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MEASURING AUSTRALIA'S PROGRESS

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Measuring Australia's Progress

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At work: *Hui, Aarthi and Jon* (ABS).

Contents

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 ABS 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 (SNA). 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 focussing mainly on economic indicators such as Gross Domestic Product (GDP). 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.

The ABS invites your comment on this new publication, *Measuring Australia's Progress* (MAP), which we hope will enhance discussion. MAP considers some of the key aspects of progress side-by-side and discusses how they are linked with one another.

This publication does not purport to measure every aspect of progress that is important. Nor does it consider all of the many different ways that parts of Australia and groups of Australians are progressing. But it does provide a national summary of many of the most important areas of progress, presenting them in a way which can be quickly understood. MAP will, I hope, inform and stimulate public debate and encourage all Australians to assess the bigger picture when contemplating progress in all its forms.

Many people have contributed to the development of this publication. I would like to express special thanks for the contributions from our group of expert external advisors — Mr Ian Castles, Mr Richard Eckersley, Dr Clive Hamilton, Prof. Ann Harding, Ms Betty Hounslow, Ms Eleri Morgan-Thomas, Dr Mike Salvaris, Dr Denis Saunders and the late Prof. Max Neutze. Many other people and organisations reviewed sections of the publication, and a full list of acknowledgements is at Appendix II. Statisticians from right across the ABS have worked on this project and I would particularly like to thank those most directly involved, namely: Jon Hall who led the project and was, with Ken Tallis and Horst Posselt, a principal author; and other authors, especially Aarthi Ayyar, Cristy Williams and Nick Biddle.

This is, of course, an ambitious project. It is also one that will develop over time, and we are looking to your feedback to help us improve future issues of the publication. Should you wish to contribute, please contact Ken Tallis at the address below.

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April 2002

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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
AGPS	Australian Government Publishing Service
AIHW	Australian Institute of Health and Welfare
DEST	Department of Education, Science and Training
DFACS	Department of Family and Community Services
MCEETYA	Ministerial Council for Education, Employment, Training and Youth Affairs
NCVER	National Centre for Vocational Education Research
NATSEM	National Centre for Social and Economic Modelling
OECD	Organisation for Economic Co-operation and Development
UK	United Kingdom
UN	United Nations
USA	United States of America

Symbols and usages

The following symbols and usages mean:

billion	1,000 million
CO_2-e	carbon dioxide equivalent
GJ	gigajoules of energy
GL	gigalitres
GDP	gross domestic product
hrs	hours
ha	hectares
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
ODP	ozone depleting potential
p	preliminary — figures or series subject to revision
SO_2	sulfur dioxide
'000	thousand
$	dollar
$b	billion 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.

Indicators 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. During 2000 and 2001, the ABS consulted a wide range of experts, organisations and individuals to understand what they saw as the most important dimensions of national progress. This publication presents indicators relating to some of those dimensions. The ABS hopes that Australians will use these headline indicators to form their own views of how our country is progressing.

Arranging the indicators

One way of assessing progress is to consider whether Australia is becoming wealthier (or is maintaining or depleting its wealth). Australia has many forms of wealth, some of which can be measured fairly accurately. In its broadest sense, Australia's wealth is made up of various stocks of assets that include:

- human capital embodied in the knowledge, skills and health of individual Australians;
- social capital embodied in the ways we live together;
- natural capital embodied in our land, air, fresh waters, seas, and flora and fauna; and
- produced and financial capital embodied in machinery, houses, buildings and other assets.

The nation has other forms of wealth, but many are less tangible and far harder to measure. While the spiritual, cultural and emotional wealth of the nation are all important, they are not measured here. (The reasons for this are discussed in the commentary *Measuring Progress — an ABS approach*.) Australia's international networks and external alliances are another resource not readily measured.

Some (but not all) of these components of Australia's wealth are included in the national balance sheet that forms part of the Australian System of National Accounts — these assets and Australia's liabilities to the rest of the world are discussed in the commentary *National wealth*.

For an asset to be included in the national balance sheet, some person or institution must be able to enforce ownership rights over it and to derive economic benefit from holding or using it. Produced and financial capital are included; but items of natural capital such as land, native forests and minerals are included only if they are used for economic purposes; and human and social capital are not included.

Some of the headline indicators relate directly to components of Australia's wealth.

- Some aspects of human capital are discussed in the commentaries *Health,* and *Education and training*.
- Some aspects of social capital are discussed under *Social attachment* — and the liability side, as it were, of the social capital balance sheet is partly reflected in *Crime*.
- Natural capital is discussed under *Air*, *Inland waters*, *Land,* and *Biodiversity*.
- Produced and financial capital is discussed under *National wealth*, and *Housing*.

Other aspects of progress are intimately linked to these varieties of wealth. For example, the commentaries *National income*, *Economic disadvantage and inequality,* and *Work* all shed light on how (and how well) Australia's human and other assets are being used. National income that is not consumed immediately constitutes saving and can be used to accumulate produced and financial capital. The income available to less well-off Australian households is discussed under *Economic disadvantage and inequality*.

Greenhouse gases flow into the air, and might, through global warming, affect other aspects of progress. Australians' *Health* and *Education and training* affect whether they *Work* (and what work they do); work can in turn generate national income.

One can arrange the progress indicators according to the broad variety of Australia's wealth to which they relate. This is, of course, only one of many different ways to display progress indicators.

The publication presents indicators for each of these dimensions. For most dimensions, one headline indicator is chosen. For crime and housing there are two headline indicators. No headline indicator has been chosen for social attachment.

Human capital	*Natural capital*	*Produced and financial capital*	*Social capital*
Health	Biodiversity	National wealth	Crime
Education and training	Land (clearing and degradation)	National income	Social attachment
Work	Water	Economic disadvantage and inequality	
	Air quality	Housing	
	Greenhouse gases		

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.

Human

Three headline indicators are associated with human capital. All three suggest progress during the past decade.

Health. During the past decade, Australians' health improved — children born in 1999 were expected to live three years longer than those born in 1990. Indigenous Australians, however, can still expect to live some 20 years less than other Australians.

Education and training. During the 1990s, the Australian population became more educated — between 1990 and 2000 the proportion of people aged 25–64 years with a vocational or higher education qualification rose from 46% to 50%.

Work. Since the last recession in the early 1990s the unemployment rate has gradually declined, and the unemployment rate in 2001 was 6.7%.

Natural

It is difficult to obtain national time series data that encapsulate the changes in Australia's natural capital. Five of the six headline indicators suggest regress during the past decade.

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. In 1999, about 470,000 hectares of native vegetation were cleared, an annual rate some 40% higher than in 1991. Land clearance is one influence thought to be reducing biodiversity.

Land degradation. 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.

Inland waters. 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 a quarter of Australia's surface water management areas were classed as highly used or overused.

Air quality. 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.

Greenhouse gas emissions in Australia increased by 17% between 1990 and 1999. Australia has some of the highest per capita emissions in the world, in part because of our heavy reliance on fossil fuel burning and also because of the Australian economy's structure.

Produced and financial

Four headline indicators are presented. During the past decade, there has been progress in all four dimensions.

National wealth, as measured in Australia's balance sheet, grew during the 1990s. Real wealth per person increased moderately (by almost 1% a year) between 1992 and 2001.

National income can be used to fund current consumption of goods and services. Or it can be saved to accumulate wealth. Real income per head grew strongly during the past decade (by 2.5% a year) — appreciably stronger growth than during the preceding twenty years.

Economic disadvantage and inequality. The real income of less well-off Australians (those in the second and third lowest decile of the income distribution) increased between 1994–95 and 1997–98 by 5%. The incomes of better-off groups increased by a similar amount.

Housing. Australia's housing stock is a component of produced capital. The commentary focuses on two social aspects of housing: housing affordability and houses with insufficient bedrooms. Although not a widespread problem, the proportion of houses with insufficient bedrooms declined during the 1990s. The proportion of households experiencing problems with the affordability of their housing remained much the same over the four years 1994–95 to 1997–98.

Social

Two aspects of social capital are covered in the headline dimensions.

Social attachment refers to the nature and strength of relationships people have with one another. The publication presents a number of indicators showing how aspects of social attachment in Australia are changing, but none of these is accorded headline status. No assessment is made as to whether these changes signal progress or regress.

Crime. Through the 1990s there was an increase in the prevalence of some of the more common personal and property crimes reported to the police. According to police statistics, for every 100,000 Australians in 2000 there were about 2,300 instances of unlawful entry and 740 victims of assault.

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 *Measuring Australia's Progress* is tentatively planned for late 2003. The ABS hopes to build on this first issue 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

Analysts in Australia and abroad have taken many different approaches to assessing national progress. This section discusses concepts of progress and sets out the ABS approach.

Notions of progress

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

For this new 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. *Measuring Australia's Progress* depicts national progress. It encompasses:

- the major direct influences on the changing wellbeing of the Australian population;
- the structure and growth of the Australian economy; and
- 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.

The ABS does not attach more or less weight to progress in any of the three major areas. However, while the essentials of economic progress can be readily consolidated, social and environmental dimensions of progress are more difficult to measure.

Alternative primary concepts

Different commentators in this field start from different primary concepts, which include the following.

- *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.

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. While we have not made forecasts or entered into any direct discussion of sustainability, 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.

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 two headline indicators — national income and national wealth — 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.

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; or
- 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 of progress. (The HDI uses information about longevity, knowledge and command over resources needed for a decent living.) Others use a larger number of issues. However, 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 growing 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).

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. *Measuring 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. Some, such as the *Tasmania Together* project (see Appendix III), have been based on extensive public consultation and focus group discussions. 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 (see Appendix II).

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.

The one-number approach combines information 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 work is in train. 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 III.

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 *Measuring Australia's Progress*.

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 methodological (and ethical) 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".

More details of the Human Development Index and the Genuine Progress Indicator are in Appendix III.

The ABS already publishes sets of indicators relating to economic, social and environmental concerns. *Measuring 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 some other countries, for example in the United Kingdom where the government produced a publication *Quality of Life Counts*. Further information is included in Appendix III.

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).

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. Any of thousands of measures of progress could have been chosen, but we present just 15 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 social attachment) 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.

- Second, we compiled a list of potential dimensions of progress 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.

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.

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

Economic, social and environmental progress was considered by the ABS as well as an expert group from outside government (membership details are in Appendix II). 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 the expert group and ABS subject matter specialists.

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 set out in the box to the right.

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

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

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. Our aim was to find one primary flow variable (which would express changes in the volume of Australia's economic activity) and one primary stock variable (which would express changes in Australia's wealth). Other economic indicators are provided as supplements to these two key measures of economic progress.

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 EU.

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.

Criteria for choosing progress indicators

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 unambiguously associated with progress. 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 no-ambiguity 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 *Measuring 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.

Continuing development

These headline indicators form a core set of statistics for reporting on Australian progress. But the first set 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 capital or social attachment); and
- 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 *Measuring Australia's Progress*. Further consultations are planned in 2002 to develop this publication and its indicators.

How the progress indicators are presented

Measuring 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; and
- 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; and
- 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

Measuring Australia's Progress is built around indicators that measure progress in dimensions of concern. It aims to 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, recognising the particular disadvantages facing Aboriginal and Torres Strait Islander peoples, some supplementary commentary is included for these Australians: their health, housing, education, and work are discussed within each headline indicator's commentary alongside differences between men and women, young and old, etc. The commentary does not attempt to summarise general progress for Indigenous Australians. Rather, it contrasts their health, education, etc. with that of Australians generally.

Future editions of MAP will include a chapter or theme essay looking more closely at issues or sub-populations. The ABS intends to address Indigenous issues in the first of this series of theme essays. However, for some areas of progress for Indigenous Australians, data comparing this group 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, it seems likely that Indigenous Australians' very notions of what constitutes progress could differ from those of other Australians. Issues relating to cultural and spiritual values, language for example, or the relationship of Indigenous Australians with the land, are likely to be important. For other dimensions of progress, such as social attachment, Indigenous views of progress may be of a different nature from the notions of progress that are set out in this publication.

These are important concerns which need to be addressed in broad consultations with Indigenous groups and organisations. The second issue of *Measuring Australia's Progress*, with the essay on Indigenous issues, is tentatively scheduled for late 2003. Between now and then, the ABS will undertake a series of meetings and consultations with Indigenous groups to try to understand more fully what should be included in the second issue and how it might be measured.

