuring Social Capital, cat. no. 1378.0*).

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 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 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 human environment: There are a range of environmental concerns associated with human settlements. It is difficult to conceive an ideal headline indicator which might measure progress against each and so we choose one. For about a decade, the Australian public has been more concerned about air pollution than about any other environmental problem. 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 the concentration of fine particles in the atmosphere, a measure of the form of air pollution about which many health experts in Australia are most concerned.

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.

International environmental concerns: Australia's actions influence a range of global environmental concerns. Global warming is perceived as perhaps the most significant threat to the world's environment and our greenhouse gas emissions are the focus of the headline indicator. 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).

Social

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 main 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.

Financial 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 financial hardship are likely to have relatively low income and low wealth. The headline indicator provides no information about the number of people living in financial hardship. But it does provide information about how the income of those in hardship is likely to be changing.

Family, community and social cohesion comprises several parts

◆ 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.

◆ Contact with friends and families: More frequent contact with friends or family and greater participation in social activity build social cohesion.

◆ Community support describes the 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. Social problems — 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, women in parliament, and the proportion of Australian residents who are citizens.

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.

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	
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 ❖Education participation rates and attainment levels for those aged 15–64 ❖Human capital stock ❖OECD literacy rates, science, reading and mathematics ❖Indigenous to non-indigenous attainment ratios ❖Female students as a proportion of all students	
Work	Unemployment rate	Extended 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 state domestic income per capita ❖Real gross domestic product per capita ❖Population in work ❖Terms of trade ❖Real final consumption expenditure per capita ❖Net national saving as a proportion of GDP	Selected measures of equivalised household disposable income
Financial hardship	Average real equivalised average weekly disposable income of households in the second and third deciles of the income distribution	People with housing stress	Average real equivalised average weekly disposable income of households in the fifth and sixth deciles of the income distribution
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 ❖Average household net worth	
Housing	*No headline indicator*	*None*	*None*
Productivity	Multifactor productivity	Labour productivity ❖Expenditure on research and development ❖Managers and professionals, as a proportion of total employment ❖Investment in software, as a proportion of GDP ❖Proportion of businesses with web site or home page ❖ Hours worked and quality adjusted hours worked	

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	Threatened species trend ❖Mammalian extinctions ❖Area of land in conservation reserves ❖Species-threatening invasive animals ❖Exotic mammals established in the wild ❖Weeds of national significance, distribution ❖Native forest area ❖Net water use ❖Dams greater than 100 gigalitres ❖Water diversions: Murray-Darling Basin ❖River condition (biota) index ❖ River environment index	Area under crops ❖Cattle and sheep numbers ❖ Natural and actual flows in the Murray River
The human environment	Fine particle concentrations, days health standards exceeded, selected capital cities	Highest one hour averages of SO2, selected regional centres ❖Days when ozone concentrations exceeded guidelines, selected capital cities ❖Recycling, Australian Capital Territory	
Oceans and estuaries	None	Estuarine condition index ❖Oil spills	Fisheries production, value and employment
International environmental concerns	Net greenhouse gas emissions	Greenhouse emissions, net, per capita and per $ GDP ❖Carbon dioxide measurements ❖Consumption of ozone depleting substances	
Family, community and social cohesion	No headline indicator	Children and divorce ❖Children without an employed parent ❖Social participation ❖ No participation in selected activities ❖ Voluntary work ❖Suicide and drug-induced death rates ❖(indicators in the Work dimension are also relevant)	Family type ❖Marriage and divorce rates ❖Participation in religious activities
Crime	Victims of personal and household crimes	Homicide rate	Imprisonment rates
Governance, democracy and citizenship	No headline indicator	Proportion of eligible overseas-born residents who are citizens ❖Voter turnout and informal votes cast ❖Women in Federal parliament ❖Volunteering rates for management, committee and coordination work	

Supplementary dimension	Supplementary and other indicators
Culture and leisure	No indicators
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 ❖ Ratio of imports to GDP ❖ Ratio of foreign investment inflow to GDP
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, has 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 does not attempt to answer questions about whether, and to what extent, Australia's population should grow (indeed, these questions are the subject of national debate). Rather, it provides some contextual information about the population and explains some of the links between changes in population and dimensions of progress.

Population size and trends

Australia's resident population at June 2003 was estimated at 19.9 million people — an increase of more than 16 million since 1901, when the population was recorded at 3.8 million. The natural increase in our population, defined as the excess of births over deaths, has been the main source of growth during this period. Another source of increase is net overseas migration.[1]

Since June 1993, Australia's population has increased by more than 2 million. However, the rate of growth over the decade has been, on average, markedly slower than growth rates in most previous decades.

Since the early 1960s, falling fertility has led to a drop in 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 as measured by the Total Fertility Rate (TFR) had declined to 2.25 children. Since then, fertility rates have fluctuated considerably, the highest being 3.55 in 1961. In 2002, Australia had a TFR of 1.75 babies per woman.[2]

This is well below the replacement level of 2.1 babies per woman, which is the number of babies a woman would have to have over her lifetime to replace herself and her partner.[2]

Estimated resident population

At 30 June	Population no.	Increase %
1993	17 667 093	. .
1994	17 854 738	1.06
1995	18 071 758	1.22
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	19 662 781	1.17
2003	19 881 469	1.22

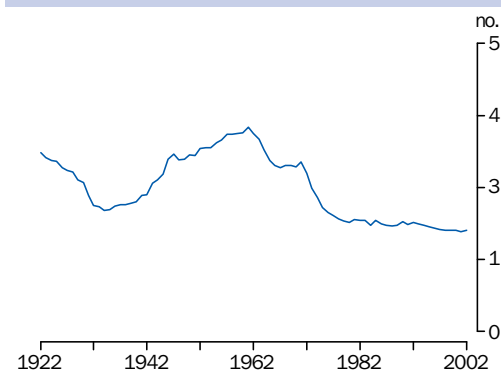*Source: Australian Demographic Statistics, cat. no. 3101.0.*

Population distribution

Australia is large in area. Compared with other countries, its population is small relative to its size. For every square kilometre of land there are only around two Australians. But this statistic hides the fact that 84% of the population is contained within the most densely populated 1% of the continent.

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 parts of the continent.

New South Wales is the country's most populous state, accounting for one-third of the total population in 2003. Of all Australia's states and territories, the population of Queensland grew the fastest between 1993 and 2003 (by 22%), and the populations of Western Australia and the Northern Territory were next fastest, growing by 16% each. Tasmania had the slowest population growth over the period at about 1%.[3]

Population density — selected countries

	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).

Total fertility rates, 1922–2002(a)

(a) The sum of age-specific fertility rates per woman. It represents the number of children a woman would bear during her lifetime if she experienced current age-specific fertility rates at each age of her reproductive life.

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

Population age structure(a) — 1993 and 2003			
Age	*1993*	*2003*	*Change*
years	*'000 people*	*'000 people*	*%*
0–4	1,293	1,265	– 2.2
5–14	2,545	2,715	6.3
15–24	2,736	2,754	0.6
25–34	2,827	2,879	1.8
35–44	2,674	2,990	10.6
45–54	2,059	2,710	24.1
55–64	1,477	2,023	27.0
65–74	1,239	1,350	8.2
75–84	645	906	28.8
85+	172	290	40.5
Total	17,667	19,882	11.1

(a) Includes 'Other Territories' in Australia from June 1994.
Source: Australian Historical Population Statistics, cat. no.3105.0 .65.001; and *Australian Demographic Statistics, cat. No. 3101.0.*

The percentage of Australians living in rural areas has also declined in recent years. The rural population includes people living on private rural properties, in very small communities, and bounded localities (population clusters of 200 to 999 people). In 1911, 43% of Australians lived in rural areas; this proportion had fallen to 14% by 1976 and has stayed around this level since. Technological, social and economic changes contributed to population decline in these areas.

Population age and sex composition

The age structure of the population has changed significantly over the last century. A decline in birth rates, changes in migration patterns 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 June 2001 this figure had risen to over 12%.

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. At June 2003, there were slightly fewer men than women in Australia (100 men for every 101 women).[3]

Aboriginal and Torres Strait Islander population

Historically, it has been difficult to measure accurately the size of Australia's Indigenous population. In the last two decades, the likelihood of people identifying themselves as Aboriginal or Torres Strait Islander has increased. This has been the result of changing social attitudes, political developments, improved statistical coverage and a broader definition of Indigenous origin. In June 2001, the total Indigenous population was

estimated to be approximately 2% of Australia's total population — about 460,000.[3]

Links between population and progress

The size and shape 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 will be generated mainly through productivity enhancements, rather than just through an increase in the scale of economic activities.

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).[4]

◆ 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.

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 1991–92 and 2001–02, the proportion of the civilian Australian

Milestone years for Australia's millions(a)

Year attained	Population(b)
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**

(a) This table reports the milestone years of increments of one million people to Australia's population that are reflected in the feature graph on opposite page.

(b) Population is a generic term intended to capture all the different methods of enumeration used from 1788 to the present day. Estimated Resident Population (ERP) is the current official method. ERP began in 1971. Before that census counts or other enumeration methods were used. Early population estimates were obtained through colonial 'musters' and, from 1828, through a series of relatively regular colonial censuses.

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.

population that was employed rose from 56.3% to 59.7%.[5]

The age distribution of the population contributes to the demand for health and aged care services, as do changing patterns of mortality, fertility and migration. In turn, the ageing of the population reflects the increase in life expectancy.

Current ABS population projections indicate that Australia's population could range between 23 and 31 million people by 2051, if various assumptions for fertility, mortality and net overseas migration were to hold.[6] The population would have an older profile and there would be more non-working older people per working adult. The proportion of the total population aged between 15 and 64 could decline from 67% in 2002 to less than 60% in 2051, according to the ABS projections.[6]

Endnotes

1   Australian Bureau of Statistics 2003, *Year Book Australia 2003*, cat. no. 1301.0, ABS, Canberra.

2   Australian Bureau of Statistics 2003, *Births Australia, 2002,* cat. no. 3301.0, ABS, Canberra.

3   Australian Bureau of Statistics 2003, *Australian Demographic Statistics 2003,* cat. no. 3101.0, ABS, Canberra.

4   State of the Environment Advisory Council 1996, *Australia — State of the Environment Report 1996,* CSIRO Publishing, Melbourne.

5   Australian Bureau of Statistics 2001, *Labour Force Australia,* cat. no. 6202.0, ABS, Canberra.

6   Australian Bureau of Statistics 2003, *Proportion in Working Ages Set to Decline*, Media Release, cat. no. 3222.0, ABS, Canberra. ABS population projections use the estimated resident population at 30 June 2002 as a base population. Population projections are not predictions or forecasts. They simply show what would happen to Australia's population if a particular set of assumptions about future levels of births, deaths and net overseas migration were to hold for the next 50 to 100 years. The assumptions about levels of future fertility, mortality and migration are based on long-term trends, current debate, and possible future scenarios arising from research in Australia and elsewhere.
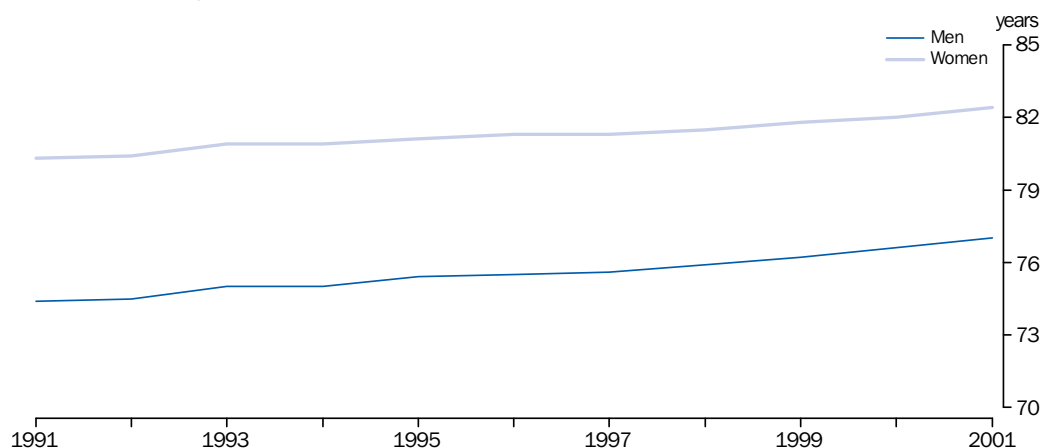
Population (millions)

Year

Creation of the Australian Commonwealth (1901)

Women gain right to vote (1902)

WW1 (1914–1918)

Vegemite invented (1923)

Great depression (1929)

Sydney Harbour Bridge opens (1932)

WW2 (1939–1945)

Australia commences manufacture of the Holden car (1948)

Korean war (1950–1953)

Melbourne Olympic Games (1956)

Indigenous Australians given full voting rights (1965)

Decimal currency introduced (1966)

Vietnam war (1962–1972)

Sydney Opera House opens (1973)

Cyclone Tracy hits Darwin (1974)

Sir John Kerr dismisses Prime Minister Gough Whitlam (1975)

High court recognises native title rights in Mabo case (1992)

Sydney Olympic Games (2000)

Centenary of Federation celebrated (2001)

0 5 10 15 20 25

1901 1904 1907 1910 1913 1916 1919 1922 1925 1928 1931 1934 1937 1940 1943 1946 1949 1952 1955 1958 1961 1964 1967 1970 1973 1976 1979 1982 1985 1988 1991 1994 1997 2000 2003

The

measures

Health: key points

Life expectancy at birth

years

Men
Women

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

Australian life expectancy improved between 1991 and 2001. A boy born in 2001 could expect to live to be over 77, while a girl could expect to reach nearly 83 — increases since 1991 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 human environment*, *Work*, and *Financial 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 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 (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 2001 could expect to live to be over 77, while a girl could expect to reach nearly 83 — increases since 1991 of three and two years respectively.

A longer term view

Increases in life expectancy occurred over most of the twentieth 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 twentieth century, and then plateaued in the 1960s, largely because of increases in cardiovascular disease.[1]

Substantial improvements in the life expectancy of older people have been a feature of the second half of the twentieth century, particularly since the 1970s. Between 1982 and 2001, life expectancy at age 70 increased by about three years for men and two and a half years for women. Life expectancy at birth over the same period increased by six years for men and just over four years for women.

Progress has been associated with a decline in deaths from chronic diseases, such as heart disease, cancer and strokes (these have replaced infectious diseases as the main causes of death). Greater attention to living healthier lifestyles, continued improvements in living standards, together with ongoing medical advances, including improvement in illness prevention, screening and diagnosis and treatment, have supported this transition.

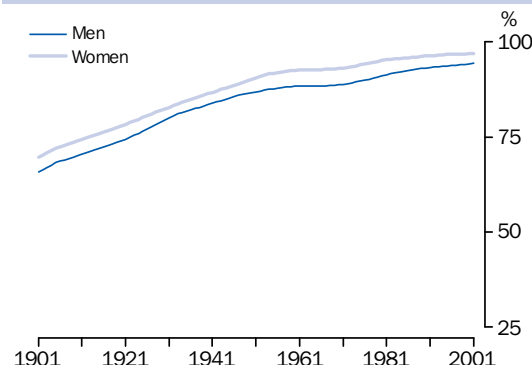### Life expectancy at birth: longer term view
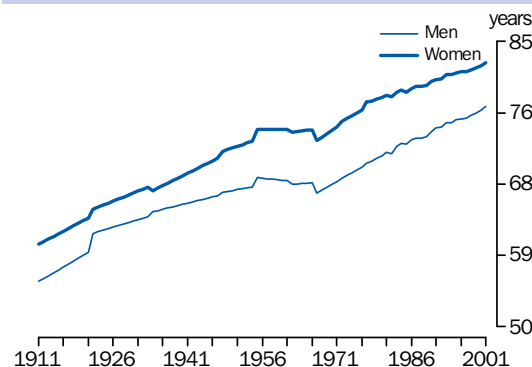
Source: Australian Demographic Trends 1997, cat. no. 3102.0; Deaths, Australia, (various) cat. no. 3302.0.
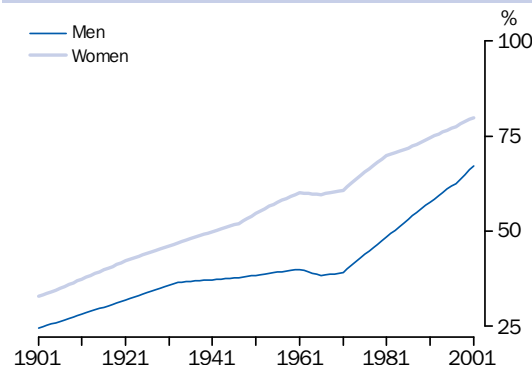
Proportion of people surviving to age 25
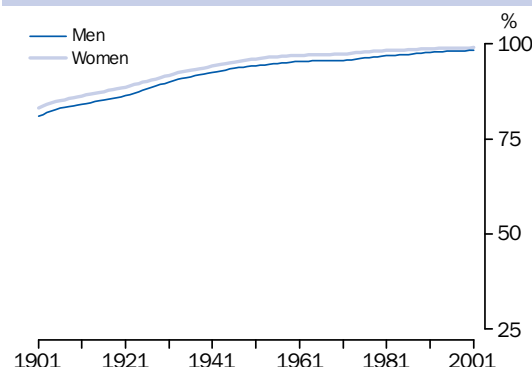
Proportion of people surviving to age 50

Proportion of people surviving to age 75

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

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. Between 1898 to 1998, the changing proportion of the population surviving to the ages of 25, 50 and 75 increased dramatically.

At the start of the last century, 81% of men and 83% of women lived to be 25 years old. By 2001 these figures stood at 98% and 99% respectively. Over the same period the proportion of people surviving to age 50 increased from 66% and 70% to 94% and 97%, for men and women respectively. The difference between the sexes was evident throughout the period.

Change was even more rapid when one considers the proportion of the population living to be 75. In 1901 less than 25% of men and 33% of women reached their seventy-fifth birthday. By 2001 these figures stood at 67% and 80% respectively. Improvement was relatively steady over the period, except during the 1960s when the increase in some conditions, including heart disease, was enough to offset any improvements in survival rates, 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 2001).

Some differences within Australia

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

Life expectancy at birth varied between the states and territories. In 2001 it was highest in the ACT for both men (79.2 years) and women (83.3 years) and lowest in the NT for both men (71.3 years) and women (76.7 years).

Men and Women

Women tend to live longer than men, and this is reflected in the differences in life expectancy throughout the twentieth century. But in recent years life expectancy at birth for men increased more quickly than for women, although a girl born in 2001 could still expect to live more than five years longer than a boy. There are a number of reasons why women live longer than men.

In 2002 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]

International comparisons

The World Health Organisation ranks Australian life expectancy among the highest in the world.[5] Total life expectancy (men and women combined) in Australia is 80.4 years, close to Switzerland, San Marino and Sweden. It falls below Japan (81.9 years), and Monaco (81.2 years), but is above countries such as Canada (79.8 years), France and Italy (both 79.7 years), New Zealand (78.9 years), the United Kingdom (78.2 years) and the United States of America (77.3 years).

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

The health of many Aboriginal and Torres Strait Islander people is poor. It is difficult to assess national trends in Indigenous life expectancy because many of the historical data are of poor quality.[6] What is known is that Indigenous Australians do not live as long, and that the difference is marked.

Information on Indigenous death rates in 1999–2001 are available for people living in Queensland, Western Australia, South Australia and the Northern Territory combined. Their death rates were higher than for the total population in all age groups. The largest differences were between men and women aged 35–54 (where Indigenous deaths rates were about five times higher than those of all people). In all other age groups, other than those older than 75, the Indigenous death rate was at least double that of the total population.[7]

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. Indigenous Australians are more likely to smoke;[4] and while several studies have shown that they are less likely to drink alcohol than other Australians, those who do are likely to consume it at hazardous levels.[7] The Indigenous 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.[7]

Indigenous infant mortality (in Queensland, Western Australia, South Australia and the Northern Territory combined) was higher than the total infant mortality rate between 1999–2001. Indigenous infant mortality was estimated at between 16 deaths per thousand births. This is 2.6 times the rate among the total population (six deaths per 1,000 live births)[7], and is similar to the level experienced by the non-Indigenous population in the mid-1970s.

Older people

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

Older people are much more likely to experience ill health and disability. In 2002 just over 4% of 18–24 year-olds reported a core activity limitation, compared to nearly 36% of people aged 75 or more.[8]

And while Australians are living longer than ever before, there are concerns about whether the general health of older people (whether or not they are afflicted by disabilities or chronic illnesses associated with ageing) is also improving. Recent evidence is not conclusive, but it appears the length of time both men and women are living without a disability is not increasing, even though life expectancies for both are increasing.[9]

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 developed 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 either to premature mortality (relative to a standard life expectancy) and 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).[10] The Australian 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.

More recent data from the World Health Organisation (WHO) quantifies the non-fatal burden of disease.[5] The WHO estimates healthy life expectancy in Australia was about 71.6 years in 2001, and that a boy born in 2001 can expect to spend seven years in his life with a disease or disability, while a girl can expect to spend over nine years.

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 twentieth century, particularly its first half. For every thousand babies born in 1901, over 100 would die before their first birthday. By 2002 this figure was around five babies per thousand, a reduction of 29% since 1992, when 7 babies per 1,000 died. In 2002, 36% of all infant deaths occurred within the first day of birth with a further 32% occurring before the baby reached four weeks.

Infant mortality declined particularly quickly in the first half of the twentieth century (to around 28 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.

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 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.

Burden of disease(a), Australia — 1996

Major disease group, health condition or injury	Years of life lost	Years of life with disability	*Disability adjusted life years*
	'000	'000	**'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.[11]

Leading causes of death — 2002

	Males	Females	Male to female
	rate(a)	rate(a)	ratio
Malignant neoplasms (cancers)	241	150	1.6
Ischaemic heart disease	170	98	2
Cerebrovascular diseases (e.g. strokes)	64	60	1.1
Chronic lower respiratory diseases	44	23	1.9
Accidents	34	16	2

(a) Standardised death rate per 100,000 population.
Source: Deaths, Australia, 2003, cat. no. 3302.0.

Causes of death

Causes of death are, of course, strongly linked to a person's age. Among people aged 1–44, 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 heart 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 1992 and 2002, death rates from cancer declined by 13% for men and over 6% for women, and death rates from 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).

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.[12]

Between 1991 and 2001 the overall death rate decreased by 16% for the general population. Most of the fall was in potentially avoidable deaths, which declined by one-third (the unavoidable death rate fell by 11%). 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 2002 cancers were the leading cause of death accounting for 28% of all deaths. Heart diseases were the second leading cause of death, contributing nearly 26% of all deaths.[13] Death rates from cancer and heart disease depend in part on prevention which reduces the incidence of these diseases, and in part on how successful their treatment is.

Between 1990 and 2000 the incidence rate for all cancers (other than non-melanoma skin cancers) among men and women rose by an average of 0.5%. Over the same period, death rates from cancers fell by about 1% for both sexes.[14]

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.[14]

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.[14]

Avoidable Deaths(a)
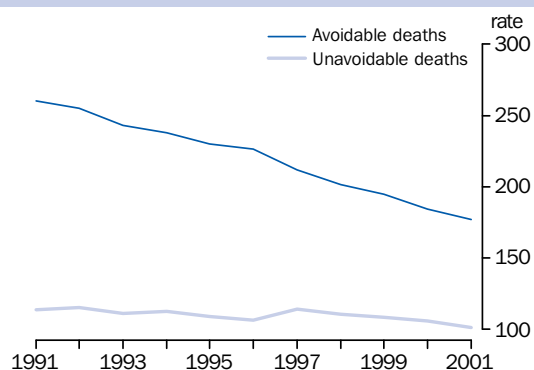
(a) Rate per 100,000 people.
Source: Australian Institute of Health and Welfare (unpub).

Incidence rates for all cancers(a)
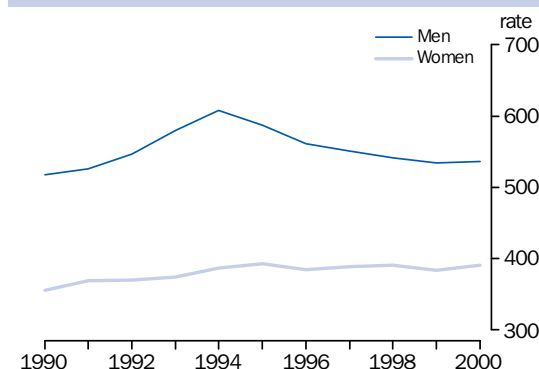
(a) Rate per 100,000 people. Excludes non-melanoma skin cancers. Age standardised to the 2001 population.
Source: Australian Institute of Health and Welfare (AIHW).[14]

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.

Smoking is recognised as the single most preventable cause of death in Australia. The proportion of adults who smoked stood at 24% in 2001, down from 25% in 1995 and 28% in 1989.[15] A similar proportion of men in most age groups smoked in both 1995 and 2001, but there was a 5% decline among men aged 65–74. Between 1995 and 2001, changes in the proportion of women who smoked varied by age group: from four percentage points lower for those aged 18–24 to four percentage points higher for those aged 35–44. [15] Smoking is more common among Aboriginal and Torres Strait Islander peoples: 49% of them were daily smokers compared with 22% of non-Indigenous Australians.[16]

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.[11] In the 2001 National Health Survey, about 70% of people 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 1989 and 1995 suggest that relatively more people are exercising now, although the rise is small: the proportions recording a sedentary response fell from 37% in 1989–90 to 32% in 2001.[15]

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.[11] Between 1989 and 2001 the proportions of overweight and obese Australian adults in capital cities and urban areas increased from 32% to 42% for women and from 46% to 58% for men.[15] In 2001, 61% of Aboriginal and Torres Strait Islander peoples were overweight or obese, compared with 48% of non-Indigenous Australians.[16]

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.[17] Overall, almost half (47%) of Australians aged 12 and over reported a daily fruit and vegetable intake of one serve or less, and 70% reported an intake of three serves or less. People were more likely to eat inadequate amounts of vegetables rather than fruit. And inadequate intakes were more common among men than women, and among 18–24 year-olds than other age groups.[18]

Many people's lifestyles involve a combination of health risk factors. In 2001, only 11% of men and 13% of women reported none of the four risk factors: smoking, high alcohol consumption, overweight/obese and low exercise levels.[15]

Incidence rates for heart attacks (a)
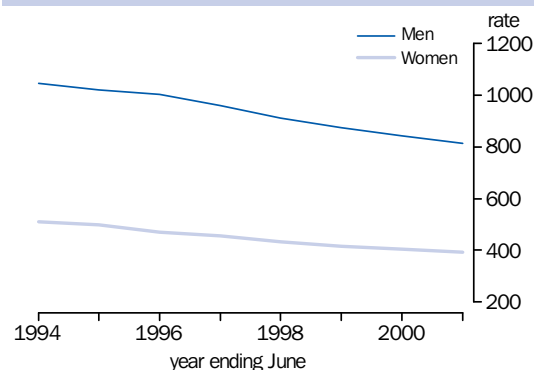
(a) Incidence rate for acute coronary heart disease events ('heart attacks') per 100,000 people.
Source: Australian Institute for Health and Welfare National Morbidity Database.

Between 1993–94 and 2000–01 the incidence of heart attacks fell by 22% for men and 23% for women. The reduction in the rate of first ever heart attacks is attributed to reduced risk factors among Australians, such as smoking, high blood pressure and poor nutrition.

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. Over the same period the proportion of heart attacks that lead to death declined from 35% to 30%.

Mental health

Although there is no time series to assess progress in the incidence of mental health, there are data from 1997 when the ABS conducted a survey of Australians' mental health, as part of the National Mental Health Strategy.[19] The survey found that over 18% of all Australian adults had experienced a mental disorder during the preceding year.

The prevalence of mental disorder was similar for men and women, but there were differences in the types of disorder suffered: 12% of women and 7% of men had anxiety disorders, while 7% of women and 4% of men had affective disorders (which include depression). Some 11% of men and 4% of women had substance use disorders (such as drug or alcohol dependence).

In 2001 the ABS National Health Survey included questions — the K10 questions — covering people's feelings of distress (anxiety, depression and worry) over the preceding four weeks. Questions were also asked in the 1997 Survey of Mental Health and Wellbeing.

In 1997, a little over 8% of adults reported a high or very high level of psychological distress. In 2001, the figure stood at a little under 13%. The 2001 survey found that more women (15%) than men (10%) reported a high or very high level of psychological distress. More than 60% of those reporting very high distress levels were women. The rates varied with age among women, with the highest proportion of women reporting high or very high stress aged 18–24 (22%). The rate declined with age thereafter. The proportion of men reporting high or very high levels of distress remained at around 10% up to age 64 and then declined in older age groups.

Links to other dimensions of progress

Improvements in health may assist progress in other areas and vice versa.

For instance, a healthy population stimulates economic growth: with fewer sick people to care for, more money is available for other things. While 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 28% of total government expenditure, and over 5% of household expenditure in 2003.[20]

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,[21] along with other factors, to reduce the incidence of fatal accidents at work, although more sedentary occupations have some adverse health effects.

A substantial body of evidence shows that lower socioeconomic status and less education contributes to poorer health. Likewise, poor health, particularly in childhood, can impair education and thus affect socioeconomic position in later life.[22]

See also the commentaries *National income*, *The human environment*, *Work*, and *Financial hardship*.

Endnotes

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2   Australian Bureau of Statistics 1995, 'Life expectancy trends', in *Australian Social Trends 1995,* cat. no. 4102.0, ABS, Canberra.

3   Smith, D.W.E. and Warner, H.R. 1990, 'Overview of biomedical perspectives: possible relationships between genes on the sex chromosomes and longevity', in *Gender, Health and Longevity: a Multidisciplinary Perspective,* (eds Ory, G.M. and Warner, H.R.), Springer Publishing, New York.

4   de Looper, M. and Bhatia, K. 2001, *Australian Health Trends 2001*, AIHW cat. no. PHE 24, AIHW, Canberra.

5   World Health Organisation, 2003, *The World Health report 2003*, WHO, Geneva.

6   Previously published ABS experimental estimates of Indigenous life expectancy need to be interpreted with caution when used as measures of Indigenous mortality. While the life expectancy estimates may have been appropriate in the mid-1990s for the purposes of producing experimental Indigenous population estimates and projections, over precise analysis of those life expectancy estimates per se should be avoided. Both the methodologies that may be used in future in the construction of Indigenous life tables, and the more recent data available for use in their construction, are currently under review. Revised estimates are likely to confirm that Indigenous Australians do not generally live as long as the rest of the population, and that the differential remains significant.

7   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.

8   Australian Bureau of Statistics 2003, *General Social Survey, Summary of Results, 2002,* cat. no. 4159.0, ABS, Canberra.

9   Australian Bureau of Statistics 2003, 'Health — National Summary Tables', in *Australian Social Trends 2003*, cat. no. 4102.0, ABS, Canberra.

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11 Mathers, C., Vos, T. and Stevenson, C. 1999, *The burden of disease and injury in Australia*, AIHW cat. no. PHE 17, AIHW, Canberra.

12 New Zealand Ministry of Health 1999, *Our Health, Our Future - Hauora Pakari, Koiora Roa* — The Health of New Zealanders, Ministry of Health, Wellington.

13 Australian Bureau of Statistics 2003, *Deaths, Australia, 2002*, cat. no. 3302.0, ABS, Canberra.

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

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16 Australian Bureau of Statistics 2002, *National Health Survey: Aboriginal and Torres Strait Islander Results, Australia,* 2001, cat. no. 4715.0, ABS, Canberra.

17 National Health and Medical Research Council 2003, *Dietary Guidelines for Australian Adults,* NHMRC, Commonwealth of Australia, Canberra.

18 Australian Bureau of Statistics 2004, *National Health Risk Factors, Australia,* 2001, cat. no. 4812.0, ABS, Canberra.

19 The Survey of Mental Health and Wellbeing of Adults 1997 was funded as part of the *National Mental Health Strategy*.

20 Australian Bureau of Statistics 2003, *Australian System of National Accounts 2002–03,* cat. no. 5204.0, ABS, Canberra.

21 National Occupation Health and Safety Commission 1994, *Work-related Traumatic Fatalities in Australia 1989–92,* NOHSC, Canberra.

22 Mathers, C. 1994, *Health Differentials among adult Australians aged 25–64 years*, AIHW: Health Monitoring Series No. 1, AGPS, Canberra.

Education and training: key points

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

— Per cent with any vocational or higher education qualification
— Per cent with vocational qualification only
— Per cent with higher education qualification(a)
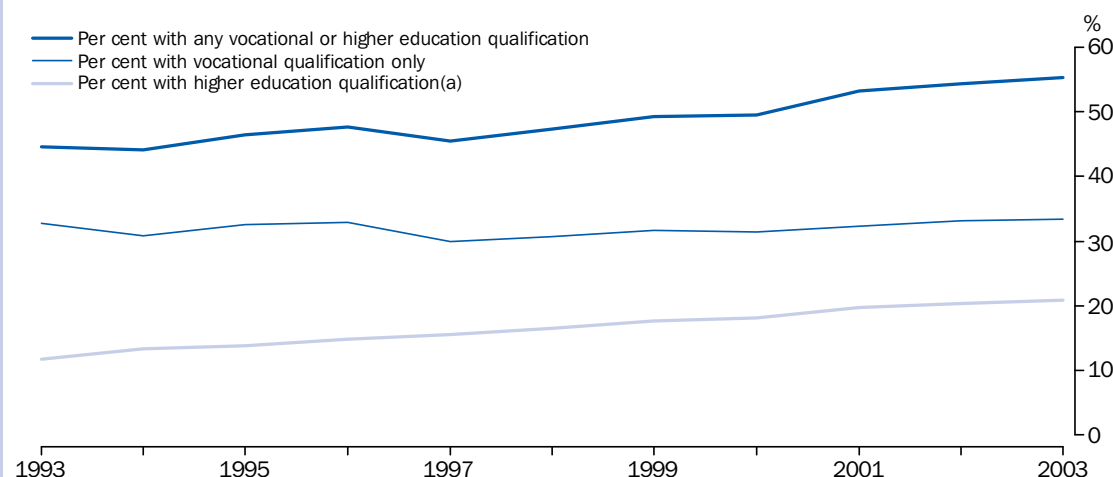
(a) Some of these people may also have a vocational qualification. As the data are based on people's level of highest non-school qualification, it is not possible to give the proportions of people with both types of qualification.
Source: Data available on request, Survey of Education and Work, Australia; and 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 1993 and 2003, the proportion of those aged 25–64 with a qualification increased from 45% to 55%. This increase continues a trend seen for many 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 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, Financial 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 formal and informal). 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 be desirable, but such an indicator is not available.

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 1993 and 2003 the proportion of 25–64 year olds with a vocational or higher education qualification rose from 45% to 55%, continuing a trend seen for many decades.[1,2]

The increase over the last decade in the proportion of people with non-school qualifications is being driven by the substantial increase in the proportion of people with a higher education qualification (i.e. a bachelor degree or above). Between 1993 and 2003, the proportion of people aged 25–64 with a higher education qualification increased from 12% to 21%. The proportion of people whose highest qualification was a vocational qualification was 33% in 2003, the same level as a decade earlier.

Associated trends

Other indicators show that the increase in the overall levels of educational attainment continues to be supported by increasing 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%, but has remained steady since.

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 (which estimates the retention of full-time students from the first year to the final year of secondary schooling)[3] stood at

Education participation rate(a) for those aged 15–19 years and Year 7/8 to Year 12 apparent retention rate
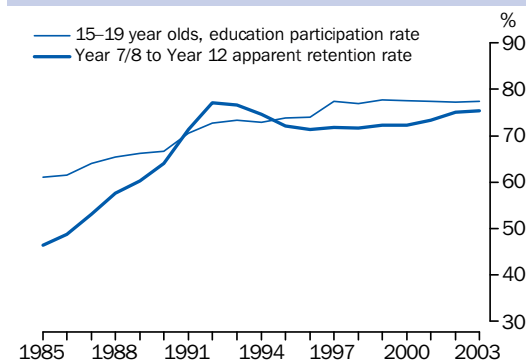
(a) Students either at school or studying for a vocational education or higher education qualification, as a percentage of all persons.

Source: Data available on request, Survey of Education and Work; Survey of Education and Work, Australia cat. no. 6227.0; Australian Social Trends cat. no. 4102.0; and Schools, Australia cat. no. 4221.0.

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, Advanced Certificate, 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 now study for vocational qualifications, such as certificates and diplomas, while attending high 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.

75% in 2003, about the same level as in 1994, and slightly below the 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, which may have inflated the peak seen in 1992.[4]

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

Overall, there is an ongoing increase in levels of participation in education among younger age groups. In 2003, 56% of people aged 15–24 were enrolled in a course of study leading to a qualification, compared to 13% in the 25–34 year age group and yet lower proportions in older age groups. The proportion of people with a vocational or higher education qualification was highest for those aged 25–34 (60%) in 2003.

People are most likely to undertake their initial non-school qualifications during their late teens and early twenties. However, between 1993 and 2003, the proportion of people with a vocational or higher education qualification increased for all age groups. Part of this increase was driven by increased educational participation in all age groups. And part was from the ageing of the younger generations who had higher attainments than their predecessors.

Changes in educational attainment among older people have been influenced by shifts towards life long learning and the need to develop and update knowledge and skills required for changes in the labour market. This is shown by the increasing education participation rates of those aged 25–64. Between 1993 and 2003, the proportion of people in this age group attending an educational institution increased from 6% to 8%.
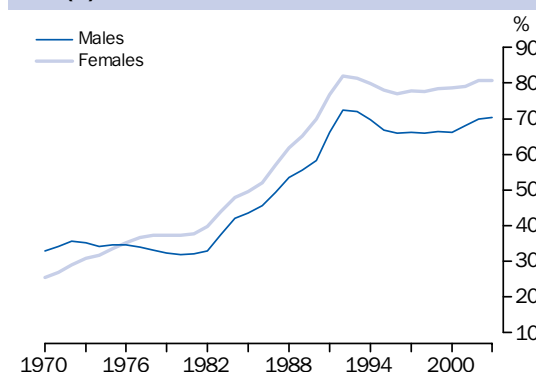
Male/female differences

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.[5] The differences between men and women in regard to educational attainment have become less pronounced. In 2003, a higher proportion of women in the 15–24 age group had vocational or higher education qualifications compared to men of the same age group (27% and 25% 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 1993 and 2003 the proportion of women (aged 25–64 years) with a vocational or higher education qualification increased from 37% to 51%. For men, the proportion increased from 52% to 60%. These changes are more pronounced among younger age groups, particularly in regard to the attainment of higher education qualifications. In 2003, the proportion of women aged 25–34 years with a higher education qualification exceeded that of men (28% and 23% respectively), whereas a decade earlier the proportions for men and women aged 25–34 were both about 13%.

Increasing female participation in senior secondary school and tertiary education is also evident. 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] This difference between men and women has continued to grow. In 2003, 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, in particular in the school system, has given rise to concerns about men's success in education.[6]

Education participation rates and levels of educational attainment, people aged 15–64 years

	Education participation rate		Persons with a vocational or higher education qualification	
	1993	2003	1993	2003
	%	%	%	%
Age group (years)				
15-24	48.2	56.4	20.8	25.7
25–34	9.7	13.4	47.2	60.4
35–44	6.1	7.9	48.8	57.5
45–54	3.3	4.7	43.7	54.5
55–64	0.9	2.0	33.2	45.6
Total 25–64	5.8	7.5	44.6	55.3
Total 15–64	**15.7**	**17.9**	**39.1**	**49.1**

Source: Data available on request, Survey of Education and Work; and Survey of Education and Work, Australia, 2003 cat. no. 6227.0.

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

(a) Refers to full-time students only.

Source: Data available on request, National Schools Statistics Collection; and Schools, Australia cat. no. 4221.0.

Human capital

In 2004 the ABS released its first experimental estimates of the value of an aspect of Australia's human capital stock.[7] 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.[8]

Australia's Human Capital Stock(a), by educational qualification

	1981	2001
	$ billion	$ billion
Male		
Higher degree	40.6	160.3
Degree	208.3	659.3
Skilled labour	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	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.

Source: Measuring the Stock of Human Capital for Australia - Experimental Estimates, due 2004, cat. no. 1350.0.

Migrants

Immigration has helped to build the skill levels of the population. Taken as a whole, migrant groups tend to have higher levels of educational attainment than the Australian-born population.[9]

Levels of educational attainment have also generally increased among successive waves of migrants. Data from the ABS 1999 Characteristics of Migrants Survey found that 61% of those who arrived in the period 1997 to 1999, and were aged 18 years and over at that time, had a vocational or higher education qualification on arrival, compared to 57% of those who arrived between 1990 and 1996 and 51% of those who arrived between 1981 and 1989. The increased focus on the skilled migration component of Australia's migration program has contributed to this trend.[10]

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, for which data have been available on an annual basis since 1994, show an increasing proportion of Indigenous Australians progressing through to Year 12. Between 1994 and 2003 the Year 12 apparent retention rate for Indigenous students increased from 33% to 39%.

Between the 1996 Census and 2001 Census the proportion of Indigenous youth aged 15-19 attending an educational institution rose from 44% to 50%, closing somewhat the gap in participation when compared with the non-Indigenous population. During this period the proportion of Indigenous adults aged 25–64 with a vocational or higher education qualification also increased, from 17% to 22%. During this same period the proportion of non-Indigenous Australians with a vocational or higher education qualification increased from 43% in 1996 to 48% in 2001.[11]

Gains in educational attainment were observed across geographic areas and in all age groups, although the gap between the Indigenous and non-Indigenous populations increased with increasing geographic remoteness.

The proportion of Indigenous Australians with a bachelor degree or above increased from 3% in 1996 to 4% in 2001.
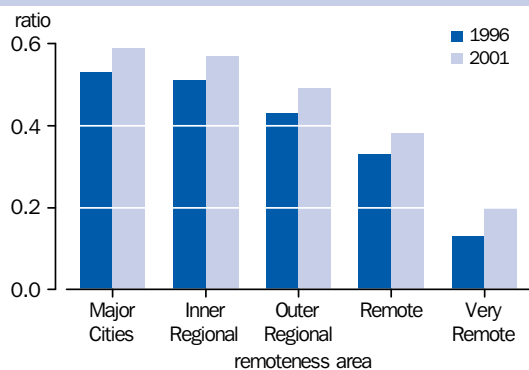
Year 7/8 to Year 12 apparent retention rate(a)
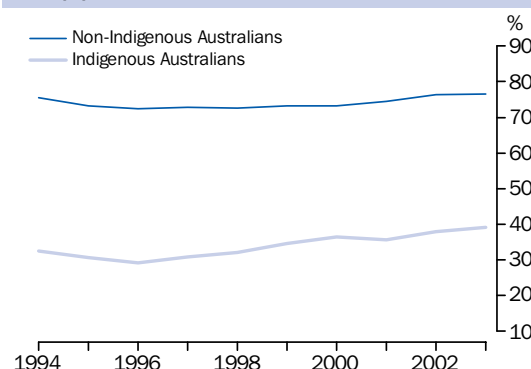
(a) Refers to full-time students only.

Source: MCEETYA, 2001, National Report on Schooling in Australia, 1999; and 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.

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 are relatively small (ranging between 28% for the Australian Capital Territory and 37% for Western Australia in 2003). However, the proportions of persons with higher education qualifications differ more substantially, ranging from 36% in the Australian Capital Territory to 16% in Tasmania. 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 attract migrants (both interstate and international) with high levels of educational attainment.

Level of highest non-school qualification, people aged 25–64 years — 2003

	Vocational qualification	Higher education qualification	Total(a)
	%	%	%
NSW	35.0	21.8	58.0
Vic.	30.5	24.3	55.6
Qld	33.5	16.8	51.4
SA	33.5	16.8	51.2
WA	36.7	18.5	56.0
Tas.	32.9	16.3	50.2
NT	30.4	20.2	51.4
ACT	28.4	36.0	65.5
Aust.	**33.4**	**20.9**	**55.3**

(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: Data available on request, Survey of Education and Work, cat. no. 6227.0.

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 2003 (90%) while the Northern Territory had the lowest (56%). 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 off 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, from 61% in 1993 to 75% in 2003.[3]
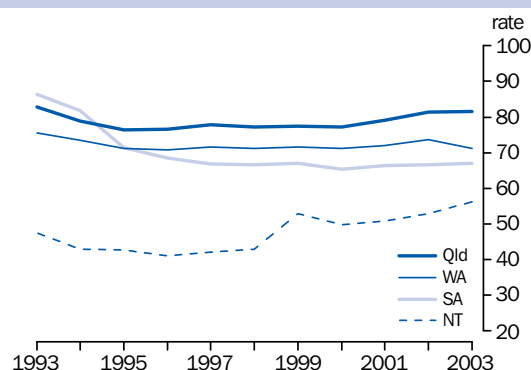
Year 7 to Year 12 apparent retention rate, states/territories in which secondary school commences in Year 7(a)
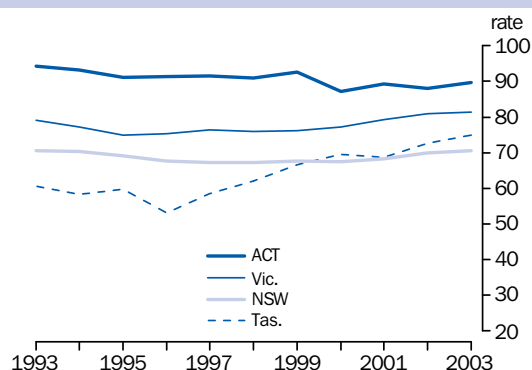

(a) Refers to full-time students only.

Source: Data available on request, 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)

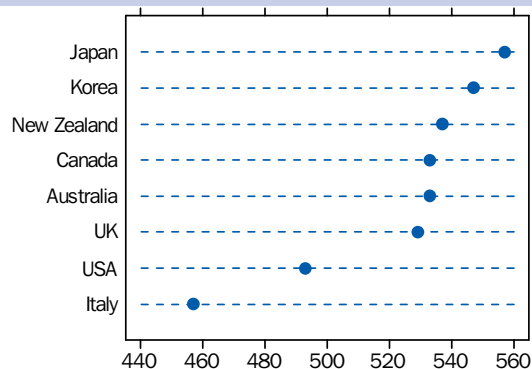(a) Refers to full-time students only.

Source: Data available on request, National Schools Statistics Collection; and Schools, Australia cat. no. 4221.0.

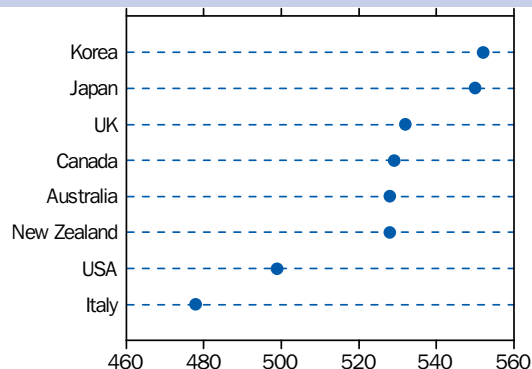## Average literacy scores for selected OECD countries, reading — 2000
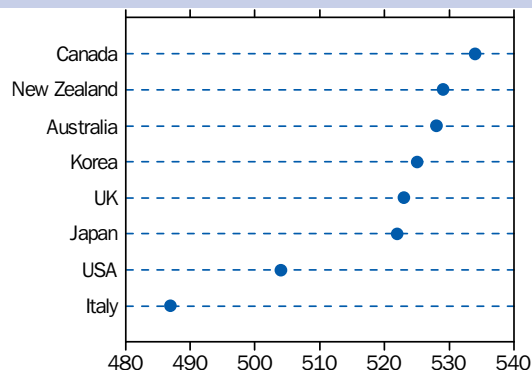
Average literacy scores for selected OECD countries, mathematics — 2000

Average literacy scores for selected OECD countries, science — 2000

Source: OECD Education at a glance, 2001, tables A5.2, A6.1 & A6.2 based on OECD Programme for International Student Assessment (PISA) Surveys of reading, mathematical and scientific literacy for 15 year olds in 32 countries.

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

International comparisons of literacy

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). In 2000, a survey was carried out with samples of between 4,000 and 10,000 students assessed in each participating country. It 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.

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, New Zealand and the United Kingdom have similar scores, with average scores between 528–532 for scientific literacy and 529–537 for mathematical literacy. Japan and Korea scored highest in both scientific and mathematical literacy assessments. Of all surveyed countries (a selection of which are included in the graphs), Australia was ranked 4th in reading literacy; 5th in mathematical literacy; and 7th in scientific literacy.

International comparisons of education

The OECD also publishes a range of indicators which can be used for international comparisons. One of these is the proportion of 25–64 year olds who attained an upper secondary or higher level qualification.

In 2001, there was a wide variation in the proportion of 25–64 year olds with an upper secondary or higher qualification among OECD members, ranging from 88% in the USA to 20% in Portugal. The OECD reported that 59% of Australians in the 25–64 age group had upper secondary or higher qualifications. For further discussion see the essay on *Progress indicators in other countries*.

Factors influencing change

The pace at which knowledge and skills are further 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 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]

The representation of women in both the vocational education and training (VET) and higher education sectors has also increased over time. Women have outnumbered men in higher education throughout the last decade. The proportion of students who were female rose from 54% in 1993 to 57% in 2003. In the VET sector, the proportion of female students is yet to exceed that of male students, but the proportion of women increased from 46% to 50% over the decade.

Female students as a proportion of all students(a)
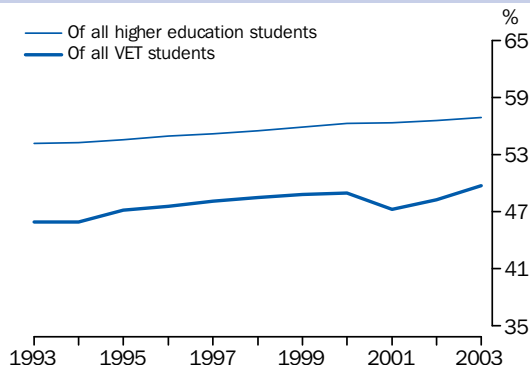
(a) Excludes overseas students.

Source: DEST 2003 & 2000, Students, Selected Higher Education Statistics.

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 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, Financial 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   The 'Year 7/8 to Year 12 apparent retention rate' is the number of full-time students in Year 12 divided by the number of full-time students in the first year of secondary school (Year 7 in New South Wales, the Australian Capital Territory, Victoria and Tasmania; Year 8 in Queensland, South Australia, the Northern Territory, and Western Australia) when the Year 12 cohort began secondary school. Care should be taken in interpreting apparent retention rates as they do not account for students repeating a year or migrating into or out of the Australian school student population.

4   Ryan, C. and Watson, L., Australian National University, Centre for Economic Policy Research 2003, *Factors affecting Year 12 retention rates across Australian states and territories in the 1990s,* ANU, Canberra.

5   Mackay, H. 1993, *Reinventing Australia. The mind and mood of Australia in the 90s,* Angus and Roberston, Sydney.

6   Buckingham, J. 2000*, Boy Troubles: Understanding rising suicide, rising crime and educational failure*, The Centre for Independent Studies, St. Leonards.

7   Australian Bureau of Statistics, *Measuring the Stock of Human Capital for Australia - Experimental Estimates* cat. no. 1350.0 (in press), ABS, Canberra.

8   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.

9   For example, in 1997, 53% of persons aged 15–64 years in the survey population (see note below) born outside Australia had a non-school qualification, compared to 47% 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 (49%). See Australian Bureau of Statistics 1999, *Education and Training, Australia, 1998*, cat. no. 4224.0, ABS, Canberra.

Note: the population in the 1997 Survey of Education and Training includes those persons who were in or marginally attached to the labour force, or in full-time or part-time education, or who had a wage or salary job in the 12 months prior to the survey.

For details of analysis of other data about migrants from the 1980s, see Australian Bureau of Statistics 1989, *Overseas Born Australians, 1988: A Statistical Profile*, (cat. no. 4112.0), ABS, Canberra.

10 Australian Bureau of Statistics 2001, 'Coming to Australia', in *Australian Social Trends, 2001*, cat. no. 4102.0, ABS, Canberra.

11 For published Census information concerning Australia's Indigenous people, see Australian Bureau of Statistics 2003, *Census of Population and Housing: Aboriginal and Torres Strait Islander People, Australia, 2001*, cat. no. 4713.0, ABS, Canberra.

12 For example, in 2000, 85% of all students in South Australia, including those attending on a part-time basis, had continued from Year 10 to Year 12, compared with 70% for full time students only. See Steering Committee for the Review of Commonwealth/State Service Provision (SCRCSSP) 2002, *Report on Government Services 2002, Vol. 1*. Ausinfo, Canberra.

13 Economic Planning Advisory Council (EPAC) 1996, *The Changing Australian Labour Market*, AGPS, Canberra.

Work: key points

Unemployment and extended labour force underutilisation rates(a)

Legend:
— Extended labour force underutilisation rate(b)
— Unemployment rate
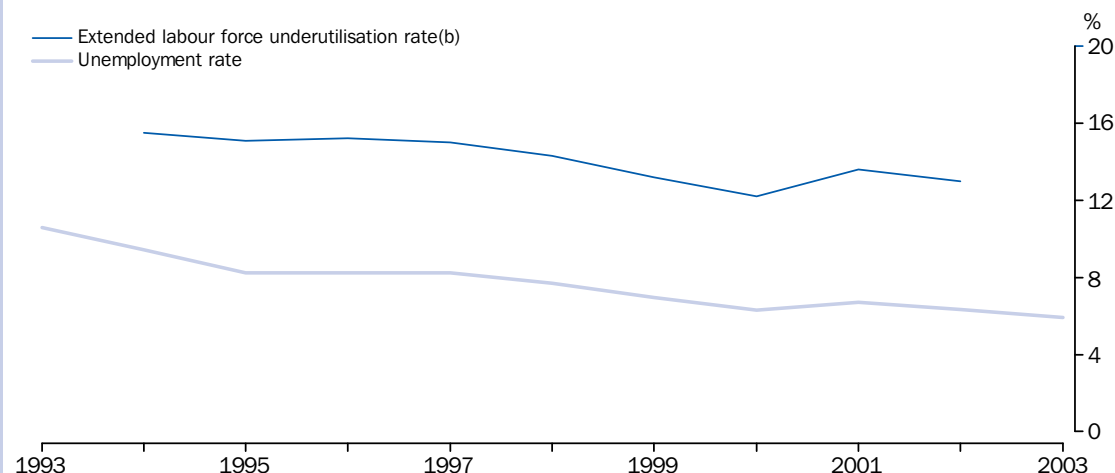
(a) The extended labour force underutilisation rate is defined in the box on the next page. (b) For September of each year.
Source: Data available on request, Labour Force Surveys, Australian Labour Market Statistics, October 2003, cat. no. 6105.0.

The unemployment rate has gradually declined following the last recession in the early 1990s. Annual average unemployment stood at 10.6% during 1993. Since then it has generally fallen, to stand at 5.9% in 2003. However, since the early 1980s, the unemployment rate has been higher than was common in the 1960s and 1970s.

The relationship between work and progress

Paid work is the means through which 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's aspirations for wanting work, or more work, are unsatisfied. The official unemployment rate, which is the number of unemployed people expressed as a percentage 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 extended labour force underutilisation rate, which is a measure of the number of unemployed and underemployed people, as well as some people marginally attached to the labour force.

Work: Other indicators

Extended labour force underutilisation rate; long-term unemployment rate; proportion of people working; retrenchment rate; unemployment to population ratios; casual employees; people working part-time or longer hours (50 hours a week or more); average hours worked per week, 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*, and *Financial hardship*.

Work

Progress and the headline indicator

Paid work is the means through which 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 twenty years. In 1980, there were 6.3 million employed people in Australia. By 2003, largely due to population growth, this had increased by 51% to 9.5 million people. Over this period, the employment to population ratio for the civilian population aged 15 and over has increased from 58% to 60%.

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 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, 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. This has been chosen as the headline indicator, because of its relevance to the economic and social aspects of work.

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 and community* 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.

Extended labour force underutilisation rate

Movements in the 'extended labour force underutilisation rate', which provides a wider view of underutilised labour than the unemployment rate, also closely track the unemployment rate (see headline graph on previous page). The 'extended labour force underutilisation rate', which is only available on a comparable basis back to 1994, fell from 15.5% in September 1994 to 13% in September 2002.

The extended labour force underutilisation rate takes the measure of underutilised labour beyond what is conventionally measured in the labour force. The measure includes the unemployed, people in underemployment and two groups of people with marginal attachment to the labour force (these two groups are defined below).

The rate is expressed by calculating the proportion of people in, or marginally attached to the labour force whose labour is underutilised.

People who are unemployed, underemployed and marginally attached are defined as follows:

Unemployed — people who were not employed during the reference week, but who had actively looked for work in the four weeks up to the reference week and were available to start work in the reference week.

Underemployed — people working less than 35 hours a week who wanted to work additional hours and were available to start work with more hours.

People who are *marginally attached* to the labour force and included in this measure are either:

◆ People actively looking for work, who were not available to start work in the reference week, but were available to start work within four weeks.

◆ Discouraged jobseekers. These are people wanting to work who are available to start work within four weeks, and whose main reason for not looking for work was that they believed they would not find a job for labour market-related reasons.

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 1993, the annual average unemployment rate stood at 10.6% as a result of the economic recession in the early 1990s. Since then it has generally fallen, to stand at 5.9% in 2003. 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% each year. There was a sharp increase from 2.3% in 1973 to 5.8% in 1981. In 2003, the annual average unemployment rate fell below 6% for the first time since the early 1980s. Over the past twenty 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.

Unemployment and long-term unemployment: longer term views
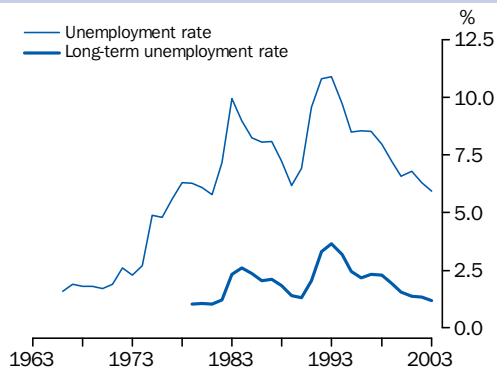
*Source: Data available on request, Labour Force Surveys.*

Associated trends

People unemployed for long periods may experience greater financial 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 2003, the annual average long-term unemployment rate was 1.2%, compared with 3.7% in 1993 in the aftermath of 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.

Unemployment and retrenchment rates
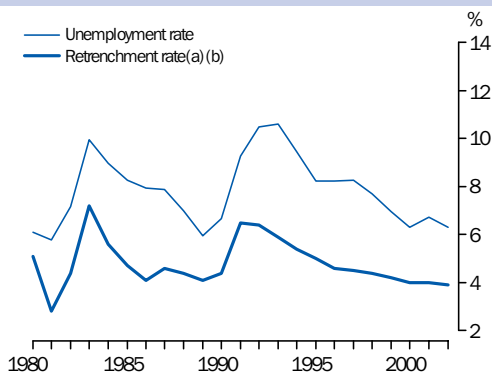
(a) People who were retrenched or made redundant over the 12-month period before the survey, as a percentage of all people who had been employed at some time over the same period. Surveys were conducted in February of the relevant years. *(b)* From 1992 onwards the survey was only conducted every 2 years.
Source: Labour Mobility, Australia, February 1980 to February 2000, cat. no. 6209.0; Labour Force, Australia cat. no. 6203.0.

Proportion of people working
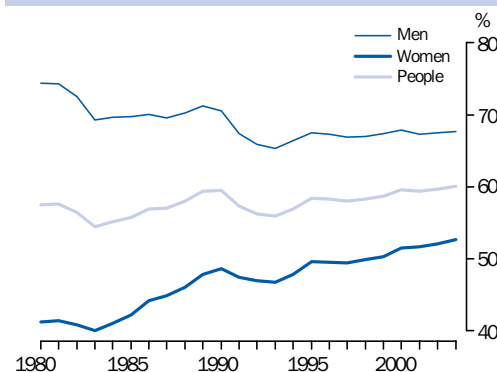
Source: Data available on request, Labour Force Surveys.

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 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 20 years. One highly significant change has been the growth in the proportion of women working in paid employment. This change reflected 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. While the proportion of men working fell from 1980 to 2003 (74% to 68%) the proportion for women increased (from 41% to 53%).

The period 1980 and 2003 also saw major changes to industry and workforce structure. Employment growth was concentrated in the service sector.[3] Much of this growth was in part-time and casual jobs.

Links between changes in the employment to population ratio and economic growth are discussed in the article *Population, productivity and participation.*

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 2001 to February 2002, some 383,200 people had been retrenched or made redundant. This number represented 3.9% of all people who had been employed during the same period, a proportion considerably below that recorded in the 12 months from March 1990 to February 1991 (6.5%) before 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.

Casual employees(a)
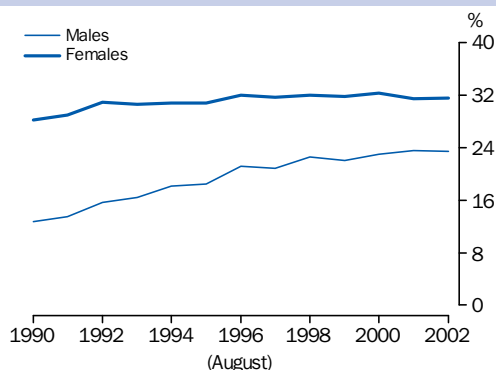
(a) Employees who were not entitled to either paid holiday or sick leave in their main job as a percentage of all employees. Casual employees included employees who operate their own incorporated enterprise with or without hiring employees.
*Source: Australian Social Trends, 2000 & 2003, cat. no. 4102.0.*

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 2003, 10% of people in the workforce had this expectation. However, 8% of employees thought they would do this for voluntary reasons. Only 2% of employed people in 2003 thought they would need to leave their job for involuntary or economic reasons.[4]

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 24% in 2002. Over the same period, the proportion of female employees who are casual employees increased from 28% to 32%. The pace of change has slowed in recent years.

These changes, which 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.

## Average hours worked per week, full-time workers(a)
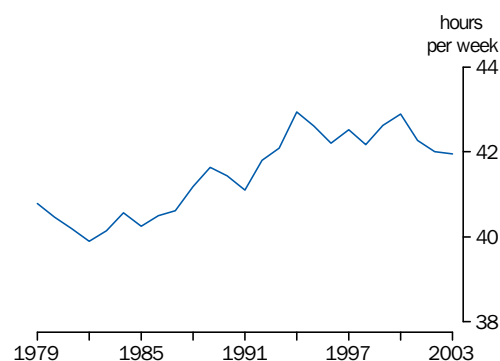
(a) An average of hours actually worked, including overtime, by full-time workers, divided by the number of full-time workers. Figures are for August of each year.
Source: Data available on request, Labour Force Surveys.

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 provided flexibility 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 increased from 16% in 1979 to 28% in 2003. But not all part-time workers are working their preferred number of hours. In 2003, 8% of employees were working part-time but wanted to work more hours. This compares with 3% in 1983 and 7% in 1993.

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 1994 and 42 hours in 2003. The proportion of employees who worked 50 hours or more increased between 1979 and 1999, from 14% to 19%, but had declined to 17% in 2003. The proportion of employees who worked very long hours (60 hours or more), continued to increase from 8% to 11% between 1979 and 2003.

People working part-time or long hours(a)
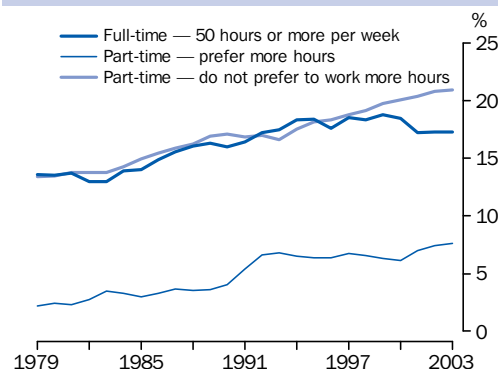
(a) Annual averages as a percentage of all employed people.
Source: Data available on request, Labour Force Surveys.

Some differences within Australia

In a job market where there are too few jobs for all
those actively seeking paid employment, it might
be expected that 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) would
have greater difficulty in securing a job than those
with more desirable attributes. 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 pay and other employment conditions and the
way these 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.

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 years
and over. In the years from 1985 to 2003, the
labour force participation rate for women
increased from 46% in 1985 to 54% in 1995 and
56% in 2003. In contrast, the participation rate for
men decreased from 76% in 1985 to 74% in 1995
and 72% in 2003.

Unemployment rates among men and women have
also changed relative to each other. The rates for
women were lower than those for men throughout
the 1990s, although they have come together in
2003. They had been higher in previous decades.

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 2003). Although most of the workers in
part-time employment prefer part-time work to
full-time work, 4.6% of female part-time workers
and 10.5% of male part-time workers wanted to
work full-time and were available, and actively
looking for full-time work in August 2003.

Unemployment rates, by sex
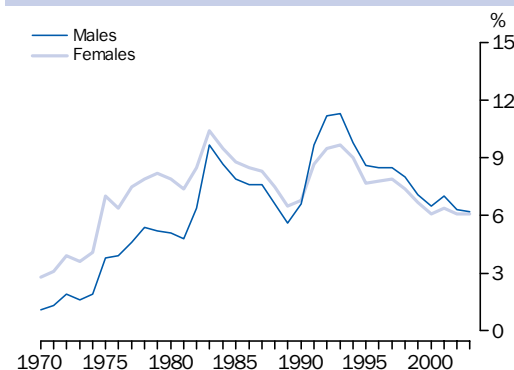
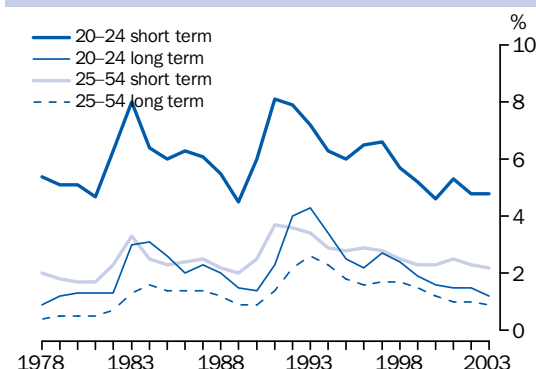*Source: Data available on request, Labour Force Surveys.*

Age group differences

Levels of involvement in the paid workforce vary
through life. They initially increase with age as
young people move from education and training
(often combined with part-time work) to full-time
jobs. They remain relatively high during prime
working age, and then decline 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 high unemployment rate. In
2003, 6.3% of 20–24 year-olds were looking for
full-time employment. However, most (almost
80%) of this unemployment was short-term (less
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 a recession, 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 2003 the proportions had
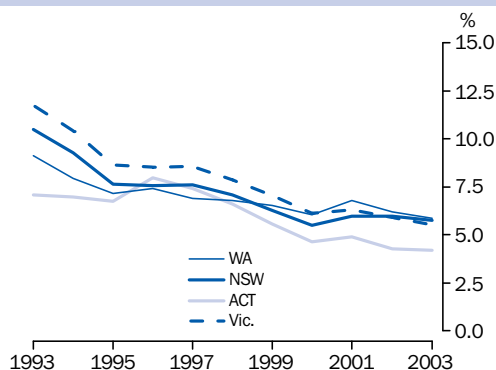become quite similar (1.2% and 0.9%).

Unemployment to population ratio(a), by age group

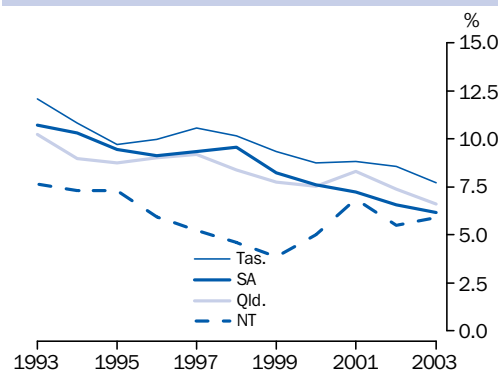(a) Unemployed people looking for full-time work.
Source: Data available on request, Labour Force Surveys.

Unemployment rates, states and territories with the lowest rates in 2003

Source: Data available on request, Labour Force Surveys.

Unemployment rates, states and territories with the highest rates in 2003

Source: Data available on request, Labour Force Surveys.

Aboriginal and Torres Strait Islander peoples

When compared with the rest of Australia's population, Indigenous Australians have substantially lower levels of labour force participation and substantially higher levels of unemployment. Data from the 2001 Census of Population and Housing showed that the labour force participation rate among Indigenous people aged 15–64 was 54% (compared with 73% for non-Indigenous people in this age group). The unemployment rate for the Indigenous population (aged 15 and over) was 20% (compared with 7.2% for the non-Indigenous population).

To some extent, these disparities reflect where people were living and the job opportunities available to them. 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. In these remote areas, more than half (53%) of Indigenous workers reported that they were employed on Community Development Employment Projects (CDEP). This is a scheme which enables participants to exchange unemployment benefits for opportunities to undertake work and/or training in activities which are managed by a local Aboriginal or Torres Strait Islander community organisation.

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. This may reflect the fact that some places have been more adversely 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 2003, the states with the highest annual average unemployment rates were Tasmania, Queensland, the Northern Territory, and South Australia.

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, Financial hardship, Family, community* and *social cohesion,* and *Health*. The relationship between labour force participation, labour productivity, population and national income is discussed in the article *Population, productivity and participation*.

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 2004, *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.

6   Australian Bureau of Statistics 1999, 'Decline of the standard working week ', in *Australian Social Trends 1999,* cat. no. 4102.0, ABS, Canberra.

7   Australian Bureau of Statistics 2001, 'Unemployment trends and patterns', in *Australian Social Trends 2001,* cat. no. 4102.0, ABS, Canberra.

8   Borland, J. and Kennedy, S. 1998, 'Dimensions, Structure and History of Australian Unemployment', in Borland, J. and Debelle, G. (eds), *Unemployment and the Australian Labour Market, Proceedings of a Conference*, Reserve Bank of Australia and Australian National University, Canberra.

Culture and leisure

People can benefit in many ways from participation in cultural and recreational activities. Leisure time gives people an opportunity to recover from pressures of work and other commitments, to bond with friends and family, to pursue their interests, and to reflect on their life's direction and meaning. And expression of identity through, say, the arts and sport gives greater meaning to individual, community and national life. Time spent on such activities is an important part of the quality of life in Australia.

The ABS recognises the importance of this aspect of progress. But it has proved difficult to find an indicator for culture and leisure that has not already been used to assess the other dimensions of progress presented in this publication.

At the simplest level, one might say that assessing progress in culture and leisure should involve measuring how much free time people have and, perhaps also, how well they use it. But this approach is fraught with difficulties.

◆ Lack of free time is one barrier to participating in cultural and leisure activities. But the quantity of free time available to Australians is an ambiguous indicator of improved wellbeing, because for different people leisure may be voluntary or involuntary. An increase in the amount of free time is sometimes considered an improvement in the quality of life, but this is not necessarily the case. It has been argued that some Australians find their work so stimulating that they choose to spend more time working, or perhaps choose to work harder so that they can afford what they feel is a better quality of leisure time. Other people are unemployed or are able to find only part-time jobs when they would prefer full-time jobs — they involuntarily have more free time than they would prefer.

◆ Moreover, Australians spend their free time in a very diverse range of activities. Assessing the relative value of those different activities is very subjective, since different activities are specific to individuals and those with whom they interact — is watching television with the family more or less valuable than attending the theatre alone, for example? — and it does not lend itself readily to statistical treatment.

Barriers to participating in culture and leisure — shortage of time, money or access to facilities — are less ambiguous indicators. Many are covered elsewhere in this publication. The time barrier is discussed in the commentary *Work: Looking more closely* which considers the people working 50 hours or more a week. The financial barriers are considered in the commentaries *National income* and *Financial hardship.* Some of the barriers to accessing facilities are considered in the *Transport* and *Communication* commentaries.

The *Family, community and social cohesion* commentary also discusses some aspects of culture and leisure, such as Australians' attendance at live performances and sporting venues.

See the commentaries *Work, National income, Financial hardship,* and *Family, community and social cohesion.*

National income: key points

Real net national disposable income(a) per capita
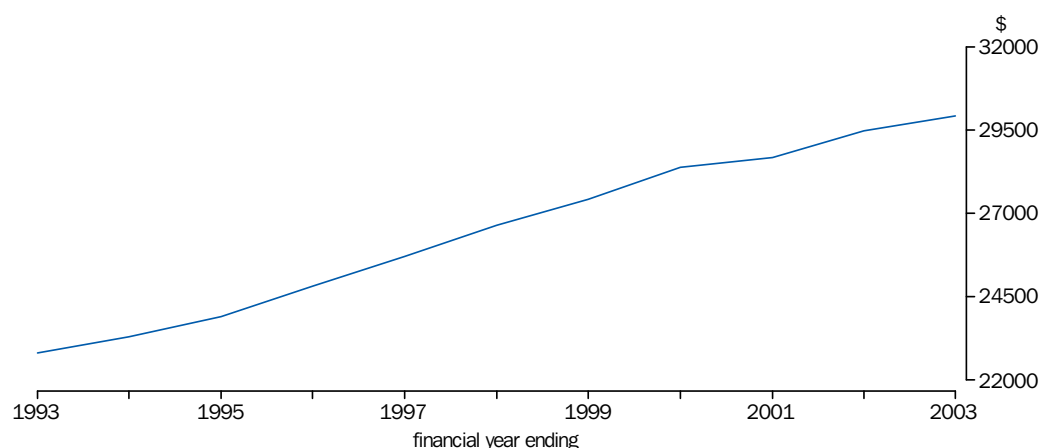
(a) Reference year 2001–2002.
Source: Australian System of National Accounts.[1]

Australia experienced significant real income growth during the past decade. Between 1992–93 and 2002–03, real net national disposable income per capita grew by around 2.8% a year — appreciably faster than during the preceding twenty-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 domestic 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 domestic income to provide a state-level perspective. Growth in real gross state domestic income per capita was highest in the Northern Territory (3.4% per year) and lowest in Tasmania (2% per year) over the period 1992–93 to 2002–03.

Household income grew for both low and high income households during the late 1990s. But there is evidence to suggest that income grew more quickly for high income households, which may have led to a greater degree of income inequality in Australia in 2000–01 than in 1994–95.

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*, *Financial hardship*, *The natural landscape, The human environment, International environmental concerns.*

National income

Progress and the headline indicator

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

Australia experienced significant real income growth during the past decade. Between 1992–93 and 2002–03, real net national disposable income per capita grew by around 2.8% a year — appreciably faster than during the preceding twenty-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 value due to technological advances in mining, depletion of resources used in the production process, or environmental degradation from pollution. These influences 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 used to acquire goods and services for consumption today, or 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.

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
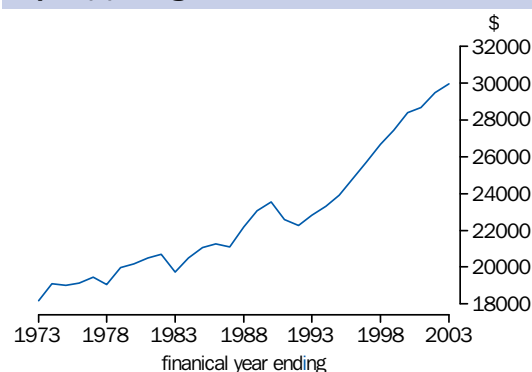
(a) Reference year 2001–02.
Source: Australian System of National Accounts.[1]

Real per capita income growth during the past decade has been quite strong. The average annual growth rate (2.8%) since 1993–94 is appreciably above the 1.7% per year recorded since the early 1970s.

A more detailed discussion of consumption and saving follows.
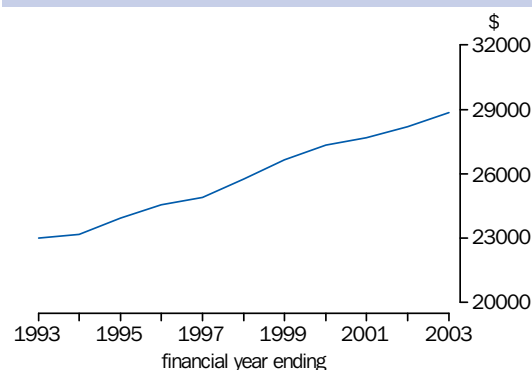
Consumption

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).

Consumption grew throughout the 1990s. Between 1992–93 and 2002–03, real FCE per capita rose by almost 2.3% a year.

Real final consumption expenditure(a) per capita

(a) Chain volume measure; reference year 2001–02.
Source: Derived from Australian System of National Accounts.[1]

Real household final consumption(a) per capita

	1992–93	2002–03	Average annual growth rate
	$	$	%
Food	2 130	2 311	0.8
Alcoholic beverages and tobacco	995	917	–0.8
Clothing and footwear	715	881	2.1
Housing, water, electricity, gas and other fuels	3 721	4 575	2.1
Furnishings and household equipment	978	1 275	2.7
Health	915	1 166	2.5
Transport	2 028	2 569	2.4
Communication	253	623	9.4
Recreation and culture	1 710	2 712	4.7
Education services	436	518	1.7
Hotels, cafes and restaurants	1 305	1 681	2.6
Miscellaneous goods and services	2 354	3 062	2.7
Total	**17 324**	**22 291**	**2.6**

(a) Chain volume measures; reference year 2001–02. Components may not sum to totals.

Source: Derived from Australian System of National Accounts.[1]

Both households and governments incur final consumption expenditure. There were some fluctuations in the relative contributions of the two sectors during the past decade, but in both 1992–93 and 2002–03, 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 2.6% per year between 1992–93 and 2002–03. Household expenditure on communication showed particularly strong growth (an increase of over 9% 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 4.7% 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 37.9% in 1992–93 to 34.8% in 2002–03), reflecting the increase in real incomes.

Real government consumption expenditure per capita grew by 1.5% a year between 1992–93 and 2002–03. Education and health were among the largest expenditures throughout the decade.

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 2.2 percentage point rise in the ratio of net national saving to GDP (from 0.9% to 3.1%). But the longer term trend has been downward; between 1962–63 and 2002–03 the ratio fell overall from around 9% to about 3%. 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). The ratio of depreciation to gross saving has risen during the past forty years — from an average of around 64% in the 1960s to around 83% in 2003. 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 *National wealth*.

Net national saving as a proportion of GDP
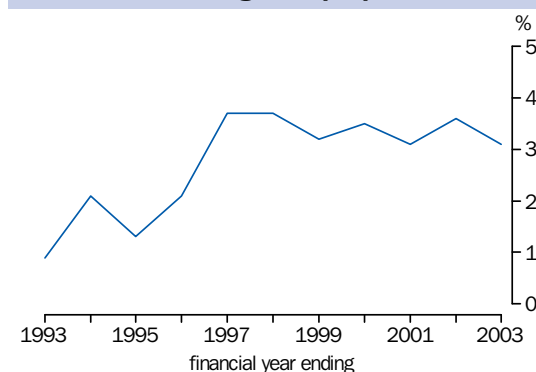
Source: Derived from Australian System of National Accounts.[1]

Net national saving as a proportion of GDP has fluctuated a good deal during the past decade; between 1992–93 and 2002–03 the ratio rose from 0.9% to around 3.1%. 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 early 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 1970s and early 1990s. But during the 1990s, government dissaving was progressively reduced and between 1997–98 and 2002–03 the government sector was again a net saver.

The corporate sector (financial and non-financial corporations) has seen considerable fluctuations in saving since the 1960s. For much of the 1990s, however, the corporate sector has been a net saver.

Net national saving as a proportion of GDP, by sector
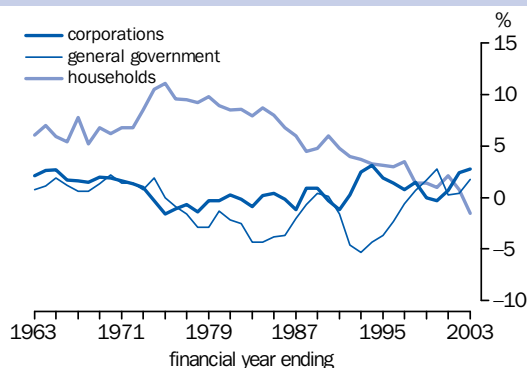
Source: Derived from Australian System of National Accounts.[1]

Industry output

A strong influence on national income is the production of goods and services. Production can increase if the factors of production — capital and labour and so on — are built up or are used more efficiently.

During the past decade, different industries have exhibited substantially different rates of real output growth. Broadly, many service industries showed stronger growth than most 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 1992–93 and 2002–03 were Communication services (averaging close to 8% a year), Property and business services, Construction and Wholesale trade (all averaging over 5% a year).

Real industry gross value added(a), average annual growth rates — 1992–93 to 2002–03

Industry	%
Agriculture, forestry and fishing(b)	0.3
Mining	3.4
Manufacturing	2.5
Electricity, gas and water supply	1.6
Construction	5.2
Wholesale trade	5.2
Retail trade	4.2
Accommodation, cafes and restaurants	4.2
Transport and storage	4.6
Communication services	7.7
Finance and insurance	4.5
Property and business services	5.1
Government administration and defence	2.8
Education	1.7
Health and community services	4.1
Cultural and recreation services	2.7
Personal and other services	3.5
Ownership of dwellings	3.9
Gross Domestic Product	**3.8**

(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]

Some differences within Australia

By state and territory

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 domestic income (RGSDI) 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.

RGSDI per capita grew in every state and territory between 1992–93 to 2002–03. Growth was strongest in Northern Territory, Western Australia and Victoria (respectively averaging 3.4%, 3.3% and 3.1% per year) and weakest in Tasmania (averaging 2.0% per year). There were wide and persistent disparities in per capita RGSDI levels among the states and territories between 1992–93 and 2002–03. In 2002–03, per capita RGSDI levels ranged roughly between $26,000 and $46,000 (reference year 2002–03), with Tasmania the lowest and the ACT the highest.[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 government taxes and expenditures, and incomes transferred between other 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 (household income is only a part of national income) is also considered by many to be important in determining progress in this dimension.

Real gross state domestic income per capita, average annual growth rates — 1992–93 to 2002–03

	%
New South Wales	3.0
Victoria	3.1
Queensland	2.4
South Australia	2.7
Western Australia	3.3
Tasmania	2.0
Northern Territory	3.4
Australian Capital Territory	2.5
Australia	**2.8**

Source: *Australian National Accounts: State Accounts.*[2]

The table presents information about changes in average 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: larger households normally need more income than smaller households, and adults need more than children, for example. And so income data have been equivalised to put different households on an equal footing (this is explained in more detail in the *Financial hardship* commentary).

Between 1994–95 and 2000–01 the average real income of all households increased by 12%. But income grew at different rates for different groups with the average income of high income households growing more quickly than that of low income households. The 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 8%, while the real income of middle income and high income groups increased by 11% and 14% respectively. One should remember that these figures are not necessarily tracking 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, say, of the income distribution by 2000–01 (and *vice versa*).

Various measures of income distribution are included in the table that follows. 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 nearly all the indicators in the table rose over the period 1994–95 to 2000–01, only the increase in the P90/P10 ratio and the decline in the share of total income going to people with low income are sufficiently large to be regarded as statistically significant at the 95% confidence level (that is such differences are, 95 times out of 100, likely to be genuine rather than the result of chance). Meanwhile the change in the Gini coefficient is statistically significant at the 90% level. And so the indicators suggest a possible rise in income inequality over the second half of the 1990s.

Selected measures of equivalised disposable household income(a)

Indicator	Unit	Year (b)						Change 1994–95 to 2000–01	
		1994–95	1995–96	1996–97	1997–98	1999–00	2000–01	Absolute	%
Mean weekly income for selected groups of people(c)									
Low income(d)	$	227	227	235	237	241	245	18	7.9
Middle income(e)	$	372	368	381	388	404	413	41	11.0
High income(f)	$	792	773	794	832	879	903	111	14.0
Weekly income at top of selected income percentiles(c)									
20th(P20)	$	225	224	233	235	241	245	20	8.8
50th(P50)	$	372	367	380	385	405	414	42	11.3
80th(P80)	$	576	578	591	602	636	644	68	11.8
Ratios of incomes at top of selected income percentiles									
P90/P10	Ratio	3.77	3.74	3.66	3.77	3.89	3.97	0.20	5.3
P80/P20	Ratio	2.56	2.58	2.54	2.56	2.64	2.63	0.07	2.7
P80/P50	Ratio	1.55	1.57	1.56	1.56	1.57	1.56	0.01	0.6
P20/P50	Ratio	0.61	0.61	0.61	0.61	0.59	0.59	−0.02	−0.3
Share of total income received by people with									
Low incomes(d)	%	10.8	10.9	11.0	10.8	10.5	10.5	−0.3	2.8
High incomes(f)	%	37.8	37.3	37.1	37.9	38.4	38.5	0.7	1.9
Gini coefficient(g)	Ratio	0.3020	0.2960	0.2920	0.3030	0.3100	0.3110	0.009	3.0

(a) See the *Financial hardship* commentary for a definition of equivalised income. (b) Indicators not available for 1998–99. (c) Adjusted for changes in the Consumer Price Index; values are given in 2000-01 dollars. (d) People in the 2nd and 3rd income deciles after being ranked by their equivalised household income. (e) People in the 5th and 6th deciles after being ranked by their equivalised household income. (f) People in the 9th and 10th deciles after being ranked by their equivalised household income. (g) 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: Data available on request, Surveys of Income and Housing Costs.[4]

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 1992–93 and 2002–03, Australia's real GDP grew by around 46% (averaging growth of 3.8% a year); in the same decade, population grew by around 12% (averaging just under 1.2% a year).

GDP is, in turn, influenced by changes in labour, capital and other inputs to production, and by productivity change. Between 1992–93 and 2002–03, capital services used in market sector production grew by more than 52% (averaging growth of around 4.3% a year). In the same decade, the labour input to market sector production rose by almost 13% (averaging around 1.2% 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 1992–93 and 2002–03, market sector multifactor productivity rose by 14% (averaging 1.3% a year).

Domestic production is not the only influence on national income growth. Between 1992–93 and 2002–03, income receivable from overseas rose by more than 86%, while income payable overseas rose just over 100%.

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.

Real gross domestic product(a) per capita
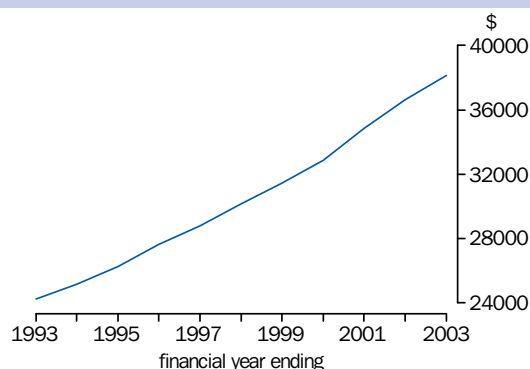
(a) Chain volume measure; reference year 2001–02.
Source: Australian System of National Accounts.[1]

Australia's terms of trade(a)
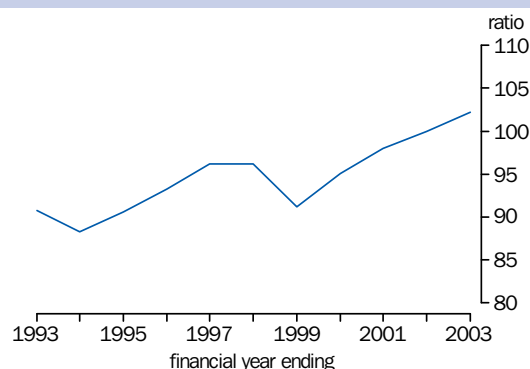
(a) Reference year 2001–02.
Source: Australian System of National Accounts.[1]

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 chain 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 (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. 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.

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 might need to be set aside for this purpose.

Domestic economic events are not the only influence on national income. In particular, 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 1992–93 and 2002–03, there was significant improvement, reflecting changes in both the prices and the composition of traded goods and services.

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.

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 twentieth century, there has been a general trend toward falling prices of primary commodities (especially agricultural products) relative to other traded goods and services. This reflects 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.

Population in work(a)
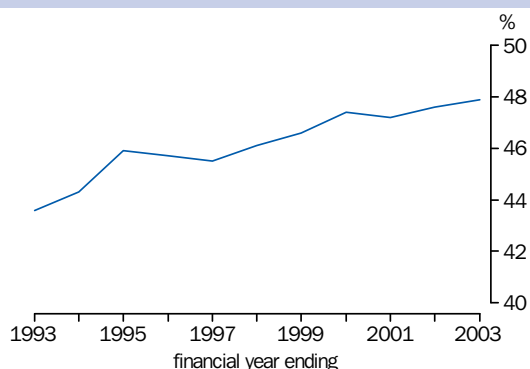
(a) Total employed persons as a proportion of population.
Source: Labour Force, Australia.[3]

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 people past retirement age.

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 1992–93 and 2002–03, the proportion of the Australian population that was employed rose from 43.6% to 47.9%.[3]

During the period 1992–93 to 2002–03, Australia's terms of trade fluctuated widely, but showed an improvement over the decade (up by 12.6%, reflecting a 12.6% rise in export prices but on average, no change 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 (by 5%), owing largely to fluctuations in import prices. Rising export 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 salaries of nurses and teachers, or the construction of hospitals and schools. Conversely, a healthier, more educated population can better engage in the economic activity that generates income.

Income can be spent on protecting or restoring the environment. But income-generating economic activity may also go hand in hand with environmental depletion or degradation. Some of the growth in income 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*, *Financial hardship*, *Work, The natural landscape, The human environment,* and *International environmental concerns.*

End notes

1   Unless otherwise indicated, all data in this commentary are derived from Australian Bureau of Statistics 2003, *Australian System of National Accounts 2002–03*, cat. no. 5204.0, ABS, Canberra.

2   Australian Bureau of Statistics 2003, *Australian National Accounts: State Accounts 2002–03*, cat. no. 5220.0, ABS, Canberra.

3   Australian Bureau of Statistics various issues, *Labour Force, Australia*, cat. no. 6202.0, ABS, Canberra.

4   Australian Bureau of Statistics 2003, *Household Income and Income Distribution* 2000–01, cat. no. 6523.0, ABS, Canberra.

Financial hardship: key points

Average real equivalised weekly disposable income(a)(b)(c)(d)
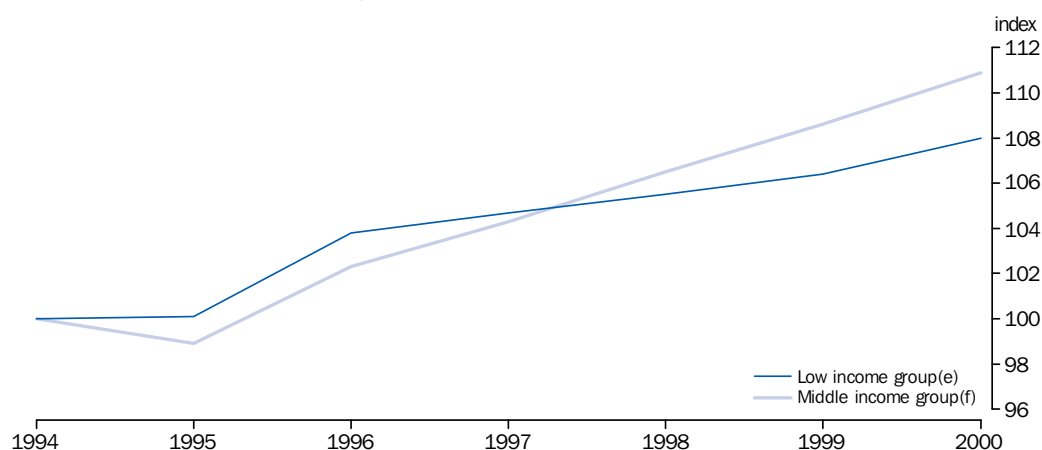
(a) Disposable (after income tax) income amounts are equivalised by applying the OECD equivalence scale.[1] (b) The base of each index is at 1994–95 and equals 100. (c) The equivalised income amounts are based on changes in living costs as measured by the Consumer Price Index (CPI). (d) No survey was conducted in 1998–99. *(e)* Households in the 2nd and 3rd income deciles from the bottom of the distribution after being ranked, from lowest to highest, by their equivalised disposable income. (f) People in the middle income quintile (5th and 6th deciles) after being ranked, from lowest to highest, by their equivalised disposable income.
Source: Data available on request, Surveys of Income and Housing Costs.

Between 1994–95 to 2000–01 the mean real equivalised income of low income people (people with household incomes between the bottom 10% and 30% incomes) rose by 8%.

The relationship of financial hardship to progress

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

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

An ideal indicator might show whether the proportion of people in financial hardship (those with limited means whose consumption of goods and services is below the minimum standards accepted by the community) was rising or falling, and whether or not the situation of such people was improving. But there is little consensus on how to construct such measures.

Low income is one indicator of the risk of financial hardship. We recognise that not everyone on a low income is in financial hardship, and, conversely, that not everyone in financial hardship is on a low income. But the group of people on low incomes are likely to significantly overlap with the group experiencing financial hardship. While factors other than income, such as a person's assets and liabilities, also affect the risk of financial hardship, data to construct a more broadly based indicator are not available. 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). The lowest 10% have been excluded from the measure because the very low incomes (close to nil and sometimes negative) recorded for some households in this group do not accurately reflect their living standards.

Financial hardship: Other indicators

People with housing stress.

Some differences within Australia

Several groups show indicators of a high risk of experiencing financial hardship. 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* and the article *Multiple disadvantage*.

Financial hardship

Progress and the headline indicator

Society generally accepts that people have a right to consume a minimum standard of goods and services. People in financial hardship do not have the economic resources to enjoy such an opportunity. The *National income* commentary describes progress in overall levels of income generated in Australia, and changes in the distribution of that income. Financial hardship is a distinct, although related, dimension of progress. However, there is no consensus about the minimum level of goods and services that is considered adequate. Moreover, views about that minimum standard change over time and are related to the norms of the community.

Measures of progress would ideally identify changes in both 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.

That said, people in financial hardship are likely to have relatively low income and low wealth. The headline indicator focuses solely on changes in the level of income among those with relatively low income, as equivalised data on wealth are not available. This indicator provides no information about the number of people living in financial hardship. But it does provide information about how the income of those in financial hardship is likely to be changing.

The number of people whose main source of income comes from government cash benefits are another group that may be of interest, particularly as government benefits are the main policy response to those without other adequate sources of income. Although the welfare system is designed to assist those who society considers are in need of help, there is a risk that some of those receiving these benefits may still be experiencing some financial hardship. While benefit recipients may often own their own home, they generally cannot hold significant amounts of other forms of wealth.

The commentary also discusses two other population subgroups that are likely to have a significant overlap with those experiencing financial hardship, and considers the types of households in each.

◆ The relatively high cost of some people's housing means that their income levels may not cover the full range of other goods and services accepted as a community standard. Such people are said to be in housing stress.

◆ A further subgroup are those people that experience cash flow problems, such as being unable to pay certain bills, or make mortgage or rent payments, on time.

Measuring income

The income measure used in this commentary is a person's equivalised disposable (after tax) household income, derived from the ABS Survey of Income and Housing Costs.

Household income is used 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]

Low income people are those who fall into the second and third deciles (bottom 10% to 30%) when all people are ranked according to the level of their equivalised disposable household income. People falling into the lowest decile are excluded because, for many of them, the value of their income does not appear to be an appropriate indicator of the economic resources available to them. Their income tends to be significantly lower than would be available to them if they were reliant on the safety net of income support provided by social security pensions and allowances. At the same time, their expenditure levels tend to be higher than those of people in the second and third deciles, indicating that they have access to economic resources other than income, such as wealth, to finance their expenditure.

Middle income people are those who fall into the fifth and sixth income deciles.

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 *Family, community and social cohesion* for more information about homelessness.

There are many other aspects of people's lives, their consumption levels and their command over economic resources that could be analysed to assess progress in meeting a minimum standard of living. For example, their ownership of property and other forms of wealth and their levels of debt can have an important impact on their current and future circumstances. Levels of wealth can also impact on people's capacity to adjust to life events, and their ability to sustain an adequate standard of living. In this chapter, analysis is restricted to the subset of four indicators described in the previous paragraphs as data for a more comprehensive evaluation are limited.

Dependency on government benefits

One identifiable group with relatively low incomes and relatively low wealth are those people whose principal source of income is government benefits. People in this group are more likely than other groups to overlap with those people unable to achieve a minimum standard of living in the short and long term.

While people with social security benefits as their principal source of income may be more at risk of financial hardship than those with higher incomes or wealth, an increase in the number of these people does not necessarily mean more people are at risk of financial hardship. It may reflect a broadening of the eligibility criteria for benefits. This may in fact signify a decrease in the number of people at risk and/or the degree of hardship experienced.

Cash flow problems

The ABS has asked questions in several surveys about cash flow problems and aspects of deprivation.[2] The table overleaf includes results from the ABS 2002 General Social Survey (GSS). Respondents were asked about a number of potential symptoms of financial hardship, including whether, in the past 12 months, they had various cash flow problems, such as being unable to pay certain bills, or make mortgage or rent payments, on time.

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 cash flow problems can give an indication of those most likely to experience financial hardship.

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.

We chose 'experiencing three or more cash flow problems in the previous year' as a risk indicator for financial hardship.

A greater incidence of risk indicators among a particular group suggests there is a more significant overlap between that group and those people with unacceptably low living standards.

The headline indicator shows changes in the real equivalised disposable household income of people close to the bottom of the income distribution, namely, the 20% of people in the second and third lowest income deciles. These people are chosen as being most likely to overlap with those unable to finance a generally acceptable standard of living. The lowest 10% have been excluded from the measure because for many people with very low recorded incomes (close to nil and sometimes negative) the value of their income does not appear to be an appropriate indicator of the economic resources available to them — see the 'Measuring income' box on the previous page.

From 1994–95 to 2000–01 the average real equivalised disposable household income of low income people rose by 8%, and so it might be expected that the average living standards of the group also rose. The same people 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 real standard of living, other things being equal. While some would interpret this increase in the real income of the low income group as progress, others would consider that it also needs to be weighed against 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 chart also shows changes in the real income of the middle income group, which grew by 11%.

Some differences within Australia

The following table presents various household composition types. Proportions of each household type experiencing the four financial hardship risk indicators are presented.

One parent families (living in a household on their own) with dependent children (9% of the population) were most likely to experience housing stress (19% or 300,000 people) and have repeated cash flow problems (23% or 350,000 people); they were very likely to have government benefits as their principal source of income (54% or 850,000 people); and apart from households with the reference person aged 65 or over, most likely to be in the low income group (34% or 550,000 people). People in this group show risk of being in financial hardship.

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*, and the article on *Multiple disadvantage* provide more information about factors linked to Indigenous peoples' financial hardship.

Financial hardship indicators by household composition(a)

Household composition	Population size	*Population with financial hardship indicator*			
		In low income group(b)	*PSI(c): govern-ment cash benefits (c)*	*Had housing stress (d)*	*Had 3 or more cash flow problems in last 12 months (e)*
	'000	'000	'000	'000	'000
Adults	14 963	2 903	3 373	732	. .
Children (0–14 years old)	3 896	869	779	355	. .
Total	**18 859**	**3 772**	**4 151**	**1 087**	**1 358**
Proportion of population					
	%	%	%	%	%
One parent, one family household with dependent children	8.5	33.5	54.1	19.1	22.9
Couple, one family household					
Couple only household					
Aged under 65	12.8	12.0	13.2	3.8	3.3
Aged 65 or over	6.0	56.1	71.7	*1.1	**0.1
Couple with dependent children	44.4	16.4	9.5	5.2	6.6
Other couple, one family household	8.7	10.4	14.6	**1.4	3.5
Other family household	6.5	13.7	15.1	*4.0	10.0
Non-family household					
Lone person					
Person aged under 35	1.8	7.1	13.7	*6.7	14.7
Person aged 35–64	4.1	14.3	31.7	8.1	7.9
Person aged 65 or over	3.7	57.2	79.2	4.7	*0.8
Group household	3.5	9.9	13.3	7.8	13.3
Total	**100.0**	**20.0**	**22.0**	**5.8**	**7.2**

* 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
(a) All but the last column of data in this table come from the *Survey of Income and Housing Costs (SIHC) 2000–01* . The data in the last column come from the *General Social Survey 2002* with the population numbers scaled to the same level as the SIHC. *(b)* See box on first page for definition of low income group. (c) Proportion of persons in households in which government pensions and allowances are the principal source of income. (d) Proportion of persons in households in the bottom 10% to 40% of the equivalised disposable household income distribution that also pay more than 30% of their gross household income in housing costs. (e) An indicator of financial hardship derived from selected indicators of cash flow problems, see description below for more detail.
Source: Data available on request, Survey of Income and Housing Costs 2000–01; General Social Survey 2002.

Older people aged 65 or older living in couple only and lone person households, together accounted for nearly 10% of the total population. Over half of both groups (56% or 650,000 people, and 57% or 400,000 people, respectively) were in the low income group. A larger majority were dependent on government pensions and allowances as their principal source of income (72% or 800,000 people, and 79% or 550,000 people, respectively). But relatively few were in housing stress, with only 9% of older couples (or 10,000 people) and 22% of older lone people (or 35,000 people) renting or paying a mortgage (the majority fully owned their homes). And very few older people reported experiencing three or more cash flow problems. On balance, therefore, it seems older people were less likely to experience financial hardship.

People aged under 35 and living alone and those in group households (which largely consist of younger people) had the lowest representation in the low income group (7% or 25,000 people, and 10% or 65,000 people, respectively) but a relatively high proportion reported multiple cash flow problems (15% or 500,000 people, and 13% or 90,000 people, respectively). While their levels of housing stress were higher than the population average, they were still well below the level experienced by one parent households with dependent children.

Measuring housing stress

Housing costs can be a major component of total living costs, and so people with high housing costs are more likely to experience financial hardship. Some people pay high rent or mortgage repayments, especially if they live in areas with high land values. Others have smaller rent or mortgage repayments because, for example, they live in subsidised housing or areas with relatively low property prices, or have relatively small mortgages. And some own their homes outright (their housing costs are confined mainly to rate payments and repairs).

High housing costs may contribute to people experiencing financial hardship, but there are sometimes offsetting aspects. People may choose to live in an area with high land values because it is close to their place of employment and therefore they have lower transport costs. Some people choose to incur relatively high housing costs because they prefer a relatively high standard of housing instead of other consumption possibilities. High mortgage repayments might reflect a choice to purchase a relatively expensive home, or pay off a mortgage relatively rapidly, as a form of investment. In any case, all repayments of mortgage principal are additions to the wealth of the household. While there is no nationally recognised standard for identifying households whose high housing costs are likely to be contributing to relatively low standards of living, we follow the broad methodology of one of the commoner approaches here.

People are most commonly defined as having housing stress if they have both relatively high housing costs and their income falls in the bottom 40% of the income distribution. For this chapter the housing stress measure includes those with incomes between the bottom 10% and bottom 40% of the distribution of equivalised disposable household income. As explained earlier in the *Measuring Income* box, the incomes of many of the people falling into the lowest decile are not an appropriate indicator of the economic resources available to them. It is likely that many of them would inappropriately be regarded as in housing stress, and they are excluded here.