International comparisons. *Measuring 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. But 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. However, we draw some comparisons when they are informative — for example, in the health dimension, where comparable international data on life expectancy are available.

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. For example, in 1999, life expectancy at birth for Australia's Indigenous population was about 60 years; it was about 80 years for all Australians.

Past, present and future

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

How the indicators relate to one another

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

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

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

- *Reinforcements* occur when one aspect of progress improves and strengthens another. For example, as economic production rises, so might employment.

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

Health and national progress

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

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

Health and economic disadvantage and inequality, and housing: studies have pointed to the link between poverty 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 social attachment: 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. And, as the commentary *Indicators of Australia's progress* describes, our indicators measure progress in dimensions that relate directly to, or are intimately linked with, Australia's assets.

Dimensions and indicators of progress

Headline dimensions	Headline indicators	Supplementary indicators
Health	Life expectancy at birth	Proportions of people surviving to ages 50 and 70; Infant mortality rate; Burden of disease
Education and training	People aged 25–64 years with a vocational or higher education qualification	Education participation rate for those aged 15–19; Year 7/8 to Year 12 apparent retention rate
Work	Unemployment rate	Extended labour force underutilisation rate; Long-term unemployment rate; Retrenchment rate; Casual employees; People in part-time jobs; People in jobs with longer hours (50 hours a week or more); Average hours per week, full-time workers
Biodiversity	Extinct, endangered and vulnerable birds and mammals	
Land clearance	Annual area of land cleared	
Land degradation	Salinity, assets at risk in areas affected, or with a high potential to develop, salinity	
Inland waters	Water management areas, proportion where use exceeded 70% of sustainable yield	Water diversions: Murray–Darling Basin; River condition (biota) index; Net water use; River environment index
Air quality	Fine particle concentrations, days health standards exceeded, selected capital cities	Highest one hour averages of SO_2, selected regional centres; Days when ozone concentrations exceeded guidelines, selected capital cities; Consumption of ozone depleting substances
Greenhouse gases	Net greenhouse gas emissions	Total greenhouse gas emissions (including land clearance); CO_2-e emissions, net, per capita and per $ GDP
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
National income	Real net national disposable income per capita	Real Gross Domestic Product per capita ; Proportion of the population in work; Terms of trade
Economic disadvantage and inequality	Real equivalised average weekly disposable income of households in the second and third deciles of the income distribution	Real equivalised average weekly disposable income of groups of higher income households; Children without an employed parent; Real equivalised weekly disposable income of households at selected income percentiles;Ratios of income of households at selected income percentiles; Share of total income received by households in low and high income groups; Gini coefficient; Proportion of households with income below both the half mean and half median income of all households
Housing	*No headline indicator*	Households with housing affordability problems; Households with insufficient or spare bedrooms
Crime	Unlawful entry with intent and assault (victimisation rates)	Homicide rate; Imprisonment rates
Social attachment	No headline indicator	Attendance at live performances; Participation in organised sports; Voluntary work; Marriage and divorce rates; Persons living alone; Waking-time spent alone; Homelessness; Suicide and drug-related death rates (indicators in the *Work* dimension are also relevant)

Supplementary dimension	Supplementary indicator
Land use	Native forest area
Marine ecosystems	Estuarine condition index; Oil spill sightings and national plan responses
Invasive species	Birds and mammals threatened by invasive species; Distribution of weeds of national significance
Waste	Quantities of solid waste disposed of at landfills
Consumption	Real final consumption expenditure per capita
Saving	Net national saving as a proportion of GDP
Inflation	Consumer price index; Domestic final demand price index
Capital formation	Real gross fixed capital formation per capita
Productivity	Multifactor productivity; Labour productivity
Knowledge and innovation	Expenditure on research and development expenditure, as a proportion of GDP; Expenditure on education, as a proportion of GDP; Managers and professionals, as a proportion of total employment; Investment in software, as a proportion of GDP; Proportion of businesses with Website or Homepage
Competitiveness	Real effective exchange rate
Openness	Ratio of imports to GDP; Ratio of foreign investment inflow to GDP
Communication and transport	Computer ownership and internet access, households; Passenger vehicles per 1,000 people
Culture and leisure	*No indicators*
Governance, democracy and citizenship	*No indicators*

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 2001 was estimated at 19.4 million people — an increase of more than 15 million since 1901, when the population was recorded at 3.8 million. The excess of births over deaths (also called natural increase) has been the main source of growth during this period. Another source of increase is net overseas migration.

Since June 1991, 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 1901, a woman could be expected to give birth to around 3.5 children in her lifetime. Twenty years later, the expected number of births as measured by the Total Fertility Rate (TFR) had declined to 3.12 children. Since then, fertility rates have fluctuated considerably, the highest being 3.55 in 1961. In 2000, Australia had a TFR of 1.75 babies per woman.[1]

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 2 Australians. But this statistic hides the fact that 84% of the population is contained within the most densely populated 1% of the continent.

Population density — selected countries

Country	*People per square kilometre*
Australia	2
Canada	3
Italy	190
Japan	335
Korea	471
New Zealand	14
United Kingdom	243
United States of America	29

Source: OECD in Figures (2001).

Estimated resident population

At 30 June	*Population* no.	*Increase* %
1991	17 284 036	
1992	17 494 664	1.22
1993	17 667 093	0.99
1994	17 854 738	1.06
1995	18 071 758	1.22
1996	18 310 714	1.32
1997	18 524 155	1.17
1998	18 730 359	1.11
1999	18 937 166	1.10
2000	19 157 140	1.16
2001	19 386 663	1.20

Source: Australian Demographic Statistics, Cat no. 3101.0.

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 a third of the total population in 2001. Of all Australia's States and the Territories, the populations of Queensland and the Northern Territory grew the fastest between 1991 and 2001 (by 23% and 19% respectively). South Australia and Tasmania had the slowest population growth over the period. South Australia grew by less than 4%, and Tasmania grew by less than 1%.[2]

The percentage of Australians living in rural areas has also declined in recent years. The rural population includes people living on private rural properties or in very small communities, and also refers to bounded localities (population clusters of 200 to 999 people). In 1911, 43% of Australians lived in rural areas; this proportion fell to 14% in 1976 and has stayed around this level since. Technological, social and economic changes have 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. Decline in birth rates, changes in migration patterns and increases in life expectancy have meant that children aged 0–14 years 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 over the last century. 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 2001 there were slightly fewer men than women in Australia (101 women for every 100 men).

Population age structure(a) — 1991 and 2001

Age years	1991 '000	2001 '000	Change %
0–14	3 786	3 923	3.6
15–24	2 761	2 745	-0.6
25–34	2 825	2 915	3.2
35–44	2 623	2 952	12.6
45–54	1 876	2 647	41.1
55–64	1 463	1 803	23.2
65–74	1 182	1 301	10.1
75–84	614	838	36.4
85+	154	263	70.3
Total	**17 284**	**19 387**	**12.2**

(a) Includes 'Other Territories' in Australia from June 1994.

Source: Australian Demographic Statistics, Cat. no. 3010.0.

Aboriginal and Torres Strait Islander population

Historically, there has been some difficulty in accurately measuring the size of Australia's Indigenous population. But 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 projected to be 427,000 — approximately 2% of Australia's total population.[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 economic and other benefits not just of a larger population but also of a growing population.

Others are of the view that Australia's 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; and
- 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, and is influenced by, the labour market, which in turn affects on our national income.

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 1990–91 and 2000–01, the proportion of the Australian population that was employed rose from 44.6% to 47.3%.[4]

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 24 and 28 million people by 2051, if various assumptions for fertility, mortality and net overseas migration were to hold.[5] The population would have an older profile and there would be more dependent children and non-working older people per working adult. The proportion of the population aged between 15 and 64 could decline from about 67% to about 60%, according to the ABS projections.[7]

Endnotes

1 Unless otherwise indicated, all data in this commentary are from Australian Bureau of Statistics 2001, *Year Book Australia 2001*, Cat. no. 1301.0, ABS, Canberra.

2 Australian Bureau of Statistics 2001, *Australian Demographic Statistics,* Cat. no. 3101.0, ABS, Canberra.

3 These are experimental projections of the Indigenous population. The projections are based on the 1996 Population Census and assume no change in the propensity of people to identify as an Indigenous person. The ABS also produces a 'high series' experimental projection, which projects the Indigenous population at 502,000 at June 2001. This projection uses an assumption that there has been an increase in the propensity of people to identify as an Aboriginal or Torres Strait Islander (an assumption based on the observed increase in the Indigenous population between the 1991 and 1996 Censuses which cannot be attributed to natural increase). For further details see Australian Bureau of Statistics 2001, *Experimental Projections of the Aboriginal and Torres Strait Islander Population,* Cat. no 2131.0, 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. 6203.0, ABS, Canberra.

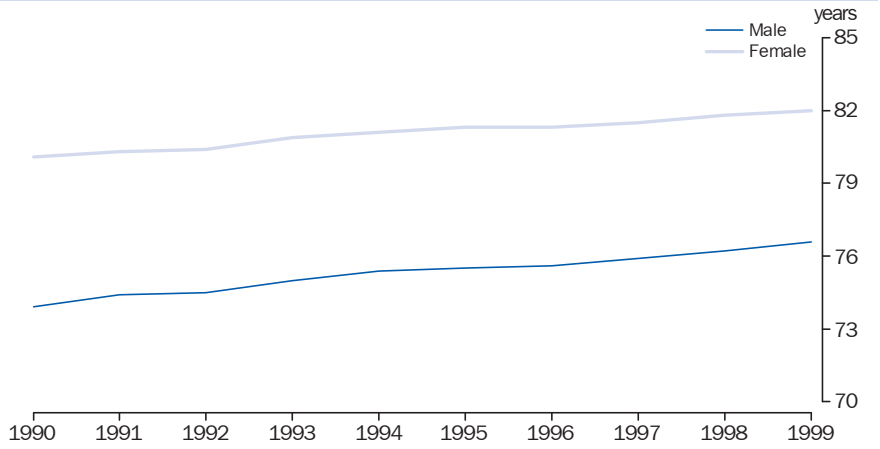
6 Australian Bureau of Statistics 2001, *Population Projections*, *Australia, 1999 to 2101,* Cat. no. 3222.0, ABS, Canberra. ABS population projections use the estimated resident population at 30 June 1999 as a base population. Population projections are not predictions or forecasts. They simply show 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.

7 The forthcoming *Intergenerational Report* to be released by the Commonwealth Treasurer will assess the financial implications of the demographic and other changes that Australia may experience during the next 40 years.

The headline indicators

Health

Life expectancy at birth



Source: Deaths, Australia, Cat. no. 3302.0.

Life expectancy at birth for men and women continued to increase throughout the 1990s, and Australians are now among the longest-lived people in the world. But substantial differences remain among certain parts of the population; Indigenous Australians in particular have much lower life expectancy than other Australians.

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 in the commentary *Health: Looking more closely*). Life expectancy at birth is one of the most widely used indicators of population health. It focusses on length of life rather than its quality, but it usefully summarises the health of the population.

Australian life expectancy improved during the 1990s. A boy born in 1999 could expect to live to be almost 77, while a girl could expect to reach 82 — increases since 1990 of close to 3 and 2 years respectively.

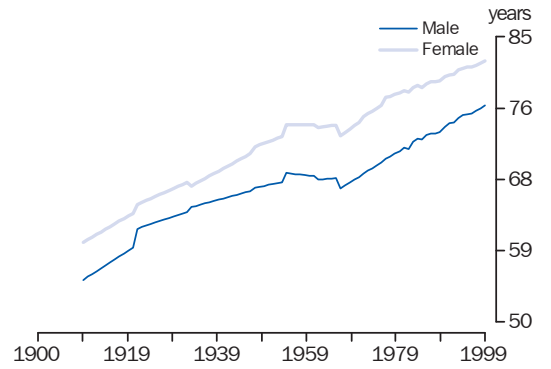
Longer term view

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 1980 and 1999, life expectancy at age 65 increased by just over 3 years for men and 2.5 years for women. Life expectancy at birth over the same period increased by over 5.5 years for men and just under 4 years for women.