Relatively high housing costs are those above 30% of gross household income (non-equivalised). Many higher income households pay more than 30% of their income on housing. They are excluded from the housing stress group because they often have more discretion to reduce their housing costs by lowering their mortgage repayments or moving to a cheaper house. Housing costs include payments of rent, mortgage and rates. No allowance is made in this indicator for repairs and maintenance costs or the quality or age of the dwelling. Note that here housing affordability relates to ongoing payments actually being made for housing, not the initial purchase price of dwellings.

One drawback of this measure of housing stress is the inconsistent treatment of public housing renters compared to renters who receive private rent assistance as part of their government benefit income. Public housing renters pay a market rent that is capped at a low proportion (say 25%) of the renter's income. Therefore, the affordability ratio of housing costs to income for these renters cannot rise above say, 25%, and they will never be assessed as having housing stress under the common definition used for this analysis.

Rather than a discounted public rent, a private renter receiving government benefits may also receive private rent assistance as a component of their government benefits. This difference in support arrangements can result in a significant difference in assessing housing stress. For example, consider a private renter receiving rent assistance whose income after deducting housing costs is the same as that of a public renter receiving subsidised housing of the same quality. Both renters can be assumed to have the same standard of living and the same degree of actual housing stress. But the private renter is recorded as having higher income and higher housing costs, resulting in a higher ratio of housing costs to income which may well result in only the private renter being measured as having housing stress. This anomaly is of particular concern when considering changes in housing stress over time, since there has been a shift from providing public housing to providing private rent assistance as a means of providing affordable housing to low income people. The analysis of housing stress is particularly difficult for some population groups, such as Aboriginal and Torres Strait Islander peoples relative to other Australians, due to high levels of low cost housing provided both as public housing and community housing (accounting for over 30% of all households in Australia with an Indigenous resident).

People with housing stress (a)(b)
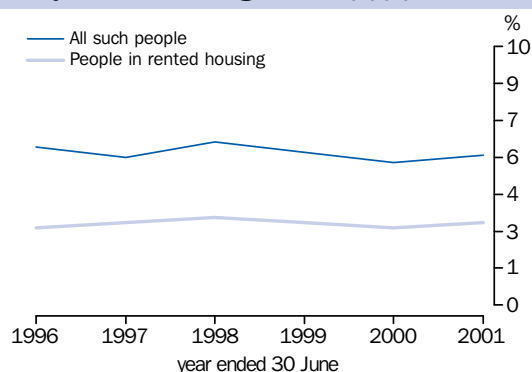
(a) People with housing stress (as defined above) as a percentage of the total population. (b) No survey was conducted in 1998–99.
Source: Data available on request, Surveys of Income and Housing Costs.

In 2000–01 there were 1.1 million people living in households with housing stress, as defined above. They accounted for about 6% of the whole population, and that proportion has been fairly constant since the mid-1990s. Of those, about half lived in rented dwellings. By comparison about 25% of the population lived in rented dwellings and 39% lived in households paying off a mortgage.

About one million individuals and couples receive rent assistance and about 360,000 households live in public housing. Around one-quarter of the renters in the bottom 10% to 40% of the income distribution are public renters, but by definition they are not in housing stress.

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 experience financial hardship.

There are mechanisms to support people who fare less well. Important among them are government social security benefits to support 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 benefits 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 financial hardship 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 at risk of financial hardship.

Financial hardship 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 their own misadventure.

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

Endnotes

1 The equivalence scale used to obtain equivalised incomes 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

National wealth: key points

Real national net worth(a) per capita
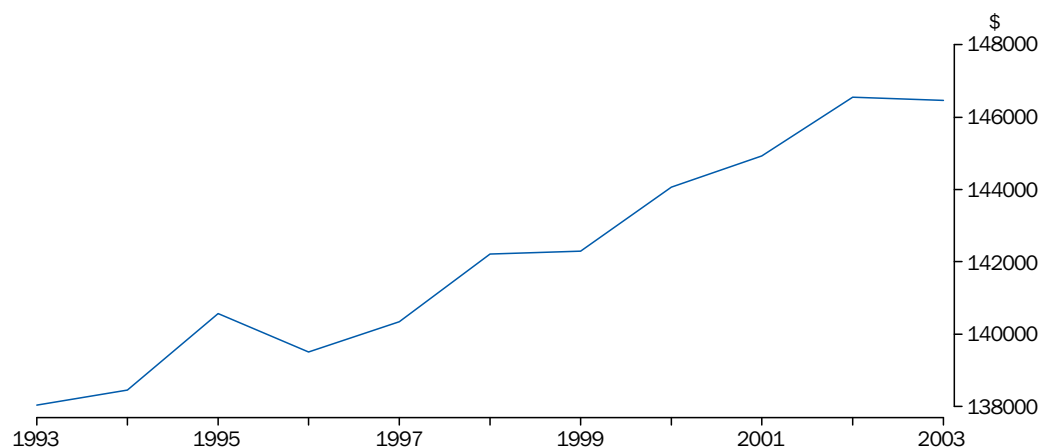
(a) Chain volume measure; reference year 2001–02.
Source: *Australian System of National Accounts.*[1]

Between June 1993 and June 2003, Australia's real net worth per capita rose at an average annual rate of 0.6%. Australia's real assets per capita grew by 1.8% per year, but this was largely offset by the 6.5% annual growth in real per capita liabilities to the rest of the world. Real produced assets per capita grew by around 1.7% per year. Of the produced assets, dwellings (up by 2.2% per year), machinery and equipment (up 2.5%) and software (up 15.6%) grew most strongly, although even by 2003 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 experimental studies of household wealth statistics dissected by age groups show, not surprisingly, that wealth increases as people have more time to accumulate it, i.e. as they 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*, *Financial 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.

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, the stock of knowledge and skills embodied in the Australian population.

Although these items are not built into the headline wealth measure, other commentaries (such as those for the *Biodiversity*, *Marine ecosystems* and *Education and training* dimensions of progress) provide information about some of them.
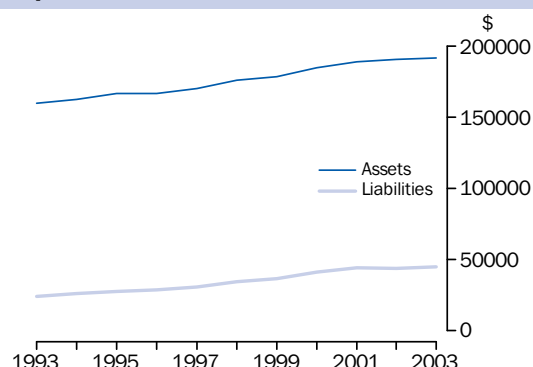
Real national assets and liabilities per capita

Changes in Australia's net worth are the net result of changes in assets and liabilities. Between June 1993 and June 2003, Australia's real net worth per capita rose at an average annual rate of 0.6%. Australia's real assets per capita grew by 1.8% per year, but this was largely offset by the 6.5% annual growth in real per capita liabilities to the rest of the world. Nevertheless, in June 2003 the value of assets was more than four times that of liabilities.[1]

Between 1993 and 2003, real produced assets per capita grew by around 1.7% per year. Of the produced assets, dwellings showed fairly strong growth (up by more than 2% per year). Computer software grew by more than 15% a year, although even by 2003 software still accounted for a small proportion of total assets (in part due to falling prices).

Real national assets and liabilities(a) per capita

(a) Chain volume measures; reference year 2001–02.
Source: Australian System of National Accounts.[1]

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 2003, significant assets included:

◆ land (28% of the total, down from 35% in 1993) and subsoil assets (no change at 6%)

◆ dwellings (19%, up marginally) and other buildings and structures (20%, down from 23%)

◆ machinery and equipment (9%), up marginally

◆ financial assets with the rest of the world (12%, up from 6%).

Major assets and liabilities(a) per capita

	At 30 June 1993	At 30 June 2003	Average annual growth rate
	$	$	%
Produced assets	86 573	102 115	1.7
Non-produced assets	66 327	65 875	–0.1
Total non-financial assets	*152 119*	*167 996*	*1.0*
Financial assets with ROW(b)	9 566	23 690	9.5
Total assets	*160 151*	*191 686*	*1.8*
Total liabilities to ROW(b)	24 158	45 218	6.5
Net worth	**138 059**	**146 468**	**0.6**

(a) In real/volume terms; reference year 2001–2002. Components may not sum to totals. (b) ROW = rest of the world.
Source: Australian System of National Accounts.[1]

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 (0.1% a year) between 1993 and 2003.

Australia's financial assets with the rest of the world more than doubled in real per capita terms between 1993 and 2003 (up by around 9.5% per year). Shares and other equity showed particularly strong growth. Australia's liabilities to the rest of the world rose by around 6.5% per year between 1993 and 2003. Again, shares and other equity showed strong growth.

Real net capital stock(a) per capita
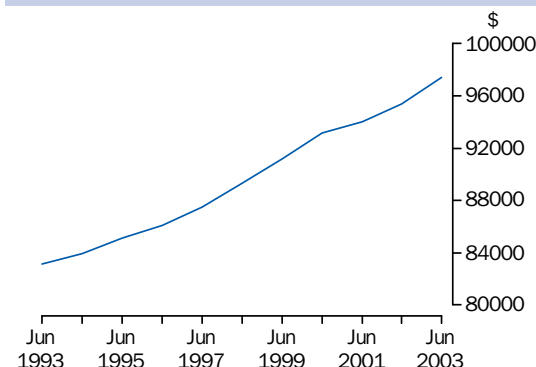
(a) Chain volume measure; reference year 2001–2002.
Source: Australian System of National Accounts.[1]

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. Real net capital stock, the net present values of the future capital services to be provided by these assets, grew on average by 1.6% per year on a per capita basis between June 1993 and June 2003. In June 2003, fixed assets accounted for 47% of the total value of Australia's assets (down from 58% a decade earlier).[1]

The increase in capital stock has in turn led to an increase in the amount of 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 almost 35% (or 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 influences — investments (or 'capital formation') which increase the stock, and retirements and depreciation which reduce it. Investments significantly outstripped retirements and depreciation during the 1990s.

Real net capital stock(a) per capita

	30 June 1993	30 June 2003	Average annual growth rate
	$	$	%
Dwellings	29 899	36 998	2.2
Other buildings and structures	36 978	39 089	0.6
Machinery and equipment	14 088	18 046	2.5
Software	336	1 417	15.5
Other assets	2 311	1 887	–2.0
All assets	**83 117**	**97 437**	**1.6**

(a) Chain volume measures; reference year 2001–02. 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 — June 1993 and June 2003

	30 June 1993	30 June 2003	Average growth rate p.a.
	$million	$million	%
Agriculture, forestry and fishing	57 379	54 860	–0.4
Mining	88 885	132 845	4.1
Manufacturing	83 746	109 054	2.7
Electricity, gas and water supply	105 049	120 590	1.4
Construction	23 115	26 817	1.5
Wholesale trade	31 730	36 429	1.4
Retail trade	30 420	44 380	3.8
Accommodation, cafes and restaurants	27 601	39 055	3.5
Transport and storage	141 542	166 920	2.0
Communication services	40 223	68 900	5.5
Finance and insurance	58 419	68 058	1.5
Property and business services	64 044	96 438	4.2
Government admin and defence	57 405	60 614	0.5
Education	63 020	76 874	2.0
Health & community services	43 601	60 246	3.3
Cultural and recreational services	10 333	20 819	7.3
Personal and other services	12 997	18 713	3.7
Ownership of dwellings	528 227	735 576	3.4
All industries	**1 468 436**	**1 937 187**	**2.8**

(a) Chain volume measures; reference year 2001–02. Components may not sum to totals.

Source: *Australian System of National Accounts.*[1]

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 1993 and 2003, the types of capital showing the most rapid growth were dwellings (up 2.2% per year), machinery and equipment (up 2.5% per year) and software (up 15.5% per year).

Between 1993 and 2003, the industries showing the most rapid growth in net capital stock were Cultural and recreational services (up 7.3% per year), Communication services (up 5.5% per year) and Property and business services (up 4.2% 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 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 1992–93 and 2002–03 it rose by 5.6% 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 sector consistently contributed most to overall capital formation during the past decade.

Gross versus net capital formation

The indicator here is capital formation gross of depreciation (called 'consumption of fixed capital' in the Australian System of National Accounts).

During the years 1992–93 to 2002–03 depreciation was equivalent to around 65%–76% of gross capital formation.

A gross-of-depreciation 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
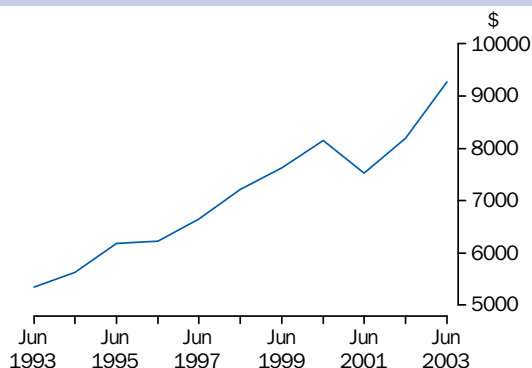
(a) Chain volume measure; reference year 2001–02.
Source: Australian System of National Accounts.[1]

Real gross fixed capital formation(a) per capita, by sector
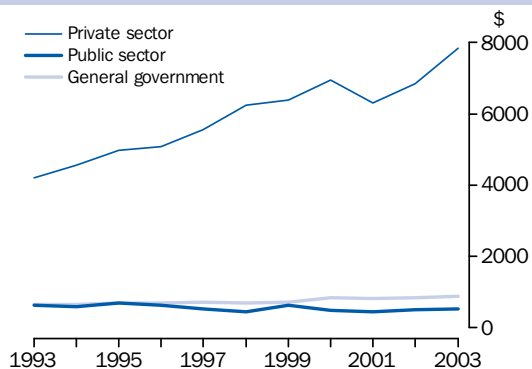
(a) Chain volume measures; reference year 2001–02.
Source: Australian System of National Accounts.[1]

After an initial decrease in the early 1990s, private sector investment recovered and grew by 87% from 1992–93 to 2002–03. The private sector's contribution to overall gross fixed capital formation rose from around 78% in 1992–93 to just under 85% in 2002–03. 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 2002–03, while public corporations accounted for about 6%.

Within private gross capital formation, there was strong growth during the decade in investment in dwellings (up 48% in real per capita terms between 1992–93 and 2002–03). Investment in machinery and equipment also grew appreciably. By 2002–03, machinery and equipment accounted for about 37% of total private capital formation, compared to 30% a decade earlier. Purchases of information technology (including computer hardware and software) are among the fastest growing components, although it still accounts for only a small proportion of total capital formation, in part due to falling prices.

Private real gross fixed capital formation per capita(a), by type of asset

|	1992–93	2002–03	Average annual change
	$	$	%
Dwellings	1 559	2 304	4.0
Other buildings & structures	779	1 358	5.7
Machinery & equipment	1 262	2 867	8.5
Livestock	140	74	–6.2
Intangible fixed assets	190	613	12.4
Ownership transfer costs	482	629	2.7
Total	**4 197**	**7 845**	**6.5**

(a) Chain volume measures; reference year 2001–02.
Components may not sum to totals.
Source: Australian System of National Accounts.[1]

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 13.3% a year between June 1993 and June 2003. After adjusting for the effects of price change, the *real* per capita value of Australia's subsoil assets grew by a little over 2.3% per year on average over the same period.

Economically demonstrated resources(a) per capita
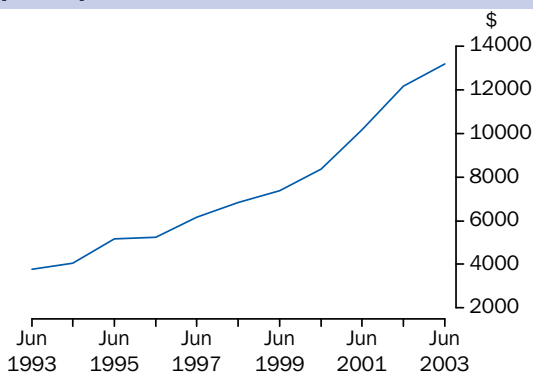
(a) Minerals and energy, net present value of economically demonstrated resources.
Source: Australian System of National Accounts.[1]

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 growth of a nation's stock of subsoil assets broadly depends on the relative pace of two offsetting influences — discoveries which increase the stock, and extractions which reduce it. The former significantly outstripped the latter during the 1990s, as was the case for most of the twentieth 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 2003, Australia had the world's largest demonstrated resources of lead, certain mineral sands (alluvial ilmenite, rutile and zircon), tantalum, uranium, silver and zinc. And Australia ranked among the top six countries for many other minerals such as black and brown coal, bauxite, copper, cobalt, diamonds, gold, iron ore, manganese ore and nickel.[1]

Among the minerals showing strongest annual growth in net present value of EDR in current price terms between 1993 and 2003 were naturally occurring LPG (up 24.7%), black coal (up 21.6%) and iron ore (up 19.8%).

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 5.4% per year between June 1993 and June 2003.[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.

## Economically demonstrated resources(a) per capita, by mineral — June 1993 and June 2003

	30 June 1993	30 June 2003	Average annual growth rate
	$/cap	$/cap	%
Bauxite	139	266	6.7
Black coal	462	3 258	21.6
Copper	126	577	16.4
Iron ore	126	769	19.8
Magnesite	37	100	10.5
Mineral sands	102	245	9.1
Nickel	199	938	16.8
Petroleum — crude oil	886	1 566	5.8
Petroleum — natural gas	1 053	3 386	12.4
Petroleum — condensate	181	841	16.6
LPG naturally occurring	52	468	24.7
Uranium	111	177	4.7
Zinc	135	330	9.4
Other minerals	177	284	4.9
All minerals	**3 785**	**13 195**	**13.3**

(a) Minerals and energy, net present value of economically demonstrated resources.

Source: Australian System of National Accounts.[1]

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 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.

Real net foreign debt(a) — June 1993 to June 2003
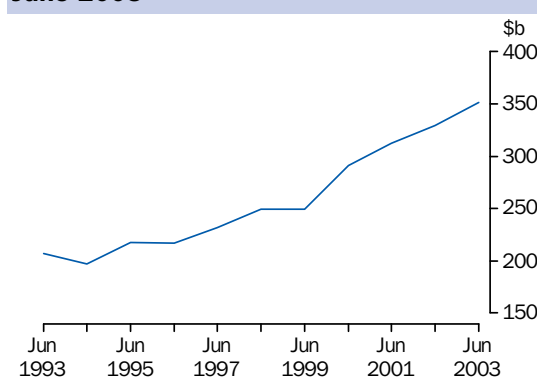
(a) To convert net foreign debt to real terms, the current-price figure has been divided by the chain price index for domestic final demand. Reference year is 2001–02.

Source: Balance of Payments and International Investment Position.[2]

Real net foreign debt(a), by sector — June 1993 and June 2003

	30 June 1993	30 June 2003	Average annual growth rate
	$b	$b	%
General government	24.1	13.0	–6.0
Other public sector	44.2	–4.1	. .
Private financial corporations	64.9	279.2	15.7
Private non-financial corporations	73.9	63.6	–1.5
Australia	**207.1**	**351.7**	**5.4**

(a) To convert net foreign debt to real terms, the current-price figure has been divided by the chain price index for domestic final demand. Reference year is 2001–02.

Source: *Balance of Payments and International Investment Position.*[2]

Foreign holdings of Australian equity and debt were both rising through much of the twentieth century.[2] Australia must pay income (dividends or interest) on both forms of liability to foreign residents. However, if by incurring those 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 rose from $68.3b in June 1993 to a peak of $79.5b in June 1995. Thereafter, it fell to just under $9.0b in June 2003.

Australia's net foreign debt

Australia's net foreign debt is the net outcome of:

◆ Australian borrowing from overseas ($568b in current-price terms at 30 June 2003).

◆ Foreign borrowing from Australia ($210b in current-price terms at 30 June 2003).

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 interest payments (income payable on net foreign debt). During the past decade, Australia's debt service ratio has improved from 12.2% in 1992–93 to 8.3% in 2002–03.

The real net foreign debt of the private sector, after having been fairly steady at around $130–140b in the first half of the 1990s, rose throughout the second half of the decade to reach $342.8b in June 2003.

Some differences within Australia

Wealth statistics dissected by geography are not available but experimental studies of household wealth statistics dissected by age groups show, not surprisingly, that wealth in nominal terms increases as people have more time to accumulate it, that is as they age, although wealth also appears to be run down to some degree after retirement. Average wealth is distributed quite differently from income, which falls away sharply for the age groups in which more people have retired.

The distribution of wealth also varies across household types. Two main conclusions can be drawn. First, younger households (whether lone person, younger group households or those with younger children) have lower average wealth than older households. Second, households containing couples appear to accumulate wealth more readily than lone person or lone parent households, which may reflect couples' having access to two incomes for extended periods.
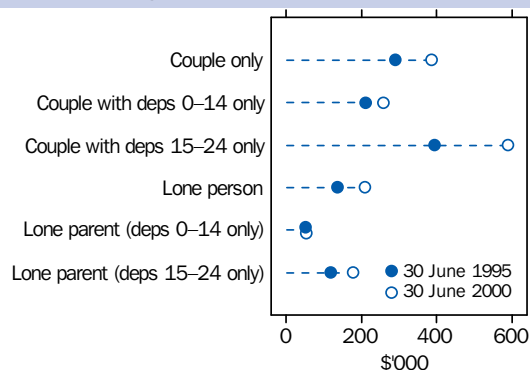
Between 1995 and 2000, couple households with children had higher average net worth than lone parent households with children of a similar age. Couples with dependent students aged 15–24 had the highest average net worth in all periods. This is likely to reflect the effects of couple formation, and the accumulation of wealth in older age groups.

The net worth of different types of households is closely associated with their average dwelling and superannuation assets. Average wealth appeared to rise between 1995 and 2000 for all age groups, but the rise was most marked where the household reference person was 45 or older, for whom growth appears to have been particularly strong in dwellings assets, superannuation and shares.

Average household net worth, by age
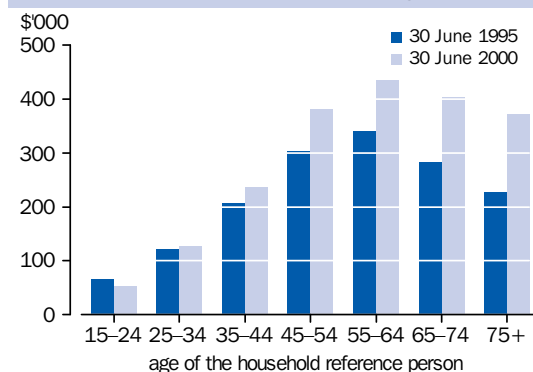
Source: *Experimental Estimates of the Distribution of Household Wealth.*[3]

Average household net worth, selected household types

Couple only	
Couple with deps 0–14 only	
Couple with deps 15–24 only	
Lone person	
Lone parent (deps 0–14 only)	
Lone parent (deps 15–24 only)	● 30 June 1995
	○ 30 June 2000

0   200   400   600
$'000

Average household owner-occupied dwelling assets

	1996	2000
	$'000	$'000
Age of household reference person		
15–24	25	26
25–34	72	93
35–44	121	156
45–54	143	182
55–64	143	184
65–74	124	179
75+	122	166

Source: *Experimental Estimates of the Distribution of Household Wealth*.[3]

Average household superannuation assets

	1996	2000
	$'000	$'000
Age of household reference person		
15–24	11	21
25–34	15	32
35–44	32	65
45–54	93	130
55–64	98	133
65–74	50	64
75+	20	31

Source: *Experimental Estimates of the Distribution of Household Wealth*.[3]

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.

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.

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 financial 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, Financial hardship* and *The natural landscape*.

Endnotes

1   Unless otherwise indicated, all data in this commentary are derived from Australian Bureau of Statistics, 2003, *Australian System of National Accounts 2002–03*, cat. no. 5204.0, ABS, Canberra.

2   All data in this segment is derived from Australian Bureau of Statistics 2003*, 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.

Housing

Housing in Australia is generally good, and Australians are continuing to invest significantly in the homes that they own. In the decade to 2002, the value of land and dwellings owned by the household sector more than doubled (in current price terms) and in 2002 represented more than half of the value of all assets owned by the sector.

Australians are tending to live in smaller household groups, with the average household size shrinking by 14% over the twenty years to 2001. One consequence of the shrinking household size in Australia is that the available housing stock can accommodate people more adequately. In 2001, while 3% of private dwellings across Australia required an extra bedroom to accommodate the residents of those dwellings, 70% of private dwellings in 2001 had one or more bedrooms spare.[1] But poor or inadequate housing is a problem for some groups, especially for Aboriginal and Torres Strait Islander peoples living in remote areas.

There is no single headline indicator to show whether housing circumstances have been getting better or worse. Some of the other dimensions of progress discuss aspects of housing, and no indicators are presented here. But we recognise that housing is a headline dimension of progress and a suitable headline indicator may be developed in future.

Housing provides people with shelter, security and privacy. Having a suitable place to live is fundamental to people's identity and wellbeing, and there are many aspects to housing that affect the quality of people's lives. Dwelling attributes, such as their size, number of bedrooms, physical condition, location relative to amenities and services, and their affordability, are all important in this regard.

Although housing is a key dimension of concern, there is no one indicator that succinctly captures whether people's many needs and desires for suitable housing are being met. And it has been difficult to find an indicator for housing that has not been used to assess the other dimensions of progress presented in this publication.

The value of Australia's housing stock is a component of our *National wealth* and is discussed in that commentary.

The amounts people pay in rent, rates and mortgage repayments for their dwelling are often substantial. The prevalence of households experiencing housing affordability problems, which can point to limitations in the supply of suitable low cost housing, is discussed in the commentary *Financial hardship*.

The extent of homelessness is an associated issue of concern, and crisis accommodation services are often overburdened.[2] But because homelessness is commonly also associated with dysfunctional relationships, and is not usually the result of housing shortages, it is discussed in the commentary *Families and communities*.

Some differences within Australia

The quality and costs of dwellings vary greatly across Australia, and can depend on when the dwelling was constructed, the affluence of the communities in which they are located, and the local climate.

Housing standards tend to be lowest in remote area communities, especially among those least able to afford building and maintenance costs. Such costs tend to be higher in remote areas because access to modern building materials and to people with the skills to build high quality dwellings is more limited, and maintenance requirements tend to be higher in harsh environmental conditions. This all leads to the average dwelling life being shorter. Indigenous Australians, particularly those in remote communities, are less likely than other Australians to be purchasing a home or to own it outright. The small proportion of owner/purchaser households in very remote areas (8%) reflects, among other things, the types of tenure available on traditional Aboriginal and Torres Strait Islander lands.

Indigenous Housing Organisations (IHOs) provide some low-cost (rental) housing but the available dwelling stock is not always sufficient to adequately accommodate the residents. This is reflected in the relatively high proportion (5%) of people living in discrete Indigenous communities who are occupying temporary dwellings, such as tin sheds or humpies; and in the relatively high proportion (31%) of IHO managed houses (mostly in remote or very remote areas) requiring major repair or replacement.[3]

Another indicator of inadequate housing is the reported need for at least one extra bedroom. In 2001, some 16% of households with an Indigenous resident required at least one extra bedroom, compared with 3% of other households. In very remote areas, almost half (45%) of households with Indigenous residents required at least one extra bedroom to adequately accommodate the members of the household.[2]

Links to other dimensions of progress

Housing conditions and costs are influenced by many factors, but most particularly the affluence of households. A poor standard of housing is often associated with problems in other areas of concern such as health, financial hardship, crime and low levels of social cohesion.[4] Housing development is often seen as important to the economy and is part of national wealth.

See also the commentaries *National income, National wealth, Financial hardship, Health*, and *Family, community and social cohesion*.

Endnotes

1   Australian Bureau of Statistics 2003, *Population Characteristics, Aboriginal and Torres Strait Islander Australians*, 2001, cat. no. 4713, ABS, Canberra.

2   For details of unmet demand for crisis accommodation services, see Australian Institute of Health and Welfare (AIHW) 2001, *SAAP National Data Collection: Annual Report, 2000–2001, Australia*, AIHW cat. no. HOU61 (SAAP NDCA Report: Series 6), AIHW, Canberra.

3   Australian Bureau of Statistics 2002, *Housing and Infrastructure in remote Aboriginal and Torres Strait Islander Communities, Australia*, 2001, cat. no. 4710.0, ABS, Canberra.

4   Australian Bureau of Statistics 2001, *Measuring Wellbeing: Frameworks for Australian Social Statistics,* cat. no. 4160.0, ABS, Canberra.

Productivity: key points

Multifactor productivity
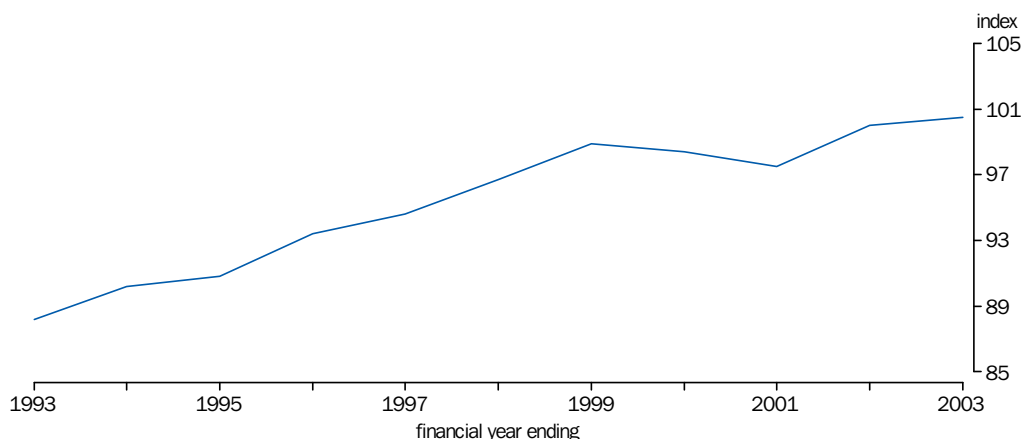
Source: Australian System of National Accounts, cat. no. 5204.0.[1]

In recent years Australia has experienced improved rates of productivity growth. During the decade 1992–93 to 2002–03, Australia's multifactor productivity rose 1.3% per year on average.

The relationship of productivity to progress

A nation that achieves productivity growth produces more goods and services from its labour, its capital and its land, energy and other resources. 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 volume of goods and services it produces (its output) for a given volume of inputs (such as labour and capital). 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 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: Wholesale trade (4.7% a year on average), Communication services (4.1% a year on average), Electricity, gas and water supply (3.3% a year on average) and Finance and insurance (3.2% a 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 volume of goods and services it produces (its output) for a given volume of inputs (such as labour and capital). 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 good productivity improvement in the decade 1992–93 to 2002–03, especially during the five years of the most recent productivity growth cycle (1993–94 to 1998–99), where real output of the market sector grew by an average of 4.6% each year. In part, this reflected average growth rates of 1.3% for labour and 4.7% for capital, or 2.7% for labour and capital combined; the remaining 2.0% of output growth reflected 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 (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 1992–93 to 2002–03 was 13.9%, averaging 1.3% per year. This was higher than the improvements recorded for the two earlier decades. The improvement for the period 1982–83 (a recession year) to 1992–93 was 10.5%, averaging 1% per year and for 1972–73 to 1982–83, the improvement was 8.4%, averaging 0.8% per year. It should be noted, though, that the 10 year periods used for this analysis do not coincide with productivity growth cycles.

Multifactor productivity: longer term view(a)
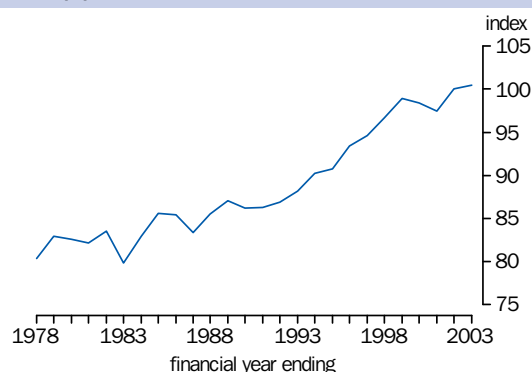
(a) Reference year for MFP indexes is 2001–02 = 100 .
Source: Australian System of National Accounts.[1]

Measuring Australia's productivity

Productivity measures are, in concept, ratios of the form:

Productivity = Output volume / Input volume

This ratio derives from the 'production function':

Output = Productivity * f(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.

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 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).

Labour productivity(a), average annual growth rate — 1992–93 to 2002–2003

Industry(b)	%
Agriculture, forestry and fishing	1.7
Mining	3.0
Manufacturing	2.8
Electricity, gas and water supply	3.3
Construction	1.8
Wholesale trade	4.7
Retail trade	1.9
Accommodation, cafes and restaurants	1.3
Transport and storage	3.1
Communication services	4.1
Finance and insurance	3.2
Health and community services	1.2
Cultural and recreational services	−1.2
All market sector industries	**1.9**

(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]

During the decade 1992–93 to 2002–03, the most rapid increases in labour productivity were achieved by: Wholesale trade (4.7% a year on average), Communication services (4.1% a year on average), Electricity, gas and water supply (3.3% a year on average) and Finance and insurance (3.2% a year on average). Some of these industries have experienced significant technological advance or industrial reorganisation.

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 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 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 and so we focus on four aspects for which data are available: some of Australia's investments in knowledge (namely expenditure on research and development and computer software); the number of knowledge-based workers; businesses' use of the Internet; and improvements in the quality of labour.

Knowledge and innovation

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, 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]

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 economic resources and the number of people devoted to the creation and application of knowledge. Indicators include the proportion of GDP devoted to research and development and the proportion of the workforce employed in knowledge-based fields.

◆ The skills and knowledge embodied in the labour force (discussed in the commentary *Education*).

◆ 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. One such aspect is organisational innovation. This is seen as particularly important because of its links with firms being able to adapt to change and embrace new technologies.

Research and development expenditure, proportion of GDP — selected years
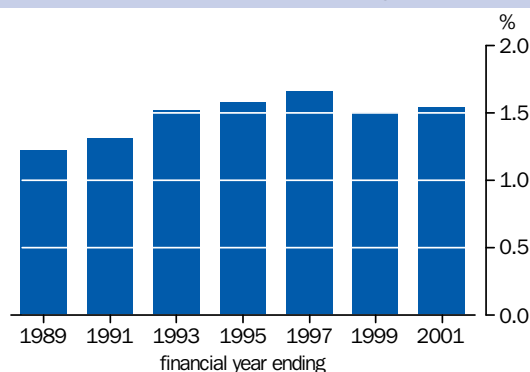
Source: Research and Experimental Development, All Sector Summary.[2]

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 or improved products, processes, materials, devices or services'.[3]

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, and peaked in 1996–97 at 1.66%. But by 2000–01 it had fallen back to 1.54%.

The proportion of Australian GDP devoted to R&D expenditure is relatively low by international standards. In 1998–99, Australia ranked twelfth among OECD countries; for example, the corresponding proportion for Japan was 2.9%, for the USA 2.6%, for Germany 2.3% and for Canada 1.8%. Its position remained roughly the same in 2000–01. But Australia also imports technology and processes embodying R&D from elsewhere.

The sources of funds for R&D have changed during recent years. In 1988–89 governments funded 64% of the total, but by 2000–01 this had fallen to 46%; during the same period, the proportion funded by business rose from 33% to 46%.

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. During the 1990s, Australian investment on software as a proportion of GDP has risen rapidly (from 1.2% in 1992–93 to 1.7% in 2002–03), during a time in which software prices fell.[1]

Investment in software, proportion of GDP
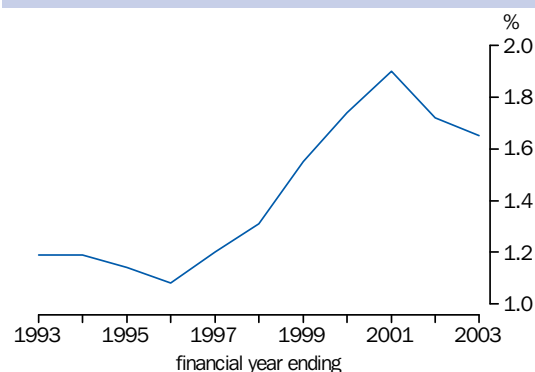
Source: Australian System of National Accounts.[1]

Knowledge-based workers

The proportion of knowledge-based workers in a country gives some indication of how intensively knowledge is used in its economy.

There are many ways of characterising the people engaged in knowledge-related occupations. One definition includes those employed as:

◆ managers and administrators

◆ professionals and associate professionals — including those in science and engineering, business and information, health and education.

The proportion of workers engaged in knowledge-related occupations in Australia increased markedly during the past decade, rising from 31% of employees in August 1993 to 38% in August 2001. However, it appears to have stabilised around 38% in the past few years. The number of professionals and associate professionals grew particularly strongly during the period 1993 to 2003 (up 92% in the ten years to August 2003, whereas total employment rose by just 23%).[4]

Managers and professionals(a), proportion of total employment(b)
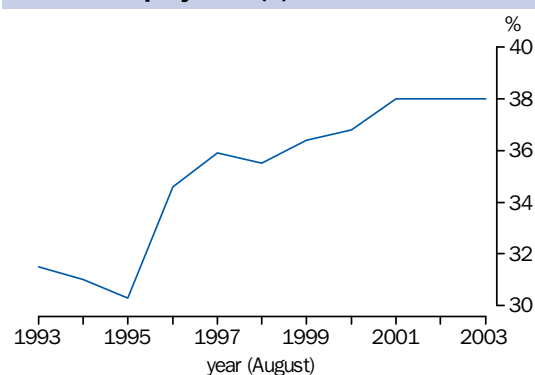
a) Managers and administrators, professionals and associate professionals. (b) At August each year.
Source: Labour Force, Australia.[4]

Proportion of businesses with web site or home page — 1998, 2000, 2001 and 2002				
	1998	*2000*	*2001*	*2002*
No. of employees	%	%	%	%
1–4	4	9	14	15
5–19	8	24	32	34
20–99	21	46	56	55
100 or more	58	68	81	81
All businesses	**6**	**16**	**22**	**24**

Source: Business Use of Information Technology, various issues, cat. no. 8129.0.[5]

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 businesses use the Internet to provide customers with information about the goods and services available.

Recent years have seen a rapid take-up of the Internet by Australian businesses. In June 1998, 6% of businesses had a web site or home page; by June 2002, this proportion had risen to 24%.[5]

Business use of information communication technology more generally has also increased in recent times and is associated with productivity growth in several sectors, including Finance and insurance and Wholesale trade.

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

Hours worked and quality adjusted hours worked
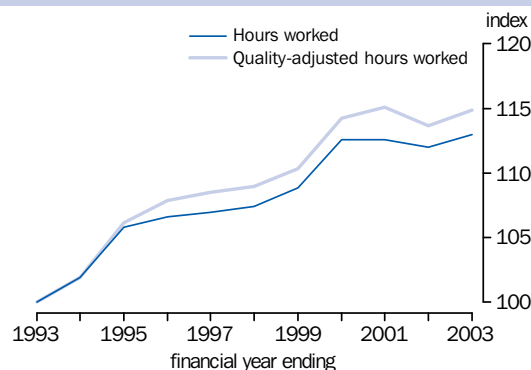
Source: Australian System of National Accounts.[1]

(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 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 1.5% a year. Positive contributions from changes in the skills and experience of the work force were particularly significant over the periods 1987–88 to 1991–92 and 1995–96 to 1997–98. 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: 0.9% a year compared to 1.0% over the period 1982–83 to 2002–03.

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   Data in this segment of the commentary are from Australian Bureau of Statistics 2003, *Australian System of National Accounts 2002–03*, cat. no. 5204.0, ABS, Canberra.

2   Data in this segment of the commentary are from Australian Bureau of Statistics various issues, *Research and Experimental Development, All Sector Summary*, cat. no. 8112.0, ABS, Canberra.

3   Organisation for Economic Cooperation and Development 2000*, A New Economy? The Changing Role of Innovation and Information Technology in Growth*, OECD, 2000.

4   Data in this segment of the commentary are from Australian Bureau of Statistics various issues*, Labour Force, Australia*, cat. no. 6202.0, ABS, Canberra.

5   Australian Bureau of Statistics 1999 and 2003, *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 changed only marginally between 1992–93 and 2002–03 and consequently did not have a significant impact on the international competitiveness of Australia.[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 2002–03, the Australian dollar was stronger against the currencies of most of our major trading partners than it had been at any time during the previous ten years, and nearly 14% stronger than it had been in 2001–02. The recent strength of the Australian dollar has reduced the competitiveness of Australia's exports.

Real unit labour costs and the trade-weighted exchange rate

Base year is 2001–02 = 100.

Source: Australian System of National Accounts;[1] and Reserve Bank of Australia.[2]

During the decade 1992–93 to 2002–03, there was a slight fall against the US dollar (down 0.7%) but the fall relative to the United Kingdom pound was more significant (down 9%). The Australian dollar appreciated against most of our other major trading partners; in the case of Japanese yen by almost 12%.

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 performance during the 1990s relative to earlier periods. Also, Australian wage increases were more modest than in some earlier decades.

Trade-weighted exchange rate

The trade-weighted exchange rate index measures changes in the value of the Australian dollar relative to our major trading partners. It includes the currencies of the nations that constitute 90% of Australia's trade. The weights for each exchange rate are determined by the percentage of two-way trade each nation accounts for. For example, the US dollar has a weight of about 15% and the Japanese Yen has a weight of about 17%.

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.

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. Or it can be assessed from 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 (including border protection) are available, but only cover barriers to trade.[3] 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.[4]

The goods and services that international trade makes available to Australian residents are an important aspect of progress. Some analysts base indicators of openness on both exports and imports. But this section focuses on how Australia's openness to imports provides Australians with wider choices of goods and services. Therefore, one of our indicators of openness is the ratio of imports to total sales in the economy. The first graph shows the ratio of imports to GDP, from 1992–93 to 2002–03. During this period, the ratio increased from 18.6% to a little over 22%.

Ratio of imports to GDP
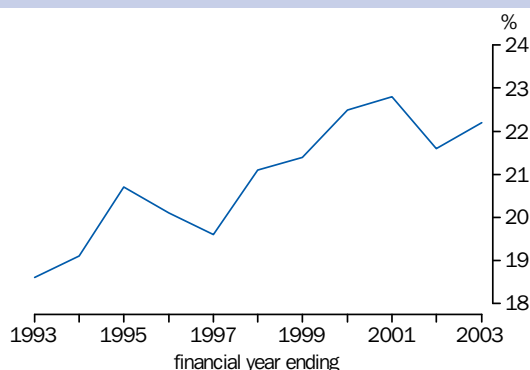
Source: Australian System of National Accounts, cat. no. 5204.0.

Ratio of foreign investment inflow into Australia to GDP
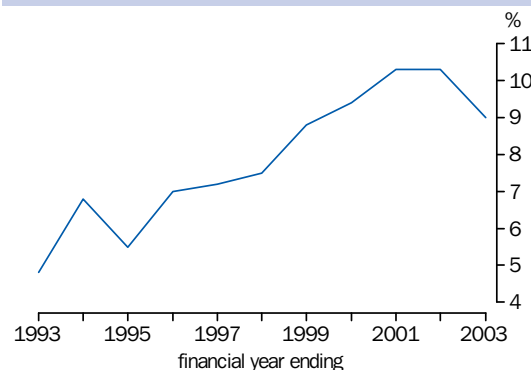
Source: Balance of Payments and International Investment Position.[5]

This indicator is affected by a range of factors aside from the openness of the economy. For instance, fluctuations in the exchange rate of the Australian dollar and changes in the tastes of domestic consumers can also result in changes in the relative prices of Australia's exports and imports. These movements can significantly affect the volume and change the relative importance of different imports, which in turn can have an impact on the indicator. Capital imports tended to increase at a much slower rate than consumption imports over the decade. The nominal value of machinery and industrial equipment imports increased by about 102% between 1992–93 and 2002–03, for example compared with a 165% increase in the value of imported household electrical items and a 225% increase in the value of motor vehicle imports.

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.[6] To measure this aspect of progress in openness, we look at the ratio of foreign investment in Australia to gross domestic product, shown in the graph. The value of incoming foreign investment transactions generally rose over the period 1992–93 to 2000–01 but appears to have peaked and has fallen since.

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 15.6% in 1988 to around 5% a decade later.[7] Multilateral and bilateral trade negotiations have played an important part in this gradual dismantling of border protection.

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 some control over its operations

◆ portfolio investment — refers to equity and debt transactions which, unlike direct investment, do not offer the investor any control over the operation of the enterprise

◆ other investment — transactions not included as direct or portfolio investment, such as trade credits.[8]

In June 2003, portfolio investment accounted for 54% of total foreign investment levels in Australia. Direct investment made up another 26%.

The industries recording the highest levels of foreign liability at the end of June 2003 were Finance and insurance, and Manufacturing.[8]

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 increased more than fivefold between 1992– 93 and 2002–03 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, increased relatively quickly between 1992–93 and 2002–03.

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.

Various other factors have contributed to increased openness in Australia. These include changes in the composition of the economy and the rate of technological improvement in different industries within the economy.

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 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 2003, *Australian System of National Accounts 2002–03*, cat. no. 5204.0, ABS, Canberra.

2 Reserve Bank of Australia, *Reserve Bank of Australia Bulletin 2003*, RBA, Sydney.

3 Productivity Commission 2001, Trade and Assistance Review 2000–01, Annual Report Series 2000–01, AusInfo, Canberra.

4 Lloyd, P.J. and MacLaren, D. 1998, Measures of Trade Openness Using CGE Analysis, Research Paper No. 659, The University of Melbourne, Melbourne.

5 Australian Bureau of Statistics 2004, Balance of Payments and International Investment Position, cat. no. 5302.0, ABS, Canberra.

6 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.

7 Australian Department of Foreign Affairs and Trade 1999, Regional trends in tariffs, Canberra <http://:www.dfat.gov.au/events/apec99/ regional_trends.html> last viewed 13 March 2002.

8 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 (inefficiencies known as 'menu costs'). 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 — 1993 to 2003

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.

CPI, percentage change from previous year
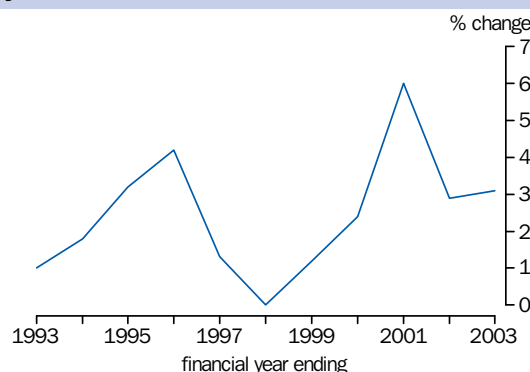
Source: Consumer Price Index, Australia, cat. no. 6401.0.

## DFD index, percentage change from previous year
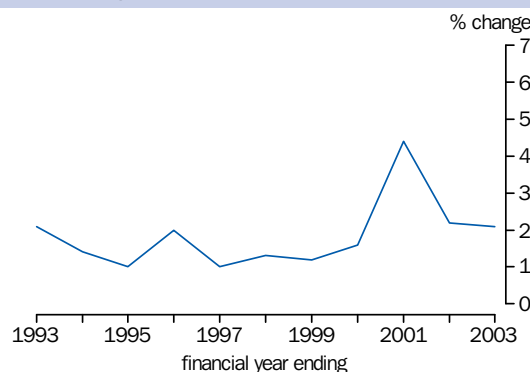
Source: Australian System of National Accounts, cat. no. 5204.0.

The graphs above show percentage changes in the CPI and DFD indexes for 1992–93 to 2002–03. The introduction of The New Tax System (TNTS) saw a large increase in both indexes between June 2000 and September 2001, the majority of which occurred in the September quarter of 2000. However inflation, excluding volatile items and price movements due to changes in tax regimes, is thought to have stayed relatively low during this period.

Trends in inflation — 1950 to 2003

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 and has remained at relatively low levels into the early 2000s.

Chain price index of total final consumption expenditure, change from previous year
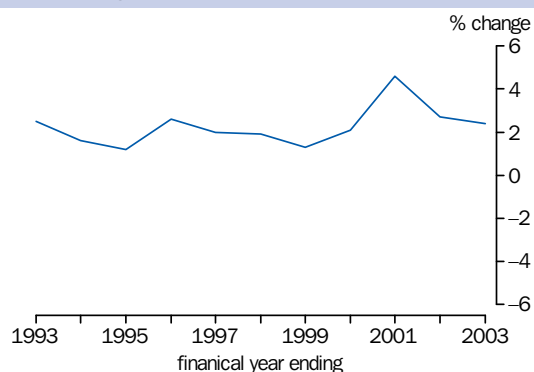
Source: Australian System of National Accounts, cat. no. 5204.0.

Chain price index of total gross fixed capital formation, change from previous year
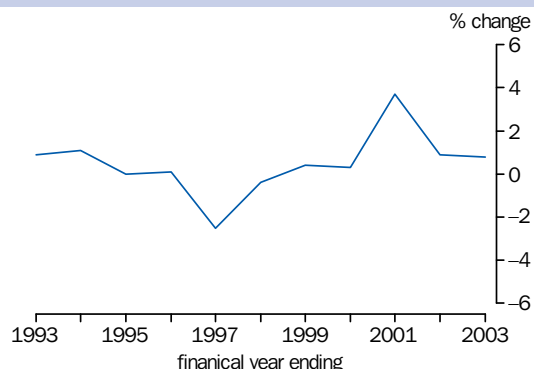
Source: Australian System of National Accounts, cat. no. 5204.0.

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 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 compared to the percentage change movements 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 to inflation during the 1990s. Fuel costs rose by 12.2% during the year ended December 1999, due to a substantial rise in the international price of crude oil.[4] The introduction of TNTS 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.

House prices have fluctuated during the past decade. The first half of the 1990s saw both upward and downward movements in the prices of established houses. During the late 1990s, house prices tended on average to increase and the rising trend has continued into the early 2000s, but at an accelerating rate from 2001 to 2003.

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.[5]

The inflation rate has started to rise again in the 2000s, due mainly to price increases in domestically produced goods and services, but these price increases were dampened to some extent in 2003 by the appreciation of the Australian dollar.

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, *The Economy and Financial Markets,* RBA Bulletin, February 2000, RBA, Sydney <http:www.rba.gov.au/ PublicationsAndResearch/Bulletin/bu_feb00/ bu_0200_1.pdf> last viewed 14 March 2002.

5 Reserve Bank of Australia 2000, *Australian Macroeconomic Performance and Policies in the 1900s*, RBA Conference Volume 2000 <http:// www.rba.gov.au/PublicationsAndResearch/ Conferences/2000/GruenStevens.pdf> last viewed 14 March 2002.

The natural landscape

In the first issue of *Measures of Australia's Progress*, separate headline progress dimensions of *Biodiversity*, *Land clearance*, *Inland waters* and *Land degradation* were presented along with supplementary dimensions entitled *Invasive species* and *Land use*. In this issue those dimensions have been combined into one headline dimension *The natural landscape*.

The Australian landscape comprises Australia's land and water and the native and introduced plants and animals that rely on them. The three 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. And changes in biodiversity (such as the clearing of native vegetation) can lead to land degradation and a decline in the health of inland waterways.
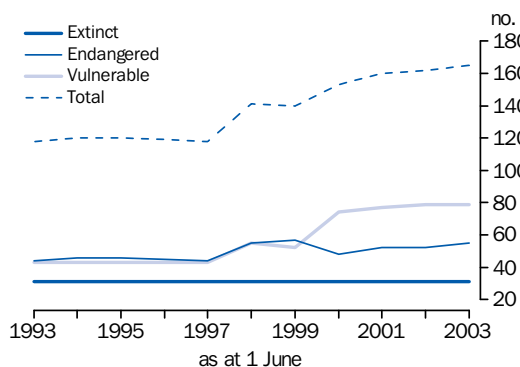
The commentary that follows comprises four subsections:

◆ 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 the area of land in conservation reserves and action that is being taken to protect Australian biodiversity.