Progress has been associated with a decline in deaths from degenerative 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 treatments, illness prevention and diagnosis and screening, 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.

International comparisons

The Population Reference Bureau ranks Australian life expectancy among the highest in the world.[3] Total life expectancy (men and women combined) in Australia is 79 years, alongside France, Italy and Canada. It falls below Japan (81 years), Hong Kong, San Marino, Sweden and Switzerland (all 80 years), but is above countries such as Greece and Spain (both 78 years), and New Zealand, the UK and the USA (all 77 years).

Some differences within Australia

Despite continued improvement in the population's health, there are significant disparities between different groups. Women tend to live longer than men, and this is reflected in the differences in life expectancy throughout the twentieth century. But during the 1990s, life expectancy at birth for men increased more quickly than for women, although a girl born in 1999 could still expect to live over 5 years longer than a boy. There are a number of reasons why women live longer than men; these are discussed in the commentary *Health: Looking more closely*.

The health of many Aboriginal and Torres Strait Islanders is poor. It is difficult to assess national trends in Indigenous life expectancy because many of the historical data are of poor quality. What is known is that Indigenous Australians do not live as long: recent data estimate their life expectancy at birth to be about 20 years less than for other Australians.[4] At the end of the 1990s Indigenous life expectancy at birth (56 years for men and 63 years for women) stood at levels similar to those of the general population close to the beginning of the twentieth century.

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 success in later life. [4]

Older people are much more likely to experience ill health and disability. However, 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 that the length of time people are living without a disability is not increasing as quickly as overall life expectancy.[5]

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.

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 Australian business benefits 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 hospitals and health care, and to maintain suitable sanitation and housing services. Moreover, the health industry is a very significant employer and total health expenditure was over 8% of GDP at the end of the 1990s.

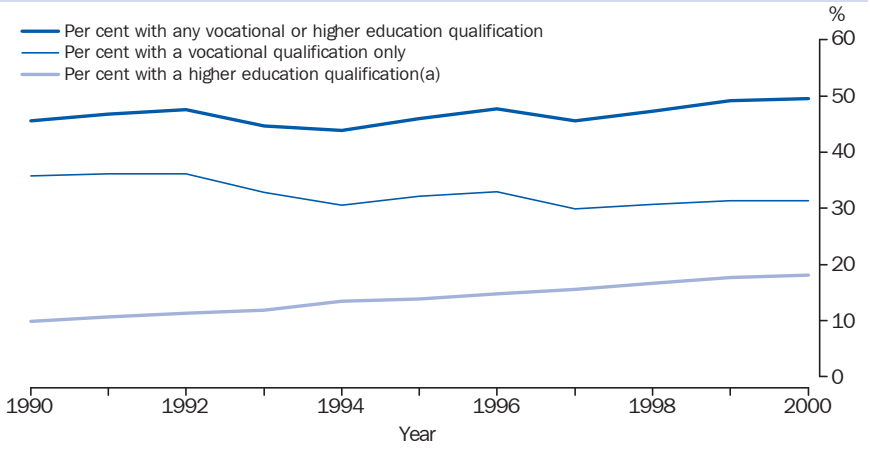
Various types of economic activity also affect human health. The burning of fossil fuels, for example, is linked to types of air pollution and a variety of health concerns. The changing make-up of the Australian economy is having an effect too: a shift to more office-based work with proportionally fewer people employed in more dangerous occupations like mining has helped,[6] along with other factors, to reduce the incidence of fatal accidents at work, although more sedentary occupations have some adverse health effects.

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. The incidence of disability is strongly linked to a person's age, and increases in life expectancy among older people have been accompanied by increases in the numbers of disabled. Not only does a disability detract from the quality of life of those it afflicts; it can also create pressures on the families and carers of people with disabilities.

See also the commentaries *National income*, *Air quality*, *Atmosphere*, *Work*, and *Economic disadvantage and inequality*.

Education and training

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



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

Source: Data available on request, Surveys of Transition from Education to Work.

Overall, the proportion of people with a vocational or higher education qualification continues to rise. Although school retention rates were lower in 2000 than in the early 1990s, people aged 15–19 years are more likely to be participating in education and training than ever before.[1]

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 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 (see box). The age range selected identifies an age group where most people have completed any initial non-school qualifications. The indicator shows that there has been a slight upward trend in the level of educational attainment. Between 1990 and 2000, the proportion of those aged 25–64 years with a vocational or higher education qualification increased from 46% to 50%. This increase marks the continuation of a trend seen for many decades.[2]

Associated trends

The relatively small increase over the last decade in the proportion of people with either a vocational or higher education qualification masks a more substantial increase in the proportion of people with higher education qualifications (i.e. a Bachelor degree or above). Between 1990 and

Measuring educational attainment

The educational attainment indicators refer to vocational and higher education qualifications (defined below) which, when taken together, are also referred to as non-school qualifications. Qualifications are defined as an award of attainment from an accredited educational institution as the result of formal learning. From 1993, courses with less than one semester's study have been deemed not to be a recognised non-school educational qualification.

Vocational education qualifications are gained at educational institutions providing skilled or basic vocational courses, e.g. Technical and Further Education institutions. This indicator includes non-school qualifications up to the level of Undergraduate or Associate Diploma.

Higher education qualifications are gained at educational institutions providing higher education courses, e.g. universities. For this indicator they refer to the levels of Bachelor degree and above.

There have been some changes in the way in which information about qualifications has been collected and recorded.[3] While these changes involve relatively small numbers of people, they help to account for some of the dips seen in the time series.

2000, the proportion of people aged 25–64 years with higher education qualifications increased from 10% to 18%. The proportion of people whose highest qualification was a vocational qualification declined from 36% in 1990 to 31% in 2000. This decline may be due in part to increases in the number of people with both a vocational and a higher education qualification.[4] Some part of the decline may also have been associated with changes to the ABS survey from which these data come.[3]

Other indicators show that the increase in 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 non-school qualification) increased steadily between 1985 and 2000, from 61% to 78%.

Despite the general increase in education participation rates, the increasing levels of retention of secondary school students through to the uppermost level of secondary school seen during the 1980s through to 1992 have not continued. 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)[1] has remained stable over recent years (at about 72% between 1994 and 2000) after falling from the 1992 peak (77%). (The peak in 1992 occurred in a year of particularly high levels of unemployment — see the commentary *Work*.)

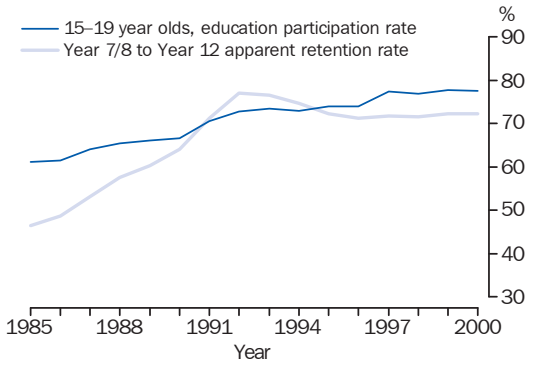
Some population group differences

Educational outcomes for females have continued to improve through the 1990s. Between 1990 and 2000 the proportion of females (aged 25–64 years) with a vocational or higher education qualification increased from 37% to 44%. For males the proportion increased slightly, from 54% to 55%.

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 Australia-born population, particularly as a result of Australia's skilled migration policies.[5]

While there has been progress in levels of educational attainment among Indigenous Australians, both their levels of participation in education and training and their levels of attainment remain well below that of the total population. The trends for these and other population groups are explored further in the commentary *Education and training: Looking more closely*.

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, Surveys of Transition from Education to Work; National Schools Statistics Collection; Schools, Australia, 2000, Cat. no. 4221.0.

Factors influencing change

The pace at which knowledge and skills are further developed within the population is influenced by many factors. Increasing requirements of 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.[6] 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.[5]

Links to other dimensions of progress

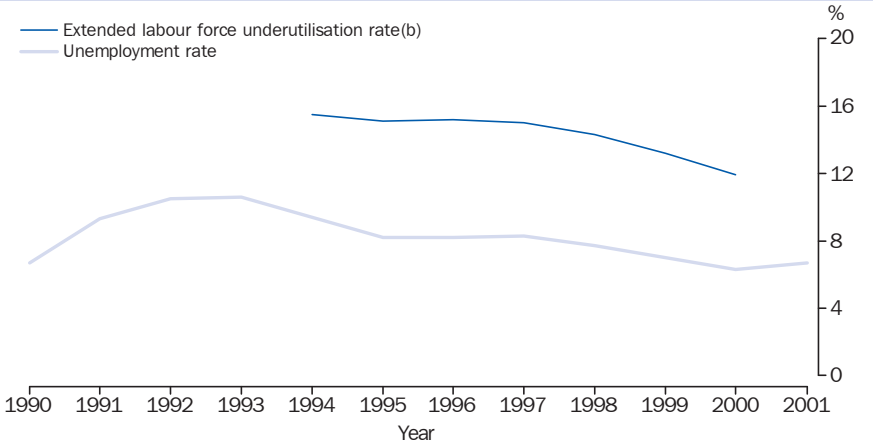
The ongoing development of people's knowledge and skills influences many dimensions of progress. Increased education and training may support economic development by providing people with specialised skills capable of increasing levels of productivity and of extending the range and quality of goods and 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*, *Economic disadvantage and inequality*, *Crime*, *Health*, *Productivity*, and *Knowledge and innovation*.

Work

Unemployment and extended labour force underutilisation rates(a)



(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.

Since the last recession in the early 1990s the unemployment rate has gradually declined. However, since the early 1980s the unemployment rate has been higher than was common in the 1960s and 1970s.

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.

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, 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 economic and social aspects of work.

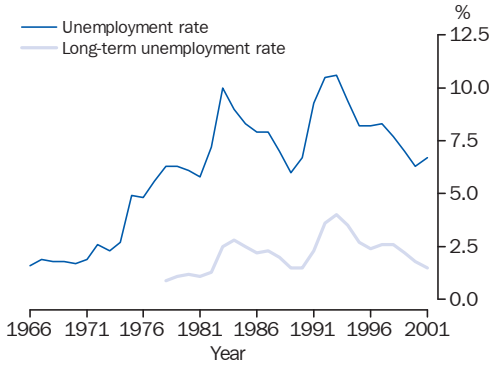
Measures of underutilised labour such as the unemployment rate are sensitive to changes in the economy. For example, the unemployment rate is widely used as a key indicator of changing economic conditions across the business cycle.

In 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 6.7% in 2001. 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. Since 1981 the annual average unemployment rate has not fallen below 6%. Over this period there has been a consistent pattern to changes in the unemployment rate. It has tended to rise quickly during economic downturns and fall slowly during economic expansions.

Associated trends

People unemployed for long periods may experience greater financial hardship, and may have more difficulties in finding employment

Unemployment and long-term unemployment: longer term views



Source: Data available on request, Labour Force Surveys.

Extended labour force underutilisation rate

The extended labour force underutilisation rate takes the measure of underutilised labour beyond what is conventionally measured in the labour force. The measure includes, in addition to the unemployed, people in underemployment and two groups of people with marginal attachment to the labour force, namely:

- persons actively looking for work, who were not available to start work in the reference week, but were available to start work within four weeks; and
- discouraged jobseekers. These are persons 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.

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

People who are unemployed and underemployed are defined as follows:

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

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

because of the loss of relevant skills and employers' perceptions of their 'employability'. The long-term unemployment rate is the number of persons who have been continuously unemployed for a period of 12 months or longer, as a percentage of the labour force. In 2001 the annual average long-term unemployment rate was 1.5%, compared with 4.0% in 1993 in the aftermath of the last recession. Movements in the long-term unemployment rate often lag movements in the total unemployment rate.

Movements in the 'extended labour force underutilisation rate', which provides a wider view of underutilised labour than the unemployment rate (see box above), also closely track the unemployment rate. 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 11.9% in September 2000.

Some population group differences

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 in the commentary *Work: Looking more closely*.