◆ Invasive species: An invasive species can be defined as a species occurring as a result of human activities (deliberate or accidental) outside its accepted normal distribution, which threatens valued environmental, agricultural or personal resources by the damage it causes. Invasive species include both foreign and native plants and animals. Not all introduced species (foreign species or those living in one part of Australia but native to another) are invasive: that is not all such species threaten valued resources by the damage they cause. The introduction of invasive species is a continual process, and they are an environmental, social and economic problem. Invasive species occur in all habitats, and many invasive plants and animals are increasing in number and spreading across Australia. They exert a major pressure on biodiversity, and can degrade the land and harm water quality. No headline indicators are presented, but the commentary includes information on the spread of exotic weeds and mammal species.

◆ 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. 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. 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, much of it from outside of the Australian Bureau of Statistics. Two important sources of information, which we have used considerably, are The State of the Environment Report for 2001, and various publications from the National Land and Water Resources Audit. These are two of the most significant sources of detailed environmental data for Australia.

The natural landscape: key points

Biodiversity: Extinct, endangered and vulnerable birds and mammals(a)

- Extinct
- Endangered
- Vulnerable
- Total

no.
180
160
140
120
100
80
60
40
20

1993 1995 1997 1999 2001 2003

as at 1 June

(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 1993 and 2003 the number of terrestrial bird and mammal species listed as extinct, endangered or vulnerable rose by 40% from 118 to 165.

Biodiversity: Annual area of land cleared (hectares)

- Forest Conversion
- Total

'000 ha
500
400
300
200
100
0

1991 1993 1995 1997 1999 2001
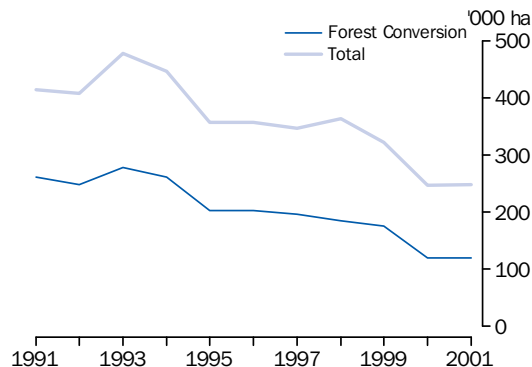
Source: National Greenhouse Gas Inventory, Australian Greenhouse Office 2003.

Although land clearing continued, the rate of clearance decreased by about 40% between 1991 and 2001. Estimates indicate that about 248,000 hectares (ha) of land were cleared in 2001, around 70% 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: Threatened bird and mammal species, 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 Australian birds and mammals; and the clearing of native vegetation.

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. 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.

Land clearing is a key threat to biodiversity.[1] 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

Threatened species trend, proportion of bioregions; Area of land in conservation reserves.

Some differences within Australia

The 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. More than 70% of land cleared in 2001 was in Queensland, but this is likely to reduce as a result of recent policy initiatives by the Australian and Queensland Governments.

Links to other dimensions

See also the commentaries *The natural landscape — invasive species*, *land and water*, *Oceans and estuaries*, and *National income*.

The natural landscape: key points

### Salinity, assets at risk in areas of high potential(a) — 2000
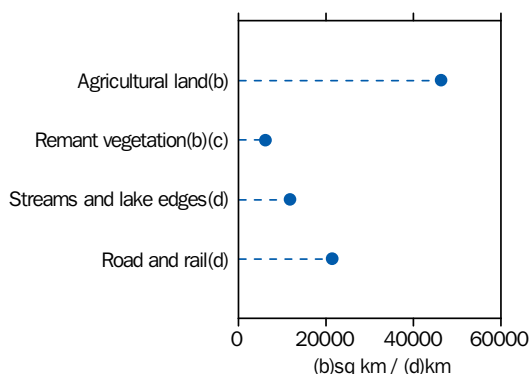
(a) The National Land and Water Resources Audit (NLWRA) defines land as having a high potential to be affected by salinity if groundwater levels are within two metres of the surface or within two to five metres with well demonstrated rising watertables. (c) includes planted perennial vegetation.

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
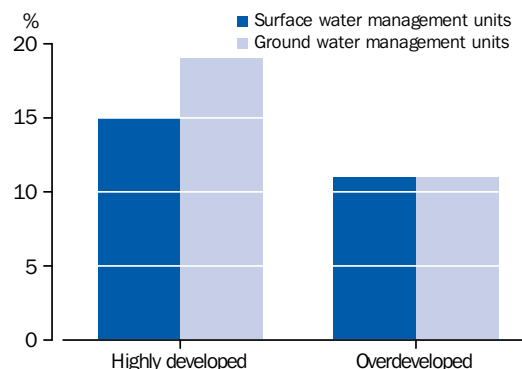
(a) Australia has 325 surface water management areas, based on the country's 246 river basins, and 538 groundwater management units (hydrologically connected water systems). (b) A highly developed water source is one where 70%–100% of the sustainable yield of water is extracted. An overdeveloped water 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. About one-quarter of Australia's surface water management areas are close to, or have 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: Land degradation and water management areas used sustainably	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 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 be sustainable.
Land and water: Other indicators	Water diversions: Murray-Darling Basin; River condition biota index; Net water use; Dams greater than 100 gigalitres; River environment index; Native forest area.
Some differences within Australia	More than half of Australia's dryland salinity problems are predicted to occur in Western Australia by 2050, 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 — invasive species*, *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, are valuable to society and are globally important (Australia is recognised as one of 17 'mega-diverse' countries, with ecosystems of exceptional variety and uniqueness[2]). Most significantly, 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.

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 of which they form a part. But to measure change as comprehensively as this would be difficult, if not impossible (more than 60 core indicators for monitoring biodiversity were suggested for National State of the Environment reporting, for example[3]) and so here we focus on two indicators: changes in the conservation status of one small component of biodiversity — mammals and birds; and the annual area of land cleared.

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 threatens ecological processes and can point to a wider decline in biodiversity.

Changes to the list of threatened species should be treated cautiously. Species can be removed or added because of improved knowledge, not necessarily because they became more or less endangered. Indeed, 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 1993 and 2003 the number of terrestrial bird and mammal species assessed as extinct, endangered or vulnerable rose by 40% from 118 to 165 (of which 65 were birds and 100 were mammals). In June 2003 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 vulnerable species, but the rise in species assessed as vulnerable was much higher (84%) than those assessed as endangered (25%).

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. Figures from the National Land and Water Resources Audit suggest that, since 1788, over 700,000 km^2 (about 20%) of woodland and forest have been cleared or thinned, primarily for crops and grazing. A further 130,000 km^2 (35%) of mallee have been cleared since 1788, along with 20,000 km^2 of heath (45%), over 60,000 km^2 (10%) of tussock grassland and smaller areas of other grasslands.[4]

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 vegetation in the eastern temperate zone has been removed.[5] Relatively little land clearance has occurred outside of the high rainfall and semiarid zones, although in these areas other 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.[4]

Wildlife has declined in northern and central Australia too, 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.[6] 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 about 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.[7] 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.

Threatened species trend(a), proportion of bioregions(b)
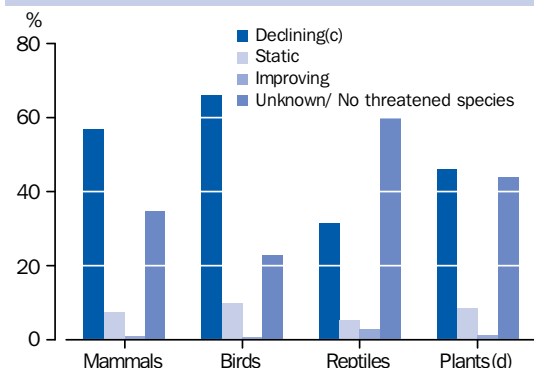
(a) Median trend in threatened species condition. (b) Australia has 384 subregions. (c) Includes the categories 'extinction' and 'rapidly declining'. (d) Vascular plants.
Source: National Land and Water Resources Audit, 2002.

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.[8] 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.

We do not know how much of this rise is because of new knowledge and how much is because of species decline, but many experts, such as those from the 2001 State of the Environment Committee believe that total Australian biodiversity declined during the 1990s.[1]

In 2002, the National Land and Water Resources Audit (NLWRA) released an assessment of Australian biodiversity.[8] They reported the status of threatened species and found that threatened species were declining in far more areas than they were improving (see box above). Some of the report's conclusions include:

◆ Over 9% of the Australian landscape was protected for nature conservation, with 67% of Australia's ecosystem diversity captured by national parks and formal reserves and a further 5% in protected areas on private land.

◆ There are 2,891 threatened ecosystems and ecological communities across Australia, with the highest concentrations in the highly cleared regions of southern and eastern Australia. Nearly half of the threatened ecosystems are eucalypt forest and woodlands with shrubby or grassy understorey that have been extensively cleared.

◆ The highest number of threatened species occurred in southern and eastern Australia from the southern highlands in Victoria and New South Wales and along the coast from Sydney to north of Brisbane.

◆ Mammal extinction has been substantial within the past 200 years, and there is evidence that the wave of extinctions is continuing: recent evidence documents major declines in the abundance in a variety of mammal species from the top end of the Northern Territory and the Kimberley region. There has been a massive contraction in the distribution of mammals in arid and semiarid areas.

◆ Populations of some species of birds have markedly declined over the past 20 years, particularly the grassland, woodland and ground nesting species.

Land clearing

The clearing of native vegetation is a key threat to Australia's terrestrial biodiversity,[1] and perhaps the most significant threat to species and ecosystems in eastern Australia.[8] 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, causes 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.

More accurate land clearing estimates

Knowing how much clearing is occurring is problematic, and the figures, from the Australian Greenhouse Office, are estimates. The figures are more accurate than those published in the first issue of Measuring Australia's Progress. Earlier figures were calculated using satellite imagery which focused on areas of significant land use change. Full continental satellite coverage is now used.

The figures used to include information about land that has been cleared for the first time as well as land that has been re-cleared. They do not distinguish between the kinds of vegetation that has been cleared — for example, whether it formed part of a healthy or a degraded ecosystem. Thus the figures cannot be used to measure the net or quality-adjusted change in vegetation cover. Both clearance and re-clearance of native vegetation have environmental impacts.

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.

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: apart from the practical difficulties of putting weights on different types of clearance, few accurate time series data are available and so we use estimates of land clearance from the National Greenhouse Inventory (NGI). The estimates include the majority of intensive clearance of native vegetation.

The estimated 248,000 ha of Australian land cleared in 2001 is 40% smaller than the 415,000 ha cleared in 1991. Of the land cleared in 2001, less than half (120,000 ha) was 'converted' (cleared for the first time), which is less than half the area converted in 1991.

Australia's botanical diversity

With over 15,500 species, Australia has more native higher plants (mainly flowering plants)[9] than all of Europe (which has 12,500 species),[10] and Queensland and Western Australia each contain around 7,500 native species.[9] New species are still being discovered, like the Nightcap Oak, a large tree discovered in 2000 in northern NSW. There are possibly 10 times the number of cryptogams (fungi, algae, lichens, mosses, etc.) than higher plants, and we have barely begun to understand them.

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.[11]

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 grassland. It is, therefore, likely to have more species than many countries by virtue of size alone. But as the table shows, 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, and about 80% of our mammals and 85% of flowering plants.[7] We have 200 species of freshwater fish, 90% of which are endemic. Also, of the 600 species of finfish found in the southern temperate zone, about 85% are found only in Australian waters.[7] Conversely groups of animals and plants found in many other countries are not found naturally here. Hooved animals, cats, canids (foxes and Dingos) 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 such species, the majority of which have not been described.[7] 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.[12]

Presumed mammalian extinctions(a) since 1788

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
Thylacine	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 Nature[7] and Mammals of Australia[13].

Seventeen species of mammals (and another 10 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.

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 Conservation Act 1999*. Ten of these species were lost in the past 100 years.

The table above 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 (and this is probably more likely for species of fish and plants than for birds and mammals because they are less well documented).

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 ten and Queensland four. The Australian Capital Territory does not maintain a list of extinct mammals, although in recent times only one 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.

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.[14]

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 and 7% in New South Wales.[14] 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.[15] Many endangered species face more than one threat. The box overleaf 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.

About 70% of land clearance in 2001 occurred in Queensland where an estimated 171,000 ha were cleared. Western Australia cleared a further 32,000 ha and New South Wales cleared 24,000 ha. Clearance in the other states and territories ranged from about 1,000 to 10,000 ha. Estimated rates of clearance before 1990 are less accurate, although the NGI 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 30% in New South Wales and the Australian Capital Territory and 60% in Victoria.[5]

Threatened species and their conservation

Dibbler

The Dibbler (*Parantechinus apicalis*) is a small carnivorous marsupial that weighs up to 120 grams. It was rediscovered after more than 80 years in 1967 at Cheyne Beach near Albany on the south coast of Western Australia. At the time of European settlement Dibblers ranged across the south-western corner of Australia but are now only found in a few scattered areas of heathland including the Fitzgerald River National Park (east of Albany), and islands off Jurien Bay (north of Perth). Scientists believe that the clearing of land and spread of the fox are in part responsible for the Dibbler's rarity. Dibblers have been bred at Perth Zoo since 1997 and have been successfully reintroduced to Escape Island, in Jurien Bay, which is free from foxes and cats. Captive-bred Dibblers are also being reintroduced to Peniup Nature Reserve, near WA's south coast, where fox numbers are controlled through baiting. [16]

Large-eared Horseshoe Bat

The Large-eared Horseshoe Bat (*Rhinolophus philippinensis*) is found in the rainforest and woodlands of eastern Queensland north of Ingham. The bats, whose ears are about one third of the length of their 6 cm long body, usually roost in caves and mines but little is known about their habits. Scientists in Queensland are working to protect the species, and are focusing on the bats' roost sites by gating off abandoned mines to allow the bats to enter and exit but prevent people from disturbing them and by building artificial caves for the bats to use. The North Queensland Mining Council are a member of the recovery team set up to protect the species and various mining and mineral organisations gave financial support to help produce a recovery plan and associated handbook about Australian bats and mines.[17]

Golden-shouldered Parrot

Golden-shouldered Parrots (*Psephotus chrysopterygius*) are closely related to the extinct Paradise Parrot. Fewer than 2000 remain, all in far North Queensland. The birds live in tropical savanna woodland and nest in termite mounds. They feed on a range of grasses, which are in short supply early in the annual wet season. The shortage can be made worse by a lack of burning in the early wet season and intense cattle and pig grazing. Altered fire patterns and grazing have also resulted in an increase in the density of woody shrubs which, it is thought, make the parrots more vulnerable to predators. Although the species declined in parts of its range between 1992 and 1998, this contraction may now have stabilised. Local landholders are working with the government to control cattle grazing, provide supplementary food and to burn at appropriate times of year. Plans are underway to reintroduce them to parts of their former range.[18]

Northern Hairy-nosed Wombat

The Northern Hairy-nosed Wombat (*Lasiorhinus krefftii*) is one of the world's rarest mammals. About 100 animals survive in 500 hectares of grassy woodland in Epping Forest National Park, central Queensland. The wombats, which typically weigh a little more than 30 kg, were more widespread at the end of the nineteenth century when populations lived in southern New South Wales and southern Queensland. But by the early twentieth century the last remaining population was at Epping Forest. Experts believe the wombat probably declined during times of severe drought when heavy grazing by cattle and sheep left little pasture for the wombats. The Queensland Parks and Wildlife Service are working with universities and other organisations to protect the species. In 2002 they built a dingo-proof fence around the wombat's habitat after dingoes killed 10 animals in 2000 and 2001. A major recovery program aims to establish a second wild population within five years.[19]

Factors influencing change

Many factors threaten biodiversity. Species are often affected by more than one threat, and one threat can affect many species. Knowledge of ecosystems and their complex relationships is limited and a decline in one species can have important consequences elsewhere.

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.[20] 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 clearance and the introduction of many exotic species, while the use of water, primarily for agriculture, has damaged the health of freshwater ecosystems.

The changes since 1788 have had far-reaching effects on biodiversity. Species interact with one another and their environment in a complicated web of checks and balances that has developed over millions of years.

A change to one part of the system can have important, sometimes unforeseen consequences elsewhere through a cascade of effects. 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 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.[8]

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.[1]

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 Nailtail 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.[1] 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.[21] 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.[22] 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.

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. But 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 17 million ha since 1997. Some ecosystems are protected better than others: the chart shows that, in 2002, 17 of Australia's 85 major biogeographic regions (IBRAs) had less than 2% of their area (down from 24 IBRAs in 1997) protected; 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).[14] 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.

A little less than two-thirds of Australian land is privately owned.[21] Efforts to protect biodiversity now extend beyond the reserve system into some of this private land. In 2003, for instance, there are about 4,500 community landcare groups,[23] while across Australia in the late 1990s more than 1,300 conservation covenants — made between private landholders and governments — helped protect 774,000 ha of mostly private land.[24] Some companies and community groups also operate conservation reserves: Birds Australia for instance now has two reserves (Gluepot and Newhaven) with a combined area of over 300,000 ha.

Proportion of ecosystems(a), area protected
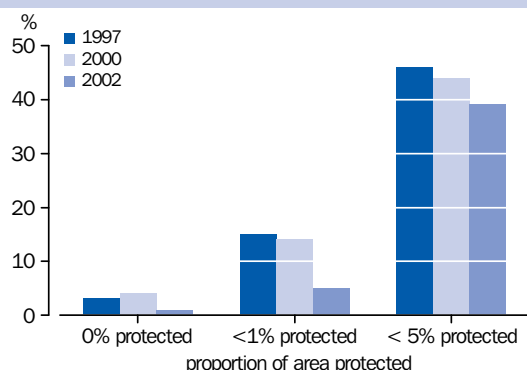
(a) Interim Biogeographic Regionalisation for Australia areas.
Source: Commonwealth Protected Area Databases.[14]

Together with land clearing, the Commonwealth list of key threats to biodiversity includes a number of invasive species such as: foxes and cats (which prey on native species); rabbits, pigs and goats (which compete for and degrade land); and dieback fungus (which is damaging whole forests). Other important threats identified include: water use, salinity, climate change, pollutants, and fishing.

Australian governments have encouraged land clearance through most of our agricultural history. Some land purchase agreements required it, taxation incentives encouraged it and agricultural departments provided advice on how to do it. But by the mid-1980s concern about the rate of loss of native vegetation had grown and governments began to establish controls on clearance.

Area under crops — 1902 to 2002

'000 ha
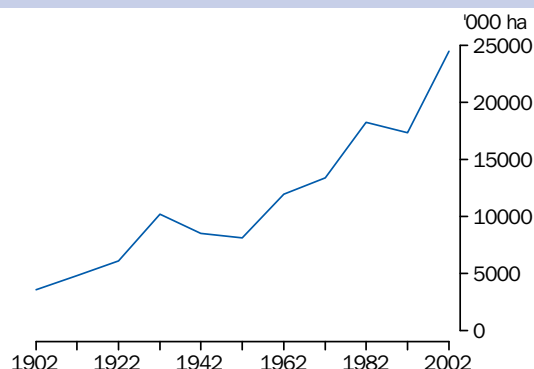
Source: Data available on request, Year Book 2001 and Agriculture, Australia.

In 2002 about 24 million ha of land were being used to grow crops and a similar area was improved pasture. These areas together represent around 10% of Australia's agricultural land and about 6% of all Australia. Between March 1992 and June 2002 the area of land used for crops increased by about 50% from 16,400 ha in 1992, although the total area of agricultural land holdings declined slightly. This reflects the intensification, rather than spread, of agriculture over the period.

Indeed, the Queensland and Australian governments have worked together to address land clearing in that State. And in March 2004, the Queensland Government introduced legislation to their parliament intended to phase out broadscale clearing of remnant vegetation by the end of 2006.

Although the growth of cities and towns has only affected land cover over a small area (less than 0.1%),[25] 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.[26]

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, with the vegetation occupying the better soil and gentler slopes cleared first. For example, 79% of the Victorian south-east coastal plain has been cleared.[5] The most intensive agricultural land clearance has occurred in areas where crops or sown pasture have been planted.

Links to other dimensions of progress

Some of the threats to biodiversity are discussed elsewhere in this publication. Headline indicators of soil degradation, inland waters, air quality and greenhouse gases each relate to areas of concern that affect our plants and animals as well as other aspects of progress. Invasive species, marine ecosystems and land use are also discussed. Another factor, discussed in the box above, is changes to the patterns of fire.

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. In northern Australia in particular, many animals depend on a certain pattern of fires for survival.

Experts think that fires have tended to be less frequent since European settlement than they were when Indigenous Australians managed the land. However, these less frequent fires have had 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, by contrast, experts believe that a higher frequency of low intensity fires can be more damaging to biodiversity than less frequent high intensity fires. Different fire regimes impact differently on different species, and scientists are only beginning to understand the importance and complexity of planning and implementing fire regimes.[27]

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)[28], 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 provision of potable water 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 — invasive species, The natural landscape — water, The natural landscape — land,* and *International environmental concerns*.

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The natural landscape — invasive species

An invasive species can be defined as a species occurring as a result of human activities (deliberate or accidental) outside its accepted normal distribution, which threatens valued environmental, agricultural or personal resources by the damage it causes. Invasive species include both foreign and native plants and animals (although not all such animals threaten valuable resources, and so not all are necessarily invasive).

The introduction of invasive species is a continual process, and they are an environmental, social and economic problem. Invasive species occur in all habitats, and many invasive plants and animals are increasing in number and spreading across Australia. They exert a major pressure on biodiversity, and can degrade the land and harm water quality.

It is difficult to conceive of a single indicator that could measure the impact of invasive species on Australia, because of the difficulty in measuring their environmental and financial cost. Few national data are available on the impact that many of the thousands of invasive species have had. Although it is difficult to assess change in this area, invasive species have had an important impact on aspects of Australian progress. This commentary discusses some of those species, together with the ways in which they have become established and what is being done to control them.

The Australian continent's long isolation from the rest of the world has endowed us with a unique set of plants and animals. Like other islands, our isolation has also made our flora and fauna susceptible to the impact of invasive species: native species have not had prior exposure to organisms like many of those that have arrived from overseas. Some invasive species thrive in Australia because the predators and parasites that controlled them at home do not exist here, while some species grow more quickly, breed more prolifically or have more varied diets than their Australian counterparts. Environmental disturbance, particularly clearing and modification of native vegetation and habitat fragmentation, is widely thought to help many invasive species to establish and spread.[1]

Animals

Many of Australia's most serious animal pests (invasive animals) were introduced deliberately, and species are still being introduced, deliberately and accidentally. The foxes, first sighted in Tasmania in early 2002, 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. Estimates published in 2002, said that 30 of the more serious animal pest species cost the economy at least $420m a year (mainly in lost agricultural production).[1]

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.[2] In other words it is a plant growing in the wrong place. Weeds (invasive plants) alone were estimated to have cost the Australian economy $3.3b each year in lost agricultural production and control costs during the early 1990s,[2] while the cost to the wider environment is virtually unknown.

Species-threatening invasive animals, number of species threatened(a)
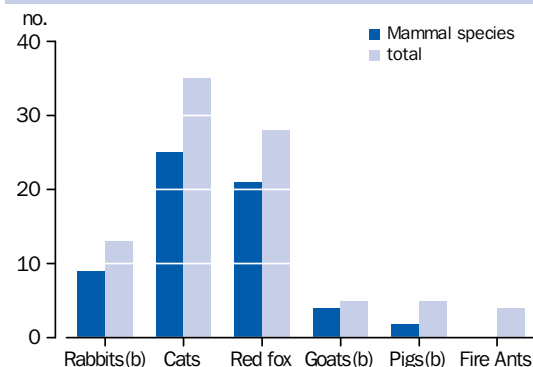
(a) Key threatening processes listed under the *Environment Protection and Biodiversity Conservation Act 1999*. Includes subspecies. Species threatened on Christmas and Norfolk Islands are excluded. (b) The threat includes associated threats such as land degradation.
Source: Threat abatement plans, Department of Environment and Heritage, Australia, January 2004.

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 2004, cats were listed as threatening 25 mammals and 10 bird species with extinction, while foxes threatened 21 mammals and seven bird species.

In 2004, 26 mammals, 20 birds, four reptiles, one amphibian and at least 23 freshwater fish species introduced from overseas were established in Australia,[1,3] along with about 2,000 plants.[4] The abundance and range of a number of native animals and plants have also changed because of human activity. Not all of these species are invasive or widespread now, but many have the potential to become invasive.

Some invasive species from overseas

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 and into the Northern Territory, and have reached Kakadu. They eat mainly insects, but also frogs, small mammals and snakes. And because they are poisonous, they kill many animals that prey on them such as goannas, quolls (tiger cats);[1] and some birds (although certain birds are learning to kill the toads and eat their organs while avoiding the poisonous glands).[5]

Rabbits have at times reached plague proportions over much of Australia, competing with native animals for resources, overgrazing vegetation and digging holes which damage soil structure.

Goats strip vegetation, erode slopes and compete with rock wallabies for food and shelter. Donkeys and pigs cause erosion and spread weeds (pigs also eat rare plant species).Commercial honeybees are an invasive insect, found in nearly every habitat.[6] They compete for nectar with native insects as well as birds and mammals from which they also take nestholes.

Exotic mammal species established in the wild and bioregions affected, 2002

Species	No. of bioregions
House Mouse	76
Polynesian Rat	2
Brown Rat	32
Black Rat	58
Five Striped Palm Squirrel	1
Dingo	76
Red Fox	60
Cat	85
Ferret (Polecat)	4
European Rabbit	67
Brown Hare	31
Brumby (Horse)	59
Donkey	40
Pig	51
Dromedary Camel	21
Water Buffalo	13
Bali Banteng	1
Cattle	63
Goat	44
Sheep	48
Fallow Deer	21
Red Deer	16
Rusal Deer	15
Sambar	19
Chital	2
Hog Deer	3

Source: The National Land and Water Resources Audit, Australian Terrestrial Biodiversity Assessment 2002.

At least 26 exotic mammal species were established in Australia at the start of 2002. Some, like the House Mouse, Cat and Dingo are found throughout the country's 76 mainland bioregions. Others, like the Polecat and Polynesian Rat have a much more localised distribution but have a high risk of increasing their range to the detriment of indigenous wildlife.

All states and territories have populations of fish introduced from overseas. Thirty-five exotic fish species have become established in inland waters, with eight identified as having a significant effect. Many exotic fish species continue to increase in range and abundance. Programs to eradicate exotic fish species are being attempted in some areas.[7] And exotic marine animals (often introduced into coastal waters from ships' ballast or riding on hulls), have entered and disrupted native food chains, and can dominate local communities.

Other introduced organisms, such as dieback fungus (*Phytophthera cinnamomi*), invade plant communities, killing selected species, and disrupting ecological processes. Dieback is the most important threat to the biodiversity of the Stirling Range National Park in Western Australia. Some plants (such as banksias and grevilleas) are highly susceptible, and 80% to 100% of infected individuals may die. The exposed ground is often invaded by weeds.[8]

Native species which are invasive

Outside their natural range or in increased numbers, native species may be as serious a threat to biodiversity as exotic ones. Many are spreading and increasing in abundance because of recent human activity. Plant species native to one part of Australia have been introduced to other parts where they have become invasive. For example, the Sweet Pittosporum, a rainforest tree from south-east Australia, now grows wild in Western Australia, South Australia and western Victoria, invading open woodlands and shading out rare plants.[6]

Large areas of grass and crops, together with more watering points, have encouraged Galahs, for example, to expand their range and colonise much of Australia. Galahs compete for nest sites with birds native to the area, like Carnaby's Cockatoo, an endangered black cockatoo from south-west Western Australia.[8]

Weeds — invasive plants

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.[2] 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.

About 350 weed species in Australia have been declared noxious.[9] To help focus national efforts addressing the weed problem, a 'Top 20' list of 'Weeds of National Significance' has been compiled (see table on next page).

Weeds of national significance, distribution — 1999

		Distribution in 1999
Common name	Origin of weed	'000 km²
Alligator weed	Argentina	30
Athel pine	North Africa, Arabia, Iran and India	80
Bitou bush/Boneseed	South Africa	231
Blackberry	Europe	691
Bridal creeper	South Africa	385
Cabomba	United States of America	35
Chilean needle grass	South America	14
Gorse	Europe	233
Hymenachne	Central America	73
Lantana	Central America	389
Mesquite	Central America	410
Mimosa	Tropical America	73
Parkinsonia	Central America	950
Parthenium	Caribbean	427
Pond apple	The Americas and west Africa	27
Prickly acacia	Africa and Asia	173
Rubber vine	Madagascar	592
Salvinia	Brazil	383
Serrated tussock	South America	171
Willows	Europe, America and Asia	63

Source: Weeds Australia 1999;[2] Thorp and Lynch 2000.[10]

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.[11] 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.[7] 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 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.

A history of introductions

Despite Australia's isolation, over millions of years species have arrived naturally from elsewhere in the world. Birds have flown here, and seeds have been carried by ocean currents or blown by the wind. But since European colonisation, the rate of invasion has changed: thousands of foreign animals, plants, insects and fungi have arrived and become established since 1788, compared to an estimated rate before that of one or two species per millennium.[6]

Exotic mammals have existed in Australia for a long time. Dingos, which were bred from wolves in Asia, first arrived in Australia some 4,000 years ago, probably brought here by people from Indonesia.[6] Experts are still debating whether cats arrived in Australia before Europeans.

However, the vast majority of foreign species have arrived since European colonisation. Many were introduced deliberately. Early settlers brought species like pigs and blackberries with them. They released the animals into the wild and sowed seeds as they travelled to provide a source of food for those who followed them. Rabbits and foxes were introduced to be hunted for sport. And the 'acclimatisation societies' of the nineteenth century introduced animals which became pests, like sparrows, starlings and carp, to enrich Australia's native fauna.

Controlling invasive species

The problems caused by invasive organisms are widely recognised and work is being done to combat them. Effort for invasive plants is being focused through the *National Weeds Strategy*, which was released for the first time in 1997 and updated in 1999. It lists 20 weeds of national significance and another 28 species that pose a potential threat to biodiversity. Threat abatement plans have also been developed for the fox, rabbit, cat and goat to combat their threat to endangered native species. And a threat abatement plan for dieback fungus was adopted in late 2001 to assist in addressing this major threat to biodiversity.[12]

The Australian Quarantine and Inspection Service (AQIS) continues to develop new ways to prevent potentially invasive species from entering this country. For instance, it is working closely with Torres Strait Islanders to reduce the risks of invasive species entering the country across the Torres Strait, while AQIS scientists monitor our northern shores searching for new introductions. AQIS officers also work overseas helping neighbouring countries to control species before they spread to Australia.

Biological control, which involves introducing parasites, predators or diseases, can reduce populations of invasive species. Myxomatosis and calicivirus have helped reduce rabbit numbers in many parts of Australia. And in 1994, 16 Dingos were released onto Townshend Island, central Queensland to control goats. By 1996 all but four of the island's 1,700 goats had died.[6] However, while biological control can be very effective (such as against prickly pear in the 1930s) it can also fail. When used against weeds for example, it failed to produce significant benefits more than three-quarters of the time.[2] Worse than simply not working, the new control species could potentially become a pest species itself, as happened with the Cane Toad: all introductions are now handled more carefully and extensively researched before they are released.

It is often difficult to use poisons or herbicides to control invasive species without harming native species as well: poison baits, for example, used to kill cats or foxes, can easily be eaten by native wildlife. But certain poisons can be effective in targeting the right animals. Some native animals have evolved an immunity to a poison called 1080 which is found in native plants of the genus Gastrolobium in south-west Western Australia. This poison has been successful in significantly reducing fox numbers in parts of Australia, although native animals in some places (especially areas far from south-west Western Australia) have little or no immunity to the poison and can also be affected.

Some of our native species are beginning to adapt to life with invasive plants and animals. Wedge-tailed Eagles and other raptors feed frequently on rabbits in parts of Australia, while house mice are an important part of the diet of Barn Owls in parts of the country.

Some endangered birds and mammals are beginning to depend on weeds for shelter (such as the Black-Breasted Button Quail which now live in lantana thickets).[6] Trout were introduced as game fish, and an American minnow, commonly known as the Mosquito Fish, was introduced in the hope it would eat mosquito larvae and rid our cities of mosquitoes.

The Cane Toad was introduced in the 1930s to help sugar cane farmers to control a native beetle that was eating their crop. The toad had little effect on the beetle, but it has had a very significant impact on many native species. And research agencies have introduced many foreign grasses as pasture, some of which have become major weeds.

Continuing threats

Research agencies and pastoralists continue to introduce foreign grasses and legumes in an attempt to make rangelands more profitable. Between 1947 and 1996, for example, over 460 exotic plant species were introduced as pasture. Only 5% of these have proved useful as fodder, yet 13% have become major weeds, including Para Grass, which has spread into Kakadu National Park, reducing habitat for water birds.[8]

The Department of Agriculture, Fisheries and Forestry has set up a risk assessment process for invasive species. This assesses the potential invasiveness of species that people want to bring into Australia, to try to prevent the importation of further invasive species.[13]

However, nurseries and garden centres still sell many species of recognised weeds, and garden plants comprise many of the top 20 worst weeds and are the main management problem in some national parks.[6] For example, Rubber Vine from Madagascar now smothers large areas of woodland and forest (its current distribution is some 600,000 km^2, but it could potentially spread over five times that area).[10]

The pet trade imports millions of live fish each year, some of which carry diseases that can infect native species. Exotic aquarium fish, plants and snails have entered our waterways, sometimes after owners have dumped them, or when ponds overflowed. Two of the top 20 worst weeds, Cabomba and Salvinia, are aquarium plants.[6]

Australia's growing trade links with the rest of the world provide a threat. Because Australia exports so many bulk commodities, we are a net importer of water carried as ballast by ships, water which has originated in other parts of the world and carries foreign plants and animals. Some, like the Northern Pacific Seastar, which eats oysters, mussels and other sedentary species, are having a major impact on our waters.[7] Ships also carry barnacles from around the world, while insects, spiders and reptiles arrive in cargo crates.

New threats

Foxes in Tasmania

In early 2002 there was evidence that the fox was becoming established in hitherto fox-free Tasmania, after illegal introductions. If established the fox could threaten the survival of several animals that are either extinct or endangered elsewhere in Australia. In February 2002, the Tasmanian Parks and Wildlife Service estimated that up to 20 foxes might be living on the island and a campaign was underway to remove them.[14]

Between January 2002 and January 2004, the Fox Taskforce received over 650 reports of fox sightings, more than 100 of which were classed as 'highly credible'. Fox footprints and scats have been found, a fox was shot and another was hit by a vehicle near Burnie. In July 2003 the Fox Taskforce began a large baiting program around fox 'hotspots'; in the north, north-west and south of the island. Around 13,000 fox baits were laid by December 2003, effectively covering about 260,000 hectares of Tasmania.

A reduction in evidence and sightings from areas that have had repeat baiting programs in late 2002 and 2003 has been seen. Baiting is expected to recommence in April 2004.[15]

Fire Ants

Fire Ants were recorded in Australia for the first time in February 2001 when they were found in Brisbane. By February 2002 the ants had been found on several hundred properties around Brisbane. Because the ants can be transported in soil or machinery, a national eradication program is trying to destroy them before they become more widely established.

These ants, which have been described as the greatest ecological threat to Australia since the rabbit, could potentially spread to most of the major coastal cities and throughout the tropical north. The ants are aggressive and will feed on small ground fauna including insects, frogs, lizards, birds and mammals. They usually nest on the ground, but often infest (and so damage) electrical equipment (causing fires) and machinery. In the United States of America (where fire ants are an invasive species), the Federal Department of Agriculture reports that the ants attack and sometimes kill newborn domestic animals, destroy crops, and damage and sometimes kill young citrus trees. Their painful bites give people blisters.

By June 2003, 650 people from the Queensland Department of Primary Industries were working on Fire Ant eradication and the species seemed to be under control, with 98% of affected properties in South East Queensland now Fire Ant-free, although people were still being asked to remain alert.[16]

Exotic Ants

At the end of 2003 nine species of exotic ants were discovered in the Tiwi Islands off the coast of northern Australia in significant numbers. Although the ants have been living in Australia for the past hundred years their populations have recently reached a size at which they are starting to spread rapidly. The ants, which cause problems similar to Fire Ants (see above), present a significant social, economic and environmental threat to the Aboriginal communities living in the affected areas. Three species — the African Big-Headed Ant, the Ginger Ant and the Singapore Ant — are causing particular concern. Meanwhile another species, the Yellow Crazy Ant had invaded north east Arnhem Land, and had the potential to spread to Broome. CSIRO are working with the Northern Land Council and Tiwi Land Council to control the pests.[17]

International travellers can carry foreign seeds on their clothing, and those travelling within Australia move native and non-native species around on their cars, while diseases such as Dieback Fungus have invaded reserves on road building machines.[6] And exotic diseases, such as the virus which killed very large numbers of pilchards in our southern waters during the mid-1990s, are difficult to detect and can enter the country in a variety of ways.[6]

Links to other dimensions of progress

Invasive species have had significant impacts on Australian biodiversity. Weeds have affected agricultural productivity, have contributed to salinity and have affected the quality of our freshwater ecosystems. As the health of those ecosystems has declined, some foreign fish have been able to out-compete native species. Animals such as rabbits, pigs and goats have caused erosion and grazed heavily on native vegetation.

Many invasive species appear to do best in a disturbed environment, and land clearance is recognised as helping many invaders to spread. Gardeners and agriculture have also been responsible for the introduction of many invasive species from overseas.

See also the commentaries *The natural landscape — biodiversity, The natural Landscape — inland waters, Oceans and estuaries*, *National income*, and *Competitiveness and openness*.

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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. 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.

There are several forms of soil degradation in Australia. The natural acidity and salinity of some of our soils have been exacerbated by the way we use the land. Soil is eroded by wind and water or can be compacted. 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. 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, the impacts of which are wider than lost agricultural production and include damage to water resources, biodiversity, pipelines, houses and roads.[2] Dryland salinity is a widespread form of soil degradation. It is linked to other forms of degradation such as soil erosion, is expensive to rectify and adversely affects agricultural or pastoral yields on about 3.3 million ha,[2] compared to 5.7 million ha judged to have a high potential to develop salinity.[2]

Some of the practices that have led to salinity have raised agricultural production and brought economic benefits. But, once established, salinity can have adverse effects on agriculture. 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 water damages bitumen and concrete.[2] In 2000 some 1,600 km of rail, 19,900 km of roads and 68 towns were at risk of damage from salinity.

By 2050 some 5,100 km of roads, 67,400 km of rail and 219 towns are predicted to be at risk. About 11,800 km of streams and lake perimeters are at risk now, a figure predicted to rise to 41,300 km by 2050.[2] 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.[3]

Salinity

Australia's soils are old and shallow, and are susceptible to degradation by agricultural activities. Salinity occurs when the water table rises, bringing natural salts to the surface (in sufficient quantity, these salts are toxic to most plants). When trees or other deep-rooted vegetation are replaced with vegetation that uses less water, the water table may rise to cause dryland salinity. (If the water table rises through increased irrigation then irrigation salinity can occur. While irrigation salinity is well understood and managed, dryland salinity is more difficult to remedy.[2])

Analysts often discuss the on- and off-farm costs of degradation. The NLWRA estimates lost yield from dryland salinity to be about $190m in 2000. Off-farm costs are much more difficult to estimate, but the NLWRA suggests that by 2020 the annual costs of salinity arising from damaged infrastructure and declining water quality might amount to some $700m, without attempting to take account of any costs associated with damage to biodiversity.[1]

Impacts of salinity

For many farms affected, dryland salinity has meant loss of productivity and income. There are 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).[1]

Rising groundwater levels and the salt contained in the water damage road pavement, bitumen and concrete, while pipelines and other structures can also be affected. 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]

Australia's responses to salinity

Salinity is difficult to slow, halt or reverse.[2] In southern Australia key responses include improving the water balance (through farming techniques or revegetation), draining or intercepting and evaporating salty groundwater, or living with salinity and implementing saline agriculture and aquaculture. In 2002 nearly 30,000 farms had implemented salinity management practices: some 3.2 million ha of crops, pasture and fodder were planted for salinity management along with 776,000 ha of trees; about 446,000 ha of land was fenced to manage salinity and over 200,000 km of earthworks (banks, levees and drains) had been built. Just over 7,000 irrigated farms had made changes to irrigation practices for salinity management.[3]

Different strategies suit different regions because salinity control invariably involves trade-offs between social, financial and environmental goals. And better understanding of salinity provides an opportunity for forestalling problems in northern Australia.

Cattle and sheep numbers

million animals

— Cattle
— Sheep
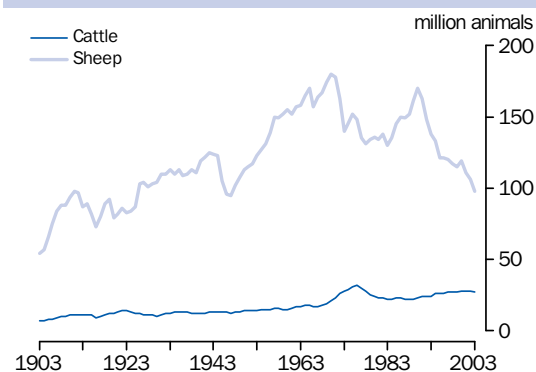
Source: Data available on request, Agricultural Censuses.

Land use: Agriculture

Agriculture is the major form of land use in Australia. In 2002, 58% of Australia was used for agricultural activity: 3% for crops, 3% for pastures and grasses[4], 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 depend on the crops grown and farming practices used. While 24 million hectares (ha) of Australian land were used for growing crops in 2002, far more of Australia was used for grazing sheep and cattle.[4]

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.[5] There is now a growing appreciation of the effects of changes in land use on central, western and northern Australia.

The pastoral industry covers about half of the continent. Numbers of cattle have increased almost four-fold since 1903, from 7 million cattle to 27 million in 2003. Numbers of sheep were 80% higher in 2003 than they were in 1903 (about 98 million sheep in 2003 compared to 54 million in 1903). But sheep numbers in 2003 were considerably lower than periods in the 1960s, 1970s and late 80s. The national flock peaked in 1970 at almost 180 million animals.

Grazing by stock 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).[6]

Altered fire and hydrological regimes and invasive species (including exotic grasses introduced in an attempt to improve pasture) have had potentially significant effects on the biodiversity of arid and semi-arid Australia. Increases in the number of large herbivores 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.

Australian land use, 2001

in Australia

- Nature conservation
- Other protected areas including Indigenous uses
- Minimal use
- Livestock grazing
- Forestry
- Dryland agriculture
- Irrigated agriculture
- Built environment
- Waterbodies not elsewhere classified

0   750km

© Commonwealth of Australia 2001
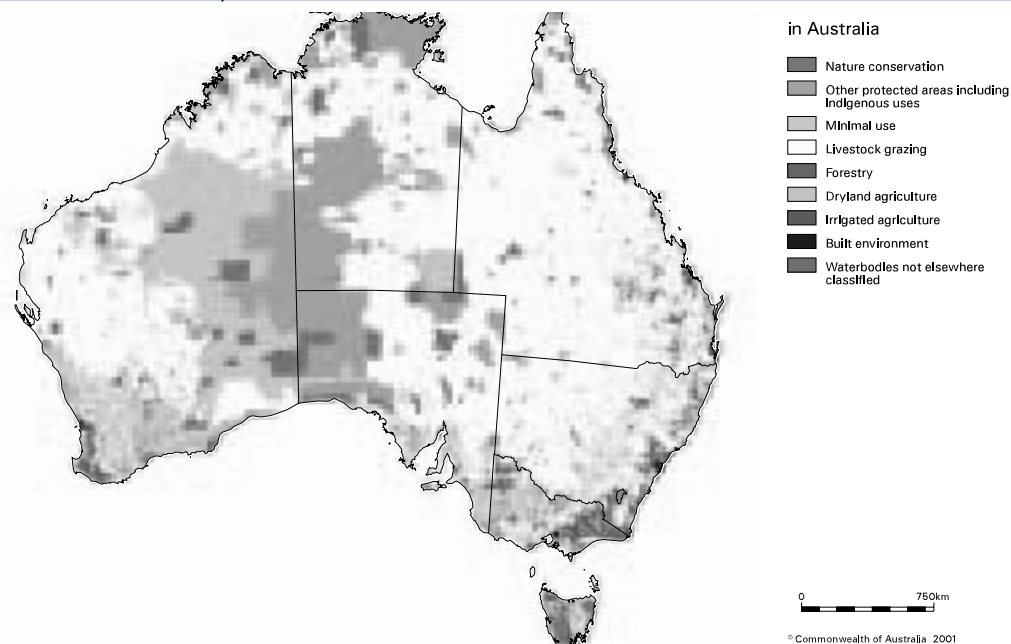
Native forest tenure — 2003

	Area	
	Million hectares	%
Public multiple-use forests	11.4	7.0
Other crown land	13.1	8.1
Nature conservation reserves	21.5	13.2
Leasehold	75.6	46.5
Private	38.9	23.9
Unresolved tenure	2.1	1.3
Total area	**162.7**	**100.0**

Source: National Forest Inventory.[7]

Land use: mining

There are many mines throughout Australia, though less than 1% of our total land area is used for mining or by mining leases.[8] Some sites are affected by land clearance or waste disposal, while the roads and infrastructure that provide access to remote mines have also had an impact on the environment.[8] Pollution from mine sites can affect the air, water and land, and some of the toxic compounds used to extract minerals at mines are a particular concern.

It is difficult to assess changes in the effects of mining on the Australian environment over recent years, but the mining industry has taken steps to reduce its impact on the environment. In 1996, for example, the Minerals Council of Australia instituted a self-regulating environmental code of practice to provide effective monitoring and reporting of mine site and mineral processing operations. Forty one companies had signed up to the revised code by July 2002, who together accounted for 300 operations and 92% of Australia's mineral production.[9]

Land use: native forests

In 2001 there were an estimated 163 million ha of native forest in Australia. More than 12% of this forest was in nature conservation reserves. The majority of native forest in Australia was eucalypt forest (nearly 80%), with acacia forest accounting for another 10%. [7]

Plantation forests

Plantation forests are an important source of timber. In 2001–02, 60% of the $1.3b worth of logs taken to saw mills or exported came from plantations.[7] When planted on land that was previously cleared, plantations can bring environmental benefits, such as lowering the water table (and hence reducing salinity) or reducing erosion.

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.

Regional Forest Agreements

Regional Forest Agreements (RFAs) are a significant recent change in the management of Australian forests. RFA s were entered into between the Commonwealth Government and state governments to try to guarantee access to forest resources and set up an adequate, comprehensive and representative reserve system for the biological diversity of Australian forests.

As part of the process, old-growth forests were mapped systematically and comprehensively for the first time.[5] RFAs have led to an increase of about 1.7 million ha of forest area included in conservation reserves between 1997 and 2002.[7]

The process has attempted to balance conservation with social and economic concerns. Some people still believe that all logging in old-growth forests should be stopped, while others believe that too much land is now protected from commercial harvesting.

Our forests are an important carbon sink (i.e. they absorb the greenhouse gas CO_2, as discussed in the *Greenhouse gases* commentary). They are used for many purposes, including recreation, biodiversity conservation, timber harvesting (the forestry industry and associated wood and paper manufacturing are important sources 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.

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.[10] 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.[11] Suitable large hollows tend only to develop in trees older than 150 years, but sections of forests are typically logged every 55–120 years,[11] 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.[12]

Assessing change in forest areas during the 1990s is difficult. Although the National Forest Inventory released data for Australia's forest area in several years, changes between years come from a range of factors, particularly from improvements in mapping, as well as actual change in forest area.

Areas with high potential to develop dryland salinity

	High potential 2000	High potential 2050
	ha	ha
NSW	181 000	1 300 000
Vic.	670 000	3 110 000
Qld.	not assessed	3 100 000
SA	390 000	600 000
WA	4 363 000	8 800 000
Tas.	540 000	90 000
Other	minor	unknown
Aust.	**5 658 000**	**17 000 000**

Source: National Land and Water Resources Audit.[2]

Some differences within Australia

More than half of Australia's dryland salinity problems are predicted to occur in Western Australia (the south-west of the State in particular, one-third of which is predicted to be at risk by 2050).[2] Much less land is currently affected by salinity in Victoria and Queensland, although in both states it could rise to over 3 million ha by 2050.

Northern Australia has far less dryland salinity than temperate Australia, although experts believe it is not necessarily immune to the problem.[2]

Improved land management

The 2001 *State of the Environment* report concludes that the response to the continued pressures on Australian landscapes is improving, although it is too early to know whether it will result in an improvement in land condition.[5]

Since the late 1990s there has been substantial investment in Landcare and Bushcare programs. Landholder and community groups plant many millions of trees each year and, in 2000–01, more than 50% of farmers participated in some type of landcare activity.[13] Volunteers work around the country such as those working on the *Paddock Adoption Program* at Calperum and Taylorville stations near Renmark in South Australia. The stations cover over one-third of the 900,000 ha Bookmark Biosphere reserve, which is managed by a partnership of government, non-government and private landholders.[14] The volunteers' work, which involves activities including fox and goat control, helps protect threatened species like the Mallee Fowl.

By 2001, two-thirds of grain farmers had adopted land management practices aimed at preventing land degradation.[5] Surveys indicate that farmers now plant or protect trees primarily for shade, environmental conservation or land rehabilitation, and not for commercial purposes.[5] And more than 7.5 million ha of Australian farmland are managed organically.[5]

Factors influencing change

Australia's soils are, in places, naturally saline. But 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 very 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.

Links to other dimensions of progress

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.)

Some 630,000 ha of native vegetation are at risk already from salinity, and this is predicted to rise to more than 2 million by 2050.[2] This degradation of both water and native vegetation will impact upon biodiversity in affected areas. In Western Australia for example, some 450 endemic plant species are threatened with extinction from salinity,[1] while Western Australia's Conservation and Land Management department has estimated that there has already been a 50% decline in waterbird species using wetlands in the Western Australian wheatbelt because of the death of vegetation due to salinity.[15]

Land clearance can lead to soil erosion and, when it results in a changing water balance, it leads to dryland salinity. Soil erosion, which is also linked to overgrazing from both livestock and invasive species such as rabbits and goats, can cause fine particle air pollution.

See also the commentaries *National income*, *National wealth*, *The natural landscape — biodiversity*, *The natural landscape — inland waters*, *The natural landscape — invasive species*, *Oceans and estuaries* and *The human environment*.

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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.

Some 80% of Australia is classed as semiarid, making this the driest inhabited continent. But our low population density means we have more water than many countries in per-capita terms.[1] However, we also have one of the world's highest levels of water consumption per head,[2] and water supply and demand vary strongly 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 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.[3]

In 2000, 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.