Factors influencing change

Factors that influence changes in indicators of 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 course of 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

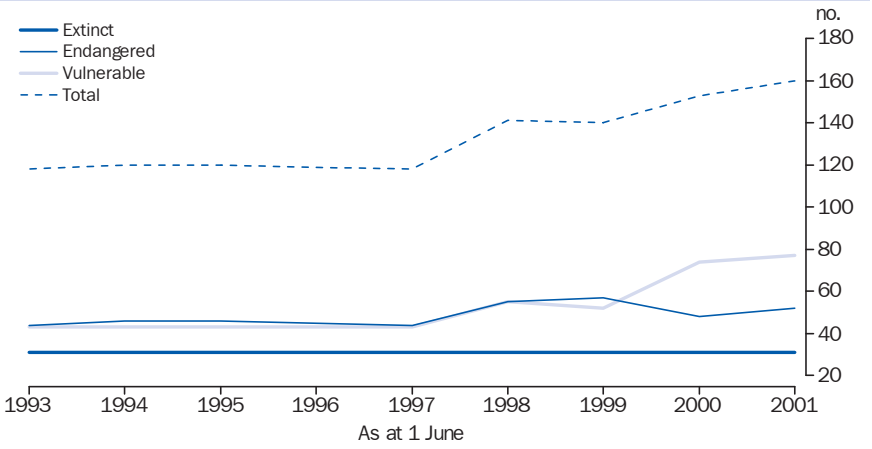
Work, and the economic and social benefits that flow from it, are important to the wellbeing of individuals and the broader community. The underutilisation of labour resources is a lost opportunity for producing goods and services, and income support and other services provided to assist the unemployed 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 poverty and lower levels of social attachment.[1] 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.

See also the commentaries *National income, Education and training, Crime, Economic disadvantage and inequality, Social attachment,* and *Health*.

Biodiversity

Extinct, endangered and vulnerable birds and mammals(a)



(a) Excludes seabirds, marine mammals and animals living on islands far offshore.[1] Extinctions data have been backcast to take account of rediscoveries. Includes subspecies. *Due to the requirements of the acts* 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.

Australia has a diverse and in many ways unique environment that supports a significant proportion of the world's biodiversity.[2] No single indicator can hope to encapsulate biodiversity, and so we focus on one aspect: the numbers of extinct and threatened Australian birds and mammals. Numbers of threatened species rose during the 1990s. The clearing of land and other changes to habitat, such as the spread of invasive species, continue to pose a threat.

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 designated as *extinct* if it has not been found during the preceding 50 years, or during the preceding 10 years despite thorough searching.

Our plants, animals and ecosystems bring important 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[3]). 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.

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[4]) and so here we focus on changes in the conservation status of one small component of biodiversity: mammals and birds.

This indicator ignores the vast majority of biological diversity. The numbers of threatened species are one aspect of biodiversity that can be measured. And we focus on mammals and birds because scientists know more about how these groups are faring than they know about many other groups. Moreover, a decline in birds and mammals 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 because they became more or less endangered. Indeed, sometimes new species are discovered, or those thought extinct are rediscovered. But 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 2001 the number of extinct, endangered or vulnerable bird and mammal species rose by over a third from 118 to 160 (of which 62 were birds and 98 were mammals). In June 2001 just under half of these species were vulnerable, a 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 (79%) than those assessed as endangered (18%). 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.[2]

Some differences within Australia

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 under 8% of Australia's land was protected in areas such as national parks in 2000;[5] but there were gaps in coverage, including ecosystems in arid and semi-arid environments, native grassland, wetland and marine areas (some of this is discussed in more detail in the commentary *Land clearance*).

Among the States and the Territories, in the late 1990s the ACT had the largest proportion of land in conservation reserves (52%), followed by Tasmania (32%), South Australia (21%) and Victoria (15%). Only 2% of the NT and 4% of Queensland were in reserves, along with 6% of New South Wales and Western Australia.[5]

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.[6]

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, perhaps unforeseen consequences elsewhere. Some conservation responses are shown in the accompanying box.

The clearing of native vegetation is a particularly strong threat to terrestrial biodiversity.[2] This has had a profound effect on native wildlife, destroying plants and habitat for animals as well as helping invasive species to spread, which compete with native wildlife. 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 and goats (which compete for and degrade land); and dieback fungus (which is damaging whole forests). Other important threats identified include: altered fire regimes, water use, salinity, climate change, pollutants, and fishing.

Links to other dimensions of progress

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)[8], 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.

See also the commentaries *Invasive species*, *Marine ecosystems*, *National income*, *Land clearance, Land degradation,* and *Inland water*s.

Conserving biodiversity

Although Australia's biodiversity continues to be threatened by many factors, much is being done to protect our flora and fauna. The Commonwealth Government, State 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, while the comprehensiveness of the nation's system of conservation reserves improved in the 1990s.[2]

The State and Territory parks and wildlife services are working to conserve native flora and fauna, and in some areas endangered species are being reintroduced to areas where they were formerly present. Bridled 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 bushland to be retained and protected.[2] The area of land in protected reserves has increased over the past decade. Species recovery plans and threat abatement plans are also addressing many issues, though it is too early in some cases to gauge their effectiveness.

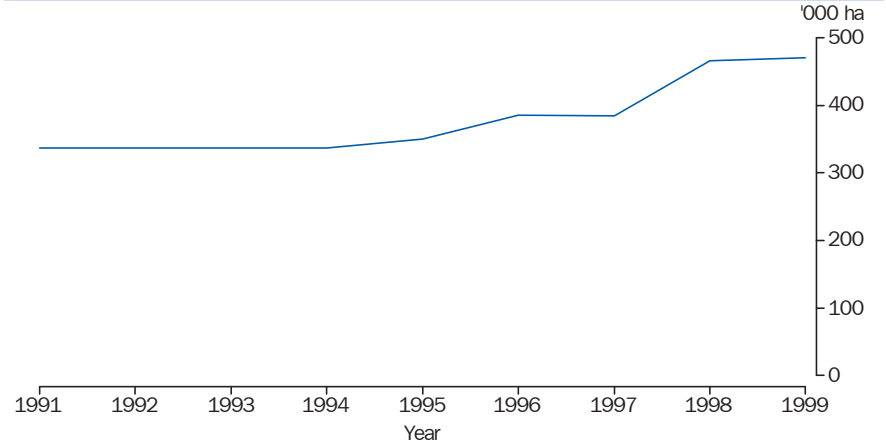
About 63% of Australia is held in private hands, either freehold or leasehold, and is managed for commercial use, and so private landowners can play a significant part in helping to conserve biodiversity.[7] Indigenous Australians' role in land management is increasingly recognised as important. Indigenous 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.

This publication focuses on progress during the 1990s, but it is important to consider change in biodiversity over the longer term. Since 1788 many elements of Australia's biodiversity have declined, and some of these changes are discussed in more detail in the commentary *Biodiversity: looking more closely*.

Land clearance

Annual area of land cleared, hectares



Source: National Greenhouse Gas Inventory, Australian Greenhouse Office 2001.

Land clearance continues to have a major impact on our biodiversity, soil and water. Since the mid-1990s, the rate of land clearance has been increasing. Estimates indicate that about 470,000 hectares (ha) of land were cleared in 1999, around 90% in Queensland.

The clearing of native vegetation is a key threat to Australia's terrestrial biodiversity.[1] Land clearing destroys plants, entire habitats and local ecosystems; it 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.

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 currently available. For the time being, estimates of land clearance from the National Greenhouse Inventory (NGI) are used. These estimates do not include all land clearance, but include the majority of intensive clearance of native vegetation.

The estimated 470,000 ha of Australian land cleared in 1999 are equivalent to over 740 football fields, each the size of the Melbourne Cricket Ground, cleared every day. Land clearance rates increased between 1991 and 1999: 40% more land (135,000 ha) was cleared in 1999 than in 1991.

Uncertainty over the estimates

Knowing how much clearing is occurring is problematic, and these figures, from the Australian Greenhouse Office, are uncertain estimates. The most reliable figures are provided by government research agencies using satellite imagery, but data collected in this way are not available for every State over the past ten years. The accuracy of estimates is expected to improve over time.

The figures used 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.

Some differences within Australia

More than 90% of land clearance in 1999 occurred in Queensland where an estimated 425,000 ha were cleared. New South Wales cleared a further 30,000 ha, while clearance in the other States and Territories ranged from about 1,000 to 4,000 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 ACT and 60% in Victoria.[2]

Factors influencing change

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.

A longer term view

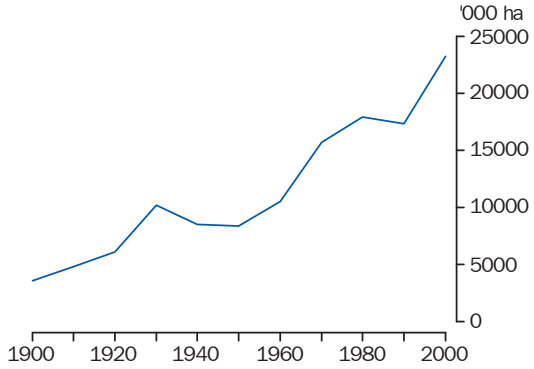
Figures from the National Land and Water Resources Audit suggest that, since 1788, over 700,000 km^2 (about 20%) of woodland and forest have been cleared or thinned, primarily for crops and grazing. A further 130,000 km^2 (35%) of mallee have been cleared since 1788, along with 20,000 km^2 of heath (45%),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

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.[3] Relatively little land clearance has occurred outside of the high rainfall and semi-arid 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.[2]

Although the growth of cities and towns has only affected land cover over a small area (less than 0.1%)[4], 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 endangered (now remnant) woodland communities such as the Cumberland Woodland around Sydney, now an endangered ecological community.[5]

However, agriculture has been responsible for the majority of land clearance in Australia. Although about 60% 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.[2] The most intensive agricultural land clearance has occurred in areas where crops or sown pasture have been planted.

Area under crops — 1900 to 2000



Source: Year Book Australia 2001, Cat. no. 1301.0.

Protecting Australia's land

While the pressures to clear land remain, Australians are responding to protect bushland. The area of land protected inside conservation reserves is growing, and in 1998–99, 60 million ha (just under 8% of Australia) were in protected areas. Some ecosystems are protected better than others: in 1998–99, 23 of Australia's 80 major biogeographic regions had less than 2% of their area protected; ten of these regions had less than 1% of their area protected and three regions had no area at all within the reserve system.[6] 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.[7] Efforts to protect biodiversity now extend beyond the reserve system into some of this private land. In 2002, for instance, there are over 5,000 community landcare groups,[8] while across Australia more than 1,300 conservation covenants — made between private landholders and governments — helped protect 774,000 ha of mostly private land.[9] 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.

In 2000 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. In the 1990s the area of land used for crops increased by over 35% from 19,000 ha in 1991, although the total area of agricultural land holdings declined slightly. This reflects the intensification, rather than spread, of agriculture over the period.

Links to other dimensions of progress

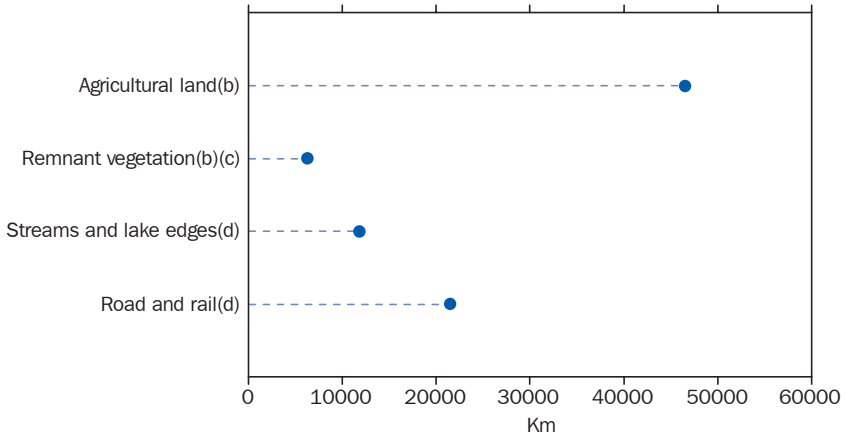
The vast majority of Australian land has been cleared for use in economic production, in particular agriculture, which has generated income and employment. But land clearance has economic impacts too. It can, for instance, lead to costs associated with reduced flood control, the provision of potable water or increased salinity and soil erosion.