A variety of information from around the country points to a decline in some water resources. Increased water use in areas such as the Murray-Darling Basin during the past 10 years will have contributed to a decline in river health. Data from the *National Land and Water Resources Audit* (NLWRA) show that turbidity was a worsening problem in Australia, while more than half of the basins it assessed had increasing nutrient loads, and just under half of the basins assessed for salinity showed increasing trends.[4] Factors including sedimentation, pollution, and the spread of exotic fish and aquatic weeds have all contributed to a decline in biodiversity. However, although overall water extractions increased during the last decade, residential water use per household appears to be declining.[5]

Net water use

In 1983–84, Australia used an estimated 14,600 gigalitres (GL) of water. By 1996–97 this had risen to 22,200 GL, an increase of over 50% in 14 years.[6]

There was some fluctuation in use through the mid-1990s, perhaps in part because of the influence of our highly variable climate, but overall the trend was one of increasing use. Water use rose by 3,600 GL between 1993–94 and 1996–97; a large proportion of this increase is attributed to agricultural activity, in particular livestock, pasture,

Net water use(a)

'000GL
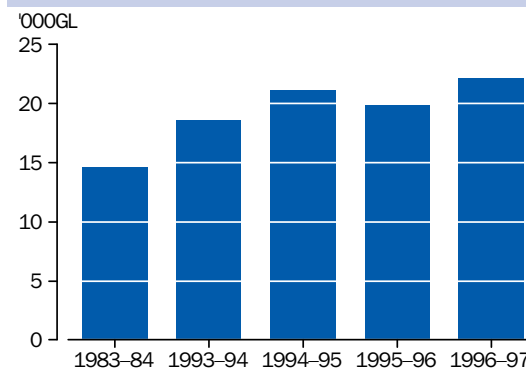
(a) Data not available for the years 1984–85 to 1992–93.
Source: Water Account for Australia, 1993-94 to 1996-97, ABS cat. no. 4610.0.

grains (excluding rice) and other agriculture.[6] There were also increases in the use of water in the rice and cotton industries, with smaller increases for use among farmers growing grapes, or other fruit and vegetables.

Water resource development

Water resource development has been integral to the growth of Australia's economy, towns and cities. It has also affected the health of many river systems.

As human settlements and agriculture increased in the nineteenth century, so did the need for reliable water supplies. Australia's unpredictable climate caused highly variable river flows which could not support intensive settlement.[7] Dams were built to regulate rivers and store water, primarily for domestic, industrial and agricultural use.

The number of dams in Australia increased during the first half of the twentieth century, but the increase was particularly rapid after the 1950s. Australia now has over 80 major dams, each with a capacity greater than 100 GL. (One hundred GL is the volume of water contained in 100,000 Olympic-size swimming pools).[8] However, only one major dam was constructed between 1991 and 2001.

Dams greater than 100 gigalitres

no.
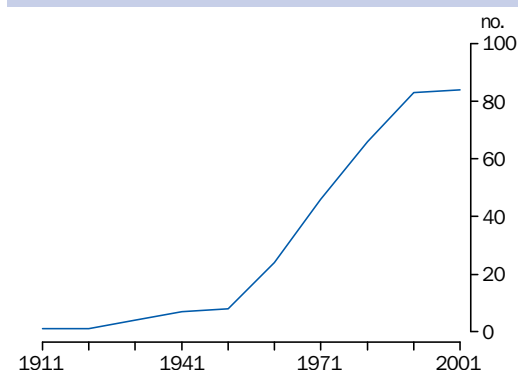
Source: Australian National Committee on Large Dams Incorporated (ANCOLD) 2001, Register of Large Dams in Australia.

Groundwater

Groundwater is also an important resource. Up to four million Australians are totally or partly dependent on groundwater for domestic water supplies.[5] In 1996–97 approximately 5,000 GL of groundwater were extracted.[9] Groundwater and surface water systems are connected to each other to varying degrees in different parts of the country. The use of one affects the other. However, the interactions between the two systems are not well understood in most parts of the country. Relatively little is known about the impact of groundwater extraction on the Australian environment: many land and water ecosystems are dependent on groundwater for at least some of the time, but the interactions between groundwater and these systems are quite poorly understood.

Urban water use

Although Australia's water use increased by about 20% between 1993–94 and 1996–97, urban water use per person in several state capitals declined, in part at least because of an increased awareness of the need to reduce water wastage along with changes in water pricing. Industrial use of urban (as opposed to all) water is falling as industries become more water efficient.[4] In a typical Australian household people use more than 270 litres of water a day. Gardening is responsible for up to half of the water used each day; flushing toilets uses about another quarter.[4] People in Asia, Africa and Latin America typically use 50–100 litres of water a day, although in the USA people use 400–500 litres a day.

Protecting Australia's inland waters

Australian governments and others are responding in a number of ways to the continuing deterioration in the health of many bodies of water. Although overall water use has risen (most of Australia's water is used by agriculture, which is also largely responsible for the increase), there was a decline in domestic water use for most large urban centres during the 1990s. The decline has been linked to a combination of water pricing, consumer education, the use of water-saving appliances and higher residential densities (linked to smaller gardens and lower outdoor water use).[5] There is potential to get more from the water we extract: on average only 77% of diverted water reaches the customer; the rest is lost to seepage or evaporation.[9]

Governments have introduced a range of reforms to the water industry, which have included creating a market for water so that it can be reallocated to higher value crops or uses. And in southern and eastern Australia, caps on extraction (such as that operating in the Murray-Darling Basin) are being introduced to try to prevent further degradation of inland waters and provide better security of supply for industry. Recent initiatives aimed at protecting inland waters include the Council of Australian Government's 2003 *National Water Initiative*, the Commonwealth's *National Action Plan on Salinity and Water Quality (2000)* and the Murray-Darling Basin Commission's 2003 *Living Murray* initiative.

Although there is still much to learn, research and reporting into Australia's water resources by the National Land and Water Resources Audit, the ABS, State of the Environment Reporting programs and state and territory water management agencies are improving our knowledge of this valuable resource.

Dam construction and water diversions have influenced the hydrology and ecology of some of our river systems. The patterns of flow in some rivers, once highly variable, have been changed and the flow of water has been reduced. Some of the impacts of these changes are discussed below.

Effects of development

The development of water resources has had many effects on freshwater ecosystems. 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.[10] 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. 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 more than 80% of assessed river length was moderately modified or worse.[10]

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.[5]

Drinking water for most of South Australia and many inland towns in New South Wales is at risk from increasing salinity.[5] If salinity is not controlled in the Murray River, Adelaide's drinking water has been predicted to exceed guidelines for salinity on two days in five by the year 2020.[5] 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.[5] The causes of salinity and its impact are discussed in the commentary *Land*.

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. This vegetation is seriously degraded in many catchments from clearing, grazing and salinity: in some areas of Western Australia, for example, 50% of rivers and creeks have lost their streamside vegetation and fewer than 10% of wetlands have healthy fringing vegetation.[5]

There are as yet few nationwide data on the extent and impacts of pollutants entering inland waters. Although Australia uses much lower levels of pesticides than other OECD countries, pesticide use is thought to have increased strongly here since the early 1980s.[5]

Algal blooms

Algae are tiny organisms and an important part of the food chain. But when some algae multiply in sufficient concentrations to 'bloom' they can poison the water, affecting people, wildlife and livestock. Some types of algae are not toxic, but others carry poisons that can cause liver damage or tumour growth, acute poisoning and paralysis in animals, and skin and eye irritation.[11]

Outbreaks of algal blooms have been recorded as far back as 1878 in Australia;[11] but they are now far more common. Blooms are often indicative of a decline in the ecological health of freshwater systems. They are not caused by a single factor and can occur in urban or rural areas. 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.

The location and frequency of algal blooms vary across Australia, but they are common and persistent in many waterways throughout Australia where they impose a significant economic cost on the community, industry and government in both urban and rural areas.[5]

It has been estimated that algal blooms cost Australian water users over $150m annually.[12]

Cotton, rice, sugar cane and horticultural crops are the highest users of pesticides.[5] Since 1990 at least 20 fish kills in New South Wales rivers have been attributed to pesticides.[5] Other pollutants, such as heavy metals and oil, may have localised effects. But in some states and territories at least, the management of these sources has improved in the views of the State of the Environment Committee.[5] For example, stormwater management plans have been set up for all urban catchments in New South Wales, while the use of pollution licensing systems has increased throughout Australia.[5]

Effects of development — river flow

Water resource development has altered the seasonal characteristics, rate and variability of flows in many river systems. For example, the flow of the Murray River at Albury would naturally peak in spring and be at its lowest in February. Now, water is stored in dams in winter and spring and released for irrigation in summer and autumn. As a result, peak flows, which are reduced, occur in summer, with minimum flows in the winter.[13]

Ecological processes have been altered by changes in the size and variability of flows. Natural wetting and drying processes have changed, and many in-stream habitats, floodplains and wetlands have become permanently flooded.[14] This, in tandem with the overall decrease in flows, has led to a reduction in available habitat and also reduced the reproductive cues of many aquatic species.[14,15] And so the reproductive patterns of both wetlands water birds and native freshwater fish have been affected, leading to a decline in their abundance.

Natural and actual flows per month, Murray River at Albury — 1998–99
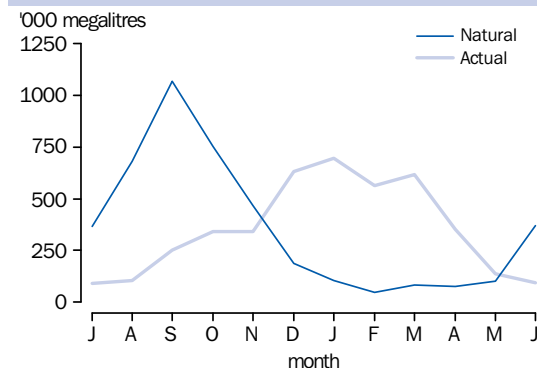
Source: Murray-Darling Basin Commission.

The release of cold water from storages has also affected the reproductive cycle of many aquatic species,[13] while changes in flow patterns have helped exotic species, such as carp, to spread and out-compete native species.[15] Reduced flows are one factor that can lead to more severe algal bloom outbreaks because of stagnation (see box).

Native freshwater fish

Of over 200 native species of freshwater fish in Australia, the Commonwealth lists 11 species as endangered and 10 as vulnerable to extinction.[16] There are at least six threats to our fish: degradation of habitat; pollution; reduced environmental flows; barriers to fish migration; introduced species; and fishing pressures. The extent of each threat varies across Australia, reflecting 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.[17]

The construction of dams, for example, has altered fish habitat by creating a barrier to movement, changing water temperatures, altering flow patterns and reducing water flow. Changes to natural flooding regimes have had different effects, such as allowing exotic fish like the European Carp to dominate or out-compete native species (the latter are less able to adjust to the new regimes). This has led to the decline of native fish in lowland regions of the Murray and Murrumbidgee rivers.[13]

Some 35 exotic fish species have become established in inland waters, with eight identified as having a significant impact.[5] Many were introduced into Australia for ornamental or fishing purposes.[18] 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).[19]

Water diversions(a), Murray-Darling Basin — 1933 to 2003
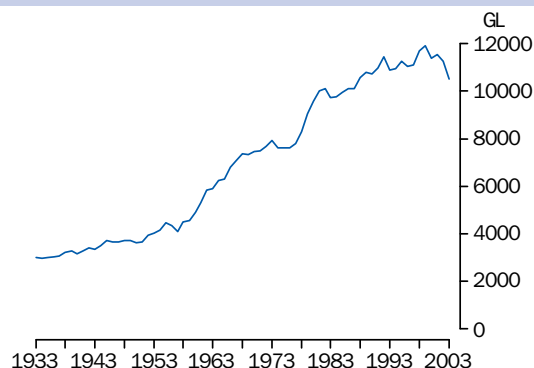
(a) Data smoothed using a 5-year moving average.

Source: Data available on request, Murray-Darling Basin Commission 2004.

The Murray-Darling Basin

The Murray–Darling Basin covers 14% of Australia's area and is an important agricultural centre. The basin contains around 75% of Australia's irrigated land and supports 40% of all Australian farms.[20] The river system, which for many years was primarily devoted to irrigation, is showing signs of environmental stress: salinity, loss of fish species and algal blooms.[18] The graph shows the quantity, in gigalitres (GL), of water diverted from the basin's river systems, which is the key pressure on the health of its freshwater ecosystems (the condition of these ecosystems also depends on factors such as the timing of extraction and land management practices).

Water diversions 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. Some 95% of diverted water is used for irrigation, and New South Wales used just over half.

In the late 1990s, environmental degradation and increasing water demand led to a 'Cap' on river diversions in the Murray-Darling Basin. The Cap was seen as a first step towards achieving a better balance between production and the environment. Because of continuing environmental degradation in the Murray-Darling Basin, a major initiative called 'Living Murray' is now under way. As a first step in this initiative in 2003, 500 GL of water was made available for environmental flows. The water will be targeted at achieving the desired environmental outcomes at six icon sites along the river Murray.

Five species of trout and salmon have been introduced to Australia, and over 5.5 million exotic trout and salmon were stocked into our inland waters in 1998–99 alone, although some of these were into artificial compounds where exotic stock can be monitored to try to prevent risk to native fish.[18] Trout have had an impact on the native galaxid family of fish, nine species of which are considered to be at risk. Adult trout are known to eat galaxids, while juvenile trout compete with galaxids for food.[21]

Some differences within Australia

Some 70% of water used nationally in 1996–97 was used by agriculture.[6] In order to compare the amount of water used by industries of different sizes, one needs to standardise by size. The value of industry value added (IVA, which looks at the value of goods and services sold less the cost of intermediate inputs) per megalitre (ML) of water used is one standardisation. In 1996–97, agriculture had the lowest IVA per ML water used ($588/ML) (i.e. it used more water than any other industry relative to its size). Manufacturing's ratio, by contrast, was about $87,500 IVA per ML of water.[6]

Among different irrigated crops, vegetable and fruit growing returned the highest gross value added per ML of water used, returning respectively about $1,800 and $1,500 in 1996–97. The rice industry had the lowest ratio of gross value added per ML water used (i.e. it used more water than any other crop industry relative to its size) at around $190 in 1996–97.[6]

River condition (biota index), by state

	% of sites assessed where biota was		
	Significantly impaired	*Severely impaired*	*Extremely impaired*
	%	%	%
NSW	34	13	3
Vic.	20	13	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.[5]

The National Land and Water Resources Audit (NLWRA) has recently published an index of river condition.[5] NLWRAs assessment collated and interpreted data for rivers in the more intensively used parts of Australia. The assessment builds on other river assessment initiatives such as the National River Health Program. The data are based on the work of scientists who examined the water to measure the diversity of macroinverterbrates (bugs) that inhabit different stretches of river. Because macroinvertebrates are sensitive to changes to river catchments (e.g. land clearing) as well as changes to the condition of the river (e.g. water quality) and spend much of their life in the river, they are good indicators of river condition.

The data show that 23% of assessed sites were significantly impaired, and had lost 20%–50% of macroinverterbrates expected to be present. A further 6% were severely impaired (had lost 50%–80% of expected macroinvertebrates) and 2% were extremely impaired (had lost more than 80% of expected macroinverterbrates). The majority of impaired river basins were in New South Wales.

Wetlands and Riparian Zones

Australia probably has the most variable wetland and floodplain systems in the world, reflecting the nature of our climate, particularly in the inland. Wetlands are essential for maintaining biodiversity, and the NLWRA found that about 50% of wetlands are estimated to have been destroyed since European settlement. The NLWRA's assessment of biodiversity reported on the condition of 851 nationally important wetlands (classed as important because of their role in protecting biodiversity and ecological processes). They assessed wetlands and riparian zones as either degraded (recovery unlikely in the medium term); fair (recovery requires significant intervention); good (recovery in short-term with minimum intervention); and near pristine. The report found that:

◆ Some 58% of the wetlands assessed were in good condition. These wetlands occurred principally in northern and eastern Australia. Nationally important wetlands in several subregions — on Cape York Peninsula, Tasmania and parts of the Channel Country — were assessed as near pristine. The nationally significant wetlands in the rangelands and south-west of Western Australia, and most of New South Wales were in fair condition or degraded.

◆ 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.

Rivers and their riparian zones have a fundamental role in the functioning of ecosystems. The NLWRA found that:

◆ Riparian zones 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 hydrology, increased fragmentation, feral animals and changed fire regimes all listed as common threats.

Source: National Land and Water Resources Audit 2002, Australian Terrestrial Biodiversity Assessment 2002, NLWRA, Canberra.

Factors influencing change

In Australia, patterns of low rainfall vary over the years, and so climatic variation is a major influence on water use. Over the longer term, population growth has led to increased water use, but its contribution has been small in recent times. The main changes in the 1990s (and recent decades) have come from increased agricultural and industrial use (to a large degree, these are independent of population growth).

Most of the 19% rise in total water consumption between 1993–94 and 1996–97 was due to the agricultural sector; which increased water use by 28%;[6] despite an increase in the sector's real gross value added of less than 10% over the period.[22]

Changes in economic activity affect water use, 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. In theory at least,

future economic growth could be accompanied by reduced 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 1996–97 approximately 134 GL of water were reused, up from 94 GL in 1993–94.[6] At less than 5% of all waste water, this figure has the potential to grow significantly.

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. Recent initiatives aimed at protecting inland waters include the Council of Australian Government's 2003 *National Water Initiative*, the Commonwealth's *National Action Plan on Salinity and Water Quality (2000)* and the Murray-Darling Basin Commission's 2003 *Living Murray* initiative.

Experts debate the impacts of water use and land clearing in different areas. For instance, a salinity audit conducted in the Murray-Darling Basin predicted that if nothing is done, the average salinity in half of the basin's Rivers will exceed World Health Organisation (WHO) standards for drinking water by 2100 because of their salinity (fewer than 10% of rivers fall into this category at the moment).[23]

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).[12]

See also the commentaries *Health, National income*, *The natural landscape — biodiversity*, *The natural landscape — land*, and *Oceans and estuaries.*

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20 Murray-Darling Basin Commission (MDBC) 2000, *Review of the Operation of the Cap: Economic and Social Impacts*, MDBC, Canberra.

21 Cadwaller, P.L. 1996, *Overview of the Impacts of Introduced Salmonids on Australian Native Fauna.* Australian Nature Conservation Agency, Canberra.

22 Australian Bureau of Statistics 2001, *Australian System of National Accounts,* cat. no. 5204.0, ABS, Canberra.

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The human environment: key points

Fine particle concentrations in selected urban areas(a), days health standards exceeded(b)

no. of NEPM one-day standard exceedences
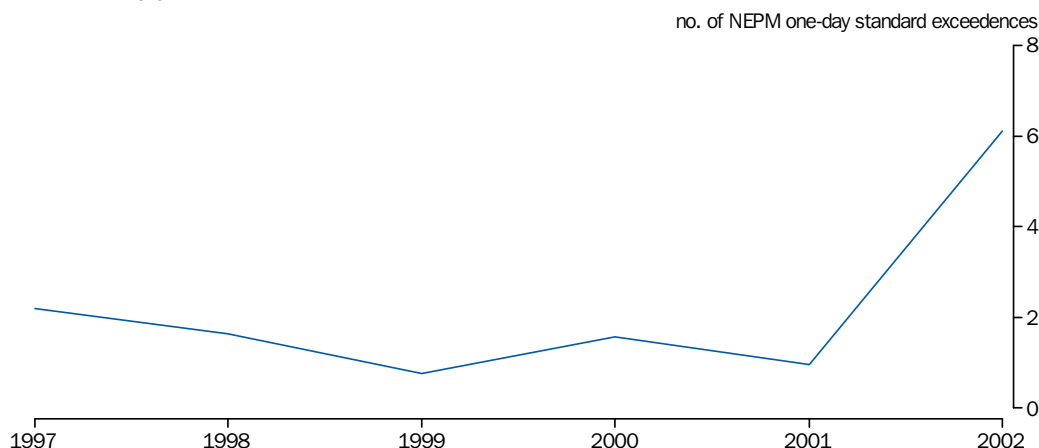
(a) Data are from representative sites in Sydney (Liverpool), Melbourne (Footscray), Brisbane (Central Business District), Perth (Duncraig) and Adelaide (Thebarton), and have been combined in proportion to each city's population. (b) Number of days when the National Environment Protection Measures (NEPM) average daily PM10 goal is exceeded.
Source : Data available on request, sourced from state environmental protection agencies, 2004.

Overall, air quality in Australia is relatively good and has generally improved during the 1990s.[1] Our cities do not suffer from the acute pollution problems found in many OECD countries.[2] 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, mainly due to severe forest fires and dust storms around the Sydney area which caused the NEPM goal to be exceeded on 13 days in Liverpool that year. The goal was also exceeded on six days in Brisbane. Sydney and Brisbane recorded no and one day's exceedences, respectively, in 2001.

The relationship between air quality and progress	Poor air quality has a range of negative impacts: it can cause health problems, damage infrastructure, reduce crop yields and harm flora and fauna. For about a decade, the Australian public has been more concerned about air pollution than about any other environmental problem.[3]
About the headline indicator and its limitations: Fine particle concentrations	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 the concentration of fine particles in the atmosphere, a measure of the form of air pollution about which many health experts in Australia are most concerned.[4]
	Most pollutants are more common in urban and industrial areas than in rural Australia. As there is little long-term information about air quality over much of Australia, the graph summarises data from Sydney, Melbourne, Adelaide, Perth and Brisbane. It is important to note that daily changes in air quality depends 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.
The human environment: other indicators	Number of days when ozone concentrations exceed guidelines, selected capital cities; Highest one hour averages of SO_2, selected regional centres;Recycling, Australian Capital Territory.
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.[1]
Links to other dimensions	See also the commentaries *Health*, *National income*, *The natural landscape, Oceans and estuaries.*

The human environment

Progress and the headline indicator

Human settlements have an impact on the landscape and seascape that surrounds them. They can also provide a home for native plants and animals. But the environmental quality of settlements is perhaps most important because it has an influence on those who live and work within them.

Several environmental concerns are associated with human settlements. It is difficult to conceive an ideal headline indicator which might measure progress against each and so we choose one. For about a decade, the Australian public has been more concerned about air pollution than about any other environmental problem.

Poor air quality has a range of negative impacts: it can cause health problems, damage infrastructure, reduce crop yields and harm flora and fauna. For about a decade, the Australian public has been more concerned about air pollution than about any other environmental problem.[4] A recent report estimated fine particle pollution had been linked to the deaths of up to 2,400 people a year in Australia, with an associated cost of $17.2b.[6]

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 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.[5]

Most pollutants are more common 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.[1] It is important to note that dailychanges 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.

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, mainly due to severe forest fires and dust storms around the Sydney area which caused the *National Environment Protection Measure* (NEPM) goal to be exceed on 13 days in Liverpool that year. The goal was also exceeded on six days in Brisbane. Sydney and Brisbane had recorded no and one day's exceedences, respectively, in 2001.

The station in Melbourne recorded air quality exceeding guidelines on four days in both 1997 and 1998, but on only two days or fewer per year between 1999 and 2002.

Air quality in Brisbane exceeded guidelines on two days in 2000, 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 2002. The station in Adelaide recorded air quality guidelines were exceeded on two days in both 1997 and 1998, and five days in 1999. Between 2000 and 2002, the levels of fine particles in the air met the NEPM standard every day.

Other pollutants also have negative impacts. In urban areas concentrations of lead levels dropped significantly during the 1990s and, together with sulfur dioxide and nitrogen dioxide, they are not a concern in any urban areas.[2] Carbon monoxide is only of concern in a few specific urban localities, but there has been no real drop in the incidence of photochemical smog (see *Ozone and photochemical smog* section later).[2]

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.[2] Fine particles (particularly wind blown dust) are often the principal air pollution problem in most of our regional centres.[2] In places like Armidale, Canberra and Launceston, fine particle pollution is closely associated with domestic wood fires used for winter heating.[6] Some areas, far from major sources of pollution, can suffer from the long range transport of pollutants. Bushfires and controlled burn-offs also pollute.[2]

Fine particles

Fine particles (PM_{10}) are particles of any substance less than 10 micrometres in diameter, and include sulfates, nitrates, carbon and silica. They are generated by fossil fuel combustion, domestic wood fires and some industries, and also arise naturally from wind-blown dust, pollens and bushfires. The finest particles, those less than 2.5 micrometres in diameter ($PM_{2.5}$), are the main cause of urban haze, which typically appears white. Increasing evidence suggests these finer particles are of rather more concern than those between PM_{10} and $PM_{2.5}$ in size, and that most of these finer particles are generated by people, rather than occurring naturally.[7]

The human health effects are many and depend on the size and chemical composition of the particles. Fine particles can penetrate deep into the lungs where they may be absorbed into the blood. The smallest particles can affect eyesight. Some particles are carcinogenic, while others are toxic or cause allergies. General effects include respiratory problems which can lead to sickness or even death among sensitive people.

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.

The headline indicator focused 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. Others (so-called secondary pollutants) react with the atmosphere, or each other, to produce pollution. This section begins by looking at sulfur dioxide (a primary pollutant) and then considers ozone and photochemical smog (formed from secondary pollution by oxides of nitrogen).

There appears to have been overall progress in the 1990s. Sulfur dioxide emissions dropped by 30% between 1996 and 2001, while dust loads in mining areas have been reduced.[2] However, there remain some localised problems in areas such as Port Pirie and Mount Isa.[2]

Climate is an important determinant of the amount of pollution experienced in Australia's cities and when it occurs. Weather patterns that result in low or no wind are more likely to produce air pollution. Pollution conducive days usually occur in the summer and spring in all of our coastal capital cities. Brisbane can also expect them in the winter.[4]

Ozone and photochemical smog

Ozone is formed when oxides of nitrogen react with sunlight in the atmosphere. It is a colourless gas and a natural part of the upper atmosphere, where it filters ultraviolet radiation from the sun. But increased concentrations in the lower atmosphere can irritate eyes and kill vegetation.

In parallel with ozone formation, nitrogen dioxide reacts with substances in the atmosphere like water vapour to form acid aerosol nitrates. These mix with ozone to form smog. As sunlight is an important factor in the formation of ozone (and hence smog), smog is more likely on sunny days in cities.

Highest one hour averages of SO_2, selected regional centres(a)

(a) Air NEPM refers to the National Environment Protection Measure guideline for SO_2 concentrations of 0.2 parts per million.
Source: 1989 to 1999 data from Australian State of the Environment Committee 2001. Data for 2002 from state environmental protection agencies, 2003.

A recently published study linked ozone and nitrogen dioxide pollution with increases in daily death rates in Melbourne.[8]

Ozone concentrations, therefore, provide an estimate of smog. During the 1990s there was no real decline in the number of days when maximum hourly ozone concentrations (averaged over four hours) exceeded guidelines in our five largest capital cities, and hence no decline in smog.[2] Between 1992 and 2002, four-hourly ozone guidelines were broken on 132 days in Sydney, 32 days in Melbourne, 22 days in Perth and nine days in Brisbane.

Sulfur dioxide emissions

Sulfur dioxide (SO_2) is emitted by the burning of coal and during industrial processes such as 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 developing health problems.[9]

Most of Australia is now unaffected by sulfur dioxide pollution. And in 2002, prompted by a 30% reduction in SO_2 emissions during the late 1990s, there were only a few localities of concern.[2] There were no exceedences in recent years in the Illawarra and Gladstone areas, where coal-fired power generation occurs.[2]

Maximum concentrations have also fallen dramatically in Kalgoorlie in recent years (because of improved mineral extraction and processing)[2] and were under the NEPM guideline in 2002. By comparison, Mt Isa's maximum concentrations also declined during the 1990s, but rose sharply in 2002 (when weather conditions forced the smelter plume to the ground near the monitoring station; stations nearby recorded much lower concentrations).
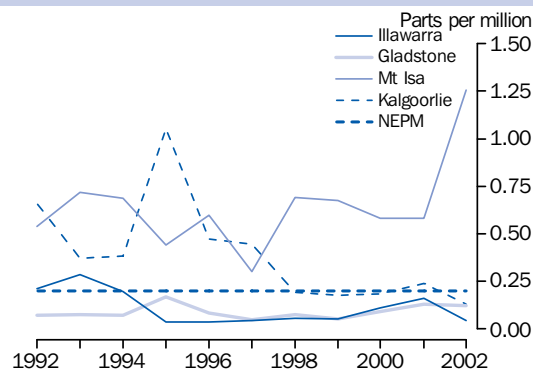
Number of days when ozone concentrations exceed guidelines(a), selected capital cities(b)

(a) Ozone concentrations are measured by the hourly maxima averaged over 4 hours. If this concentration is higher than 0.08 ppm it breaches NEPM guidelines. (b) Data are for Sydney, Melbourne, Brisbane, and Perth and have been weighted together in proportion to these cities' populations.
Source: Data available on request, state environmental protection agencies, 2003.

Factors influencing change

Our 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 dependent traffic have released millions more tonnes of pollutants into the air (over a million tonnes of PM_{10} emissions alone in 2002–03)[10]. Most of these emissions (20%) are from the use of fossil fuels.

Motor vehicles are Australia's single largest source of air pollution.[2] For example, in 2002–03, in the Sydney-Newcastle-Woollongong NSW Airshed, the largest single source (more than 25%) of all PM_{10} emissions was motor vehicles.[10] Cars and trucks generate particles directly through burning fossil fuels, especially diesel. Diesel generates far more particles than petrol per litre, and generates more of the finest particles (smaller than 2.5 micrometres) which have serious health implications for humans.[11] Vehicles also generate particles when tyres lose rubber, and tyre and air turbulence wear away road surfaces.

Motor vehicles also emit other types of air pollution. In the mid-1990s, traffic accounted for more than 75% of emissions of carbon monoxide (which can affect memory and vision, cause heart disease and harm unborn children), and most of the oxides of nitrogen (which contribute to smog), and was a major contributor to many volatile organic compounds (which contribute to smog).[2] Industries that contribute to fine particle pollution include those that burn fossil fuels to make heat and power (such as power plants, and iron and steel works), refineries, mines and quarries, cement works, mineral processing plants and some agricultural activity (controlled burning and eroded soil generate fine particles).[10] Domestic wood heating can also have a significant effect.[2]

But although industrial activity and the numbers of cars grew during the 1990s, measured air quality has not deteriorated significantly. Technology and strategies designed to control air pollution appear to have countered the rises which would have been expected given the increases in pollution sources.[4]

For instance, diesel vehicles contribute almost three-quarters of all vehicular fine particle emissions. However, 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.[12] 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).[13] A greater use of renewable power sources to generate energy could also reduce some forms of air pollution.

Waste

Substantial quantities of waste are generated from human consumption and activities related to the construction, operation, maintenance, and renewal of human settlements.[14] Solid, liquid and gaseous wastes are a by-product of many productive processes, and goods (or their packages) may be discarded by consumers.

Waste can be expensive to deal with and can have a damaging impact on the environment or even affect people's health. This commentary sheds some light on three important aspects:

◆ how much waste Australians generate

◆ how much is recycled

◆ how the remainder is disposed of.

The amount of waste generated tends to increase with the size of human settlements and the level of industrial activity. The volume and type of waste disposed of by Australian households and industries have varied over time, as has the rate at which resources are being recycled and reused. This commentary focuses on the disposal and reuse of solid wastes. Waste water is also important, and is discussed in the commentary *Oceans and estuaries*.

The costs imposed by waste generation go beyond the financial costs of processing, treatment and transportation to landfill sites. Waste-related pollution and contamination can affect the environment and human health. However, in some circumstances, waste can be recycled, reducing the volume of natural resources that must be extracted or harvested to support future production and consumption.

When assessing progress in this area, one might want to bear in mind three major aspects. The first involves minimising the amount of waste generated. The second is to use the waste that is generated as resources where possible. The final aspect involves disposing of whatever waste cannot be recycled in a manner that is least harmful to the environment, the health of the population and economic progress. An ideal indicator of progress might capture all three aspects.

Waste can originate from a number of sources: households and councils; building and demolition sites; and commercial and industrial sources.

Waste from households is generally made up of organic (food and 'green') wastes, paper, glass, metal and plastic. Councils are also responsible for collecting and disposing of litter (such as cigarette butts, bottles, cans, and packaging materials), often at a significant economic cost. Loose litter can also contribute to stormwater pollution which, in turn, can affect water quality on beaches and in waterways.[15]

Recycling, Australian Capital Territory

'000 tonnes
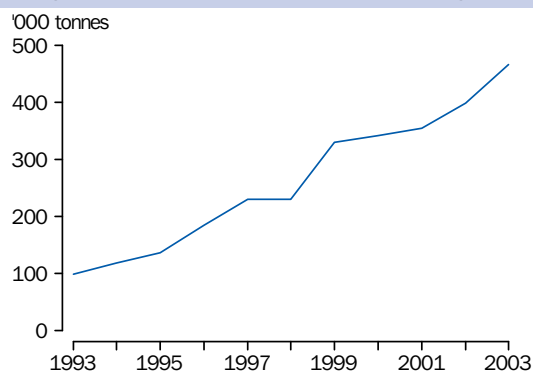
Source: ACT Government 2004, NoWaste by 2010.

Recycling and waste reduction

In recent years, recycling has become more popular among many Australian households. By March 1993, around 95% of households recycled waste and around 83% re-used waste. Only 2% of households do not recycle or re-use. These levels are virtually unchanged since 2000, but are higher than 1996. In 2002, more than 80% of households recycled or re-used glass, plastic bags and bottles, old clothing, paper and cardboard. Paper and cardboard were most likely to be recycled, with 88% of households recycling them.[16]

This popularity is partly the result of government programs aimed at increasing not only the awareness of the types of materials that can be recycled, but also the capacity for households to participate in recycling. The provision of a bin or crate, and a regular council collection service, have played an important role in fostering community participation. The development of facilities for processing different types of recycled waste has also been important in expanding the range of materials collected.[17]

In the ACT, for example, the volume of waste recycled increased from 99,000 tonnes to 466,000 tonnes between 1992–93 and 2002–03.[18] There is considerable variation in recycling and disposal facilities, price incentives and publicity campaigns from one jurisdiction to another, so the recycling pattern in the ACT is unlikely to be representative of national patterns. But the ACT experience illustrates the extent of the change that has taken place in some parts of the country over the last decade.

Despite the marked improvements in the uptake of recycling by householders, there is still potential to reduce the volume of waste that could be recycled (which instead goes to landfills). One study estimated that nationally, around one-fifth of the waste stream is recycled — this is less than half of the proportion that could be recycled.[17] The 2001 State of the Environment report assessed that recycling rates had improved across the country. But, the report indicates, progress had fallen short of the target set in 1992, when the Australia and New Zealand Environment Conservation Council's Waste Minimisation and Recycling Strategy was introduced. The strategy set a target of a 50% reduction in national waste from 1990 levels by 2000.[2]

Another area in which there appears to be scope for progress is the reduction of contamination by non-recyclable materials. In a sample of 18 tonnes of waste diverted by households for recycling, 1.2 tonnes (6.8%) were found to consist of non-recyclable waste.[17]

Industrial waste and recycling

The volume of commercial and industrial waste disposed of as landfill varies significantly by industry sector. For instance, a landfill audit in South Australia found that 45% of all commercial and industrial waste is generated by the manufacturing sector, with retail trade (17.5%) the next largest contributor.[19]

An increasing number of industries are using recycled materials as inputs into the manufacturing process. Examples include the recycling of steel and aluminium cans by manufacturers of packaging.

Another example is the use of bagasse (the residual waste from raw sugar processing). The heat produced by burning bagasse is used to power machines that crush sugar cane, and also for electricity generation. Other biomass resources (i.e. biological materials used as fuels) used to generate electricity include: black liquor at paper pulp plants, sawmill waste, and woodchips.[20]

Links to other dimensions of progress

Air quality is linked to 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 show increased mortality rates, hospital admissions and emergency room visits for respiratory and cardiovascular disease.[4]

Polluted air can harm biodiversity: smog and acid rain can affect many plants and animals.[21]

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.

Radioactive Waste

Australia produces and uses radioactive material, and subsequently generates radioactive waste. Waste is classified according to the amount of radiation it emits (low, intermediate or high) and the length of time over which it will continue to emit radiation (short or long lived). Most of our waste is short-lived and either low or intermediate level. We also produce some long-lived intermediate level waste, but do not produce any high level waste (high level waste comes from spent fuel used in nuclear reactors).

Over the past 40 years Australia has accumulated around 3200 cubic metres of low-level and short-lived intermediate level waste. This is accumulating by 40–60 cubic metres each year, with an extra 500 cubic metres expected in 2035 when the Lucas Heights reactor near Sydney is decommissioned. In comparison, Britain and France each individually produce about 25,000 cubic metres of such waste each year. We had around 500 cubic metres of long-lived intermediate waste, an amount that is also expected to grow over time.[22]

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.

High levels of waste can impose adverse effects on the environment, particularly if not contained and managed effectively. The quality of land surrounding waste disposal sites can also be affected. Land degradation may occur if adequate measures are not taken to prevent substances such as oils and tars, metals and organic compounds from contaminating landfill sites and the areas surrounding them. Waste is also related to greenhouse emissions (the decomposition of organic waste releases methane, a greenhouse gas, into the atmosphere).

See also the commentaries *National income*, *Transport*, *Health* and *The natural landscape*.

Endnotes

1   The PM10 data from each state environmental protection agency was obtained using the Tapered Element Oscillation Microbalance (TEOM) method, which continuously monitors PM10 levels in the air averaged over a 24 hour period. 1997 was the first year all of the five EPAs used this method.

2   State of the Environment Advisory Council (SEC) 2002, *Australia — State of the Environment Report 2001,* SEC, CSIRO Publishing, Melbourne.

3   Organisation for Economic Co-operation and Development (OECD) 2000, *Environmental Performance Reviews,* OECD, Paris.

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5   Experts, such as those who wrote Urban Air Pollution in Australia (at 9 below) generally mention both smog and fine particles as the two forms of air pollution with the most serious impacts on health. But the State of the Environment Report in 2001 noted that some studies from other countries have indicated that more deaths are attributable to the concentration of particulate matter of diameter below 2.5 μm (PM2.5) than to the concentration of PM10. However, particles with sizes between 2.5 and 10 μm may be more important in relation to asthma and respiratory illnesses.

6   State of the Environment 2001, *Fact Sheet: Air Quality* <http://www.deh.gov.au/soe/2001 /fact-sheets/ air.html>, last viewed 20 March 2003.

7   National Environment Protection Council (NEPC) 1998, *Ambient Air Quality: Final Impact Statement for the Ambient Air Quality NEPM,* NEPC, Adelaide.

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9   *National Pollutant Inventory: Sulfur Dioxide* <http://www.npi.gov.au/database/substance-info/profi les/77.html> last viewed 14 March 2002.

10 The National Pollutant Inventory (NPI) was set up in 1996 to quantify, for the first time, the amount of pollution released into the environment at a national level. The NPI's database provides a comprehensive record of pollutants entering the air, land and water. Its first reporting period was 1998–99, and so it is still too early to consider national trends in air pollution, although this should be possible in a few years. Environment Australia 2002, *National Pollutant Inventory: Particulate Matter 10.0 Summary - All Sources* <http://www.npi.gov.au> last viewed 8 March 2004.

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16 Australian Bureau of Statistics 2003, *Environmental Issues: People's Views and Practices*, cat. no. 4602.0, ABS, Canberra.

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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. The marine environment is also important to Australian society and the economy. Many of the ways in which we use our oceans, beaches and estuaries can affect the quality of the ocean's water and the diversity of life within it.

There are very few nationwide time series data suitable for assessing the progress of Australia's marine ecosystems. At some time in the future, perhaps, better progress indicators might become available. For the time being, this commentary:

◆ recognises the importance of the ocean

◆ describes some of the important influences on the health of our seas (such as fishing, introduced species and water quality).

However, it does not attempt to assess overall progress among Australia's marine ecosystems.

Australia has one of the longest coastlines of any country. The Exclusive Economic Zone, the area surrounding Australia's coast for which Australia has exclusive responsibilities and to which it has exclusive rights, covers 11 million square kilometres (among the largest of any country in the world). And so it is perhaps not surprising 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 are six kilometres deep. This diversity is reflected in a vast array of life forms. More than 4,000 species of fish live in Australian waters, and about one-quarter of them are found nowhere else (most of these are found in southern waters). Australian waters provide a home to at least 43 species of whales and dolphins and 112 species of seabirds. Australia has the world's largest and most diverse area of seagrasses, largest area of coral reefs and highest diversity of mangrove species.[1] Much remains to be discovered: a research expedition in 2003 over the Norfolk ridge to our eastern seamounts found more than 1,800 species, many new to science.[2]

There are substantial pressures on Australia's marine environment. Over 80% of the population live within 50 kms of the coast,[3] and 97% of the volume of Australian trade is carried by ships.[4] In 2001–02 Australian fisheries produced about 233,000 tonnes of fish[5] while in 2002–03, about 650,000 people visited the Great Barrier Reef, more than 160,000 of whom were from overseas.[6]

Fishing, particularly overfishing, places strains on a number of species, and may also affect other species through disruptions to the food chain or accidental catching of other fish, birds, mammals, and turtles. The release of hydrocarbons, waste water and other nutrients can also disrupt marine ecosystems, while the introduction of foreign species into Australian waters has the potential to cause irreversible harm.

To assess progress within our oceans and estuaries one would need information on a broad range of issues, and how they are changing over time. The oceans are vast and for many areas, information is scarce, so a thorough assessment of progress is not yet possible. Some data are available for some important concerns, particularly for the coastal and estuarine environment and these are discussed here. The National Oceans Office is currently gathering a range of relevant data and developing indicators. These should be available for future editions of this publication.

Estuaries

The Estuarine Condition Index is an indicator that has been developed by the National Land and Water Resources Audit (NLWRA). Time series data are not available yet, but in future this index will go a long way towards summarising progress in our marine ecosystems. 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. And so 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 2002 the NLWRA assessed estuary conditions as:[7]

◆ near-pristine — 50%.

◆ largely unmodified — 22%.

◆ modified — 19%.

◆ extensively modified — 9%.

Fish and fishing

Australia's major fisheries target high value species such as lobsters, prawns, abalone and tuna, which, despite their modest tonnage in world terms, are subjected to high fishing pressure.[8]

An underfished stock could sustain catches higher than those currently taken. A fully fished stock is one where current catches and fishing pressure are close to their sustainable limit — increasing the fishing pressure or catches may lead to overfishing. A 'heavily fished' stock may be overfished; it is clear that fishing is intense, but not clear whether it is excessive. A stock is overfished when there is too much fishing or when there are too few fish left; in the latter case, the stock may reflect the effects of previous excessive fishing — management might curtail overfishing, but it can take some time (perhaps many years for some species) before a stock recovers.

A review of the status in 1999 of Australia's primary fishery stocks managed by Australian governments indicated that of the 145 species considered, nine were underfished, 35 fully fished, 15 heavily fished (some of which were probably overfished), and 17 overfished. The review was uncertain about the

Fisheries production, value and employment, by state — 2001–2002

	Production		
	Weight	*Value*	*Employment*
	tonnes	$m	no.
NSW	22 304	136	4 002
Vic.	9 211	117	2 070
Qld	31 634	277	4 311
SA	37 412	490	2 899
WA	33 956	615	3 229
Tas.	22 912	327	2 573
NT	5 763	37	509
Commonwealth	75 387	481	..
Total	**233 346**	**2 409**	**19 627**

Source: Australian Bureau of Agricultural and Resource Economics. (Total includes minor amounts not shown).[5]

Australian Fisheries

The gross production of Australia's fisheries in 2001–02 was about 233,000 tonnes, valued at $2.4 billion (including the value of aquaculture, which contributes 30% of the total). Fisheries managed by the Australian government produced 75,400 tonnes, valued at $481 million in 2001–02. The Northern Prawn, Eastern Tuna and Billfish, South East and Southern Bluefin Tuna fisheries provide three-quarters of that value.[9]

State and territory managed commercial fishery production reached 158,000 tonnes in 2001–02, with a value of $1.9 billion. Australia's most valuable fishery is the State managed Western Rock Lobster Fishery. Other important state/territory managed fisheries — for abalone, southern rock lobsters and prawns — rely on long standing, valuable export markets. There are also many coastal, estuarine, freshwater and aquaculture fisheries supplying a diverse range of finfish and invertebrates for the fresh fish market.[9]

status of the other 69.[8] Data on those fish stocks managed by the Australian Commonwealth was updated in 2002, and found that 16 of the 75 principal species managed by the Australian Commonwealth were classified overfished compared to only five a decade ago.[9]

Comparable information at a state level is not available, but it is clear that 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.

The status of most of the species caught incidentally to primary species is uncertain (even the status of those species caught incidentally that contribute substantially to the market value of a fishery). In fisheries where a bycatch of threatened or endangered species occurs, the introduction of bycatch action plans (mandatory for fisheries managed by the Australian government) has increased protection from fishing. For example, Northern Prawn Fishery vessels must use turtle-excluder and bycatch-reduction devices.[9]

Whales and Dolphins

The importance of some whale and dolphin species to the Australian public is reflected in the popularity of activities such as whale watching. The hunting of whales for meat and oils was common in Australian waters from the early 1800s to the mid-1960s. An estimated 26,000 Southern Right Whales were taken from south-eastern Australia and New Zealand before they were protected in 1935, and over 40,000 Humpback Whales were killed in Australia and New Zealand before they were protected worldwide in 1965.[10]

Whales have low birth rates, and their numbers are slow to recover. But conservation efforts have seen numbers of Humpback Whales grow at 10% per year, moving them in 1998 from a Commonwealth endangered species to a vulnerable one. Other species, like Blue and Southern Right Whales, remain listed as endangered.[11]

Turtles

Of the seven species of marine turtles found in the world, six breed in Australia, although their population numbers are uncertain.

Turtles migrate which makes them susceptible to both international and domestic pressures. The eastern Australian Loggerhead Turtle (*Caretta caretta*), breeds almost exclusively in the southern Great Barrier Reef region and is an endangered species. Its nesting population has declined by 70%–90% since the 1970s, to about 300 animals.[11] Threats to turtles include bycatch in trawl nets, traditional hunting, habitat degradation, bycatch in shark control programs, floating rubbish (plastic and fishing lines) and prawn and other fishing activities. Regulation on turtle hunting and Bycatch Action Plans are some of the initiatives taken to protect marine turtles in Australia.[11]

A decline in catch can point to increasing scarcity. It can also point to reduced fishing effort. But if catch sizes have remained constant while the effort required to catch fish has increased, the size of the fish stocks may also have decreased. In the South East Fishery, the annual catch remained relatively constant between 1992 and 2002, yet required double the amount of trawling by the late 1990s.[9]

Introduced species

Fishing is not the only human activity that affects the biodiversity of Australian waters. Introduced organisms can place native species at risk from predatory behaviour or competition for food. 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.[12]

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 is 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.

Seagrass

Seagrasses are flowering plants growing in marine or estuarine areas, and Australia is home to over half the world's known seagrass species. Although there are few accurate data, experts estimate that some 50% of our seagrass beds have been lost since 1788, though patterns vary around the country. In New South Wales an estimated 50% of seagrass beds have been lost in recent decades;[1] and at Cockburn Sound in Western Australia, 97% of seagrass beds have been lost.[13] Turbidity, from soil erosion, is believed to be one factor behind the decline (the soil prevents sunlight from reaching the sea bed).

Seagrasses provide food for many marine organisms including green turtles and swans, as well as habitats and nursery areas for many fish. Large scale destruction of seagrass areas could have impacts on the commercial viability of the surrounding fisheries. Dugongs are particularly at risk from the loss of seagrasses, which are the sole source of food for this large marine mammal. The loss of seagrasses, as well as accidental capture in mesh nets, has led to the dramatic decline of some populations of dugongs since 1800.[11]

Coral reefs

Australia has two major coral reefs: the Great Barrier Reef, 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. Both are diverse marine systems that are home to many organisms, and provide commercial benefits to Australia, mainly through tourism and fishing.

As with many marine systems and species, coral reefs are potentially at risk from international as well as domestic influences. Rising sea temperatures (linked in part by some scientists to greenhouse gases) could place reefs at risk from coral bleaching, which occurs when water temperatures exceed long term averages by 1.5 ºC–2 ºC. Once this temperature threshold is exceeded, algae in the coral tissues are expelled, allowing the white skeleton to show through the clear tissue cover. If temperatures remain above normal levels for more than a few weeks the coral can die. On reefs where the majority of corals die, the plants and animals that depend on a healthy reef lose their habitat and a wide variety of biodiversity is lost. Widespread bleaching events occurred in Australia in 1998 and 2002, causing extensive stress throughout the entire reef ecosystems. Although Australia was not affected as badly as other regions, a small proportion of reefs was severely damaged in each bleaching event. For example, 70%–90% of corals were killed by bleaching on reefs around Bowen in 2002, and similar coral mortality was reported from reefs in the Coral Sea in 2002 and at Scott Reef off northern Western Australia in 1998.[14]

Domestic sources placing the Great Barrier Reef at risk are sediment and nutrient runoff (often from land use practices far inland), commercial and recreational overfishing, and the coral-eating Crown-of-Thorns Starfish, which periodically explodes in numbers. Scientists are still unsure what triggers the starfish outbreaks, although some theorise that overfishing of the starfish's natural predators or increased nutrient levels in the water from pollution are to blame.[15]

Sources of reported oil spills, 2002–2003
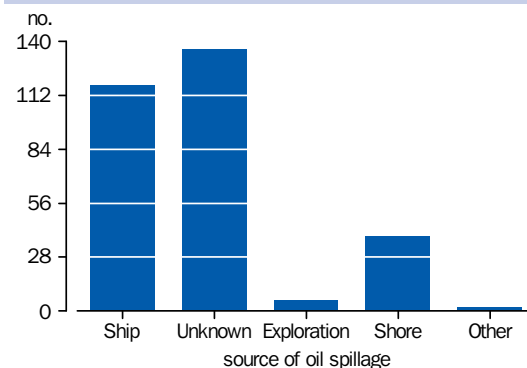
Source: *Australian Maritime Safety Authority, data available on request, Annual reports.*

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. Between 1994–95 and 2002–03 there were over 2,800 oil spill sightings in Australian waters. In 2002–03, 300 oil discharge sightings and oil spills were reported (graph above) where 77 of these incidents required a response action under the National Plan arrangement.[16]

Although many invasive species are difficult to eradicate, the removal of Black Striped Mussels from Darwin Harbour in 1999 was effective, albeit costly. These mussels grow in dense mats and an individual can produce 50,000 offspring in a month. They were probably transported to Darwin on the hull of a yacht. If established, they could have threatened the biodiversity of surrounding waters, had a major impact on aquaculture, commercial and recreational fishing and could potentially have affected the local port and shipping industries, through the fouling of wharves, marinas and vessels. The mussels' freshwater cousin which behaves similarly, the Zebra Mussel, caused very significant economic and ecological damage to the North American Great Lakes. The removal operation involved treating three infected marinas and numerous vessels that were thought possibly to be infected.[17]

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.[11]

Poor water quality can be attributed to many sources, sometimes land use practices far inland that add nutrients to inland waters (such as land clearance or overgrazing which can enhance erosion or the use of agricultural chemicals).

Protecting our oceans

A number of initiatives are underway to give greater protection to Australian oceans.

The National Representative System of Marine Protected Areas (NRSMPA) is setting up a system of marine protected areas that are 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.

Meanwhile, a series of regional marine plans are being prepared to identify priorities and short-list areas that should be assessed for declaration as a marine protected area.

Scientists are working to gather better information about the condition of existing protected areas. In 2003–03, 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.