Land clearance is a key pressure on biodiversity, and an estimated 1,000 to 2,000 birds permanently lose their habitat for every 100 ha of woodland cleared.[1] About 14% 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*, *Biodiversity*, *Land degradation*, *Inland waters*, *Greenhouse gases*, and *Invasive species*.

Land degradation

Salinity, assets at risk in areas affected or with a high potential to develop salinity(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.[1] (b) Measured as area affected, in square kilomtres. (c) Includes planted perennial vegetation. (d) Measured as lenght affected, in kilometres.

Source: National Land and Water Resources Audit 2001.[1]

This commentary focusses on a form of land degradation in Australia of particular concern: dryland salinity. At the end of the 1990s, about 5.7 million hectares (ha) of Australia were assessed as having a high potential to develop dryland salinity through shallow or rising watertables.

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.[2]

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.[1] 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.[1]

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.[2] 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.

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.[1])

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.[2]

Areas with high potential to develop dryland salinity

State	High potential 2000 ha	High potential 2050 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.[1]

By 2050 some 5,100 km of roads, 67,400 km of rail and 219 towns are predicted to be at risk. A further 11,800 km of streams and lake perimeters are at risk now, a figure predicted to rise to 41,300 km by 2050.[1]

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, a third of which is predicted to be at risk by 2050).[1] 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.[1]

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).[1]

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).

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).[2]

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.[1]

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.[1]

Australia's responses to salinity

Salinity is difficult to slow, halt or reverse.[1] 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. 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.

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.)

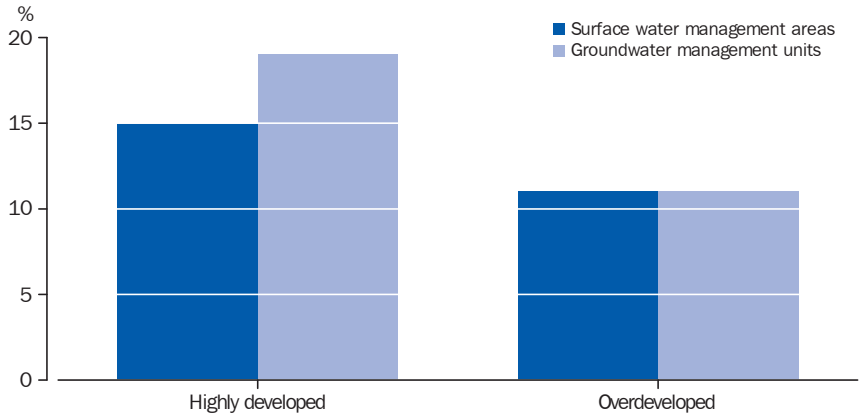
Some 630,000 ha of native vegetation are at risk already from salinity, and this is predicted to rise to more than 2 million by 2050.[1] This degradation of both water and native vegetation will impact upon biodiversity in affected areas. In Western Australia for example, some 450 endemic plant species are threatened with extinction from salinity,[2] 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.[3]

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*, *Biodiversity*, *Inland waters*, *Land clearance*, *Invasive species*, and *Air quality*.

Inland waters

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.[1]

Source: National Land and Water Resources Audit 2000, *Australian Water Resources Assessment 2000*.

Increasing extraction of both surface water and groundwater, particularly for agriculture, are leading to a continuing deterioration of the health of water bodies, while increasing salinity is causing deterioration in many areas. About a quarter of Australia's surface water management areas are close to, or have exceeded, sustainable extraction limits.

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 semi-arid, making this the driest inhabited continent. But our low population density means we have more water than many countries in per-capita terms.[2] However, we also have one of the world's highest levels of water consumption per head,[3] and water supply and demand vary strongly across the country. In the tropics, for example, only a fraction of available fresh water is used. In other areas, such as the Murray–Darling basin, pressure on water resources is acute.

Progress in the 1990s

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 1990s will have contributed to a decline in river health. Data from the 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 1990s, residential water use per household appears to be declining.[5]

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.[1]

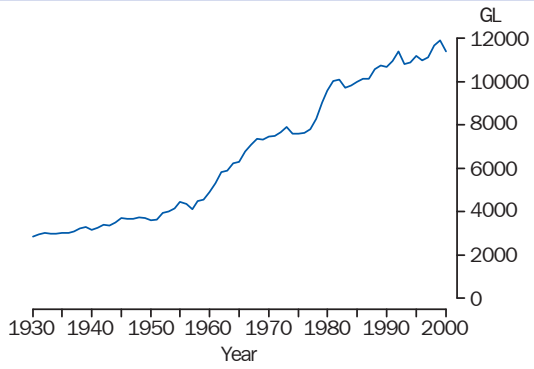
In 2000, about 11% of Australia's surface water management areas were overdeveloped. Another 15% were approaching sustainable extraction limits (i.e. highly developed). Some 11% of groundwater management units were overdeveloped, and a further 19% were highly developed.

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 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]

Water diversions(a), Murray–Darling Basin — 1930 to 2000



(a) Data smoothed using a 5 year moving average.

Source: Data available on request, Murray–Darling Basin Commission 2001.

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.[7] 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.[8] 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 1975–1980 and 1995–2000 increased by 19%. Some 95% of diverted water is used for irrigation, and New South Wales used more than half. In 1998–99 Queensland accounted for only 6% of total diversions, but growth in diversions has been particularly strong in that State, more than doubling between 1989–90 and 1998–99, and increasing six-fold since 1984–85.

In the 1990s, in response to the environmental problems caused by water diversions and to ensure continued supply for those who use water, a cap was placed on the volume of water that could be taken from the river systems in the basin. While increases in diversions have slowed, the Murray–Darling Basin Commission notes that it is too early to decide whether and to what level the cap needs to be changed to avoid further degradation.

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).

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.

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.[9]

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 reused. 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.

Experts debate the impacts of water use in different areas. The Murray–Darling Basin Commission, for instance, has predicted a steep increase in salinity problems. It predicts that, if nothing is done to remedy problems, more than 50% 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).[10]

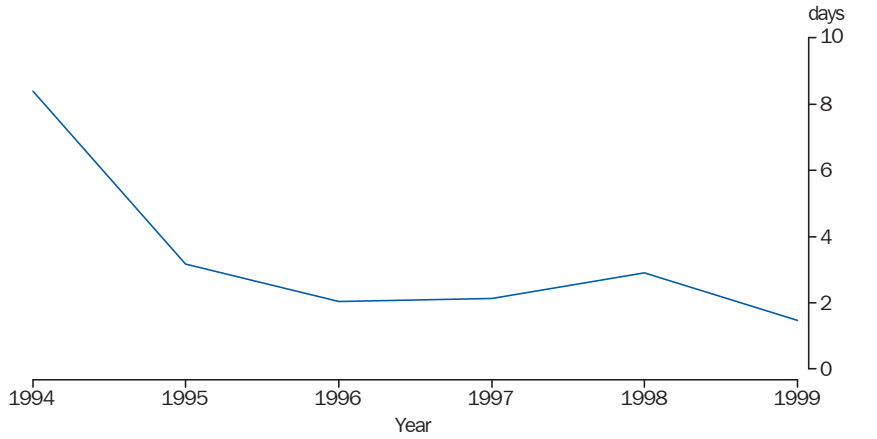
Links to other dimensions of progress

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. 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)[11].

See also the commentaries *National income*, *Biodiversity*, *Health*, *Land degradation*, and *Land clearance*.

Air quality

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



(a) Data are from Sydney, Melbourne, Brisbane, Perth and Adelaide, 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, State of the Environment Advisory Council 2001.

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]

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]

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.

The average number of days each year when health standards were exceeded in the selected urban areas showed a declining trend between 1994 and 1999. In 1994, 16 days in Brisbane, 12 days in Sydney, seven days in Adelaide, six in Perth and two in Melbourne exceeded health standards (a weighted average of over eight days). In 1999 the average number of days when standards were exceeded was less than 1.5, with four areas exceeding standards only once, and Adelaide exceeding them on six days.

Moreover, data for Sydney, Brisbane and Adelaide are available for a longer time period. These data also show that fine particle pollution between 1996 and 1999 was consistently below the levels in the years 1990 to 1995.[2]

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.[1] 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.[1]

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. There is increasing evidence that these finer particles are of considerably 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.[5]

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 vision. 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.

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] Fine particles (particularly wind blown dust) are often the principal air pollution problem in most of our regional centres.[1] Some areas, far from major sources of pollution, can suffer from the long range transport of pollutants. Bushfires and controlled burn-offs also pollute.[1] 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.[1] However, there remain some localised problems in areas such as Port Pirie and Mount Isa.[1]

Climate is also an important determinant of the amount of pollution experienced in Australia's cities and when the pollution 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.[3]

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 in 1998–99 alone)[6]. Most of these emissions are from the use of fossil fuels.

Motor vehicles are Australia's single largest source of air pollution.[1] In Sydney, for example, in 1999–2000 more than 25% of all PM_{10} emissions were generated by motor vehicles.[6] Cars and trucks generate particles directly through burning fossil fuels, especially diesel, which not only generates far more particles than petrol per litre, but generates more of the finest particles (those less than 2.5 micrometres) which, evidence increasingly suggests, have the most serious health implications for humans.[7] 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 can form smog), and was a major contributor to many volatile organic compounds (which contribute to smog).[1] 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).[6] Domestic wood heating can also have a significant effect.[5]

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.[3]

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.[8] 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).[9]

A greater use of renewable power sources to generate energy could also reduce some forms of air pollution.

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.[3]

Polluted air can harm biodiversity: smog and acid rain can affect many plants and animals.[10]

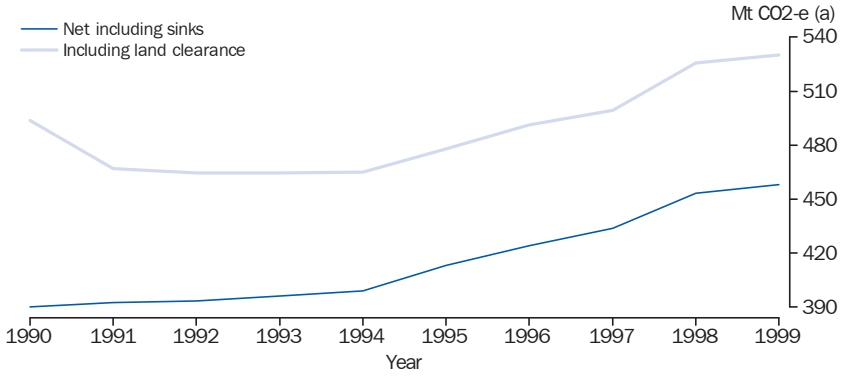
Air quality is linked to the generation of income. Economic activity, especially among the more energy-intensive industries, creates pollution. But in turn, air pollution has financial impacts, such as the cost of cleaning buildings, while acidic gases in the atmosphere can corrode iron and steel. Agriculture can also be affected: polluted air can harm crops and livestock.

Land clearance and degradation contribute to air pollution: fine particles are created when vegetation is burnt, and when eroded soil is blown into the air.

See also the commentaries *Health*, *National income*, *Biodiversity*, *Land clearance*, and *Land degradation*.

Greenhouse gases

Australia's greenhouse gas emissions



(a) Million tonnes (megatonnes) of carbon dioxide (CO_2) equivalent.[1]

Source: Australian Greenhouse Office, National Greenhouse Gas Inventory, 1999.

Australia's net greenhouse gas emissions have risen by over 17% between 1990 and 1999. Per capita, we have one of the world's highest levels of greenhouse gas emissions.[2] Our heavy reliance on fossil fuel burning for energy rather than other forms of power (such as nuclear) and the strucutre of our economy are two influences behind our high rate of emissions.

The main gases in the Earth's 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. This process is known as 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). A number of experts believe that these gases are linked to global warming and climate change by way of an *enhanced greenhouse effect*.[3]

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 graph looks at Australia's net emissions (excluding those from land clearing). Estimated total emissions (including land clearing) are also shown in the graph, but only as background information.

Australia's net greenhouse emissions in 1999 were about 460 megatonnes (Mt) CO_2-e, up from around 390 Mt CO_2-e in 1990, an increase of 17.4%. Our total emissions stood at almost 530 Mt CO_2-e in 1999, an increase of 7.4% over the period.

In order to compare countries of different population size, one can consider per capita emissions of greenhouse gases; about 24 tonnes of CO_2-e, were produced for every Australian in 1999. These figures are high by international standards. Our per capita emissions of CO_2 (the main greenhouse gas) from fossil fuel burning, for instance, are among the highest in the world (in 1997 our emissions were some 30% higher than the Organisation for Economic Co-operation and Development (OECD) average).[4]

Australia's relatively heavy use of both coal-fired power stations and road transport are two important factors contributing to the high per capita emissions.

Net and total emissions

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 considers *net emissions*, which comprise the greenhouse gases released from activities like the burning of fossil fuels, less those absorbed by forests, etc. But significant amounts of greenhouse gases arise from land clearing, and are excluded from the net emissions figure because only rough estimates are available at the moment. When land is cleared, greenhouse gases — mainly CO_2 — are released from the burning and decay of vegetation or from the disturbance of soil which releases carbon. The sum of net emissions and those from land clearing are referred to above as *total emissions*.

Global warming and climate change

Over the past 100 years, global mean surface temperatures have increased by 0.4 to 0.8^{0}C, and the World Meteorological Organization reports that the 10 warmest years in the past 140 have all occurred since 1983.[5] Some of this change may be natural, but over the past 200 years human activity has altered the world's atmosphere;[6] and there is increasing evidence that these atmospheric changes are having an influence on the climate through the enhanced greenhouse effect.

The effects of global warming are very difficult to predict but are of global concern. CSIRO predicts that, relative to 1990, average annual temperature in Australia may increase by 0.4 to 2^{0}C by 2030 and by 1 to 6^{0}C by 2070.[6] Global warming may cause regional rain patterns to change (both within Australia and around the world), while melting glaciers and the thermal expansions of seawater may raise global sea levels by between 15 and 95 cm by the year 2100 (with a current 'best estimate' of 50 cm).[7]

Climate change and biodiversity

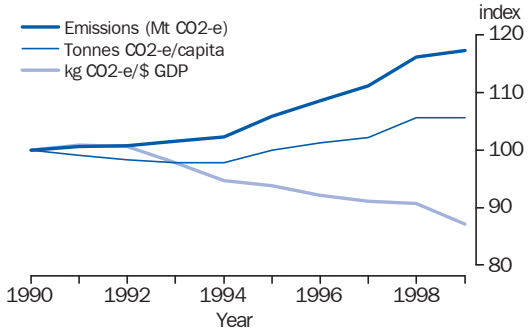
The possible effects of climate change on Australian wildlife are yet to be fully documented, but several species are believed to be threatened, including the endangered Mountain Pygmy Possum which could, scientists predict, lose its entire alpine habitat with just a 1^0C rise in mean annual temperature.[8] It also appears that many corals in the Great Barrier Reef are living close to their survival limits in terms of sea temperature.[9]

Climate change is predicted to impact upon different parts of Australia in different ways. Data beginning in 1910 show that annual mean temperatures in Australia have increased;[10] while the World Meteorological Organization reports that temperatures in the 1990s were the warmest since records began in the 1860s.

Factors influencing change

The size of the economy, its structure and the energy intensity of industries are important determinants of emissions. In 1999 the energy sector (mainly power stations and transport) accounted for almost 80% of net emissions, with electricity generation — primarily from coal-fired power stations — accounting for half the sector's emissions. 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.[11] The energy sector's emissions grew more quickly than those of any other sector (22% between 1990 and 1999).

CO_2-e emissions, net, per capita and per $ GDP



Source: Derived from Australian Greenhouse Office data.

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. Although emissions of greenhouse gases per capita increased by 5.7% between 1990 and 1999, emissions per $ of GDP fell by almost 13%, reflecting the fact that, over the period, economic growth was faster than the growth in emissions: the economy became less emissions-intensive.

Agriculture was the second largest emitter, and accounted for over a fifth of net emissions in 1999 (mainly methane from livestock).

Forestry was a net consumer of CO_2 throughout the period, because growing trees absorbed more CO_2 than was released from trees felled. In 1999 the net carbon sink from the forestry sector was about 26 Mt CO_2-e, about 5% less than in 1990.

Other things being equal, growth in industries that are emissions-intensive (such as iron, steel and aluminum smelting) will increase greenhouse gas output more than growth in sectors such as service industries which are less energy- and emissions-intensive. The price of energy also has an influence in managing demand. Electricity prices fell in Australia during recent years, while the relatively low cost of vehicle fuel here helps to explain why our cars are larger, less fuel efficient and driven more than in many other countries.[12]

The net emissions figures do not take into account the added effects of land clearing, mainly for agriculture, which was estimated to generate a further 71.7 Mt CO_2-e in 1999 (increasing net emissions by over 15%). This was about two-thirds of the estimated emissions from land clearing in 1990, but higher than any of the levels between 1991 and 1998.

Reducing greenhouse gas emissions has become the subject of major international negotiations. In 1992, Australia ratified the United Nations *Framework Convention on Climate Change*, 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.

Links to other dimensions of progress

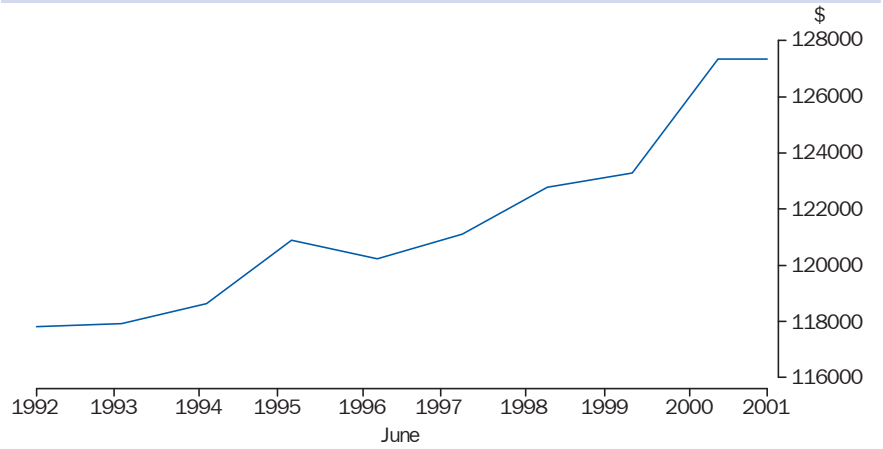
Greenhouse gas emissions and climate change are more than an environmental concern. While Australia's biodiversity and freshwater ecosystems might be affected by climate change, global warming could — if the projections of the International Panel on Climate Change prove correct — have profound consequences 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 the commentary *Atmosphere: Looking more closely*).

See also the commentaries *National income*, *Biodiversity*, *Land clearing*, and *Knowledge and innovation*.

National wealth

Real national net worth per capita(a)



(a) Reference year 1999–2000. Data are not available before 1992.

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

Between June 1992 and June 2001, Australia's real net worth per capita rose at an average annual rate of 0.9%. Real assets per capita grew by 2.2% a year, but this was largely offset by the 7.6% annual growth in real per capita liabilities to the rest of the world. Nevertheless, in June 2001 the value of assets was more than four times the value of liabilities.[1]

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. 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.

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 ways of measuring 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.

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'); and
- currency, shares, loans and other securities ('financial assets').
- Australia's liabilities to the rest of the world which 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 value such as monetary gold; and
- 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.

- 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.

Some differences within Australia

Wealth statistics are not yet dissected by either geography or type of household.

Factors influencing change

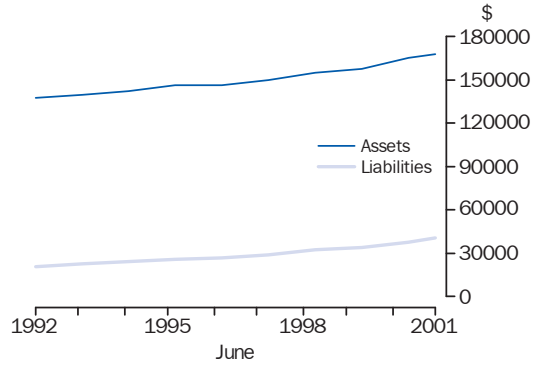
The growth in a nation's wealth is the outcome of a wide variety of influences. Changes in Australia's net worth are the net result of changes in assets and liabilities. Between June 1992 and June 2001, Australia's real assets per capita grew by 2.2% a year, but this was largely offset by the 7.6% growth in real per capita liabilities to the rest of the world.

Broadly, changes in real wealth reflect both accumulations of past saving or dissaving and changes in the prices of assets and liabilities. More information is provided in the commentaries *Capital formation* and *Saving*.

Between 1992 and 2001, real produced assets per capita grew by around 1.5% a year. Of the produced assets, dwellings showed fairly strong growth (up by more than 2% a year). Computer software grew by more than 16% a year, although even by 2001 software still accounted for a small proportion of total assets. Non-produced assets (such as land, mineral resources and native forests) are largely the result of natural endowment although, even for these assets, exploration and development may have been undertaken to discover or improve their economic value. Real non-produced assets per capita rose more slowly (less than 1% a year) between 1992 and 2001.

Australia's financial assets with the rest of the world more than doubled in real per capita terms between 1992 and 2000 (up by around 11.7% a year). Shares and other equity showed particularly strong growth. Australia's liabilities to the rest of the world rose by around 7.6% a year between 1992 and 2001. Again, shares and other equity showed strong growth. More information about the changes in Australia's assets and liabilities is provided in the commentary *Wealth: Looking more closely*.

Real national assets and liabilities per capita(a)



(a) Reference year 1999–2000.

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 2001, significant assets included:

- land (28% of the total, up marginally from 27% in 1992) and subsoil assets (5%, up from 3%);
- dwellings (19%, down marginally) and other buildings and structures (22%, down from 27%);
- machinery and equipment (9%, down from 12%); and
- financial assets with the rest of the world (13%, up from 6%).

Major assets and liabilities per capita(a)

	At 30 June 1992	*At 30 June 2001*	*Average annual growth rate*
	$/cap	$/cap	%
Produced assets	80 419	91 919	1.5
Non-produced assets	50 210	54 641	0.9
Total non-financial assets	*130 566*	*146 565*	*1.3*
Financial assets with ROW(b)	7 928	21 468	11.7
Total assets	*137 728*	*168 028*	*2.2*
Total liabilities to ROW(b)	21 001	40 698	7.6
Net worth	**117 907**	**127 330**	**0.9**

(a) In real/volume terms. Reference year 1999–2000. Components may not sum to totals. (b) ROW = rest of the world.

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

Links to other dimensions of progress

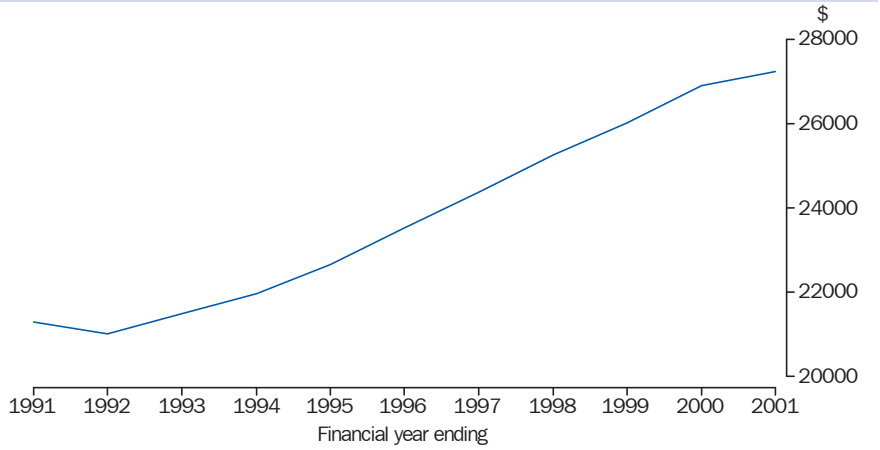
The connections between wealth, income and saving are discussed above and in the commentaries on those dimensions of progress.

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*, *Saving*, *Biodiversity*, *Housing*, *Land degradation*, and *Land use*.

National income

Real net national disposable income per capita(a)



(a) Reference year 1999–2000.