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 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.[18]

Endnotes

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International environmental concerns: key points

Australia's net greenhouse gas emissions(a)
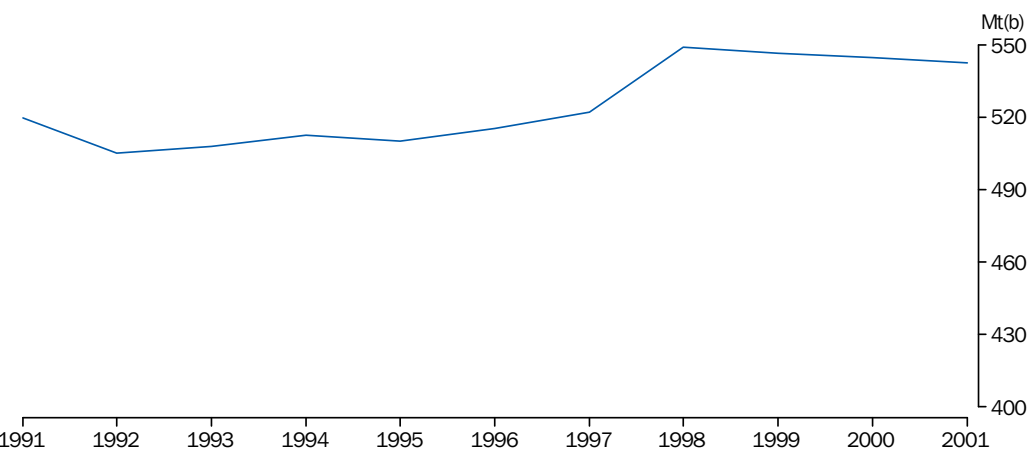
(a) Kyoto-based estimates. (b) Million tonnes (megatonnes) of carbon dioxide (CO_2) equivalent.[1]
Source: Australian Greenhouse Office, National Greenhouse Gas Inventory, 2001.

According to the estimates produced by the accounting rules of the *Kyoto Protocol*, Australia's total greenhouse gas emissions in 2001 were about 4% higher than they were in 1991.

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. Our heavy reliance on fossil fuel burning for energy rather than other forms of power (such as nuclear or hydro-electricity), the structure of our economy and our changes in Australian land use are three influences behind our high rate of emissions.

The relationship between greenhouse gas emissions and progress	Human activity is increasing atmospheric concentrations of existing greenhouse gases (such as carbon dioxide and methane) and adding new gases. Many experts believe that these gases are linked to global warming and climate change by way of an *enhanced greenhouse effect*.
	The effects of global warming are very difficult to predict but are of global concern. 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 significant damage). Australia's biodiversity and freshwater ecosystems might also be affected by climate change.
About the headline indicator and its limitations: Greenhouse gas emissions	The headline indicator assesses Australia's total net greenhouse 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).
International environmental concerns: Other indicators	CO_2-e emissions, total, per capita and per $ GDP; 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 human environment*, *The natural landscape* and *Productivity*.

International environmental concerns

Progress and the headline indicator

The health of our environment depends largely on the actions of Australians. But some environmental concerns transcend national boundaries: our environment can be influenced by the actions of other countries, and we, in turn, can influence other countries' environments. Our contribution to these international concerns is an important aspect of progress. Global warming is widely perceived as the most significant international environmental concern and Australia's greenhouse gas emissions are the focus of the headline indicator. We also look at Australia's ozone depleting emissions.

The main gases in the atmosphere, nitrogen and oxygen, are almost completely transparent to the sun's rays. But water vapour, carbon dioxide and other gases form a blanket around the Earth, trapping heat — a process called the *greenhouse effect*. Human activity is increasing atmospheric concentrations of existing greenhouse gases (such as carbon dioxide and methane) and adding new gases such as chlorofluorocarbons (CFCs). Many experts believe that these gases are linked to global warming and climate change by way of an *enhanced greenhouse effect*.[2]

Data beginning in 1910 show that annual mean temperatures in Australia have increased (although this has not been uniform);[3] while the World Meteorological Organization reports that global temperatures in 1998, 2002 and 2003 were the three warmest since records began in 1861.[4] In Australia, 1998 is the hottest year since records began (in 1910), and 2003 was the sixth hottest.

The Intergovernmental Panel on Climate Change (IPCC) has developed a range of scenarios that provide projects 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 emissions. It estimates our total emissions, less any credits from greenhouse sinks, between 1991 and 2001. 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 difference relates to the treatment of forest sinks).[6]

Australia's total net greenhouse emissions in 2001 were almost 543 megatonnes (Mt) CO_2-e[1], an increase of 4.4% since 1991. Emissions rose gradually over the period, with the sharpest rise between 1997 and 1998 when emissions from land use change rose by more than 10% rather than fall as they had done during most of the decade.

Forest sinks

Greenhouse gases are emitted by human activity such as the burning of fossil fuels, but are also absorbed in *carbon sinks* (growing vegetation absorbs CO_2 during photosynthesis, while carbon is absorbed into soil by farming practices such as pasture improvement).

The headline indicator assesses Australia's total net greenhouse emissions. The indicator is based on our estimated total emissions from anthropogenic 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]

The figures are estimates. It is particularly difficult to measure the exchanges between the biosphere and the atmosphere accurately, such as emissions from land clearing and credits from reforestation.[6]

Global warming and climate change

Over the past 100 years, global mean surface temperatures have increased by 0.4^0C to 0.8^0C, with the rate of changes since 1976 three times that for the 20th century as a whole. Some of this change may be natural, but over the past 200 years human activity has altered the world's atmosphere;[7] and there is increasing evidence that these atmospheric changes are having an influence on the climate through the enhanced greenhouse effect.

While scientists are certain that the world has become warmer, and reasonably certain that this is largely due to the greenhouse effect, there is much less certainty about the future, although there is an expectation that greenhouse warming will continue over the next few decades.[8]

The effects of global warming are very difficult to predict but are of global concern. Global warming may cause regional rain patterns to change (both within Australia and around the world). It has been suggested that melting glaciers and the thermal expansions of seawater may raise global sea levels by between 15 cm and 95 cm by the year 2100.[9] The number of very hot summer days may rise, while scientists believe we will have fewer cold nights and frosts.[10]

Climate change and biodiversity

The possible effects of climate change on Australian wildlife are yet to be fully documented (and indeed may never be), but several species are believed to be threatened, including the endangered Mountain Pygmy Possum which could, scientists predict, lose its entire alpine habitat with just a 1^0C rise in mean annual temperature.[11] It also appears that many corals in the Great Barrier Reef are living close to their survival limits in terms of sea temperature.[12]

Other global environmental concerns

Global warming is a concern that transcends national boundaries. But there are other international environmental concerns that, while not 'global' in the same way as climate change, are common to many countries. Australia plays a role in tackling these, through, for instance, our work as parties to international conventions for biodiversity and desertification.

CO₂-e emissions, net, per capita and per $ GDP
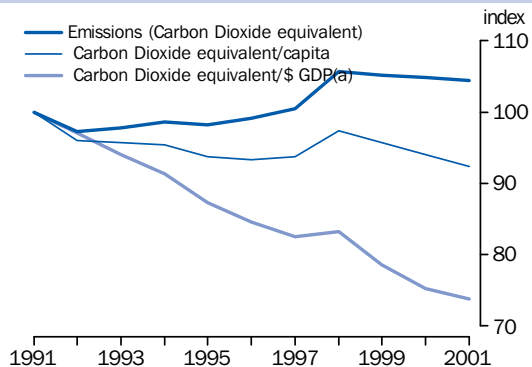
(a) GDP is a chain volume measure. Base year = 1991.
Source: AGO (2003), National Greenhouse Gas Inventory - Analysis of Trends and Greenhouse Indicators 1990 - 2001, Australian Greenhouse Office, Canberra.

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 about 8% between 1991 and 2001, and emissions per $ of GDP fell by more than 26%, reflecting the fact that, over the period, economic growth was faster than the growth in emissions: the economy became less emissions-intensive.

However, Australia's population has grown by rather more than that over the past 10 years, and Australia's per capita emissions declined by about 8% over the period. The economy is also becoming less emissions-intensive, with emissions per $ of GDP declining by more than a quarter.

In order to compare countries of different population size, one can consider per capita emissions of greenhouse gases; almost 28 tonnes of CO₂-e were produced for every Australian in 2001. These figures are high by international standards. Our per capita emissions of CO₂ (the main greenhouse gas) from fossil fuel burning, for instance, are among the highest in the world. In 2001 about 19 tonnes of CO₂ were emitted for every Australian: only America, among the OECD members, had higher per capita emissions of CO₂.

Australia's large per capita emissions in part reflect our heavy use of coal in electricity generation: according to OECD estimates for 2001, about 55% of Australia's carbon dioxide (the main greenhouse gas) emissions arose in the production of public electricity and heat, a higher proportion than any other OECD member. Some 35% of the OECD's entire CO₂ emissions were generated for this purpose.[13] Unlike most OECD members, Australia does not use nuclear power to generate electricity.

Factors influencing change

The size of the economy, its structure and the energy intensity of industries are important determinants of emissions. And it is informative to consider changes in the contribution of different sectors over time.

The 4% rise in emissions over the period 1991 to 2001 has primarily been driven by a larger rise (28%) in emissions from the energy-sector. This rise has been partially offset by a significant decline (73%) in net emissions attributable to land use and land use change (this in turn comes from a reduction in emissions from land clearing).

In 2001 the energy sector (mainly power stations and transport) accounted for 68% of net emissions, up from 55% in 1991, with emissions from energy industries (primarily from coal-fired electricity generating stations) increasing by over 36% since 1991. 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.[14]

Agriculture was the second largest emitter, and accounted for one-fifth of total net emissions in 2001 (mainly methane from livestock). Emissions from this sector rose by 11% over the period.

Land use and land use change activities emitted about 37 Mt CO₂-e, and forest sinks consumed about 11 Mt CO₂ during 2001 to produce a net emission of almost 26 Mt CO₂-e. (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.
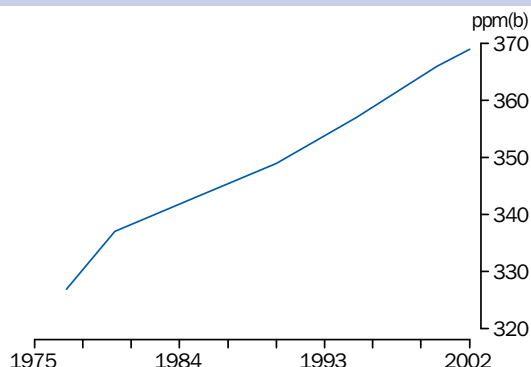
Australia's Greenhouse emissions(a), by category
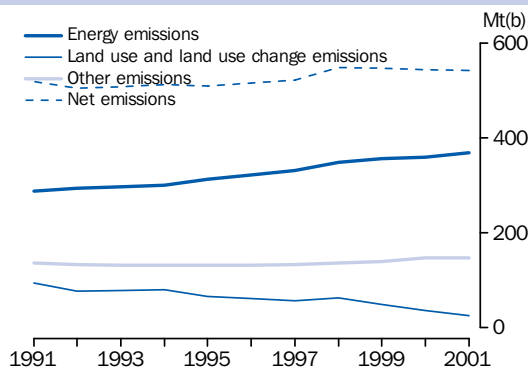
(a) Kyoto-based estimates. (b) Million tonnes (megatonnes) of carbon dioxide (CO₂) equivalent.[1]
Source: Australian Greenhouse Office.[6]

Carbon Dioxide Measurements(a)

ppm(b)

(a) 1977–2002 data recorded at Cape Grim Baseline Air Pollution Station, Tasmania. (b) Parts per million.
Source: Data available on request, CSIRO, 2003.

Increasing greenhouse emissions are reflected in findings from atmospheric weather stations, such as this data from Cape Grim in Tasmania. The concentration of atmospheric CO_2 has increased steadily since 1975.

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.[15]

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 agreed to accept greenhouse gas emission targets. Australia's target is to restrict annual average emissions over the period 2008 to 2012 to no more than 8% above their 1990 level.

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.

Renewable energy resources can in theory provide energy indefinitely. The main forms used in Australia include hydro-electricity, wind generators, solar cells, and hot water and biomass generators, which use organically based fuel sources such as wood and bagasse (the waste left over after extracting sugar from sugar cane).

Data from the International Energy Agency show that the proportion of Australia's overall energy consumption that came from renewable resources was 5.7% in 2001, down from 6% in 1991. Although Australia's renewable energy consumption grew by one-quarter over the period, total energy consumption grew by one-third.[16]

But 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 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) 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 increasing the concentrations of these substances in the upper atmosphere: the main ozone depleting emissions are chlorofluorocarbons (CFCs) used in refrigeration, foam plastics and aerosol products.

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.[17] There was international recognition of the problem in the mid-1980s when most countries signed the Montreal Protocol governing the global consumption of ozone depleting substances.

Since then the accumulation of ozone depleting substances in the atmosphere has slowed. 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 may not decline much further.[17] The largest losses have been observed over Antarctica (more than 60% of natural levels)[17] particularly in spring, losses that have led to the so-called Antarctic ozone 'hole', an area of the stratosphere within which ozone concentrations are well below levels at which they were at the beginning of the twentieth century.[17]

Consumption of ozone depleting substances in Australia

ODPT(a)
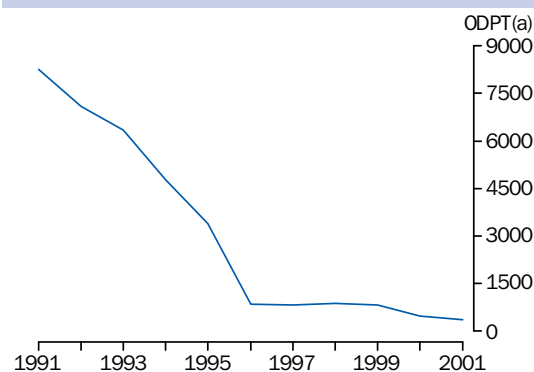
(a) Ozone depleting potential tonnes are an aggregated scale of measurement which allows one to add together quantities of different gases and weights them according to the amount of ozone each could potentially deplete.
Source: Data available on request, Environment Australia 2003.

Health effects linked to ultraviolet exposure

Australia has the highest incidence of skin cancer in the world.[17] Malignant melanoma incidence has been recorded since the late 1970s in most states and territories, and has doubled among both men and women in the past two decades. In the main, this increase is thought to stem from people spending more time out of doors, but the increase in ultraviolet (UV) radiation will also affect skin cancer rates. And exposure to UV radiation is directly linked to cataracts.

Some scientists expect that complete ozone recovery may be achieved by about 2050, although it may be delayed by as much as 50 years by climate change.[17] Greenhouse gases trap heat in the lower atmosphere, thereby keeping the stratosphere cooler. At very low temperatures, certain stratospheric clouds form above the poles, and in spring they react with ozone depleting substances which then destroy ozone.

Estimates of Australia's total consumption of ozone depleting substances, weighted according to the ozone depleting potential of each, are presented in the graph. Consumption in 1991 was over 8,000 *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 2001, it had fallen, in response to international restrictions, to 362 ODTs, mostly composed 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 minor ozone depleting substances that are used as interim replacements for CFCs.

Links to other dimensions of progress

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*, *The human environment* and *Transport*.

Endnotes

1   CO₂ equivalent emissions. Different greenhouse gases have different effects and remain in the atmosphere for different periods of time. A tonne of methane, for example, contributes as much to global warming as 21 tonnes of carbon dioxide (CO_2). To assess the impact of the different gases together, emissions of each gas are converted to a common CO_2 equivalent (CO_2-e) scale and added. For example, a tonne of methane and a tonne of CO_2 would equate to 22 tonnes of greenhouse gases CO_2-e.

2   Intergovernmental Panel on Climate Change 2001, *Summary for Policymakers of the Contribution of Working Group I to the IPCC Third Assessment Report,* Cambridge University Press, Cambridge.

3   Bureau of Meteorology 2000, *Australian Annual Mean Temperature Anomalies*, <http://www.bom.gov.au/climate/change/amtemp.shtml>last viewed 23 March 2004.

4   World Meteorological Organization, *WMO Statement on the Status of the Global Climate in 2003,* <http://www.wmo.ch/web/Press/Press702_en.doc> last viewed 11 February 2004.

5   The Economist November 8—14 2003, 'Economic focus: Hot potato revisited', *The Economist,* vol. 369, no. 8349, p.176, The Economist, London.

6   Australian Greenhouse Office (AGO) 2003, *National Greenhouse Gas Inventory 2001*, AGO, Canberra.

7   Commonwealth Scientific and Industrial Research Organisation 2001, *Climate Change: Impacts for Australia,* Marine Research Organisation, Hobart. <http://www.marine.csiro.au/iawg/impacts2001.pdf> last viewed 21 February 2002.

8   Zillman, J. 2003, World Meteorological Day Address 2003 'Our Future Climate', <http://www.bom.gov.au/announcements/media_releases/ho/20030320a.shtml> last viewed 18 February 2004.

9   United Nations 2001, *Climate Change.* < http://www.un.org/cyberschoolbus/briefing/climate/index.htm> last viewed 23 March 2004.

10 Commonwealth Scientific and Industrial Research Organisation 2003, *Hotter Summers fewer frosts for Australia*, CSIRO, Canberra. <http://www.csiro.au/index.asp?type=mediaRelease&id=Prfewerfrost?> Last viewed 11 February 2004.

11 Brereton, R., Bennett, S. and Mansergh, I. 1995, 'Enhanced greenhouse climate change and its potential effect on selected fauna of south-eastern Australia: a trend analysis', *Biological Conservation*, 72, pp. 339–354.

12 Lough, J.M. and Done, T.J. 2000, 'Coral bleaching collaborations at the Australian Institute of Marine Science'*, Climate Change Newsletter*, Vol. 12(1), pp. 7–8.

13 Organisation for Economic Co-operation and Development (OECD) 2003, *OECD in Figures: Statistics on the member countries 2002*, OECD Observer 2002/Supplement 1.

14 Australian Bureau of Statistics 2001, *Energy and Greenhouse Gas Emission Accounts 1992–93 to 1997–98*, cat. no. 4604.0, ABS, Canberra.

15 Australia and New Zealand Minerals and Energy Council (ANZMEC) 2001, *Energy Trends: an analysis of energy supply and use in the National Energy Market — 2000*, ANZMEC, Canberra.

16 See <http://library.iea.org/renew/eng/TableViewer/wdsview/dispviewp.asp> last viewed 9 March 2004.

17 State of the Environment Committee 2002, *Australia — State of the Environment Report 2001*, CSIRO Publishing, Melbourne.

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.

Introduction

People are social beings. They require love, companionship and agreeable engagements with others (including those that involve the formal exchange of goods and services) 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. The family unit takes on a large part of the burden of caring for people in need of support, and the vast range of services provided within communities by groups, clubs and charitable organisations are a crucial adjunct to the institutionalised care provided by governments. Families are responsible for providing guidance on social values which helps to form the basis of a civil society. Day to day interactions between people in a community build trust and reciprocity.

The discussion here focuses on the contribution that family and community functioning makes to social cohesion. There is no conceivable single indicator that captures all that might be important. Therefore a selection of indicators is presented that paint a picture of the way our families and communities function, and the cohesiveness of Australian society.

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 also the place where, through the everyday performance of family life, people make an enormous contribution to those who require special assistance. Most of the care provided to children, and to people with a disability is provided by immediate and extended family members.

Social cohesion and related concepts

Social cohesion refers to the social ties and community commitments that bind people together.[1] Closely related to the concept of social cohesion are the notions of 'social capital' and 'social exclusion'.

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.[2]

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.[3]

Desired directions of change

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 on to traditional values, the decline of traditional family structures may be viewed as regress.

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.[2]

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.

Changing nature of the family

Over recent decades there have been extensive change in the way families are structured and function. These trends have a range of social implications. Later partnering, later child bearing and smaller family size have implications for the size and age profile of the population. The increasing propensity to live alone has implications for housing and support.

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.[4]

Family type
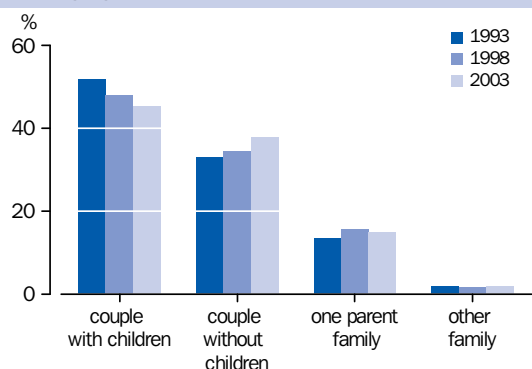
Source: Data available on request, Labour Force Surveys.

Types of families in Australia

According to the 2001 Census of Population and Housing, 83% of people lived in a 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.

In 2003, there were over five million families in Australia. The most common type of family was a couple family with children (45%), followed by a couple family without children (38%). There were 821,800 one parent families which represented 15% of all families. In the years from 1993 to 2003, the proportion of one parent families increased from 14% to 15%. However, there has been a more marked increase in the proportion of children under 15 living in one parent families, which rose from 15% to 20% over ten years.

Largely due to the ageing of the population creating 'empty nesters', but also including trends towards childlessness, over the past decade the proportion of families with children has declined from 65% of families to 60%. The decline has been driven by couple families with children, which fell from 52% of families to 45% in this period.

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.[5]

Family formation and dissolution

Ideally we would like to measure all family formation and dissolution, whether formed through registered or de facto marriages, and dissolved through divorces or separations. As such detailed family history data is not available we use registered marriage and divorce statistics.

Marriage and divorce
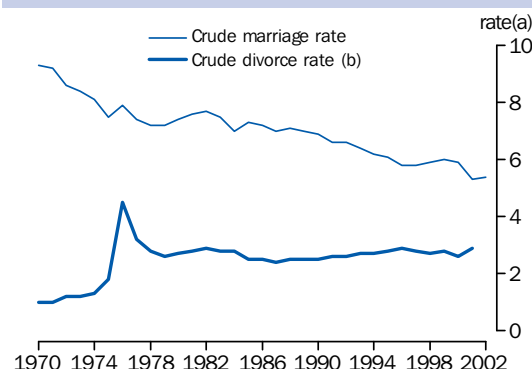
(a) Marriages and divorces per 1,000 persons in the population. The sharp rise in the divorce rate in the mid-1970s is linked to the introduction of the *Family Law Act* in 1975. (b) Divorce data not available for 2002.

Source: Australian Historical Population Statistics: Marriages and Divorces, cat. no. 3105.0.65.001; Marriages and Divorces, Australia, 2003, cat. no. 3310.0.

The commitment to a formal marriage (in a religious ceremony or by a civil celebrant) has become less popular. In 1970, the crude marriage rate stood at 9.3 marriages per 1,000 people. Between 1992 and 2002 the crude marriage rate declined from 6.6 to 5.4 marriages per 1,000 people, a continuation of a longer term trend.

The trend away from marriage is partly explained by a growth in the proportion of people who form de facto marriage relationships and a growth in people living without partners. Comparisons from the 1986 and 2001 Censuses of Population and Housing show that de facto couples as a proportion of all couples has doubled over the period, from 6% to 12%. Further comparisons from 1986 to 2001 show that the proportion of adults who did not have a partner (in either a legal marriage or a de facto marriage relationship) increased from 33% to 38%. The change was greater for younger people (those in the 18–34 year age range), but the proportion of people who were not living with a partner increased for each age group under 65.[6]

The dissolution of legal marriages through divorce has contributed to the increase in the proportion of people not living with a partner. However, while divorce rates increased over the decade up to 1996, the data indicate a decline in divorce rates from then until 2001, when they increased again. The decline in the latter half of the 1990s needs to be viewed in the context of the decline in the number of registered marriages.

In 2001, the crude divorce rate (2.9 divorces per 1,000 people) was higher than that in the preceding year (2.6 divorces per 1,000 people) and had returned to the longer term peak of 2.9 recorded in 1996.

Children and divorce

No. of children under 18 involved in divorces
No. of divorces involving children under 18
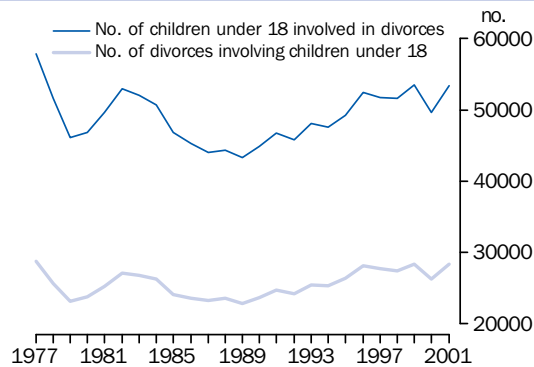
Source: Data available on request, ABS Divorces data.

Impact of divorce and separation

An increase in the number of divorces may reflect a greater prevalence of unhappy marriages, or greater acceptance of dissolving unhappy marriages.

Divorce and separation of couples is a disruption to family life. Some families manage the transition well; others find it stressful. The process of adjusting to the new family circumstances can take differing lengths of time with some people feeling stressed by the divorce or separation years after it occured.

As the rate of divorces increases so too does the number of children experiencing parental divorce. Over the 10-year period from 1991–2001, there has been a steady increase in the number of children under 18 experiencing divorce. In 2001, approximately 53,400 children under 18 experienced divorce. In 1991, it was 46,700.

One of the impacts of divorce and separation on family structure is to create fewer families where children live with both natural parents. The proportion of families with children under 18 which were intact was 76% in 1992 and declined to 72% in 1997.[7] Over the same period, while the proportion of step families and blended families with children under 18 stayed fairly similar in size (step families 4% and blended families 3%), the proportion of one parent families grew, as noted in the commentary on types of families in Australia.

One parent families are also more prone to disadvantage in a number of areas, and this is discussed in the article *Multiple disadvantage*.

Caring role of families

The care and support a family provides is a foundation for people's health and 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 Time Use Survey indicate that parents spend on average six and a half hours a day caring for children; for mothers this is over eight

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 not available, although some key outcomes of family life, such as whether people behave well in society, achieve good educational and work outcomes are measured by other indicators in this publication (*Crime*, *Work* and *Education*). Instead we discuss some of the 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.[8]

Feeling pressed for time is one important stressor for which we have data. Parents with small children feel the greatest amount of time pressure. Over 60% of mothers living in couple relationships, with a youngest child aged 0–4 years old, always feel pressed for time. For fathers in the same family type, it is 52%. The reporting of always feeling time stressed decreases as children age, with 48% of mothers and 34% of fathers in couple families, whose youngest child is aged 15–24 years old reporting always feeling pressed for time. By the time the children are over 25 years of age, 35% of mothers and 23% of fathers report always feeling time stressed. For fathers this is in line with the experience of adults who live in households with no children present.

The job of raising children is complex. And if one or both parents suffers from illness or psychological distress this may result in poor outcomes for children.[9] In the 2001 National Health Survey, 13% 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 (23%). 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 (14% and 13% respectively).

Young adults (18–24) living in one parent families report higher distress than young adults living in couple families. This is particularly true for young men in one parent families who were twice as likely to report high psychological distress (18% compared with 9%).

and a half hours a day while for fathers it is four hours a day. The largest component (65%) is low intensity, child minding activities.

Developmental activities such as playing with children take, 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 spend 15% of their child care time providing such physical care as feeding, bathing, and dressing children, compared with 8% for fathers.

Primary carers of the elderly and disabled, 1998

Relationship to recipient	Recipient of care	no.
Wife	Lives with	105,480
Husband	Lives with	85,385
Mother	Lives with	82,279
Daughter	Does not live with	47,866
Daughter	Lives with	36,609
Son	Lives with	15,276
Son	Does not live with	12,373
Other female relative	Does not live with	10,946
Father	Lives with	10,411
Female friend/ neighbour	Does not live with	9,362
Total(a)		**450,858**

(a) Total Includes other relationships not defined in list above.
Source: Data available on request, Survey of Disability, Ageing and Carers 1998.

When mothers work outside the house, in paid employment, the contact time between them and children reduces. Recent research indicates that, on the whole, mothers choose to maintain the time spent on developmental activities while substantially reducing low intensity, child minding activities. As mother's hours of paid work increase, fathers increase slightly the time they spend with children in developmental activities and in low intensity care.[10]

Families also often care for elderly and disabled relatives. In 1998, the Survey of Disability, Ageing and Carers identified that there were over 450,000 people who were primary carers. 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 (79%) lived with the person requiring care. And it is a role that most often falls to the immediate family: 89% of primary carers were either a partner, parent or offspring. While many husbands, fathers and sons do provide care, 70% 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 carers.[11]

Children living without an employed parent

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. Children living without an employed parent are a source of particular concern, both because the joblessness is an indicator that the children are at greater risk of experiencing financial hardship and because the joblessness may also have impacts on their psychological wellbeing and long-run personal development.

While studies have shown that there are correlations 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, income levels, etc. It is also important to note that while studies point to a higher incidence of poor outcomes 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.[12]

The graph below shows that, since the mid-1990s, the proportion of children living without an employed parent in the same household has been relatively steady at between 14% and 16%. Over half these children lived in one parent families (even though one parent families only accounted for 20% of all children in 2000–01), and approximately one-third lived in one parent families in which the youngest child was under five.

In 2000–01, 79% of lone parents whose youngest child was under five were jobless, compared to 46% whose youngest child was between 5 and 14. In contrast, 55% of children living in couple families had both parents employed.

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.

Children(a) without an employed parent(b)
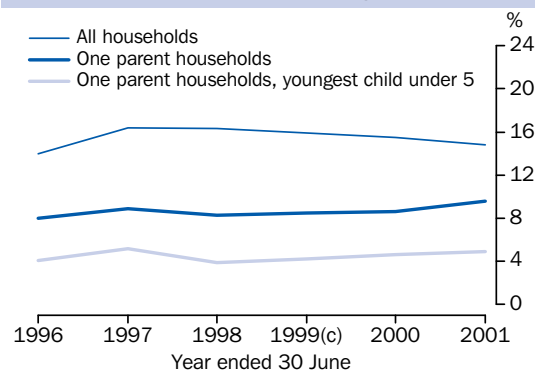
(a) Those less than 15 years of age. (b) Refers to the labour force status of parent(s) living in the same household as the children at the time of interview. (c) No survey was conducted in 1998–99.
Source: Data available on request, Surveys of Income and Housing Costs.

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 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.

More people are living alone and time spent alone is also increasing. Adults, of all ages, are increasingly more likely to live alone. Between 1992 and 2002, the proportion of people aged 15–64 years who lived alone increased from 6% to 9%. Among those aged 65 years and over it increased from 29% to 30%.[13]

Partly associated with more people living alone, people are also spending more of their time alone. Between 1992 and 1997, the average waking time per week spent alone among people aged 15 years and over increased from a little under 18½ 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.[14]

Social participation

Most people participate in social activities of one kind or another. In 2002, most Australians living in private dwellings (92%) participated in at least one of a nominated set of social activities in the three months prior to being surveyed. Popular activities were going out to restaurants (80% of people), attending movies (60%), attending or participating in sporting events (57%), visiting parks, zoos and theme parks (51%). Not surprisingly, as people age they are less likely to participate in such social activities. By 75 years and over, 21% of people did not participate in any of the nominated social activities in the previous three months.

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) which suggests that women have more work-related social contacts than in the past. In 2002, 8% of unemployed people had had no contact with friends and family outside the household in the previous week. Only 4% of employed 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).
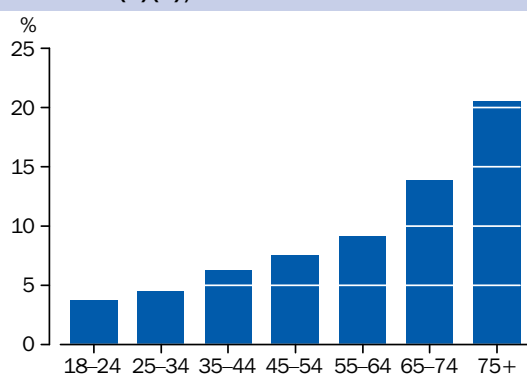
Social participation by adults in 2002(a)
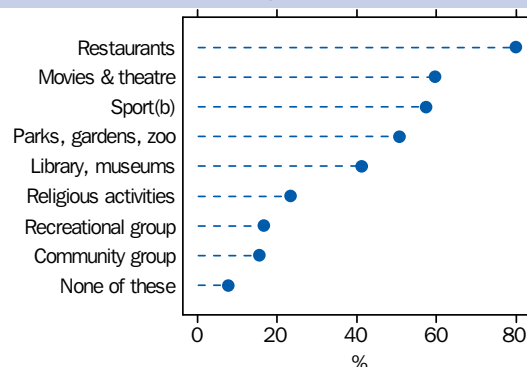
(a) In the previous three months. (b) Includes attendance at sporting events as well as participating in sport events.
Source: General Social Survey, 2002

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.
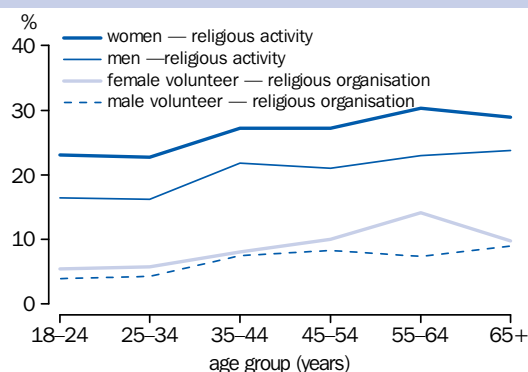*Source: General Social Survey, 2002.*

Undertaking voluntary work is another way in which people meet and interact with one another, and this is discussed in the next section.

Levels of participation in organised, non-organised and social sport or physical activities grew during the 1990s. 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 for both, participation increased with age.

Participation in religious activities, 2002

Source: Data available on request, General Social Survey, 2002.

In 2002, adults who had participated in church or religious activities within the three months prior to the survey were much more likely to have undertaken voluntary work than those who did not participate (52% to 29%). In particular, they were twice as likely to have volunteered for a welfare or community organisation than those who had not participated in religious activities (18% compared with 9%), and were also more likely to volunteer for an organisation providing education, training or youth development (12% compared with 7%).[15]

Community support

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. When the support offered by people's families and communities declines or is absent, it can contribute to serious social exclusion and problems such as homelessness, suicide and deaths from drug taking.

Building social support

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 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%).[16]

Trust

Trust and trustworthiness are two sides of the same coin, acting to lubricate social interaction and the smooth functioning of society. Trust refers to confidence in the reliability of a person or a system. It is based on the expectation that people or organisations will act in ways that are expected or promised, and will take into account the interest of others. Trustworthiness involves honesty, accountability, fair dealing and a level of competence.[17]

Trust is widely regarded as an important element of social capital, and, therefore, an important part of social cohesion.

The ABS does not collect data about trust, per se, although the 2002 GSS collected information on people's feelings of safety at home, which sheds some light on trust in Australia. About 82% of people reported feeling very safe or safe at home alone after dark, with the rate higher for men (91%) than women (72%).

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. Examples of reciprocal actions include contributing time or money to the community, making charitable donations, and sharing support among friends and family. One important and widespread expression of reciprocity is that which occurs over time in families, with reciprocal provision of support that occurs between different family members. 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.[17]

In 2002, most people (93%) felt they could ask people outside their household for small favours, such as looking after pets, collecting mail, watering 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), friends (66%) followed by neighbours (34%) and work colleagues (21%).

Some groups in Australia do report lower levels of ability to access support in times of crisis. People who were born overseas and not proficient in English were more likely to report an inability to access support than people born in Australia (14% felt they could not access support compared with 5%). Some 11% of people aged under 65 with a disability resulting in a core activity restriction felt they could not access support in times of crisis.

Proportions of people volunteering by age
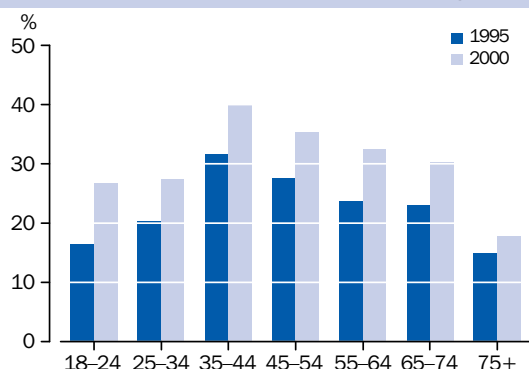
Source: *Voluntary Work Survey, 1995 & 2000.*

Another indicator of community support is the willingness to donate money or goods to community groups or charities. The Business Generosity Survey showed that in 2002, some 36% of operating businesses made donations, 4% participated in supporting community projects, and 11% sponsored individuals or charities. Some businesses did all three.

Making donations of money to disaster relief funds, charities or groups or organisations in the community is common. In 2000, 74% of adults donated money to an organisation. Women were more likely than men to donate (77% compared with 72%) and 80% of people aged between 35–54 donate. Those most likely to donate money were people already donating their time, with 84% of volunteers donating money.[18]

Breaking the bonds of social support

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. Deaths as a result of suicide or drug taking and homelessness provide pointers to a disintegration of social support, and hence social cohesion.

Suicide deaths(a)
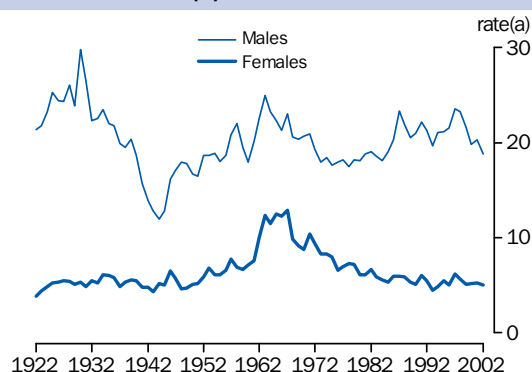
(a) Age-standardised rate per 100,000 people.[19]

Source: *AIHW Australian long term trends in mortality workbooks, 2003*

Homelessness

Homelessness might be seen as an indicator of poor social cohesion. 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 14,000 were sleeping rough and nearly half (48,600) were staying with friends and relatives.[20] The estimate of homeless people, using the 1996 Census of Population was 105,000 people. As an indicator of the difficulty experienced in counting the homeless, in 1997 researchers of the Consilium group, using different methodologies to those used in the Chamberlain/ABS study produced a smaller estimate of 53,000 people.[21]

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 2002–03 (about 21,100 to 22,500 per day) than in 1996–97 (about 13,000 to 14,000 per day).[22] But 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. They cannot by themselves be taken as reliable evidence of deteriorating levels of social attachment.

The suicide rate is one widely used indicator of social cohesion.[23] 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. Despite a recent fall in the male suicide rate to 18.8 suicide deaths per 100,000 men in 2002, the general shift from the relatively low rates recorded through the 1970s to higher rates in the late 1980s and 1990s stands in contrast to the downward shift in female rates since the 1970s.

Youth suicide deaths(a)
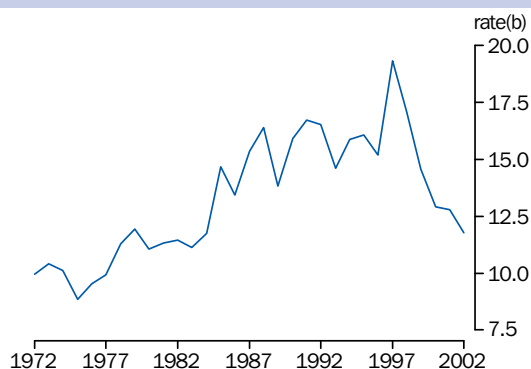
(a) People aged 15–24. (b) Rate per 100,000 people.
Source: AIHW Australian long term trends in mortality workbooks, 2003

For young people aged 15–24, the suicide rate showed a period of steady increases in the late 1980s through to the peak of 19.3 suicides per 100,000 people in 1997. Since then it has declined sharply to the current rate in 2002 of 11.8 suicides per 100,000 people. A rate last experienced in 1984.

Drug-induced death rates are mostly due to the use of opiates such as heroin.[24] Like suicide, 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 14 deaths per 100,000 men in 1999, falling to 6 deaths per 100,000 men in 2002.

For women, on the other hand, the drug-induced death rate at the end of the 20-year period was the same as the beginning (4 and 3.6 per 100,000 women in 1982 and 2002, respectively). The fluctuations over time for women show periods of relative stability with a peak in 1999 of 5 deaths per 100,000 women, and some decline in recent years.

Drug-induced deaths(a)[25]
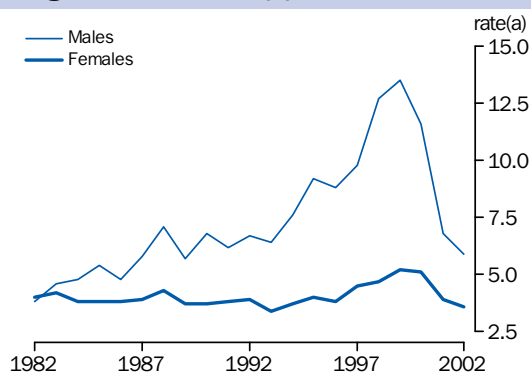
(a) Age-standardised rate per 100,000 persons.[19]
Source: Data available on request, Causes of Death collection.

Links to other dimensions of progress

See also the commentaries *Crime, Health, Work, Financial hardship, Multiple disadvantage, Culture and leisure,* and *Democracy, governance and citizenship.*

Endnotes

1   Berger-Schmitt, R. and Noll, H. 2000, *Conceptual Frameworks and Structure of a European System of Social Indicators*, EU Reporting Working Paper No. 9, Centre for Social Research and Methodology, Mannheim.

2   Organisation for Economic Co-operation and Development (OECD) 2001, *The Wellbeing of Nations: The Role of Human and Social Capital, Education and Skills,* OECD Centre for Educational Research and Innovation, Paris, France.

3   Jary, D. and Jary, J. 2000, *Collins Dictionary of Sociology*, Harper Collins Publishers, Glasgow.

4   Rodgers, B. 1996, 'Social and psychological wellbeing of children from divorced families: Australian research findings', *Australian Psychologist 31*, pp. 174–182.

5   Australian Bureau of Statistics 1999, *Household and Family Projections 1996 to 2021*, cat. no. 3236.0, ABS, Canberra.

6   Australian Bureau of Statistics 2000, 'People without partners', pp. 43–46 in *Australian Social Trends, 2000*, cat. no. 4102.0, ABS, Canberra.

7   Data on intact families is only available from the Characteristics of Families Survey 1992 & 1997. The next Characteristics of Families Survey, which was undertaken in 2003, is due for publication in 2004.

8   Pryor, J. and Rodgers, B. 2001, *Children in Changing Families: Life after Separation*, Blackwell Publishers, Great Britain.

9   Silburn, S., Zubrick, S., Garton, A., Gurrin, L., Burton, P., Dalby, R. et al, 1996, *Western Australia Child Health Survey: Family and Community Health*, ABS and TVW Telethon Institute for Child Health Research, Perth.

10 Bittman, M., Craig, L. and Folbre, N. 2003 'What happens when children receive non-parental care?', pp. 133–151, in Bittman, M., Craig, L. and Folbre, N. (eds) *Family Time: Social Organisation of Care*, Routledge, New York.

11 Australian Institute of Health and Welfare, 2003, *Australia's Welfare 2003*, pp. 106–113, AIHW cat. no. AUS 41, AIHW, Canberra.

12 See, for example: Dawkins, P., Gregg, P, and Scutella, R. 2002, 'The growth of jobless households in Australia', *Australian Economic Review*, vol. 35(2), pp. 133–154; and Gregory, R. 1999 *Children and the Changing Labour Market: Joblessness in Families with Dependent Children*, Discussion Paper No. 406, Centre for Economic Policy Research, Australian National University.

13 Statistics on proportions of people living alone are published in *Family and community: national summary*, pp. 28-29, in *Australian Social Trends 2003*, cat. no. 4102.0, ABS, Canberra.

14 Australian Bureau of Statistics 1999, 'Spending time alone', pp. 35–38 in *Australian Social Trends, 1999*, cat. no. 4102.0, ABS, Canberra.

15 Australian Bureau of Statistics 2004, 'Religious affiliation and activity', in *Australian Social Trends, 2004*, cat. no. 4102.0, ABS, Canberra. Due for publication mid-2004.

16 Australian Bureau of Statistics 2001, *Voluntary Work, 2000,* cat. no. 4441.0, ABS, Canberra. Also, Australian Bureau of Statistics 2003, *General Social Survey*, cat. no. 4159.0, ABS, Canberra.

17 Australian Bureau of Statistics 2004, *Information Paper: Measuring Social Capital: An Australian Framework and Indicators*, cat. no. 1378.0, ABS, Canberra.

18 Australian Bureau of Statistics 2001, *Voluntary Work, 2000,* cat. no. 4441.0, ABS, Canberra.

19 Standardised death rates enable comparisons of death rates between populations of different age structures by relating them to a standard population. Death rates have been standardised to the 2001 total population.

20 Chamberlain, C. and MacKenzie, D. 2003, *Australian Census Analytic Program: Counting the homeless*, 2001, cat. no. 2050.0, ABS, Canberra.

21 Consilium Group 1998, *Estimating the Number of Homeless People in Australia*, FaCS, Canberra.

22 Australian Institute of Health and Welfare (AIHW) 2003, *Homeless People in SAAP, SAAP National Data Collection Annual Report 2002–03 Australia.* AIHW cat. no. HOU 91, AIHW, Canberra.

23 Organisation for Economic Co-operation and Development (OECD) 2001, *Society at a Glance: OECD Social Indicators*, OECD, Paris.

24 For further analysis, see ABS 2001, 'Drug-induced deaths', pp. 71–74 in *Australian Social Trends, 2001*, cat. no. 4102.0, ABS, Canberra.

25 Drug-induced deaths are those caused directly or indirectly by drug abuse, including deaths from organ damage caused by drugs. They include deaths from illegal drugs as well as the misuse of legal drugs.

Excluded from the death rates presented in this commentary are: deaths directly attributable to alcohol and tobacco use; deaths from poisoning or exposure to volatile organic compounds (such as petrol); and murder where drugs were the weapon. Also excluded are deaths such as some road traffic accidents or AIDS deaths where drug use partly contributed to the death.

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.

In this article, drug-induced deaths include the following categories from the ICD-10:

◆ suicide by drugs (X60–X64)

◆ accidental drug-induced deaths, which include two components: accidental poisoning by drugs (X40–X44) and mental and behavioral disorders due to drug use (F11–F16, F19 & F55)

◆ drug deaths where the intent of the poisoning was undetermined (Y10–Y14).
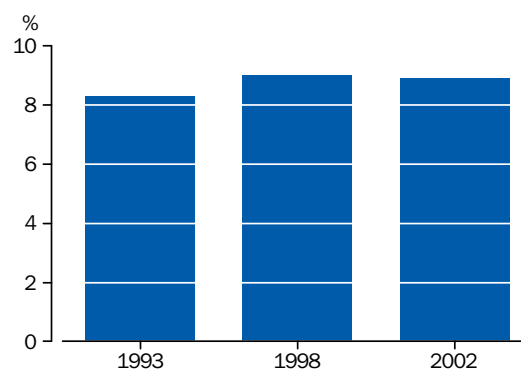
Crime: key points

Victims of personal crimes(a)
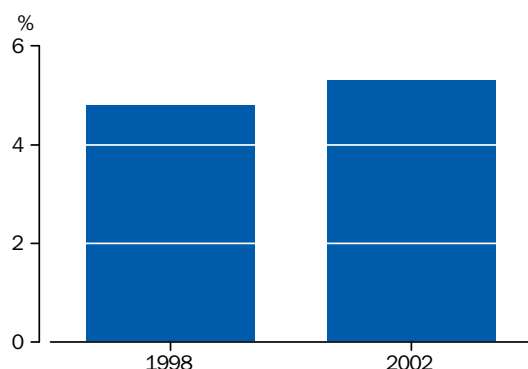
(a) Assault and robbery among people aged 15 and over. Sexual assault among people aged 18 and over.
Source: Crime and Safety, Australia, 2002 cat. no. 4509.0.

Victims of household crimes(a)

(a) Actual or attempted break-ins; and motor vehicle theft..
Source: Crime and Safety, Australia, 2002 cat. no. 4509.0.

Though small, the changes in the prevalence rates for personal crimes between 1998 and 2002 showed an increase from 4.8% to 5.3%. Most of these people were assaulted.

Between 1993 and 2002, there was little change in the proportion of households that were the victim of a household crime (an actual or attempted break-in or motor vehicle theft) and it remained at a little below 9%.

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 and restrict their lives in many ways. 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: Unlawful entry with intent, assault

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 victims 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, Financial 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 and restrict their lives in many ways. 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. The focus here is on 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.

There was little change in the proportion of households suffering a household crime between 1993 and 2002. In 1993 just over 8% of households were the victim of a crime. In 2002, just under 9% of households experienced a crime. Break-ins were the most commonly reported household crime in 2002 (4.7% of households), while 3.4% of households reported an attempted break-in and 1.8% reported a motor vehicle theft.

Over one million household crimes were committed in 2002. About 290,000 households experienced just one break-in, but a further 43,000 households suffered two break-ins that year, while over 20,000 suffered three or more such crimes. Almost 135,000 households had a motor vehicle stolen in 2002. Most (125,000) of these households reported only one such incident.

Though small, the changes in the prevalence rates for personal crimes between 1998 and 2002 showed an increase. In 1998, 4.8% of Australians reported being the victim of a personal crime. In 2002 the figure stood at 5.3%. Assault was the most commonly reported personal crime, with 4.7% of people reporting an assault in 2002. Some 0.6% of people reported a robbery, and 0.2% reported sexual assault.

Some 2.8 million personal crimes were committed in 2002. About 350,000 people reported being the victim of a single assault in 2002. Another 135,000 people were the victim of two assaults, while 230,000 people were the victim of three of more assaults. Some 71,000 people were the victim of one robbery, 14,000 were the victim of two and 11,000 were the victim of three or more.
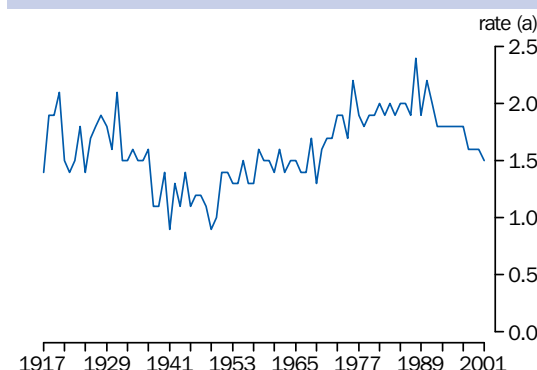
Homicide rates

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 1917 to 2001 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 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 2001 there were 300 homicides recorded in the cause of death statistics: 1.5 homicides per 100,000 people. Similar data compiled from police records since 1993 indicate little change through the 1990s.[3]

Homicide rates

rate (a)

(a) Age-standardised rates 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 1998 to 2000, the average homicide rate for the 17 member states of the European Union was 1.7 per 100,000 persons (the rates ranged from a low of 0.9 in Austria to a high of 3.1 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 5.9 and 54.3 respectively.

Homicide rates(a) — 1998 to 2000

| Selected countries	Homicide rate
European Union member States	
Austria	0.9
England and Wales(b)	1.5
France	1.7
Northern Ireland(b)	3.1
Italy(c)	1.5
European Union — average for 17 member states	1.7
Other countries	
Australia	**1.9**
Canada(c)	1.8
Japan(d)	1.0
New Zealand	2.3
South Africa	54.3
USA	5.9

(a) Homicides per 100,000 of the population, 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. & Siddique A 2002, International Comparisons of Criminal Justice Statistics, 2000. Home Office, United Kingdom.

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 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.