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

Australia experienced significant real income growth during the past decade. Between 1990–91 and 2000–01, real net national disposable income per capita grew by around 2.5% a year — appreciably faster than during the preceding twenty-year period.[1]

National income, which reflects Australians' capacity to purchase goods and services, 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.

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 owing to technological advances in mineral extraction, depletion of resources used in the production process, or environmental degradation through pollution. Although these influences are not built into the headline income measure, commentaries on other progress indicators provide information about some of them.

While aggregate national income growth is a key element of progress, the distribution of income is considered by many to be important too. This is discussed in the commentaries *National income: Looking more closely* and *Economic disadvantage and inequality*.

Some differences within Australia

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

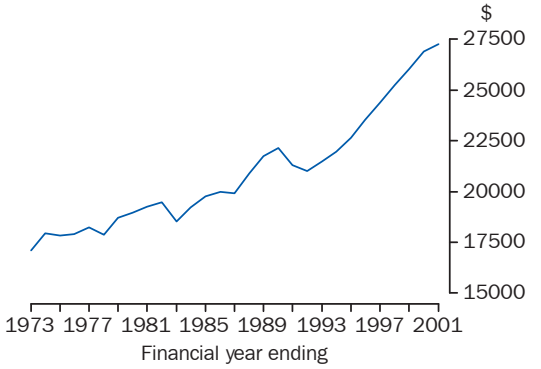
Real per capita Gross State Product (GSP) grew in every State and Territory during the 1990s. Growth was strongest in New South Wales, Victoria and Queensland (respectively averaging 2.5%, 2.7% and 2.6% a year) and weakest in Tasmania (averaging 1.3% a year). There were wide and persistent disparities in the levels of per capita GSP — in 2000–01, New South Wales, Victoria, Western

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 1999–2000.

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

A longer term view

Real per capita income growth during the past decade has been quite strong. The average annual growth rate (2.5%) since 1990–91 is appreciably above the almost 1.8% a year recorded since the early 1970s. Moreover, the nine years or more of recent income growth is the longest growth run observed during that three-decade period.

Australia, the Northern Territory and the Australian Capital Territory were above the national average, and the other States were below. But State disposable incomes (if we could measure them) might not be so diverse, because there are significant government transfer payments and other financial flows between States that can moderate the differences.[2]

Although the output of every major industry (measured by real industry value added) grew during the past decade, the rates of growth differed appreciably. Broadly, some service industries showed stronger growth than many goods-producing industries. Growth was most rapid in Communication services (averaging over 10% a year) and Property and business services (around 5.6% a year).

More information about changes underlying GDP is provided in the commentary *National income: Looking more closely*.

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 1990–91 and 2000–01, Australia's real GDP grew by around 42% (averaging growth of 3.6% a year); in the same decade, population grew by a little over 12% (averaging around 1.2% a year).

GDP is, in turn, influenced by changes in labour, capital and other inputs to production, and by productivity change.

Between 1990–91 and 2000–01, real capital services used in market sector production grew by more than 46% (averaging growth of around 3.9% a year). In the same decade, the labour input to market sector production rose by almost 9% (averaging around 0.8% a year).

During the past decade, improvements in productivity (the amount of output per unit of input) have also made a strong contribution to GDP growth. Between 1990–91 and 2000–01, market sector multifactor productivity rose by 15% (averaging 1.4% a year).

Domestic production is not the only influence on national income growth. Between 1990–91 and 2000–01, income received from overseas rose by more than two-thirds, greatly outpaced by income paid overseas (which more than tripled). During the same period, Australia's terms of trade fluctuated widely, but showed a modest improvement over the decade (up by 0.6%, reflecting a 14.5% rise in export prices and an almost 14% rise in import prices).

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.

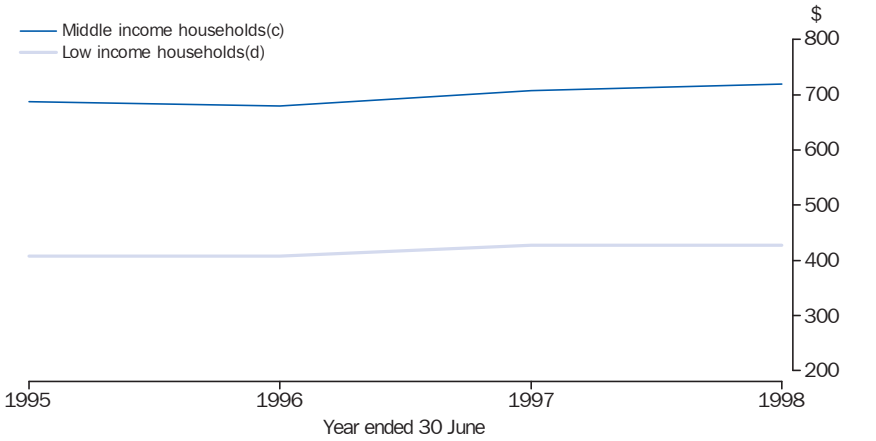
Some of the growth in income may be channelled to the accumulation of national wealth that will generate future income. Or it may be spent to improve the welfare of economically disadvantaged Australians.

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*, *Economic disadvantage and inequality*, *Work*, *Land clearance*, *Land degradation* and *Water*.

Economic disadvantage and inequality

Equivalised average weekly disposable income of households(a)(b)



(a) Disposable (after income tax) income amounts are equivalised by applying the OECD equivalence scale.[1] (b) The equivalised income amounts are all in 1997–98 dollars based on changes in living costs as measured by the Consumer Price Index (CPI). (c) Households in the middle income quintile (5th and 6th deciles) after being ranked, from lowest to highest, by their equivalised disposable income. (d) 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.

Source: Data available on request, Surveys of Income and Housing Costs.

The real income of low income households increased through the period 1994–95 to 1997–98 at a similar rate to that for households in higher income groups.

The commentary *National income* describes progress in overall levels of income generated in Australia. But it is also important to consider whether that progress is being realised by all members of the community, especially the most economically disadvantaged groups, and whether the gap between the least and most disadvantaged groups has been growing or not. An ideal indicator might show whether the proportion of people in poverty (those with limited means whose consumption of goods and services is well below community norms) was rising or falling, or whether or not the situation of people in poverty was improving, either in absolute terms or relative to the situation of others in the community. However, such measures are notoriously difficult to construct (see box). Income based measures, which compare the circumstances of people within and between different parts of the income range (commonly in 10% or 20% groupings), remain the most widely used indicators of economic disadvantage.

The headline indicator presented here focuses on changes in the average disposable (after tax) income of households close to the bottom of the income distribution (namely, the 20% of households in the second and third lowest income deciles). The lowest 10% have been excluded from the measure because of concerns with the fact that the extremely low incomes (close to nil and sometimes negative) recorded for some households in this group do not accurately reflect their living standards.[2]

Equivalised income has been used to group households into low, middle and high income groups.[1] Equivalised income is the income of households adjusted for the different income needs of households of different size and composition. A consequence of using equivalised income measures is that the dollar amounts do not accord with the amounts that households actually receive, but are those amounts they would have received if they all comprised two adults and two children aged less than 15 years.

Based on comparable annual data available for the period 1994–95 to 1997–98 (more recent data are being reviewed),[3] the indicator shows that the real income of the low income households (the more disadvantaged households) was rising through this period. It increased by 5%, from $408 to $427 per week (expressed in 1997–98 dollars).

As might be expected, the average incomes of higher income groups also increased. For instance, the cost of living adjusted, equivalised disposable income of households in the middle 20% of households also increased by 5%, from $687 to $720 per week in the three years to 1997–98. The average income of the 20% of households at the top of the income distribution increased by 6% from $1,556 to $1,642 per week.

The close to uniform changes in the equivalised disposable income of households with low, middle and high incomes suggest that there has been little change in the income gap between households. When looking at other commonly used measures of changes in income inequality (as presented in the commentary *Economic disadvantage and inequality: Looking more closely*), the same pattern of little or no change in income distribution emerges.

Measuring poverty

There are obviously some basic needs (such as food, clothing and shelter) without which people may be considered to be in absolute poverty. However, such poverty is probably rare in Australia. As a result poverty is usually considered in terms of those who are relatively less well off in terms of the economic resources available to them. However, identifying the less well off is a complex matter for which there are no widely agreed community standards. Those income based measures that have been used (such as the Henderson Poverty Line) are widely regarded as less than ideal, partly because the income people receive does not completely capture whether they are able to access goods and services that may be accepted as being normal (or at least adequate) according to community expectations. For instance, some households can have a low (or even negative) income, but have many assets from which to support their consumption of goods and services. Also, for those households with lower incomes, a significant proportion of their consumption of goods and services is financed through indirect government benefits such as education and health. Nevertheless, comparisons of people's incomes can provide useful insights into differences in levels of economic wellbeing within the population.

Associated trends

Another approach to assessing changes in the extent of economic disadvantage is to focus on the circumstances of some groups in most need of support. The indicator, presented in the accompanying graph, looks at the proportion of children that may be living in (or may be at risk of living in) economically disadvantaged households because they do not have a parent in paid employment.

Through the 1990s, on average about 18% of children aged less than 15 were, at any one point in time, in families in which their parents (or parent in lone parent families) did not have a job. Many of these children were in households where the parent(s) were not in the labour force. For those children whose parents remained unemployed or continued not to be in the labour force for a significant period of time, many would be in households primarily dependent on welfare benefits as their main source of income.

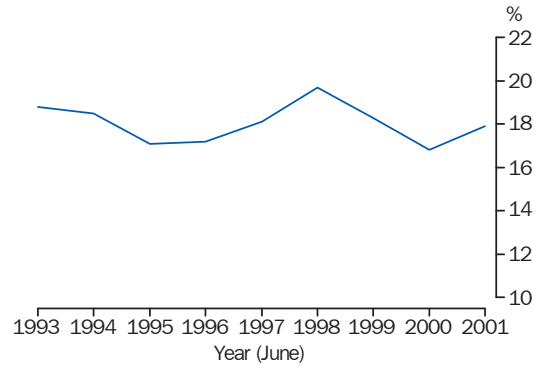
Other specific groups in the community widely recognised as being relatively disadvantaged include Indigenous Australians, people with disabilities, the carers of people who need help and/or supervision in meeting their daily needs, one parent families, and retirees with limited means of their own. Many of these people depend on income support provided by the social security system as their main source of income.

Factors influencing change

The overall vitality of the economy is a key determinant in providing jobs and therefore of the economic wellbeing of households. However, some people are unable to work, some earn more than others, consumption and investment behaviours differ, and life circumstances vary, so inequalities in income and wealth are inevitable.

Mechanisms exist to support people who fare less well. Important among them are government benefits and taxes which directly redistribute resources from the better off to the worse off. In addition to the direct income support payments (the pensions and benefits provided to people with limited means of their own), government provides 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 to ensure that most people in Australia have adequate food, clothing and shelter. It is the relative ability of households to provide for themselves and the relative generosity of support mechanisms that help determine the economic wellbeing of the most disadvantaged groups.

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) at the time of interview.

Source: ABS, data available on request, Labour Force Surveys.

Links to other dimensions of progress

The income generated by the economy as a whole is an important determinant of living standards. Economic disadvantage is often associated with problems such as a lack of participation in work, drug taking, poor health, poor education, poor housing, crime, social exclusion and a lack of opportunity for children. Changes in the economic wellbeing of people with low incomes will to some extent impact on, and be impacted by, the other dimensions of progress described in this publication.

See also the commentaries *National income, Education and training, Work, Health,* and *Social attachment*.

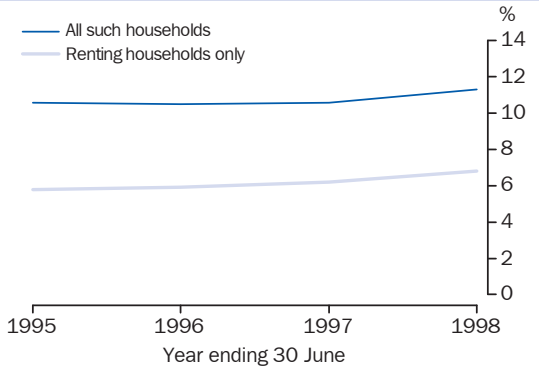
Housing

Housing in Australia is generally good, as evidenced by ABS surveys which show that most people live in affordable housing and are generally satisfied with their dwelling.[1] But poor housing is a problem for some groups, especially for Indigenous people living in remote areas.