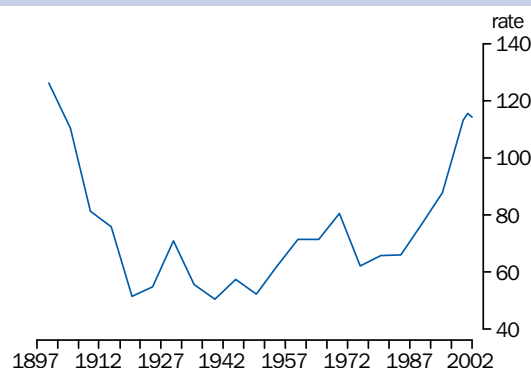### Imprisonment rates, per 100,000 adults(a)
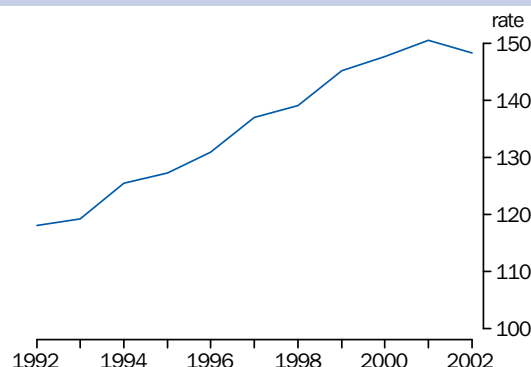
(a) Rate per 100,000 people aged 17 years and over.
Source: Prisoners in Australia, 2002, cat. no. 4517.0.

Overall, the rate of imprisonment has increased over the decade 1992–2002 so that by 2002, 148 adults (those aged 17 years or over) in every 100,000 were serving a prison sentence — up from 118 per 100,000 in 1992. From 2001 to 2002 there was a slight decrease from 150 adults in every 100,000 to 148.

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 17 years or over), it also shows that imprisonment rates in 2002 stood at levels higher than in most other years of the 20th century. Despite the upward trend seen over recent decades, the rates have not returned to the levels observed at the beginning of the 20th century: in 2002 there were 114 prisoners per 100,000 people (of all ages) compared to 126 in 1900.
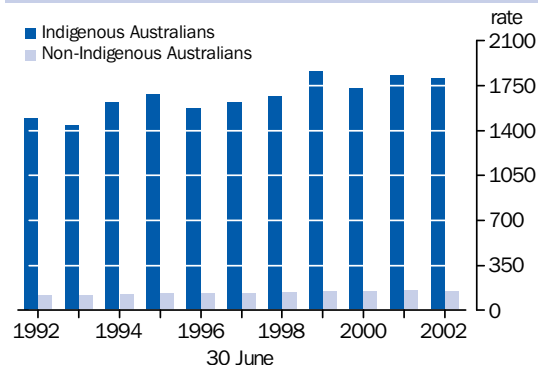
Imprisonment rates, per 100,000 people(a)

(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, 2002, cat. no. 4517.0.

Indigenous and non-Indigenous imprisonment rates, per 100,000 adults(a)

(a) Rate per 100,000 people aged 17 years and over.
Source: *Prisoners in Australia, 2002, cat. no. 4517.0.*

The imprisonment of Indigenous Australians has been a major issue of social concern in Australia, with imprisonment rates much higher than those of the general population. There have also been related concerns about the high proportion of Indigenous Australians in prisons dying of unnatural causes, especially by suicide.[4]

In 2002, there were 1,806 Indigenous prisoners per 100,000 adults of Aboriginal or Torres Strait Islander origin, an imprisonment rate over 12 times the rate for non-Indigenous people (148 prisoners per 100,000 adults). The Indigenous imprisonment rate fluctuated through the 1990s, but in 2002 it was higher than in 1992 when the rate was 1,498 prisoners per 100,000 adults. In June 2002, there were close to 4,500 Indigenous prisoners in Australia; they represented 20% of the 22,492 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.[5] Very high rates are observed in some small rural areas with high levels of disadvantage.[6] 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.[7]

In 2002, crime victimisation rates, from the ABS Crime and Safety Survey and, for murder and kidnapping/abduction, as recorded by police, varied considerably among Australia's states and territories. No single state had the highest (or lowest) rate for all offence categories shown (see table *Victims of selected offences*). New South Wales had by far the highest crime rate for robbery and kidnapping/abduction offences, but murder, assault, break-ins and motor vehicle theft were most prevalent in the Northern Territory.

Victims of selected offences (a) — 2002

	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	rate	rate	rate	rate	rate	rate	rate	rate	rate
Murder(b)	1.5	1.4	1.5	1.9	2.1	1.5	7.5	n.p.	1.6
Kidnapping/abduction(b)	6.5	2.0	2.0	2.0	1.9	1.7	2.0	3.1	3.5
Personal crime(c)									
Assault	4 800	4 700	4 400	4 500	5 100	5 000	7 800	5 800	4 700
Sexual assault	3 00	*200	*300	*100	*200	*300	**200	*200	200
Robbery	1 000	500	300	500	600	*300	**100	*200	600
Total personal crime(d)	**5 700**	**5 200**	**4 700**	**4 900**	**5 700**	**5 200**	**8 100**	**5 900**	**5 300**
Household crime									
Break-in/attempted break-in	7 900	5 300	8 000	6 700	9 600	7 800	19 500	7 400	7 400
Motor vehicle theft	2 100	2 000	1 300	1 800	1 000	1 600	*2 500	2 300	1 800
Total household crime(d)	**9 600**	**7 000**	**9 000**	**8 200**	**10 400**	**8 900**	**20 300**	**9 200**	**8 900**

(a) Victims refer to individual people for personal crimes, or households for property crimes per 100,000 people/households. (b) Data are from police statistics and refer to crimes recorded by the police. (c) Excludes murder and kidnapping/abduction. (d) The total is not a sum of each of the components as people 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.

Source: Crime and Safety. Australia. 2002 cat. no. 4509.0: and Recorded Crime - Victims. Australia. 2002. cat. no. 4510.0.

Total household crime victimisation rates were lowest in Victoria and South Australia, while total personal crime victimisation rates were lowest in Queensland and then South Australia. 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).[8] 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 also be a factor. Differences in the level of drug and alcohol use in each community may also be important. And other factors, such as the level of policing activity may be important.

Victims of personal crimes

The chance of being the victim of a robbery or an assault decreases with age. In 2002, 9.9% of 15–19 year olds were the victim of an assault compared to 0.8% of those aged 65 or over. Similarly 1.9% of 15–19 year olds were the victim of a robbery compared to 0.2% of those aged 65 or over.

Men of all ages were generally more likely to be the victims of assault or robbery than women in the same age group, although women aged 25–34 were a little more likely than men of that age to suffer assault, and women aged 65 or older were more likely to be the victim of a robbery than men in that age group.

Data from the General Social Survey in 2002 shows that the unemployed, lone parents and people living alone were also more likely to be the victim of personal (and household) crimes than their married, and employed or not in the labour force, counterparts.

In 2002, more than one-third of assaults happened in the victim's home, with a further 16% in their place of work or study. A weapon was used in 11% of assaults, and in almost three-quarters of assaults the victim was not physically hurt. About 80% of assaults were carried out by men, and the victim knew his or her assailants about 60% 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

While national rates of household crimes increased slightly between 1993 and 2002, this trend was not uniform. In the Northern Territory there was a substantial increase in the proportion of households falling victim to a crime, where the rate rose from 11% of households in 1993 to 20% in 2002. Rates fell in Western Australia over the period: from 13% to 10% of households.

Personal crimes

Comparative data relating to the prevalence of personal crimes cover a shorter time period than for household crimes, and have generally been less volatile. Between 1998 and 2002, national personal crime rates rose. Among the states and territories, the victimisation rates for personal crimes rose in the Northern Territory from 6.8% of people experiencing a crime in 1998 to 8.1% of people in 2002. Rates also increased in New South Wales from 4.6% to 5.7%., and Victoria from 4.2% to 5.2%. The rate fell in the Australian Capital Territory, from 7.7% of people in 1998 to 5.9% in 2002. Rates remained broadly unchanged in the other states.

Household crime victimisation rates, 1993 and 2002

rate(a)
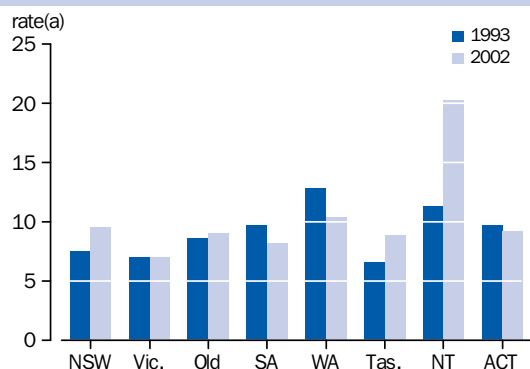
(a) Rate per 100,000 people.
Source: Crime and Safety, Australia, 2002 cat. no. 4509.0.

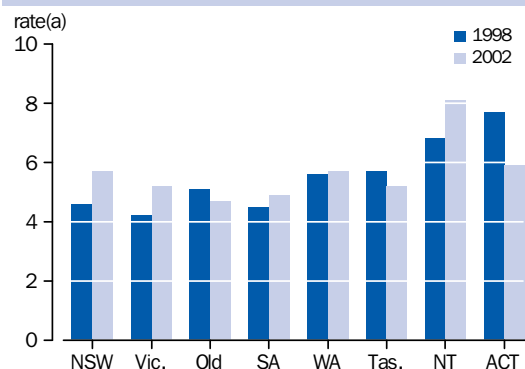**Personal crime victimisation rates, 1998 and 2002**

rate(a)

(a) Rate per 100,000 people.
Source: Crime and Safety, Australia, 2002 cat. no. 4509.0.

Crimes recorded by police

Most of the statistics in this commentary are based on people's responses to ABS surveys. But 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) — 2002

	Break-in	Assault(b)
	2002	2002
	%	%
NSW	68.0	34.6
Vic.	79.0	24.1
Qld	74.9	33.2
SA	81.4	31.7
WA	83.7	29.1
Tas.	79.3	*32.4
NT(c)	*72.8	*45.6
ACT	*80.9	*23.9
Aust.	**75.1**	**30.8**

(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, 2002, cat. no. 4509.0.

The national reporting rate in 2002 for break-ins was 75%, with Western Australia having the highest rate (84%) and New South Wales the lowest rate (68%). Victims were much less likely to report assault to the police — the national reporting rate was 31%, ranging from 46% in the Northern Territory to 24% in the ACT.

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.

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, increasing levels of drug dependence may have been a factor in increasing crime rates.[9] The prevalence of crime may also depend on available opportunities and the size of the potential rewards, perhaps weighed 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.[8]

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 financial hardship when comparing crime rates among population subgroups, but the association between crime rates and changes in unemployment over time are considered to be weak.[10] It is believed that the effect of changes in levels of financial 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.[10]

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, Financial 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) 2004, *Report on Government Services 2004,* 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 1.9 and 1.8 per 100,000 people between 1993 and 2002 with no apparent trend. See Australian Bureau of Statistics 2003, *Recorded Crime - Victims, Australia, 2002,* cat. no. 4510.0, ABS, Canberra.

4   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: Collins, L., and Ali, M. 2003, *Deaths in Custody in Australia: 2002 National Deaths in Custody Program (NDICP) Annual Report*, Australian Institute of Criminology, Canberra.

5   National statistics relating to differences between 'metropolitan' and 'non-metropolitan' areas have been published in Australian Bureau of Statistics, *Crime and Safety, Australia, 2003,* cat. no. 4509.0, ABS, Canberra. Differences within states have also recently 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.

6   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.

7   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.

8   See Weatherburn, D. 2001, *What Causes Crime*? (Crime and Justice Bulletin B54) at <http://www.Lawlink.nsw.gov.au> last viewed 18 February 2002.

9   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 has been a sharp increase in drug-induced deaths over the past 15 years.

10 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 2002, and 46% of households were using the Internet at home by 2002.[1] However, there are substantial differences in levels of access between different groups of the population.

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 communicate with a broad range of people. Many companies, organisations, universities, political parties and individuals have web sites. Online services include education, banking and shopping, while the Internet helps people to work from home or communicate with others, including friends and family.

The number of households connected to the Internet grew rapidly between 1998 and 2002. In 1998, about 1.1 million households (16%) had access to the Internet.[1] By 2002 this figure had risen to almost 3.5 million (46% of households). The growth in the number of households connected to the Internet is, as would be expected, reflected in the number of adults accessing the Internet at home. In 2002, adults were more likely to access the Internet at home than anywhere else.[1]

In 2002, 98% of households connected to the Internet used a computer for access. Between 1998 and 2002, households' access to computers increased, though not as strongly as their access to the Internet. In 1998, just over 3 million households had access to a home computer (44% of households), and 37% of these households were connected to the Internet. By 2002, 4.6 million households (61%) could access a home computer, and three-quarters of them were connected to the Internet. In 2002, the Internet was accessed daily in 37% of households with access to the Internet, with access at least once a week in 91% of such households.

Spending on communication more generally has grown: real household final consumption expenditure on communication more than doubled (in chain volume terms) between 1994–95 and 2002–03 to stand at more than $12 billion (the reference year was 2001–02).[2] The price of communications services increased by 1.1% over the period, more slowly than the general rate of inflation (with the price of telecommunication actually falling).[3]

Computer ownership and Internet access, households
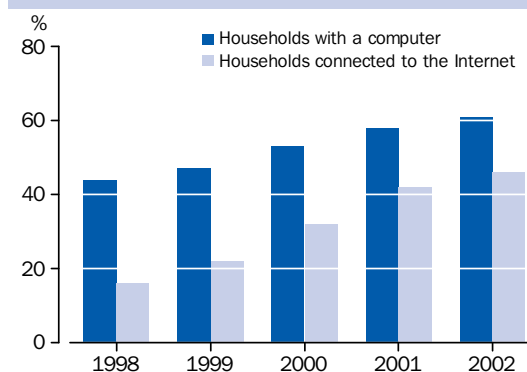
Source: Household Use of Information Technology 2001–02, cat. no. 8146.0.

Some differences within Australia

In 2002, access to the Internet at home differed according to household characteristics like income, location and family structure. Households with incomes over $50,000 were more than twice as likely to have access to the Internet at home than those with incomes under $50,000 (66% compared to 29%). Households with children under 15 years old were more likely to have access than others (59% compared to 40%). Metropolitan households were more likely than those outside the cities to have access to the Internet at home (50% compared to 39%).[1]

Among the states and territories, the Australian Capital Territory had the highest proportion of households connected (60%) in 2002, possibly because of the ACT's relatively high average incomes and younger age profile. Tasmania had the smallest proportion connected, at 35%.[1]

Businesses use of the Internet is discussed in the *Productivity* commentary.

Telephones

Telephones remain one of the major communication tools. International Telecommunications Union data show that in 1993 there were about 52 fixed telephone lines or mobile phones for every one-hundred Australians. By 2002, the figure stood at 118.[4] Much of this growth was driven by the rise in popularity of mobile phones. In 1998, ABS figures show that more than 40% of households had a mobile phone, and by 2002 almost three-quarters of households had a mobile phone.[5]

The digital divide

The term 'digital divide' is used to describe unequal access to information and communications technology among some parts of the community. Although Internet use has increased rapidly since 1998, data show that people on low incomes, without tertiary education, living outside metropolitan areas or aged over 55, are less likely to use the Internet.[1] And as the Internet becomes more widespread, groups without access may not have the full opportunities to participate in social, economic and political life. Barriers to Internet access are discussed in the *Factors influencing change* section.

Adults using the Internet

One can also consider the characteristics of the individuals — rather than the households — that use the Internet. In 2002, over half of the adults in Australia accessed the Internet at home or elsewhere. More than 40% of all adults accessed the Internet at home, while 30% used it at work. Over 30% of adults accessed the Internet at other sites, such as the home of a friend or relative, a tertiary institution or a library.[1]

The likelihood that an adult was an Internet user fell as age increased. Some 84% of adults aged 18–24 years were Internet users, but only 26% of adults aged 55 years or over used the Internet. Adult men were slightly more likely than women to have been Internet users (61% to 56%). Those in employment were also much more likely to have used the Internet than other adults. Almost three-quarters (73%) of employed adults used the Internet in 2002, compared to one-third of other adults.[1]

The proportion of adults using the Internet in Australia is high by world standards, and in 2000 Australia was ranked joint fifth by an OECD study of selected countries (behind several Scandinavian countries and Canada, and alongside the United States of America).[6] Comparing information from different countries can be problematic, and figures should be treated with caution.

Children using the Internet

Information is not available on changes over time in the number of children accessing the Internet, but figures are available for the twelve months to April 2000. Almost half (47%) of children aged 5–14 years accessed the Internet in this period, with just over one quarter of all children accessing from home and almost one third using the Internet at school. There was no difference in the proportions of children accessing the Internet in regional and metropolitan areas (both 47%).[7]

Factors influencing change

Many factors affect whether people decide to connect to the Internet at home. Cost and interest in the Internet are two, as is ownership of a computer (most of the people who access the Internet from home use a personal computer).

Although the Internet can be accessed without using a home computer (such as through a mobile phone or a set-top box), 99% of households accessing the Internet used only a computer to access it in November 2000.

In 2002, almost half of the 2.9 million households without a computer reported either that they had no need for a computer or a lack of interest in computers. A little more than one-quarter reported high costs as the main reason for being without a home computer.[1]

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 were more likely to report having access elsewhere, rather than cost, as a reason for not having the Internet at home.[1]

Although the ABS has little information about the changing cost of Internet access, the price of home computers has fallen steadily in recent times, while the capability of those computers has improved dramatically.[8]

Interest in the Internet is likely to rise as the breadth of online services increases and people become more accustomed to using them. For example, the proportion of adults using the Internet for to pay bills or transfer funds was only 3% in 1999. This proportion has continually increased and was 23% in 2002. Internet shopping is becoming more common too. In 2002, 26% of Australian Internet users were Internet shoppers compared to only 12% in 1999. Also 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. Accessing tax information, submitting tax returns and accessing employment/unemployment information were also popular reasons.[1] Some 57% of businesses with Internet access also used 'e-government' in 2001–02, with many seeking information on government services.[9]

Other factors believed to be a barrier to Internet use include lack of skills and training and concerns over security. The use of the Internet in the workplace is thought to stimulate people to become connected at home, while children who use the Internet at school or a friend's house are likely 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. But 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 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 2003, *Household Use of Information Technology 2001–02,* cat. no. 8146.0, ABS, Canberra.

2   Australian Bureau of Statistics 2004, *Australian System of National Accounts 2002–03,* cat. no. 5204.0, ABS, Canberra.

3   Australian Bureau of Statistics 2004, *Consumer Price Index,* cat. no. 6401.0, ABS, Canberra.

4   International Telecommunications Union 2003, *World Communication Development Report 2003: Access Indicators for the Information Society,* ITU, Geneva.

5   Australian Bureau of Statistics 2003, *Measures of a knowledge-based economy and society, Australia,* Australia Now, cat. no. 8146.0, ABS, Canberra.

6   Organisation for Economic Co-operation and Development 2001, *OECD Science Technology and Industry Scorecard 2001— Towards a knowledge-based economy,* OECD, Paris.

7   Australian Bureau of Statistics 2000, *Children's Participation in Cultural and Leisure Activities,* cat. no. 4901.0, ABS, Canberra.

8   Landefeld, S and Grimm, B.T. 2000, *'A note on the Impact of Hedonics and Computers on Real GDP', Survey of Current Business,* vol. 80, no.12, pp. 17–22.

9   Australian Bureau of Statistics 2003, *Business Use of Information Technology 2001–02,* cat. no. 8129.0, ABS, Canberra.

Transport

Passenger vehicles per 1,000 people
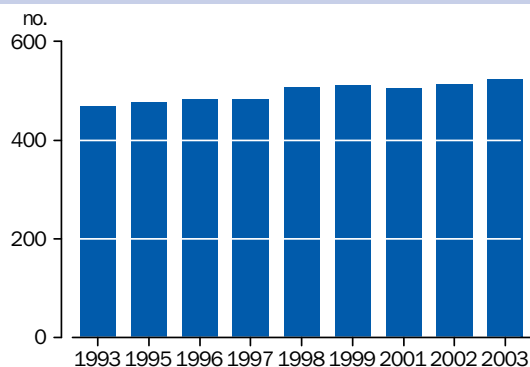
no.

Access to motor vehicles also increased through the 1990s, and in 2003 there was about one passenger vehicle for every two Australians.[1]

Many aspects of transport relate to progress. Transport and transport links connect businesses with market places, and, in so doing, give people access to different goods and services. And greater access to transport gives individuals more choice in where to live, work or 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 (see box opposite).

On 31 March 2003 there were over 10.3 million registered passenger vehicles in Australia, up from around 8.3 million in 1993. In 2003, passenger vehicles accounted for almost 80% of the vehicle fleet, with trucks, buses, motorcycles and light commercial vehicles comprising the rest (another 2.8 million vehicles).

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 (640 million passenger trips in 2002).[2] Rail also carries a good deal of freight, particularly bulk commodities like coal and mineral ores. In 2000–01, rail moved 509 million tonnes of freight over about 134,000 million tonne kilometres.[3]

Sea transport moved 47 million tonnes of domestic freight in 2000–01 over nearly 100,000 million tonne kilometres. Domestic sea transport focused on long distance movement of bulk commodities such as metal ores, petroleum and petroleum products, coal and cement. There was considerable additional long distance transport by ships of large quantities of goods and material for export and import.[3]

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. Domestic air freight carried 0.2 million tonnes of freight in 2000–01.[3] In 2002–2003, about 29 million domestic passenger revenue journeys were made by air and passengers were carried over nearly 34 billion passenger kilometres.

The motor vehicle fleet grew more quickly than the population in the 1990s. By 2003 there were 522 passenger vehicles for every 1,000 people in Australia, up from 469 vehicles per 1,000 people in 1993.[1] And there has been a shift towards four wheel drive cars, which made up 17% of new vehicle sales in 2002, up from 8% in 1992.

Each passenger vehicle travelled an average 14,200 kms in the year to 31 October 2002, up from 13,400 kms in 1998.[4]

Fuel and fuel consumption

Access to vehicles is important to many Australians, but the combustion of fossil fuels by motor vehicles is an important source of air pollution and greenhouse gases.

Average passenger vehicle fuel consumption has remained around 11 to 12 litres per 100kms over the 1998 to 2002 period.[13] In 2003, an estimated 88% of registered vehicles used petrol. The proportion of the entire fleet using diesel fuel rose between 1993 and 2003, from under 7% to over 9%. There was strong growth in the proportion of passenger vehicles using diesel, which increased from 1.9% to 2.9%.[2] Diesel engines emit fine particles as atmospheric pollution.[5]

Government policy aimed at reducing lead emissions from car exhausts achieved a strong shift away from leaded petrol over the decade 1992–2002. By 1998 for passenger vehicles, unleaded petrol accounted for almost three quarters (73%) of petrol sold in Australia, and rose to 90% by October 2002. There was also a shift towards the use of LPG/CNG/dual fuel between 1992 and 2002. The amount of such fuel used increased from about 1.3 million litres in 1998 to almost 1.9 million litres in 2002, and gas's share of total fuel consumed by passenger vehicles increased from 9% to 11%.[4]

Fatalities per 100 million vehicle kilometres travelled 1975–2000

No. fatalities per 100 million km travelled
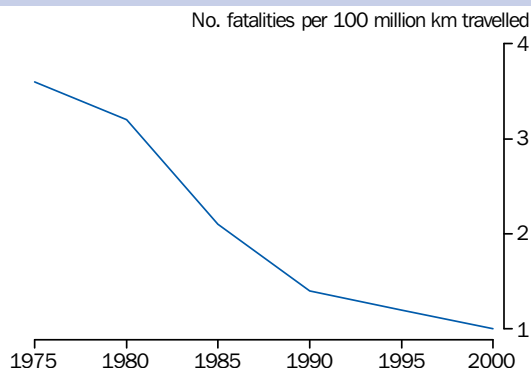
Source: Australian Transport Safety Bureau, International Road Safety Comparisons, The 2001 Report. Australia.

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 30.4 in 1970, to 8.8 in 2002.[6]

In 2001, this figure was 8.9 per 100,000 people, which reflected a total of 1,737 fatalities in Australia that year, compared to an OECD median rate of 11.1 per 100,000 people.

Australia was ranked 11th safest among the 25 members of the OECD for whom there were data in 2001, and we had fewer fatalities per capita than the USA (14.8 per 100,000 people), France (13.8) and New Zealand (11.8). But we had more fatalities than Germany (8.5), Japan (7.9) and the UK (6.1).[7]

Korea had more fatalities per capita than any other reporting OECD country (17.2 per 100,000 people). The lowest number of fatalities were recorded in Norway and the UK (both 6.1 per 100,000 people).[7]

Some differences within Australia

In 2003, the highest levels of passenger vehicle registrations were in Victoria, with 573 vehicles per 1,000 residents, up from about 516 vehicles per 1,000 people in 1993. The Northern Territory had the lowest rate with about 346 vehicles per 1,000 residents in 2003, up from about 323 vehicles per 1,000 people in 1993.[2] These data are influenced by the level of ownership within each state as well by the numbers of vehicles, such as hire cars, that might be registered within a state but used elsewhere.

In 2003, some 3.9 million passenger vehicles (30% of all vehicles) were registered in New South Wales, more than any other state or territory. Between 1993 and 2003 there was a strong rise in the proportion of registrations in Queensland, which grew by 38% over the period.[2] Population growth in Queensland was 22% over that period.[8]

By contrast, growth in the Tasmanian fleet was slowest (about 9% over the period), possibly due to a relatively slow growth in the population (1%).[2,17] In 2002, passenger vehicles registered in the NT travelled the most, on average 15,600 kms a year, while Tasmania-registered vehicles recorded the lowest average distance travelled, of 12,700 kms.[13]

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

Access to transport helps to determine where people work and what goods and services they can purchase. But motor vehicles remain the largest single source of fine particle air pollution in Australia, and also an important source of greenhouse emissions.

See also the commentaries *National income*; *Work*; *Family, community and social cohesion; The human environment;* and *International environmental concerns.*

End notes

1   Australian Bureau of Statistics 2003, *Motor Vehicle Census,* cat. no. 9309.0, ABS, Canberra.

2   Australasian Railway Association Inc. 2003, *Yearbook 2003,* ARA, Melbourne.

3   Australian Bureau of Statistics 2002, *Freight Movements Survey,* cat. no. 9220.0; ABS, Canberra.

4   Australian Bureau of Statistics 1991–2000, *Survey of Motor Vehicle Use,* cat. no. 9208.0, ABS, Canberra.

5   State of the Environment Committee 2002, *Australia — State of the Environment Report 2001*, CSIRO Publishing, Melbourne.

6   Australian Transport Safety Bureau, *Monthly Fatalities Database*, ATSB, Canberra.

7   Australian Transport Safety Bureau, *International Road Safety Comparisons, The 2001 Report;* ATSB, Canberra.

8   Australian Bureau of Statistics 2003, *Australian Demographic Statistics,* cat. no. 3101.0, ABS, Canberra.

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 democracy and the extent to which citizens of Australia participate actively in their communities or cooperate with one another.

For a long time these qualities, although often publicly agreed to be of critical importance, were seldom measured statistically. This was partly because they were harder to measure than more concrete statistics, e.g. the value of goods produced or the rate of infant mortality; and partly because they were regarded as more controversial.

More recently several projects from academics and national and international organisations including the United Nations, the World Bank, the Organisation for Economic Co-operation and Development, 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.[2] 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. Other important factors include the trust that citizens have in government and public institutions, and the degree to which they participate in civic and community life and value and understand their rights and duties as citizens.

Whilst democracy is supported globally, 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 over the past five years 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, associated with the United Nations, and with 21 member states including Australia. The framework has been applied in practice in nine countries.

The following material covers:

◆ nationhood and citizenship

◆ political participation.

Our consultations and research have brought to light a wide range of views about what aspects of governance, democracy and citizenship are most important to Australia's progress. This is new territory for the ABS and although the following discusses a selection of indicators that were suggested during our consultation with experts, we expect that this commentary will develop in future issues of MAP. 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 organization 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. Issues such as corruption in public life, and the availability of social and economic rights are also important.

Nationhood and citizenship

Citizenship is a common bond which brings together the people of Australia. It also 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, and expected to defend Australia should the need arise.

Only Australian citizens can vote in elections, and so the proportion of those people living here permanently 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 2001, about 95% of the people living in Australia were citizens. The number of people taking out Australian citizenship each year between 1992 and 2002 ranged between 129,000 (in 1998) and 71,000 (in 2000), but these data are influenced by the number of non-citizens eligible to apply for citizenship as well as whether they wish to become Australians.[3]

When considering progress it is more informative to consider the changing proportion of Australian residents who have lived here for a least two years (those generally eligible for citizenship) that are citizens. In 1991 about 65% of 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 were Australian citizens.
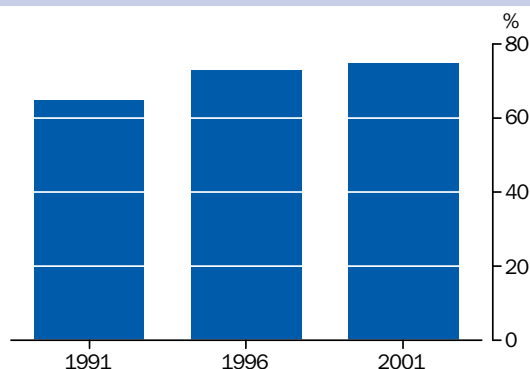
Political participation

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.[4] Powers are separated to prevent oppressive government by ensuring three bodies — the Legislative, 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 sanction of dismissal.

Participation in elections is important to the functioning of a democracy. And statistics on voter turnout, 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. 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. But it might also represent widespread contentment among voters.[5]

In June 2003, the Australian Electoral Commission (AEC) estimated that about 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 about 76% of eligible 18–25 year olds were enrolled.[6]

Voter turnout has not dropped below 94% since the general election in 1955 (when it was about 88%). But in Australia, where enrolment and voting in State and Federal elections is compulsory, it is perhaps more informative to consider the proportion of informal votes cast.

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 - 2001

| Federal election	Voter turnout %	Invalid 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

Source: Data compiled by IDEA international.[7]

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.[8]

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 proprotion 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 2001 Federal election, just less than 5% of the vote was informal.

Voting in local government elections is not compulsory in all 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 recent elections. But in other states, where voting in 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% in Western Australia's May 2001 local election.[9]

Proportion of Federal parliamentarians that are women
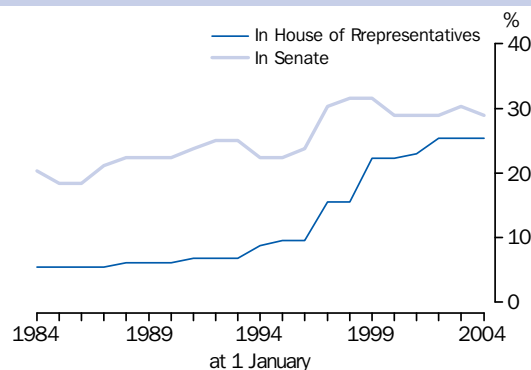
Source: Parliament of Australia, 2002.[10]

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 Goals was the representation of women in parliament.[11]

The proportion of Federal MPs who are women has risen over the past 20 years. On 1 January 1984 fewer than 5% of the House of Representatives were women, as were about 20% of the Senate. By the start of 2004 these proportions had risen to 25% and 29% respectively. At the end of 2003 there were 12 female ministers in the Federal parliament (representing 30% of ministers). About one-quarter of shadow ministerial positions were held by women.

Civil society and civic participation

Civil society has been defined as 'the groups and organisations, both formal and informal, which act independently of the state and market, to promote diverse interests in society'.[12]

Civic participation describes activities reflecting interest and engagement with governance and democracy, such as membership of political parties and trade unions/professional associations, or serving on committees of clubs and associations. It has been defined as a two way communication process between the government and citizens. The overall goal is for better decisions, supported by the public and fostering the increased wellbeing of the population.[13]

Some people suggest that active citizen engagement is important for better government. Researchers and commentators, such as Robert Putnam, argue 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 that the performance of representative government is improved by the social infrastructure of civic communities and by the democratic values of both officials and citizens.[14]

Volunteering rates for management, committee, and coordination work.
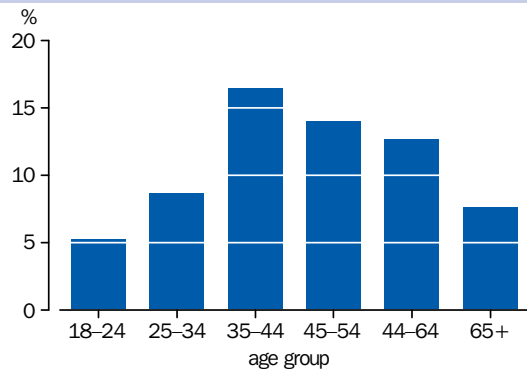
a) People aged 18 or older.

Source: Voluntary Work, Australia 2000 cat. no. 4441.0.

Civic participation involves both collective and individual activities, including the membership of civic organisations, such as political parties and trade unions, and serving on committees of clubs, voluntary organisations and associations. 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 2004).[15] These activities extend social networks of those participating, and help people develop important skills for participating in democracy and governance.[16]

In 2000, some 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.[17]

In 2000, people aged 35–44 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 volunteering among people with children younger than 15.

People with higher levels of educational qualifications, such as a bachelor degree or higher (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 best represented among volunteers in general with over 40% volunteering rates.[17]

Links to other dimensions of progress

This dimension is linked to many others. In particular, 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*.

Endnotes

1   See, for example, Berger-Schmitt, R. and Noll, H. 2000, *Conceptual Frameworks and Structure of a European System of Social Indicators*, EuReporting Working Paper No. 9, Centre for Social Research and Methodology, Mannheim; Salvaris, M., Burke, T., Pidgeon, J. and Kelman, S. 2000, *Measuring Victoria's Progress, A System of Social Benchmarks and Indicators for Victoria,* Institute of Social Research, Swinburne University of Technology, Hawthorn, Victoria; Beetham D. (Ed) *Defining and Measuring Democracy,* Sage, London; and Institute for Democracy and Electoral Assistance 2002, *State of Democracy: Trends from Pilot Countries* <http/:www.idea.int/ideas_work/14political_state.htm> last viewed 29 January 2002; Organisation for Economic Co-operation and Development (OECD) 2004, *Open Government: Fostering Dialogue with Civil Society*, OECD, Paris.

2   International Institute for Democracy and Electoral Assistance (IDEA), *Democracy Assessment: The Basics of the International IDEA Assessment Framework*, <http://www.idea.int/publications/sod/demo_ass_inlay_eng_L.pdf> last viewed 10 February 2004.

3   Department of Immigration and Multicultural and Indigenous Affairs 2004, *Key Facts in Immigration*, <URL:http://www.immi.gov.au/facts/02key_1.htm #9>, last viewed 10 February 2004.

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6   Australian Electoral Commission (AEC) 2003, *Annual Report 2002–03*, AEC, Canberra.

7   International Institute for Democracy and Electoral Assistance (IDEA), *Voter turnout from 1945*, <URL:http://www.idea.int/vt/country_view.cfm> last viewed 10 February 2004.

8   Australian Electoral Commission (AEC) 2003, *Informal Votes Survey, House of Representative 2001 Election*, AEC, Canberra. <http://www.aec.gov.au/ _content/ what/voting/research_2001elections.htm>

9   Data were supplied from the Tasmanian Electoral Commission; and, for Western Australia, were published by the Western Australian Electoral Commission (WAEC) 2001, *Local government Report: 2001 Postal Elections*, WAEC, Perth.

10 Parliament of Australia 2002, 'Women in Parliament' in *The Handbook of the Fortieth Parliament*, Parliament of Australia, Canberra.

11 See <http://www.un.org/millenniumgoals/>, last viewed 17 March 2004.

12 World Bank 2002, What is Civil Society?, <http://www.worldbank.org/poverty/scapital/sources/civil1.htm> last viewed 9 March 2004.

13 World Bank 2002, Draft module on *Civic Participation in National Governance*, <http://www.worldbank.org/wbi/communityempowerment/Modules/Natgov_Module.doc> last viewed 10 February 2004.

14 Putnam, R.D. 1993, *Making Democracy Work, Civic Traditions in Modern Italy.* Princeton University Press, Princeton, New Jersey.

15 <http://www.cleanup.com.au/main.asp?RequestType=MediaReleaseIn&SubRequestType=Detail&MediaRelID=163>, last viewed 9 March 2004.

16 Australian Bureau of Statistics 2004, *Measuring Social Capital: An Australian Framework and Indicators*, cat. no. 1378.0, ABS, Canberra.

17 Australian Bureau of Statistics 2001, *Voluntary Work Australia 2000*, cat. no. 4441.0, ABS, Canberra.

Multiple Disadvantage

Many aspects of disadvantage go hand in hand. The links, for example, between a poor education and low income are well known, while low income is, in turn, associated with poor health and inferior housing.

The progress indicators within this publication focus on progress at the national, or aggregate level. Although an indicator of progress might have reached a certain level for Australia as a whole, we recognise in the *Some differences within Australia* section of each commentary, that that level might be different among the various subgroups of the population: for example, different groups of people have different average life expectancy, different unemployment rates or different levels of educational attainment. And so, for most progress dimensions, the commentaries shed some light on the relative advantage and disadvantage of some population subgroups.

But, because the commentaries discuss each dimension in turn, they do not include information on the extent to which various sub-groups of the population experience more than one form of disadvantage.

Information on the patterns and incidence of multiple disadvantage in Australia can be important to an understanding of Australia's progress.

Those experiencing multiple disadvantage have poor outcomes across a range of dimensions of life. The effects of several disadvantages acting in tandem can be more difficult to overcome than just a single aspect of disadvantage. And this multiple disadvantage can be perpetuated across generations. Multiple disadvantage can also lead to exclusion from society (see box opposite) and a lack of access to goods, services, activities and resources.

This article discusses multiple disadvantage in Australia. It begins by comparing levels of disadvantage across a range of areas of concern for different population subgroups — men and women of different ages; different household types; and people in different states and territories or remote and non-remote areas.

It goes on to examine the associations between disadvantage in one dimension and disadvantage in another: to what extent, for example, is a low level of education associated with a high level of unemployment, and do the associations differ in different subgroups of the population?

It ends by considering how patterns of multiple disadvantage affect different subgroups, and examines the characteristics of places in Australia that experience relatively high levels of disadvantage across a range of key areas.

Measuring disadvantage

Whether or not someone is disadvantaged in an aspect of life depends on a range of circumstances, and there are no absolute definitions of disadvantage in any area with which everyone would agree. We focus on people who are disadvantaged relative to others, not, necessarily, people experiencing absolute disadvantage. We have chosen measures that, where possible, are tied closely to the headline indicators in *Measures of Australia's Progress*:

◆ Health: whether someone reported their health to be only fair or poor.

◆ Education: whether someone was without non-school qualifications.

◆ Work: whether someone was unemployed.

◆ Financial hardship: where someone's equivalised gross household income was in the bottom quintile (20%) of incomes.

◆ Crime — assault and break-in: whether someone was the victim of actual or threatened violence and/or an actual or attempted break-in during the previous 12 months.

◆ Family and community: whether someone felt that, in a time of crisis, they were unable to get support from someone outside their household.

There are, of course, other ways in which disadvantage might be measured or characterised including looking at things like proficiency in English, poor housing, family breakdown and transport difficulties.

Social exclusion

Around the world, researchers are becoming increasingly interested in the concept of *social exclusion*.[1] 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.[2]

The General Social Survey

In 2002, the ABS undertook a General Social Survey (GSS).[3] The GSS asked a series of questions designed to capture key dimensions of social and economic outcomes for households and individuals. Demographic characteristics include age, sex and marital status. Social outcomes include health, education, crime and family and community support. Economic outcomes include income, wealth and financial stress.

The GSS was designed to support analyses of the linkages between the various dimensions of a person's social and economic outcomes. Unlike other ABS surveys (such as the National Health Survey or the Survey of Income and Housing Costs) which concentrate on one or two specific 'areas of social concern', the GSS was designed to capture information across a range of areas. It is, therefore, a particularly useful data set if one wants to investigate multiple disadvantage. Much of the information in this article comes from the GSS.

Different surveys can yield different results and some of the estimates from the GSS — the crime victimisation rates for example –— differ from other ABS figures.[4]

Disadvantage by household type

Household composition (selected categories)	Health Fair/poor health	Education and training Without a non-school qualification	Work Unemployed	Crime Victim of break-in or violence	Financial hardship Lowest income quintile	Family and community Unable to get support in time of crisis
	%	%	%	%	%	%
Couple only household, one family						
Person aged under 35	6.8	31.3	3.8	19.2	3.6	*3.3
Person aged 35—64	18.7	47.8	2.2	14.3	19.4	6.6
Person aged 65 or over	32.4	62.6	. .	7.5	44.9	6.3
One family household with dependent children						
Couple household	8.0	45.1	3.8	18.7	11.8	5.0
Lone parent	15.7	55.5	7.5	33.1	39.6	5.5
Lone person household						
Man aged under 35	7.6	41.4	7.2	35.8	21.5	*4.5
Woman aged under 35	9.4	39.0	*6.2	31.4	21.2	*1.9
Man aged 35—64	25.3	46.0	7.2	25.6	32.9	11.2
Woman aged 35—64	26.4	50.1	4.2	21.0	43.0	3.8
Man aged 65 or over	34.3	60.8	. .	13.2	59.4	7.7
Woman aged 65 or over	34.8	79.9	. .	8.8	69.3	4.7
Person aged under 35	8.3	40.5	6.8	34.1	21.4	*3.5
Person aged 35—64	25.8	47.9	5.8	23.5	37.5	7.8
Person aged 65 or over	34.6	73.9	. .	10.2	66.1	5.6
All people	**15.9**	**50.0**	**3.9**	**18.3**	**19.6**	**6.0**

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

Source: Data available on request, General Social Survey.

Disadvantage among different subgroups

In 2002, the ABS General Social Survey (GSS) asked a series of questions about people's social and economic outcomes. We focus here on several areas that are also headline dimensions of progress — health, education and training, work, financial hardship, crime, and family and community. And we examine the extent to which various subgroups in the population experience relatively poor outcomes in these areas. We examine subgroups defined by their age and sex; their living arrangements; and where they live. A one page box discusses disadvantage among Australia's Aboriginal and Torres Strait Islander peoples.

Couples and people living alone

There were considerable differences in patterns of disadvantage among the different households set out in the table above.

In 2002, people living with a partner (of any age) but no children were less likely to experience many aspects of disadvantage than people in the same age group who were living alone. For instance, among those aged 18–34, some 31% of people living in a couple only household were without a non-school qualification, compared to 41% of people in the same age group and living alone; 4% were unemployed (compared to 7%); 19% had been the victim of an assault or break-in (compared to 34%); and only 4% had equivalised household income in the bottom quintile (compared to 21%).

In the 35–64 age group, 26% of people living alone were in fair or poor health, compared to 19% of their counterparts living in couple-only relationships. People in this age group and living alone also reported higher unemployment (6%) and were more likely to have been the victim of an assault or break-in (24%) than their counterparts in a couple only relationship, 2% of whom reported being unemployed and 14% of whom reported being the victim of a crime. People in this age group living alone were nearly twice as likely to have equivalised income in the bottom quintile as those living in a couple only relationship (37.5% and 19.4%). There was, however, little difference in educational attainment between the two groups.

Among people older than 64, there were fewer large differences between those living alone and those living in couple only relationships. The largest differences for this age group were in the proportions of people without post-school qualifications and with low income. About 74% of people older than 64 and living alone were without a non-school qualification and 66% had equivalised income in the bottom quintile. The figures stood at 63% and 45%, respectively, of people older than 64 who were living in a couple only relationship.

Men living alone were less likely to have support in a time of crisis than either their female counterparts or people in the same age group living in a couple relationship. Lack of support was most prevalent among men aged 35–64 and living alone: 11% of them felt they would not have support from outside their household.

Families with dependent children: couples and lone parents

Differences in disadvantage between couple and one parent families with dependent children were noticeable in 2002, with couple families less likely to experience disadvantage in any area.

People living in a couple family were about half as likely to be in fair or poor health as single parents were; and while 45% of people in couple families reported not having a non-school qualification, this rose to 55% among lone parents. Unemployment among lone parents was twice as high as among couple families, which made a small contribution to the large difference between the two groups in the proportions of people with a relatively low income: about 12% of people in couple families reported an equivalised household income in the bottom 20%, compared to about 40% of lone parents. Lone parents were almost twice as likely to have been the victim of an assault or break-in than people in a couple family (33.1% and 18.7%).

Men and women living alone

Differences in the prevalence of disadvantage between men and women who live alone are also shown in the table.

In all three age groups, there were only small differences in the proportions of men and women living alone who reported fair or poor health.

In recent years the proportion of women taking qualifications outside school has increased and this is reflected in the data here. Younger women living alone (those aged 18–34) were a little more likely to have a non-school qualification than their male counterparts. But the pattern changed in older age groups, with men aged 35–64 a little more likely to have a non-school qualification. Among older people (those aged 65 and over) the difference was quite substantial: about 40% of men older than 64 and living alone had a non-school qualification, compared to only 20% of women.

The chance of being a victim of crime decreased as people got older, but, regardless of age, men living alone reported a crime victimisation rate about four and a half percentage points higher than women living alone.

There was little difference in the proportions of men and women younger than 35 and living alone who had income in the bottom quintile. But in older age groups, the proportions of women reporting equivalised income in the bottom quintile were about 10 percentage points higher than the proportion of men who reported low income.

Men living alone were less likely than women living alone to have support in a time of crisis. The difference was most marked among those aged 35–64 where 11% of men and 4% of women felt they would not have support.

Disadvantage and location

Differences in patterns of disadvantage according to the remoteness of the areas in which people live are influenced by many factors. Those living in more remote areas tended to experience a higher rate of fair or poor health, a greater tendency to be without a non-school qualification, a higher unemployment rate and were more likely to have income in the bottom quintile. But people living in more remote Australia reported lower rates of crime victimisation than other Australians.

Disadvantage by remoteness

	Health	Education and training	Work	Crime	Financial hardship	Family and community
	Fair/poor health	*Without a non-school qualification*	*Unemployed*	*Victim of break-in or violence*	*Lowest income quintile*	*Unable to get support in time of crisis*
	%	%	%	%	%	%
Major cities	14.9	47.8	3.6	18.9	17.4	6.0
Inner regional	17.6	52.4	4.4	17.6	22.9	5.7
Outer regional, remote and very remote	19.0	58.2	5.0	15.8	26.7	6.4
Australia	**15.9**	**50.0**	**3.9**	**18.3**	**19.6**	**6.0**

Source: Data available on request, General Social Survey.

Associations between dimensions of disadvantage

Many aspects of disadvantage are associated with one another. This section investigates the links between some key areas of disadvantage by describing the associations between poor self-assessed health, absence of a non-school qualification, low income, an inability to get support in a time of crisis, unemployment, and whether someone had been the victim of a crime (the six dimensions of disadvantage considered in the previous section). Although we discuss the associations between areas it is not possible to postulate a causal relationship. For example, while there may be an association between poor health and low income, it is impossible to ascertain from the GSS data whether poor health leads to low income or *vice versa*.

Health

Across the entire population, about 16% of people reported their health as fair or poor and about 25% reported excellent health. People who reported their health as fair or poor were generally more likely to experience other aspects of disadvantage.

◆ People of all ages in fair or poor health were much less likely to have a non-school qualification, with rates of attainment in the region of 20 percentage points lower than those in excellent health. They were also more likely to have been the victim of an assault or break-in (the difference was most marked among those aged 18–34, where victimisation rates for assaults and break-ins were more than double the rate among people in excellent health). And they were more likely to have income in the lowest 20% of all incomes (the difference was most marked among people aged 35–64).

◆ People under 65 in fair or poor health were less likely to feel they could get support in a time of crisis than those in excellent health.

◆ Younger people (aged 18–34) in fair or poor health were nearly three times more likely to be unemployed.

Health: Self-assessed health status and disadvantage

	Self-assessed health status by age					
	Excellent			Fair/poor		
	18–34 years	*35–64 years*	*65+ years*	*18–34 years*	*35–64 years*	*65+ years*
Disadvantage	%	%	%	%	%	%
Without a non-school qualification	44.6	36.3	59.2	63.0	58.6	77.2
Unemployed	4.6	2.8	..	12.9	3.4	..
Victim of assault or break in	17.8	16.1	5.5	40.2	22.5	10.9
Unable to get support in time of crisis	2.9	5.4	11.7	10.0	11.7	8.6
Lowest income quintile	9.4	9.1	36.6	26.2	35.4	51.3

Source: Data available on request, General Social Survey.

Aboriginal and Torres Strait Islander Peoples

Indigenous Australians are disadvantaged across many areas of social concern relative to non-Indigenous people, and this disadvantage is highlighted elsewhere in this publication (see, for example, the commentaries *Health*, *Financial hardship*, *Work*, *Education and training*, and *Housing*). When compared with the non-Indigenous population, the Indigenous population has on average: lower life expectancy, lower income, lower educational attainment, lower labour force participation, and lower levels of home ownership. And Aboriginal and Torres Strait Islander peoples are more likely to commit suicide, be the victim of crime (including homicide) or to be in prison.

For Indigenous Australians there is evidence of greater socioeconomic disadvantage with increasing geographic remoteness. According to the 2001 Census, Indigenous Australians in remote areas have lower rates of educational attendance and labour force participation than those who live in major cities or regional areas. They are also more likely to work in low-skilled occupations and to have low incomes.

In 2001, around one in five Indigenous Australians aged 15–64 years had a non-school qualification. Those with a non-school qualification had far better outcomes in labour force participation, occupation and income, than the majority without a qualification. More extensive information on multiple disadvantage will be available from the forthcoming *Indigenous Social Survey* (results due in 2004).

Aboriginal and Torres Strait Islander Peoples: Selected indicators by remoteness

	Major cities	Inner regional	Outer regional	Remote	Very remote	Total	Non-Indigenous
Estimated resident population ('000s)	*138.5*	93.0	105.9	40.2	81.0	458.5	18,954.7
	%	%	%	%	%	%	%
Proportion (% Indigenous within each area)	1.1	2.3	5.3	12.4	45.4	2.4	. .
Not attending education aged 15–19 years (% of all 15–19)	41.5	39.8	42.3	54.6	72.5	47.9	23.9
No non-school qualification (% of people aged 15 and over)	66.5	69.4	72.3	74.2	83.4	72.1	55.3
Not in the labour force (% of people aged 15–64)	40.9	46.2	47.3	47.3	51.6	45.9	26.7
Low skill occupations (% of employed)	53.1	58.1	60.5	61.6	72.3	59.8	42.5
Proportion of people in lowest income quintile	35.2	43.5	44.9	46.1	63.2	45.0	19.3

Aboriginal and Torres Strait Islander Peoples, aged 15–64: Labour force status, occupation and income — by educational attainment

	No non-school qualification			Has non-school qualification			Total		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Labour force	%	%	%	%	%	%	%	%	%
Employed, not CDEP	33.9	26.6	30.0	67.6	61.9	64.8	38.9	32.4	35.6
Employed CDEP(a)	11.6	6.7	9.0	4.4	3.1	3.8	9.5	5.9	7.7
Unemployed	14.8	8.4	11.4	11.5	8.3	10.0	13.6	8.2	10.8
Not in the labour force	39.7	58.3	49.6	16.5	26.7	21.5	37.9	53.5	45.9
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
People ('000s)	80.3	90.8	171.1	22.0	20.8	42.8	115.5	122.1	237.6
Occupation skill level	%	%	%	%	%	%	%	%	%
High skill	8.4	10.6	9.4	23.8	36.5	29.6	13.0	18.5	15.5
Medium skill	18.6	14.9	16.9	41.4	22.4	32.7	25.4	17.1	21.6
Low skill	73.0	74.5	73.7	34.8	41.1	37.7	61.6	64.3	62.8
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
People (000s)	36.2	30.0	66.2	15.8	13.4	29.2	54.3	45.3	99.6
Income	$	$	$	$	$	$	$	$	$
Median equivalised gross weekly income	341.0	328.0	334.0	502.0	488.0	495.0	350.0	343.0	346.0

(a) The Community Development Employment Project.
Source: Data available on request. Census of Population and Housing 2001.

Education and training: Educational attainment and disadvantage, by age

	Educational attainment by age					
	Degree holders			Without a non-school qualification		
	18–34 years	*35–64 years*	*65+ years*	*18–34 years*	*35–64 years*	*65+ years*
Disadvantage	%	%	%	%	%	%
Fair/poor health	5.1	11.9	23.3	9.0	20.4	40.6
Unemployed	5.4	2.6	..	8.8	3.6	. .
Victim of assault or break-in	22.4	19.3	9.4	25.2	16.0	7.8
Unable to get support in time of crisis	3.8	6.1	7.4	3.7	7.7	7.9
Lowest income quintile	7.8	10.6	32.2	13.9	21.3	46.9

Source: Data available on request, General Social Survey.

Education and training

People with degrees reported lower levels of disadvantage in all areas (aside from crime victimisation) than their counterparts without a non-school qualification.

◆ Those without a non-school qualification were more likely to be unemployed, with unemployment rates three percentage points lower among 18–34 year olds with degrees than among 18–34 year olds without a non-school qualification.

◆ Those without a non-school qualification were 70%–75% more likely to be in fair or poor health than their degree-qualified counterparts, and much more likely to have income in the bottom 20% of all incomes. For example, 11% of degree holders aged 35–64, reported income in the lowest quintile. The figure rises to 21% of people without a non-school qualification in that age range.

◆ There was no marked difference in the proportions of people with degrees or without a non-school qualification who reported being the victim of a crime or unable to get support.

Work

Whether or not people are unemployed, or participate in the labour force is mainly seen as an aspect of disadvantage for those younger than 65. And so the figures here focus on that age group.

Being unemployed or out of the labour force was associated with increased reporting of poor heath, and absence of a non-school qualification, with those outside the labour force most likely to experience disadvantage. Those outside the labour force were more likely than the unemployed to be in fair or poor health. And, in turn, the unemployed were more likely to experience fair or poor health than the employed.

◆ Reporting rates for poor or fair health were highest among 35–64 year olds outside the labour force (38%) compared to 8.5% of employed people in that age range.

◆ People with jobs were much more likely than others to have a non-school qualification, and the unemployed were rather more likely than those outside the labour force to have such a qualification.

Work: Labour force status and disadvantage, by age

	Labour force status					
	Employed		Unemployed		Not in the labour force	
	18–34 years	*35–64 years*	*18–34 years*	*35–64 years*	*18–34 years*	*35–64 years*
Disadvantage	%	%	%	%	%	%
Fair/poor health	4.8	8.5	12.9	17.3	14.5	38.0
Without a non-school qualification	44.4	39.4	61.2	53.0	65.1	62.6
Victim of assault or break-in	23.1	18.5	28.6	21.6	24.3	15.3
Unable to get support in time of crisis	2.8	5.7	5.1	14.6	7.7	9.5
Lowest income quintile	4.8	5.8	29.7	59.0	29.7	39.6

Source: Data available on request, General Social Survey.

Financial hardship: Household income and disadvantage, by age

	Gross equivalised household income quintile					
	Highest quintile			*Lowest quintile*		
	18–34 years	*35–64 years*	*65+ years*	*18–34 years*	*35–64 years*	*65+ years*
Disadvantage	%	%	%	%	%	%
Fair/poor health	4.7	8.7	19.4	17.0	36.2	42.8
Without non-school qualification	35.7	33.6	47.2	63.0	62.5	74.5
Unemployed	2.6	1.0	. .	19.2	11.7	. .
Victim of assault or break-in	22.6	18.4	11.1	29.0	19.3	8.7
Unable to get support in time of crisis	3.4	5.0	5.8	8.3	13.1	7.4

Source: Data available on request, General Social Survey.

◆ Crime victimisation rates, however, were higher among the unemployed than other groups, although once again the employed were least likely to experience disadvantage.

◆ The employed were, as one would expect, much less likely to have low incomes.

Financial hardship

Although we would ideally like to consider data about people in financial hardship, such data are unavailable (see box) and so we focus on people with low incomes, some of whom experience financial hardship.

There were some noticeable differences in rates of disadvantage between those with high and low incomes.

◆ People with income in the bottom quintile were much more likely to be in low health than those in the top quintile. Reported rates of poor or fair health were about four times higher among people on low incomes, than those on high incomes, in the 18–65 age range.

◆ People of all ages on low incomes were much less likely to have a non-school qualification, with rates about 30 percentage points lower than among those in the top income range.

◆ Crime victimisation rates were higher among 18–34 year olds in the bottom income quintile than in the top quintile, were similar for 35–64 year olds and lower for those 65 and over.

◆ Unemployment was, as one would expect, much more prevalent among people on the lowest income.

◆ About 13% of 35–64 year olds in the lowest income quintile felt unable to seek support in a time of crisis, compared to only 5% of those in the top quintile.

One, two and three aspects of disadvantage

This article has examined patterns of, and associations between, aspects of disadvantage. The next table shows patterns of disadvantage among different subgroups by comparing how often people in different groups have one, two or three aspects of disadvantage. The three aspects are:

◆ Whether someone reported their health as fair or poor.

◆ Whether someone was the victim of an actual or attempted assault or break-in during the previous 12 months.

◆ Whether someone was without a non-school qualification.

It is important to remember that people's health is closely related to their age, and educational attainment is lower in older generations.

Almost two-thirds (64%) of people reported at least one of these measures of disadvantage in the GSS, about one-fifth of people reported two of the three measures, while about 2% experienced all three. Groups reporting higher rates of at least one disadvantage include people older than 64, people in the bottom income quintile, lone parents and the unemployed (more than 70% of each group reported experiencing at least one measure).

Multiple disadvantage prevalence rates, selected population subgroups

	Selected population subgroup	*Relative disadvantage: Fair/poor health; victim of assault or break-in; no non-school qualifications*		
		Percentage who experience		
		One disadvantage	*Two disadvantages*	*All three disadvantages*
		%	%	%
Family/household type	Couple only: person aged under 35	47.3	9.0	1.0
	Couple only: person aged 65 or over	72.9	27.4	2.2
	Couple family, with dependent children	58.3	12.3	1.2
	One parent family, with dependent children	71.8	27.6	5.0
	Lone person aged under 35	62.4	17.7	2.8
	Lone person aged 65 or over	83.4	31.3	4.0
Remoteness area	Does not live in a major city	67.8	19.4	2.5
Income	Bottom income quintile	80.4	33.6	5.1
Labour force status	Unemployed	73.6	21.1	3.6
Family and community	Low social attachment(a)	71.7	24.4	3.5
Benchmark	**Total population**	**63.8**	**18.3**	**2.1**

(a) Having low social attachment is defined, here, as being either unable to ask for small favours, having no support in a time of crisis or having less than weekly contact with friends and family.
Source Data available on request, General Social Survey.

Reports of at least two of the three aspects of disadvantage were most common among people in the bottom income quintile and people older than 64 and living alone, with about one-third of people in each group reporting at least two aspects.

Far fewer people reported experiencing all three aspects of disadvantage, and differences in reporting rates between groups, in absolute terms, was small. But about 5% of people in one parent families and those in the bottom income quintile reported experiencing all three aspects, when the rate overall was 2%.

Multiple disadvantage by area

Using census data, transformed into Indexes of Relative Socio- Economic Advantage and/or Disadvantage (SEIFA), one can examine various aspects of multiple disadvantage.[5]

Health and multiple disadvantage

The links between poor health and other aspects of disadvantage are illustrated by considering the differing prevalence of health conditions in geographic areas grouped according to their level of other aspects of disadvantage. The graphs display information on illnesses from the 2001 National Health Survey.[6]

The data are age standardised to take into account variations in the age profile of the different SEIFA quintiles.

Socio-Economic Indexes For Areas

The Population Census provides information on a broad range of social and economic aspects of the Australian population. Nearly fifty questions of social and economic interest are asked in the census. People using census data are often interested not just in these items taken one at a time, but in an overview or summary of a number of related items. Statistical techniques can be used to provide such summaries and the SEIFA indexes are one type of measure.

The SEIFA indexes summarise data from the census to provide measures of disadvantage and advantage for an area. Variables summarised in the indexes are measures of socioeconomic status and measures of specific aspects of disadvantage, excluding health. The indexes are used to rank areas in terms of their advantage and disadvantage. For the health analysis in this article we use the Index of Relative Socio-Economic Disadvantage from the 1996 Census. The analysis of Collection District characteristics that follows uses the Index of Relative Socio-Economic Advantage/Disadvantage from the 2001 Census.

In 2001, Australia was divided into nearly 36,000 Census Collection Districts (CDs).
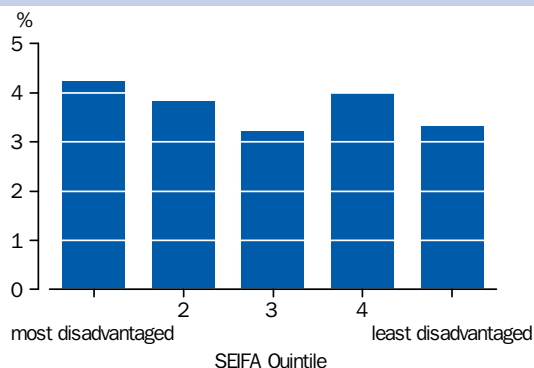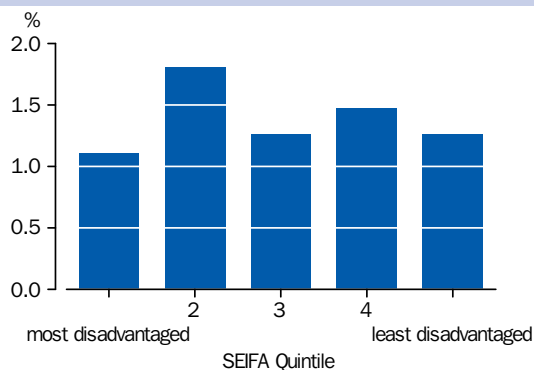
Diabetes and disadvantage

%

4

3

2

1

0

| most disadvantaged | 2 | 3 | 4 | least disadvantaged |

SEIFA Quintile
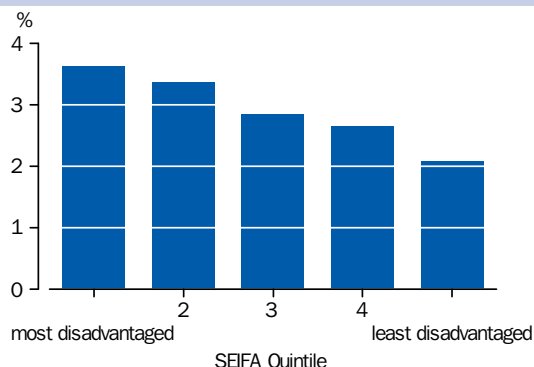
Mental and behavioural problems and disadvantage
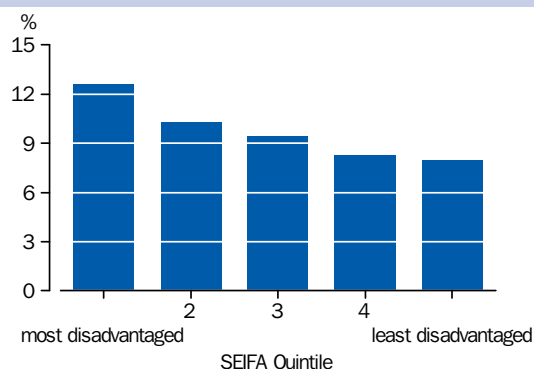
%

15

12

9

6

3

0

| most disadvantaged | 2 | 3 | 4 | least disadvantaged |

SEIFA Quintile

Heart disease and disadvantage

%

5

4

3

2

1

0

| most disadvantaged | 2 | 3 | 4 | least disadvantaged |

SEIFA Quintile

Cancer and disadvantage

%

2.0

1.5

1.0

0.5

0.0

| most disadvantaged | 2 | 3 | 4 | least disadvantaged |

SEIFA Quintile

Source: Data available on request, National Health Survey 2001.

In each graph, the prevalence of a health condition is shown in each of five SEIFA groups (the SEIFA quintiles from the 1996 Census): each group is made up of areas with a similar level of general relative disadvantage. Areas in the first SEIFA quintile are the most disadvantaged, those in the fifth, the least disadvantaged.

There appears to be an association between disadvantage and both diabetes and mental and behavioural problems, with a higher prevalence of both conditions in more disadvantaged areas.

After adjusting for age differences, diabetes appears to be more common in the most disadvantaged areas than the least disadvantaged areas. The age standardised rate for diabetes is 3.6% of people in the most disadvantaged areas, compared to 2.1% in the least. Mental and behavioural problems were also more prevalent in areas in the first SEIFA quintile than the fifth, with age standardised rates of 12.6% and 7.9% respectively.

The association between heart disease and disadvantage was less clear cut, although there appeared to be a general tendency for heart disease to decline with reduced disadvantage. At 4.2 per hundred, age-standardised rates of heart disease were almost one-third higher in the most disadvantaged areas compared to the least disadvantaged areas (3.3 per hundred).

These data did not show a strong association between those suffering cancer and disadvantage, although other researchers have found a link between deaths from cancer and SEIFA quintile.[7]

Other characteristics of the advantaged and disadvantaged areas

The following analysis examines characteristics of Australia's more disadvantaged neighbourhoods, and uses data from the 2001 SEIFAs index of advantage/disadvantage. We compare average educational attainment, labour force status, and equivalised household income across SEIFA.

## Proportion of people and labour force status, SEIFA(a) top and bottom
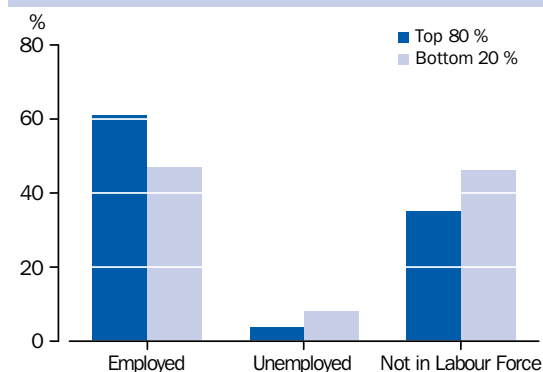
%

80

60

40

20

0

■ Top 80 %
▨ Bottom 20 %

| Employed | Unemployed | Not in Labour Force |

(a) The Socio-Economic Index for Relative Advantage/Disadvantage.

Source: data available on request, SEIFA 2001.

Proportion of people and years of schooling, SEIFA(a) top and bottom

	SEIFA areas	
Years of schooling and educational qualification	*Top 80%*	*Bottom 20%*
No school	1	2
Year Eight	9	16
Year Nine	8	13
Year Ten	26	32
Year Eleven	11	11
Year Twelve	45	26
Degree	16	5

Proportion of people and equivalised weekly household gross income, SEIFA(a) top and bottom
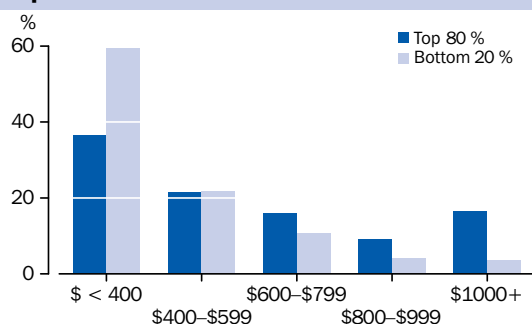
(a) The Socio-Economic Index for Relative Advantage/Disadvantage.
Source: data available on request, SEIFA 2001.

These figures should be interpreted with caution because SEIFA is calculated by considering, among other things, levels of education, employment and income in an area. And so there will, by definition, be considerable differences in those characteristics among the most advantaged and disadvantaged CDs. This analysis highlights the strength of those differences. Again, the data are age standardised.

Those living in areas in the most disadvantaged 20% of CDs were much more likely to be unemployed (8%) than those residing in other areas (4%).

Fewer than half (47%) of those living in the bottom quintile were employed compared to 61% of people elsewhere, while 46% of those living in the bottom quintile were not in the labour force, compared to about a third (35%) of those living elsewhere.

About one-quarter of those living in the most disadvantaged 20% of CDs had a year 12 or equivalent education, while 45% of people living in other areas had completed year 12. Only 5% of those living in the bottom 20% of CDs had a degree compared to 16% of those living elsewhere.

Those living in the bottom 20% were about twice as likely never to have gone to school (2% compared to 1%).

Average weekly equivalised household gross income was $385 for those living in areas in the bottom 20% of CDs. For those living in the remaining 80% of CDs, average weekly equivalised income was $618. About two-fifths of those living in the top 80% of CDs had weekly equivalised income over $600, and a quarter of people in those CDs had an income over $800 a week. About 60% of those living in the most disadvantaged 20% of CDs had a weekly equivalised income less than $400. About 15% of people in these areas had an income over $600 a week and fewer than 8% had an income greater than $800 a week.

Endnotes

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Progress indicators in other countries

Introduction

Measures of Australia's Progress (MAP) reflects on issues of importance to Australia and Australians, and no systematic or comprehensive attempt has been made elsewhere in this publication to compare Australia's progress with that in other countries. But considering Australian progress side-by-side with progress in other countries can be informative: apparent progress in a dimension, say increases in life expectancy, might seem less (more) impressive if they are slower (quicker) than improvements in life expectancy overseas.

This article compares the level 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; Work; The natural landscape*; *The human environment; International environmental concerns*; and *National income* — is presented. The article begins with some background information about population size and growth in different member states.

Most of the data used here comes from the OECD. Not all of MAP's headline dimensions of progress are discussed in this essay: few internationally comparable data are available for some areas. Moreover, for the dimensions that are discussed, we typically use indicators that are somewhat different from those used as headline indicators of Australian progress. To draw international comparisons we have had to use available data, and so have chosen the best approximation of the Australian progress indicators used elsewhere in this publication. Some of the difficulties inherent in drawing comparisons between countries are discussed in the box opposite.

In each area, Australia's progress is compared with a range of OECD countries. 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.

Population

Australia covers 7.7 million square kilometres. Among the OECD member states, only Canada (10 million square kilometres) and the USA (9.4 million square kilometres) are larger. But Australia has fewer people than many OECD countries. In 2001, Australia's population was about 19 million. By comparison, about 286 million people lived in the USA, 127 million in Japan, 60 million in the UK, 57 million in Italy, 31 million in Canada, and four million in New Zealand.

Because of our relatively large land mass and small population, Australia's population density was, in 2001, among the lowest in the OECD: at about three people per square kilometre, we rank alongside Canada and Iceland as the least densely populated of OECD nations (although of course

The difficulty in drawing international comparisons

When considering a nation's progress, or quality of life, it is often desirable to compare levels and rates of progress with those of other countries. But there are two main reasons why international comparisons are not possible for all the dimensions and indicators used in *Measures of Australia's Progress.*

◆ Comparable Dimensions: Some of MAP's dimensions cover aspects of progress that are (almost) uniquely Australian. For example salinity (a form of land degradation) is not a significant problem in many other countries. Restricting our measures of progress to cover only those areas of concern for which international data were available would have forced us to neglect areas of progress important to Australia.

◆ Comparable indicators: For most of MAP's dimensions, however, some international data are available. But it can be misleading to compare different data sets. For some indicators, say life expectancy at birth, where there is an agreed international definition, comparisons are valid. For other indicators, say crime rates, differences might be influenced by compiling practices. For other indicators, say the number of people with degrees, differences might be influenced by university curriculum standards. The quality of statistical data can also vary.

Progress outside the OECD

This essay focuses on Australia's progress compared to that of the 30 OECD member states: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States of America.
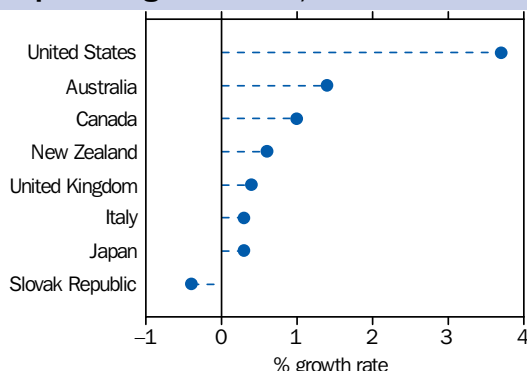
There are many other countries that readers might wish to compare Australia's progress with. We focus here on the OECD, primarily because there are a good deal of internationally comparable data to draw on (more so than for most other groups of countries).

Comparing OECD data with ABS figures

Most of the figures used in this article come from the OECD. In some cases they differ from data used elsewhere in this, or other, ABS publications. This is because, in order to draw international comparisons, the OECD sometimes use different classifications or data sources to those used by the ABS, or adjust ABS data.

parts of Australia are more densely populated, as are parts of Canada and Iceland). In comparison, South Korea was the most densely populated country (476 people per square kilometre), while there were 244 people per square kilometre living in the UK, and 30 people for each square kilometre of the USA.

Australia's population grew more quickly than many members of the OECD. Our rate of growth between 2000 and 2001 was 1.4%, alongside that of Iceland and Ireland, and behind only the USA (3.7%) and Turkey (1.7%). Fifteen OECD nations' grew by less than 0.5% between 2000 and 2001.

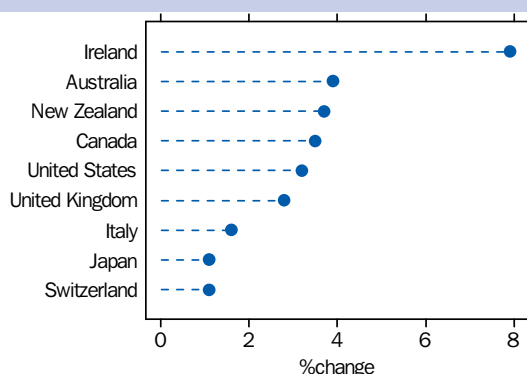**Population growth rates, 2000 to 2001**

National income

Gross domestic product (GDP) per capita is a measure commonly used to compare countries' national incomes.

Between 1992 and 2002, only five OECD countries saw their total GDP grow more quickly than the Australian average rise of 3.9% a year. Growth was highest in Ireland, where GDP grew by an average of 7.9% annually. Growth across the whole of the OECD was more modest, averaging about 2.8% a year, and was weakest in Japan and Switzerland: GDP in both countries grew by an annual average of 1.1% over the ten-year period.

In 2002, Australia's per capita GDP, adjusted for purchasing power parity (i.e., adjusted to account for the different costs of living in different countries) was 10% above the OECD average. Luxembourg, whose per capita GDP was twice the OECD average, had the highest GDP per capita among the OECD members. Turkey's per capita GDP was the lowest in the OECD, at only a quarter of the OECD's average. In 1999 the OECD categorised Australia as falling into a group of 'high-middle income' countries. The group also included Italy, Canada, Japan and the United Kingdom.

Gross domestic product per capita, 2002(a)(b)
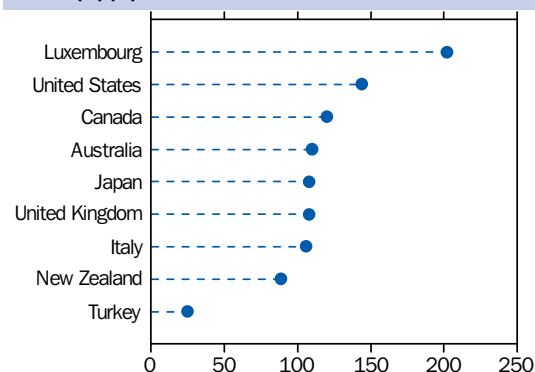
(a) Calculated using purchasing power parities. (b) OECD average = 100.

Health

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.

At the start of this millennium, Australia was among the most long-lived of OECD members. Australia was ranked sixth in the OECD for female life expectancy at birth (82 years), and fifth in the OECD for male life expectancy (77 years).

In 2001, Japanese people had the longest life expectancy: a girl born in Japan could expect to live to be 85 and a boy 78. By contrast, Turkey had the lowest life expectancy: Turkish men could expect to live to 66 and Turkish women to 71.

Australian infant mortality rates, however, did not rank as well against other OECD countries. About half the OECD members had lower rates of infant mortality than Australia. In 2001, a little over five Australian babies in every 1,000 died before their first birthday. This was below the figure in the USA (about 7 babies per 1,000) and well below the rates in Mexico (21 babies per 1,000) and Turkey (33 babies per 1,000). But it was higher than the rates in countries such as Italy and Japan (about four and three babies per 1,000, respectively).

Average annual GDP(a) growth, 1992 to 2002

(a) Average annual volume change.

Life expectancy at birth, 1991 and 2001
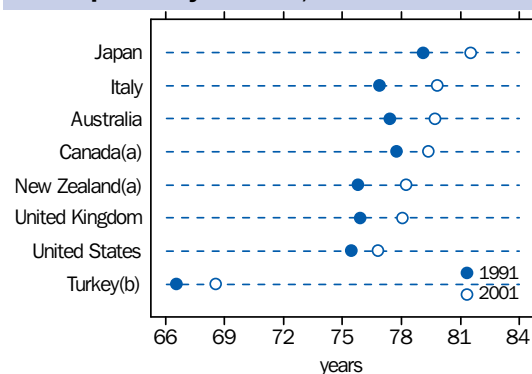
(a) Data are for 2000 not 2001. (b) Data are for 2002 not 2001.
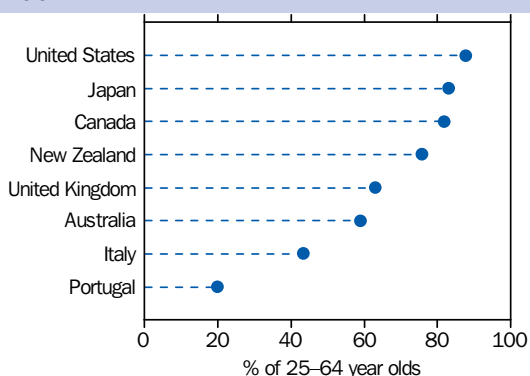
Tertiary attainment(a), 2001
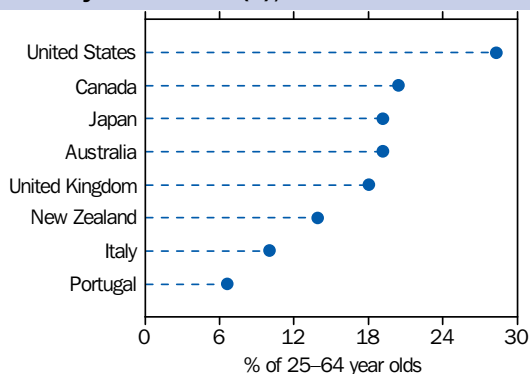
(a) Tertiary-type A attainment..
Source: OECD World in Figures, 2003. [1]

Education and training

The OECD uses the *proportion of 25 to 64 year olds who attained an upper secondary or higher level qualification*, as a key indicator of a country's education.

In 2001, there was a wide variation in the proportion of 25–64 year olds with an upper secondary or higher qualification among OECD members, ranging from 88% in the USA to 20% in Portugal. The OECD reported that 59% of Australians in the 25–64 age range had an upper secondary or higher qualification. Eighteen OECD nations had a higher level of attainment, and across the OECD as a whole, some 64% of 25–64 year olds had an upper secondary or higher level qualification.

The OECD also discusses attainment of tertiary qualifications. The OECD reported that just over 19% of Australians in the 25–64 age group had a tertiary qualification in 2001, and that only four OECD members had a higher level of tertiary attainment. Once again there was a wide variation, ranging from more than 28% of American 25–64 year olds with a tertiary qualification, to less than 7% in Portugal and Austria. Some 15% of 25–64 year olds across the OECD as a whole had a tertiary qualification.
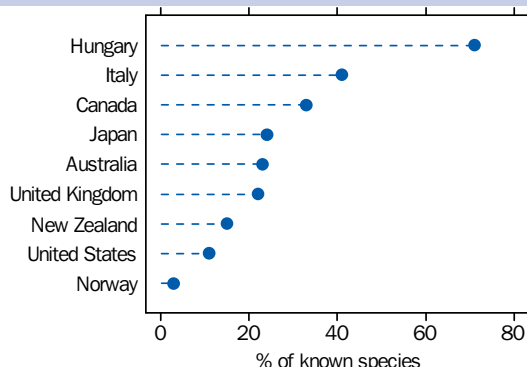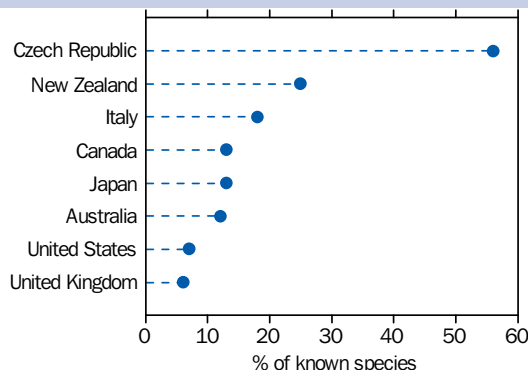
Average unemployment rates, 1999–01 and 1989–91
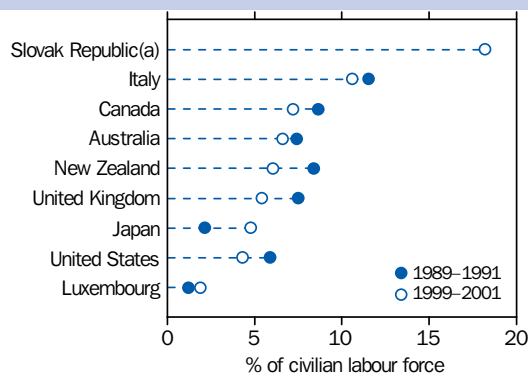
(a) Data not available from the Slovak Republic for 1989—1991.
Source: OECD World in Figures, 2003, 2002 and 2001.[1]

Work

Measures of Australia's Progress uses the unemployment rate as its headline indicator of progress in the *Work* dimension. The economic cycle is a major influence on the unemployment rate, and, in any one year, different countries can be at different stages of the economic cycle. In the graph above, the effect of the economic cycle has been removed, to some extent, by averaging data over three years. However, the economic cycle should still be taken into consideration when comparing unemployment rates between countries.

The OECD reported that average unemployment in Australia between 1999 and 2001 stood at 6.6% of the civilian labour force, down from 7.4% between 1989–91. Twelve OECD countries had higher average unemployment than Australia in 1999–01, with Australian rates lower than Canada (7.2%), Italy (10.6%) and the Slovak Republic (18.2%), the highest in the OECD. But our unemployment rate was higher than New Zealand (6%), Japan (4.8%) and the USA (4.3%). The OECD's lowest average unemployment rate during 1999–01 was in Luxembourg (1.9%).

Upper secondary or higher attainment, 2001

Threatened(a) mammals, 2003(b)

% of known species

Country	
Hungary	~71
Italy	~41
Canada	~33
Japan	~23
Australia	~23
United Kingdom	~22
New Zealand	~14
United States	~11
Norway	~3

Threatened(a) birds, 2003(b)

% of known species

Country	
Czech Republic	~56
New Zealand	~25
Italy	~18
Canada	~13
Japan	~13
Australia	~12
United States	~7
United Kingdom	~6

(a) Species listed by the IUCN as vulnerable to, or endangered with, extinction. Excludes extinct species. (b) The information refers to the latest year for which data are available, which differs between countries.
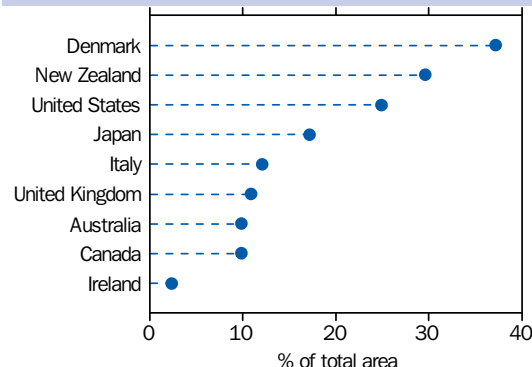*Source: OECD Selected Environmental Data, 2004.*[2]

The natural landscape

The OECD report the percentage of known bird and mammal species in each country that are listed as threatened by the World Conservation Union (IUCN). The IUCN threatened species lists include animals assessed as vulnerable to, or endangered with, extinction. But they do not include species that are extinct, and so differ considerably from the figures used in MAP's headline indicator for biodiversity.

In 2002, the OECD report that 23% of Australia's mammal species and 12% of our bird species are designated as threatened.[3] The proportion of species threatened varied: 71% of Hungary's mammals were threatened, compared to 3% in Norway; 50% of Luxembourg's birds were threatened, compared to 6% in the UK. Twelve of the OECD's thirty members had a greater proportion of mammals that were endangered or vulnerable than in Australia. Twenty five members had a greater proportion of bird species that were threatened.

The area of protected land — land inside national parks and the like — is one measure of the protection afforded to a nation's natural landscape. The OECD report that the total land area of each OECD member that was protected ranged from 37% in Denmark to a little over 2% in Ireland.

Major protected areas(a), 2004(b)

% of total area

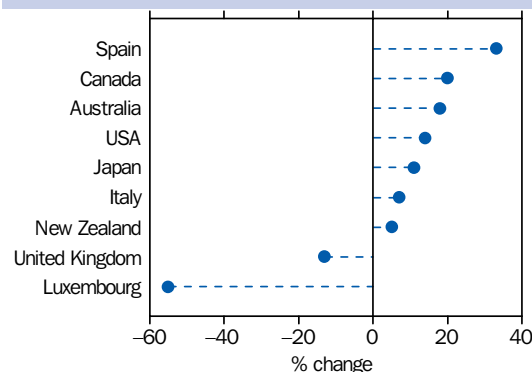| Country	
Denmark	~37
New Zealand	~30
United States	~25
Japan	~17
Italy	~12
United Kingdom	~11
Australia	~10
Canada	~10
Ireland	~2

(a) IUCN categories I-VI. (b) The information refers to the latest year for which data are available, which differs between countries.
Source: OECD Selected Environmental Data, 2004.[2]

Australia, with 10% (77.4 million hectares) of land protected, was ranked in the middle of the OECD (fifteen of the thirty members had a greater proportion of their land protected than us): the OECD average was a little less than 15%

International environmental concerns

The change in a nation's emissions of greenhouse gases can be used to compare different countries' response to tackling global warming.

The OECD do not report total greenhouse gas emissions, and so data from the United Nations Greenhouse Gas Inventory database is presented here. These UN figures include emissions of the main greenhouse gases but do not include information about gases released by changes in land use or absorbed into new forest plantations (land use emissions and sinks are included in the Kyoto-based estimates discussed in the headline commentary *International environmental concerns*). The UN database does not include information for 2000 about three OECD members: Korea, Mexico and Turkey.

Change in greenhouse gas emissions, 1990 and 2000

% change

Country	
Spain	~35
Canada	~20
Australia	~18
USA	~13
Japan	~11
Italy	~7
New Zealand	~5
United Kingdom	~-14
Luxembourg	~-58

Source: Data available on request, and compiled from the UNFCCC Greenhouse Gas Inventory database.[4]

Between 1990 and 2000, the UN data show that Australia's greenhouse gas emissions increased by almost 18%, with Australia already starting from a high base (our per capita emissions were the highest among reporting countries).

Greenhouse emissions grew more quickly in five of the 27 reporting countries, and grew most quickly in Spain, rising by one-third over the period. Eleven countries reported a decline in emissions between 1990 and 2000, with the largest decline in Luxembourg where emissions more than halved.

Endnotes

1   Organisation for Economic Co-operation and Development (OECD) 2003, *OECD in Figures: Statistics on the member countries 2002 edition*, OECD, Paris.

2   Organisation for Economic Co-operation and Development (OECD) 2004, *Selected environmental data, 2004* <http://www.oecd.org/dataoecd/11/15/24111692.PDF> last viewed 8 February 2004.

3   Some threatened species occupy, and have always occupied, a restricted geographical range and, under many threatened lists, this restricted range is considered to be inherently threatening to the species. Because of this, at any point in time, these species would always be listed as threatened under some listings systems. It is also worth noting that the conservation status of most of Australia's 2 million or more species is not known, and this is particularly so for invertebrates. Difficulties with assessing progress by referring to changes in the numbers of threatened species are discussed in the 'Biodiversity' section of the *Natural landscape* commentary.

4   United Nations Framework Convention on Climate Change, *Greenhouse Gas Inventory*, <http://ghg.unfccc.int>last viewed 12 February 2004.

Population, participation and productivity

Economic and Social influences on improvements in national income

Following the downturn of the late 1980s–early 1990s, Australia experienced more than a decade of sturdy economic growth. Between 1992–93 and 2002–03, the average rate of growth in real net national disposable income (RNNDI) was 4.0% per year.

Over the same period, Australia's population grew at an average rate of 1.2% per year, implying that per capita RNNDI (one measure of material living standards, and Measures of Australia's Progress's headline indicator for the income dimension of progress) grew by 2.8% a year.

Analysing changes in Australia's national income

There are many ways of analysing changes in Australia's national income. One illuminating perspective, used by the Treasury in their *Intergenerational Report*, considers changes in the number of people working, the hours they work and the value of the output they generate for each hour worked.[1] How many people work, in turn, depends on the age structure of the population, their participation in the labour force and the employment rate. This style of analysis begins from the following decomposition:

Real net national disposable income / Total Population

= *Real net national disposable income / Real GDP*

x *Real GDP / Hours worked (commonly called 'labour productivity')*

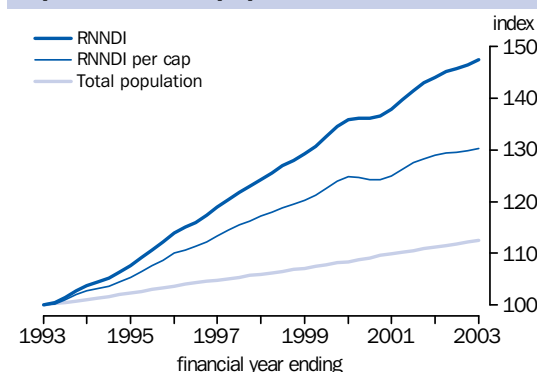x *Hours worked / Employed persons ('Average hours worked')*

x *Employed persons / Labour force*

x *Labour force/ Population aged 15 years and over ('participation rate')*

x *Population aged 15 years and over / Total population*

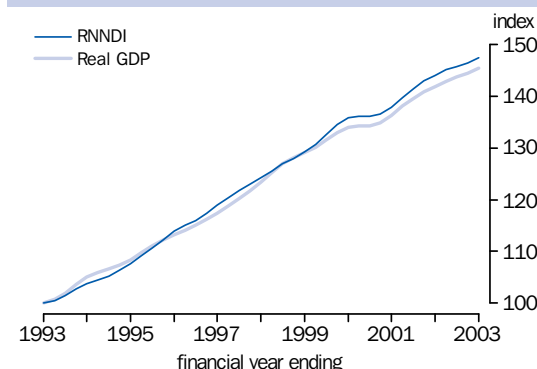More discussion of each of the components in the decomposition follows.

Real net national disposal income per capita and total population

Reference year 1992–93.
Source: Australian National Accounts: National Income, Expenditure and Product, cat. no. 5206.0.

Real net national disposal income and real GDP
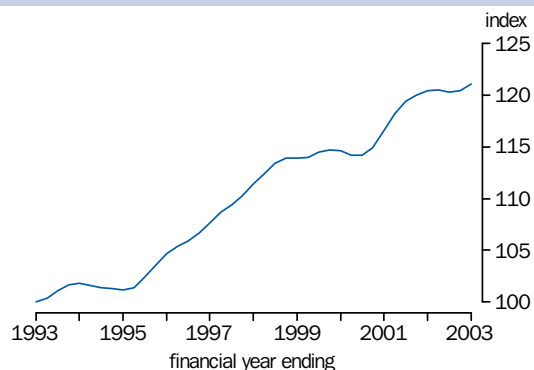

Reference year 1992–93.
Source: Australian National Accounts: National Income, Expenditure and Product, cat. no. 5206.0.

Real net national disposable income and real GDP

Real net national disposable income differs from real GDP because it takes into account:

◆ Income flows between Australia and the rest of the world.

◆ Changes in the relative prices of Australia's exports and imports (the terms of trade).

◆ Consumption of fixed capital (the depreciation of machinery, buildings and other produced capital used in the production process).

Notwithstanding these differences, RNNDI and real GDP show similar trends: between 1992–93 and 2002–03, the average rate of growth in RNNDI was 4.0% per year, whereas growth in real GDP was a little weaker, at 3.8% per year. The major contributor to the difference was changes in the terms of trade.

GDP per hour worked

Reference year 1992–1993.

Source: Australian National Accounts: National Income, Expenditure and Product, cat. no. 5206.0.

The RNNDI to real GDP ratio increased 1.4% during the period 1992-93 to 2002–03 — an annual average growth of 0.1%.

The commentary *National income* discusses GDP and RNNDI in more detail.

Labour productivity

During the past decade, the amount of GDP per hour worked rose by more than 20% — an annual average growth of 2.1%.

The improvement in labour productivity reflects two kinds of change — increases in the ratio of capital to labour ('capital deepening') and improvements in multifactor productivity (the amount of output per unit of labour and capital combined). It is possible to estimate the relative contributions of these two influences, but only for the market sector (measures of multifactor productivity are not available for the economy as a whole).

During the 1992-93 to 2002-03 decade, labour productivity in the market sector grew each year on average by 2.6%. Capital deepening grew at an average annual rate of 3% and the average annual growth rate for multifactor productivity was 1.3% during the same decade.

Underlying these changes were influences such as technological advances, improvements to the quality of labour or management practices, organisational change, and shifts of labour, capital and other inputs toward firms or industries that are more productive.

The commentary *Productivity* discusses multifactor and labour productivity in more detail.

Average hours worked by Australian employed population
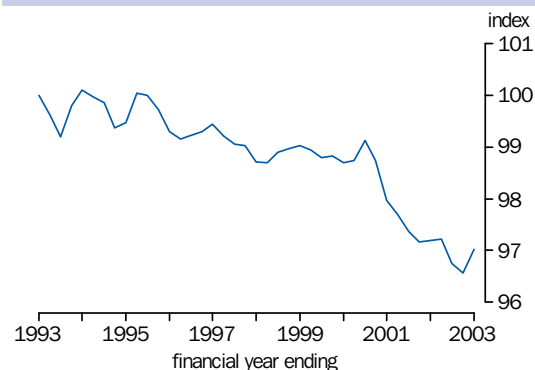
Reference year 1992–1993.

Source: Australian National Accounts: National Income, Expenditure and Product, cat. no. 5206.0, Australian Labour Market Statistics, cat. no. 6105.0.

Average hours worked

During the past decade, the average hours worked by employed people fell by 3.0% — an annual average fall of 0.3%.

During this period, there was a strong rise in the number of part-time employees (up by 51%, whereas the number of full-time employees rose by 16%). There was a partly offsetting increase in the average working hours of full-time employees.

For more information on average hours worked, see the commentary *Work*.

Ratio of employed people to labour force

During the past decade, the proportion of the labour force that was employed rose from 89% to 94% — an annual average growth of 0.5%. This was mirrored by a fall in the unemployment rate, and reflected in part the generally buoyant state of the Australian economy through the past decade.

For more information on the ratio of employed people to labour force, see the commentary *Work*.

Ratio of employed people to labour force
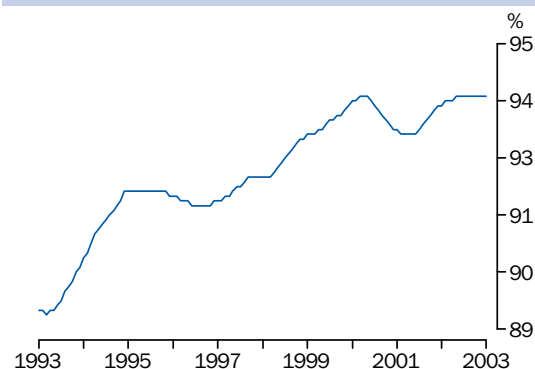
Source: Australian Labour Market Statistics, cat. no. 6105.0.

Participation rate
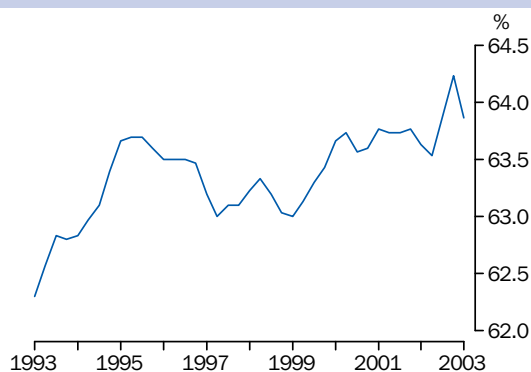
Source: Australian Labour Market Statistics, cat. no. 6105.0.

Participation rate

Between 1993 and 2003, the labour force participation rate rose from 62% to 64% — an annual average rise of 0.2%.

Men and women showed opposite trends over the 10 years — the participation rate for men fell from 74% to 72%, whereas the rate for women rose from 52% to 56%.

For more information on participation rate, see the commentary *Work*.

Ratio of population aged 15 years and over to total population

During the past decade, the proportion of the population that was 15 years of age or more rose from 78% to 80% — an annual average growth of 0.2%. This is consistent with the pattern of structural population ageing in Australia.

The commentary *Population* discusses ageing in more detail.

### Influences on growth in Australia's real net national disposable income, 1992–93 to 2002–03

Component	Contribution (Average percentage points per annum)
Real net national disposable income / Real GDP	0.1
Real GDP / Hours worked (labour productivity)	2.1
Hours worked / Employed persons (average hours worked)	-0.3
Employed persons / Labour force	0.5
Labour force / Population aged 15 years and over (participation rate)	0.2
Population aged 15 years and over / Total population	0.2
Real net national disposable income / Total population	**1.5**

Conclusion

A summary of the contribution to growth by the different components is provided above. Of the five components, the largest contributor to growth in real net national disposable income during the past decade has been the improvement in labour productivity.

Endnotes

1   Treasurer of the Commonwealth of Australia 2003, *Intergenerational Report: 2002–03* Budget Paper No. 5, May 2002, Treasury, Canberra.

Ratio of population aged 15 years and over to total population
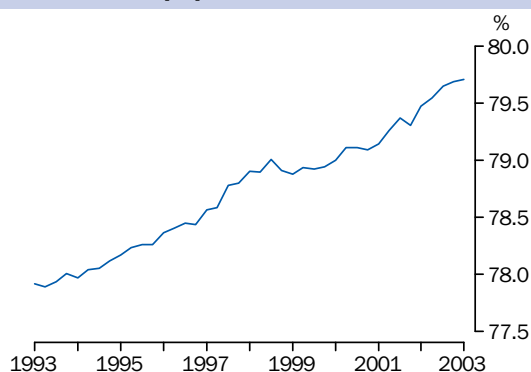
Source: Australian Labour Market Statistics, cat. no. 6105.0 and Australian Demographic statistics, cat. no. 3201.0.

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 started compiling 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.

◆ A value for household labour is 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>.

A national accounting framework

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 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.

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 has been assisting 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.

Some indicators identified in these two projects are already published by the ABS. The ABS expects to continue assisting the Victorian State Government in the further development of indicators and progress measures.

More information on *Growing Victoria Together* can be accessed on

<http://www.growingvictoria.vic.gov.au>

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 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 have been selected to collectively measure national performance against the core objectives of the National Strategy for Ecologically Sustainable Development (NSESD).

The Report, and the indicators against which it reports, have been 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/index.html>

Comparing dimensions and indicators, MAP and Are We Sustaining Australia

Measures of Australia's Progress		Are We Sustaining Australia	
Headline dimension	*Headline indicator*	*Dimension*	*Indicator*
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		
Income	Real net national disposable income per capita	Industry performance	Real GDP per capita
Financial hardship	Equivalised average weekly disposable income of low income households	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	Biolodiversity 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
Human environments	Fine particles, days health standards exceeded in major urban areas	Air quality	Air pollutants, days health standards exceeded in major urban areas; SOx, NOx and particulate emissions
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
International environmental concerns	Total net greenhouse emissions	Climate change	Total net greenhouse emissions
		Management of energy	Renewable energy use as a proportion of total
Governance and democracy	No headline indicator		
Family, community and social cohesion	No headline indicator		
Crime	Victims of household and personal crimes		
		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

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.

For example, Goal 2 in the area of Community is that by the year 2020 Tasmania will 'have a community where people feel safe and are safe in all aspects of their lives'. During the community consultations on this goal, a key issue was the greater risk of harm borne by younger people. As a result, one of the benchmark standards for this goal is to 'support young people who have challenging behaviour or who are at risk'. A benchmarking committee identified two key indicators of progress. One of these indicators is the number of deaths of people aged 29 or younger due to external causes. For this indicator, a target has been set for a 15% annually compounding reduction up until the year 2020. Other indicators of progress towards this goal include crime rates and people's perceptions of personal safety.

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, two Progress Reports (August 2002 and August 2003) have been tabled.

More information on *Tasmania Together* is available at:

< http://www.tasmaniatogether.tas.gov.au>

Other initiatives

There are countless initiatives at the international, national and sub-national level around the world. A selection is mentioned below.

◆ 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>

◆ The United Kingdom Government's *Indicators of Sustainable Development*, at:

<http://www.sustainable-development.gov.uk/indicators/index.htm>

A table on the next page compares the ABS Measures of Australia's Progress with the UK publication.

Comparing dimensions and indicators, Measures of Australia's Progress and the UK's Quality of Life Counts

Measures of Australia's Progress		Quality of Life Counts	
Headline dimension	*Headline indicator*	*Dimension*	*Indicator*
Health	Life expectancy at birth	Health	Expected years of healthy life
Education and training	Percentage of people aged 25–64 with a non-school qualification	Education and training	Qualifications at age 19: percentage with level 2 qualifications
Work	Unemployment rate	Work	Proportion of people of working age who are in work
Income	Real net national disposable income per capita	Income	GDP and GDP per capita
Financial hardship	Equivalised average weekly disposable income of low income households	Poverty and social exclusion	Children in low income households; adults without qualifications and in workless households; elderly in fuel poverty
National wealth	Real net national worth per capita		
		Investment	Total and social investment (% of GDP)
Housing	No headline indicator	Housing	Homes judged unfit to live in
Productivity	Multifactor productivity		
The natural landscape (biodiversity)	Threatened species; Annual area of land cleared	Wildlife	Populations of wild birds
The natural landscape (inland waters)	Water management areas, proportion where use exceeded 70% of sustainable yield	River quality	Rivers of good or fair quality
The natural landscape (land)	Salinity, assets at risk	Land use	New homes built on previously developed land
Human environments	Fine particles, days health standards exceeded in major urban areas	Air pollution	Days when air pollution is moderate or higher
Oceans and estuaries	No headline indicator		
International environmental concerns	Total net greenhouse emissions	Greenhouse gases	Emissions of greenhouse gases
		Waste	Amount of waste and its management
Governance and democracy	No headline indicator		
Family, community and social cohesion	No headline indicator		
Crime	Victims of household and personal crimes	Crime	Crime rates: burglary, motor vehicle theft; violent crime
		Road traffic	Vehicle miles

◆ In 2003, the USA's General Accounting Office, in cooperation with the National Academies, hosted a forum on Key National Performance Indicators in Washington D.C. The objective of the Forum was to discuss whether and how to develop a set of key national indicators for the United States of America. More information is at:

<http://www.gao.gov/npi>

◆ The Irish Central Statistical Office's *Measuring Ireland's Progress*, at:

<http://www.cso.ie/publications/measuringprogress/indicatorsreportfull.pdf>

◆ 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, Aboriginal and Torres Strait Islanders Commission, 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..australiancollaborationcom.au/reports>

◆ 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>

◆ Other useful references are provided by the International Institute of Sustainable Development's web site, at:

  <http://www.iisd.ca>

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