There is no single headline indicator to show whether housing circumstances have been getting better or worse. The two time series indicators chosen focus on issues of housing affordability and housing suitability (whether or not households have sufficient bedrooms). The affordability indicator, for which data are only available for the period 1994–95 to 1997–98, shows that the proportion of households with housing affordability problems had remained much the same. The housing suitability indicator shows continuous improvement through much of the last two decades.

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 *Social attachment*.

Households with housing affordability problems(a)



(a) Households with housing affordability problems (as defined in the box below) as a percentage of all households in Australia.

Source: Data available on request, Surveys of Income and Housing Costs.

Measuring housing affordability problems

Although there is no nationally recognised standard for identifying households with housing affordability problems, one of the more often used benchmarks has been adopted. This is households with lower incomes (those in the bottom 40% of the income distribution — see details below) and with housing costs above 30% of their disposable income. It should be noted that many higher income households also pay more than 30% of their income on housing costs. These have been excluded from the group identified as having affordability problems because such households often have the discretion to reduce their housing costs by reducing their mortgage repayments or moving to a place with lower costs.

Households in the bottom 40% of the income distribution were identified by ranking all households, from highest to lowest, into equivalised income groups after applying OECD equivalence scales.[3] The use of such scales effectively adjusts to a standard household type the incomes of households of different size and composition which would have different income needs. Having identified the 40% of households with the lowest equivalent incomes, housing costs — including rent, mortgage and rate payments — were calculated as a proportion of the households' unequivalised disposable (after tax) income.

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. While housing is a key dimension of concern, there is no one indicator that succinctly captures these and other attributes to identify whether people's many needs and desires for suitable housing are increasingly being met or not. Instead the following discusses some limited but important aspects of people's housing circumstances.

Housing affordability problems

The amounts people must pay in rent or rates and any mortgage repayments for their dwelling are often substantial. The prevalence of households experiencing housing affordability problems, which points to limitations in the supply of suitable low cost housing, can be measured by assuming that households with lower incomes (as defined in the adjacent box) which pay more than 30% of their income in housing costs will experience such difficulties. Annual data for the period 1994–95 to 1997–98 show that the proportion of all households in such circumstances (i.e. about 11%) had remained much the same. In 1997–98 there were 793,000 households with housing affordability problems. Many of them were paying off a mortgage for their home, but the majority (60%) were households in rented housing.

In 1997–98, lower income households renting their dwelling and paying more than 30% of their income in housing costs accounted for 7% of all households in Australia. This proportion had also remained much the same over the preceding three years.

Households with insufficient bedrooms

Having insufficient bedrooms is not a problem for most households in Australia: indeed the majority have spare bedrooms. However, the proportion of households with insufficient bedrooms (defined according to community standards of bedroom requirements for different household types — see box on next page) provides a useful indicator of the extent of housing disadvantage. Looking at changes in the proportion of households with spare bedrooms is also of interest, as growth in the

proportion suggests an increase in housing affluence. But it is important to note that such affluence might not always be desirable, as some households may prefer to live in dwellings with fewer bedrooms to suit their lifestyle.

The trends have been favourable. In 1984, 7% of all households lived in dwellings with fewer bedrooms than their expected requirements, but in 1998–99 this proportion had declined to less than 5%. Over the same period, the proportion of households with spare bedrooms (often with two or more spare) rose. Those with at least one spare bedroom increased from 63% to 74% and the proportion with two or more spare bedrooms increased from 26% to 37%.

Changes in household size and composition and in the average number of bedrooms per dwelling help to account for the improvements. For instance, the general decline in the average number of people per household has generally increased the likelihood that households will have spare rooms (because many occupied dwellings were built for the needs of society when families were larger). Also, despite the construction of smaller dwellings to meet the needs of certain people (such as town houses designed for elderly people), the general trend has been to construct substantially bigger dwellings (and probably with more rooms, some of which might be used as bedrooms) than in the past. Between 1990 and 2000, the average size of new private sector dwellings increased by 22% from 189 to 231 m^2.

Some differences within Australia

The quality and costs of dwellings vary greatly across Australia, and can depend on the period in which the dwelling was constructed, the affluence of the communities in which they are located, and the local climate (for example, in Queensland many older dwellings were built using timber, whereas in the colder southern States, brick houses were more common).

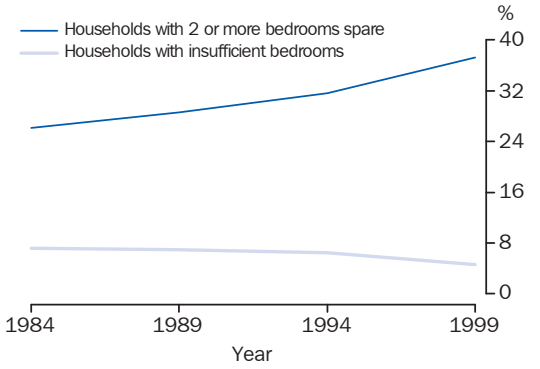
Identifying requirements for bedrooms

The criteria used to identify bedroom requirements for households are, in the absence of any widely accepted Australian standard, based on the Canadian National Occupancy Standards. A household's bedroom requirements are assessed as follows:

- there should be no more than two persons per bedroom;
- children less than 5 years of age of different sexes may reasonably share a bedroom;
- children 5 years of age or older of opposite sex should not share a bedroom;
- children less than 18 years of age and of the same sex may reasonably share a bedroom; and
- single household members 18 years or over should have a separate bedroom, as should parents or couples.

Of course, these assumptions are open to debate (see Endnote 4).

Households with insufficient or spare bedrooms(a)



(a) Requirements have been assumed on the basis of the occupancy standards described in the box below.

Source: Data available on request, Household Expenditure Surveys.

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. Indigenous Australians, particularly those in more remote communities, are widely regarded as having the poorest housing circumstances in Australia. In 1999, one in eight of all dwellings in remote Indigenous communities were temporary dwellings, such as caravans, tin sheds or humpies.[5]

Several other indicators show that housing conditions tend to be poorer among Indigenous Australians irrespective of where they live. For instance, in 1999 13% of all households living in non-remote areas of Australia, and having at least one person aged 15 years and over who identified as being of Aboriginal or Torres Strait Islander origin, needed more bedrooms to adequately accommodate all household members. This compared with 4% for other households.[6] Households containing Indigenous Australians 15 years or over were also more likely to report that their dwelling was in high need of repair (20%) compared with other households (7%).[6]

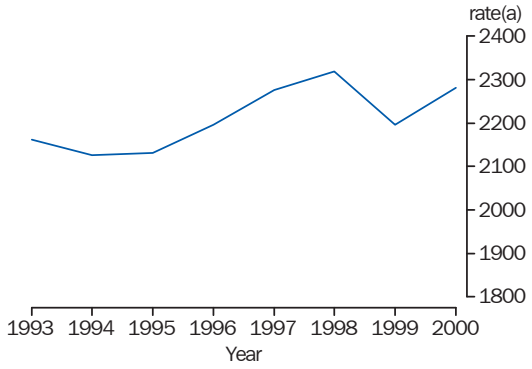
Links to other dimensions of progress

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, economic disadvantage, crime and low levels of social attachment.[7] Housing development is often seen as important to the economy and is part of national wealth. However, new housing development sometimes involves clearing native vegetation, with associated loss of biodiversity.

See also the commentaries *National income, National wealth, Economic disadvantage and inequality, Health*, *Social attachment,* and *Land clearance*.

Crime

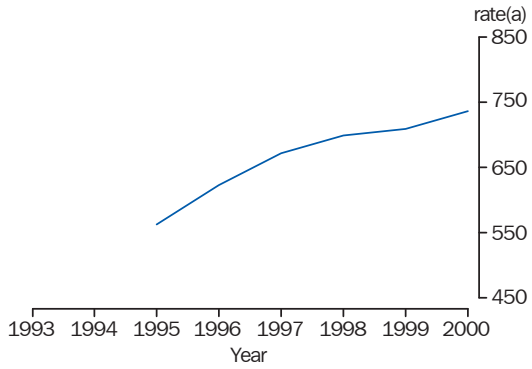
Unlawful entry with intent



(a) Rate per 100,000 persons.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

Assault



(a) Rate per 100,000 persons.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

Through the mid to late 1990s there were increases in the prevalence of some of the more common personal and property crimes recorded by police. Homicide rates have not changed greatly over the last 80 or so years, but were lower in 2000 than the long term peak in 1988.

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. However, there is no well established means of doing this nor are there comprehensive data sources. Although information about government expenditures on crime-related services provides some idea of the financial costs of crime to the community, the full costs to victims, or the subsequent costs to the wider community, might never be fully quantified.[1] This is partly because the full extent of illegal activity cannot be measured through available information systems. Indeed it is well known that many crimes are never brought to the attention of the police. Producing estimates of the costs of crime, even for those crimes that are identified, 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 of concern is to look at criminal offence victimisation rates based on police records. The focus here is on two of the more common categories of offences, namely 'unlawful entry with intent' and 'assault'. (The former refers to unlawful entry of a property with the intent to commit an offence, be it theft, property damage, or an offence against an individual.)

The prevalence of unlawful entry with intent has slowly increased through the 1990s. In 1993 the rate was 2,161 victims per 100,000 persons. It rose to 2,281 per 100,000 persons by 2000, a little less than the 1998 peak.

The prevalence of assault also rose through the 1990s. While assaults recorded by police were much less frequent than instances of unlawful entry with intent, the increase in assaults between 1995 and 2000 (the longest period for which comparable data are available) was substantial. Between 1995 and 2000 the assault rate rose on average by 5.5% per annum, from 563 to 737 victims per 100,000 persons. These rates may, however, significantly understate the extent of assault within the community, as data from the 1993 and 1998 crime victims surveys suggest that a

Crimes recorded by police

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.

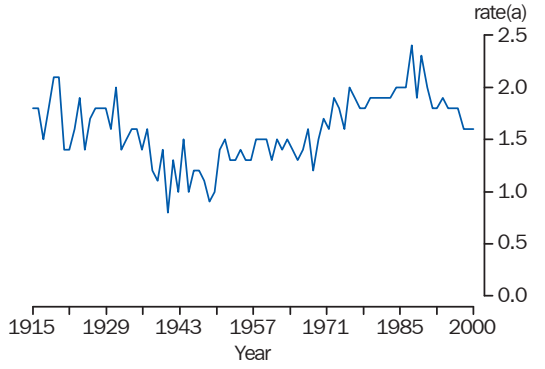
However, these statistics do not provide the total picture: ABS household-based crime and safety surveys reveal that many crimes are not reported to the police. In particular, surveys broadly show that personal crimes such as assault and sexual assault are much less likely to be reported to police than property crimes.[2] In addition reporting rates can change over time. For further information related to the crimes referred to here see the commentary Crime: Looking more closely.

Care should also be taken in interpreting changes in police statistics. Changes in recorded crime may be a reflection of changes such as:

- community attitudes to reporting crime;
- policing resources and strategies; and
- crime recording systems,

rather than changes in the incidence of criminal behaviour.

Homicide rates



(a) Rate per 100,000 population.

Source: Data available on request, Causes of Death collection.

large proportion of assaults (over two-thirds) are not reported to the police (see the commentary *Crime: Looking more closely*).

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. 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.

Homicide rates for the period 1915 to 2000 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 0.8 and 2.4 homicides per 100,000 persons per annum (see graph above). 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 persons in 1988. After falling back to 1.8 homicides per 100,000 persons in 1992 the annual rates though the 1990s have fallen slightly further. In 2000 there were 313 homicides recorded in the cause of death statistics: 1.6 homicides per 100,000 persons. Similar data compiled from police records since 1993 indicate little change through the 1990s.[3]

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. National police statistics for 2000 show that crime rates relating to various offences also differ among Australia's States and Territories. For instance, as the supplementary commentary *Crime: Looking more closely* shows, New South Wales had the highest rate for robbery offences. Murder, assault and sexual assault were most prevalent in the Northern Territory, and property crimes, both 'unlawful entry with intent' and 'other theft' (which excludes motor vehicle theft) were most prevalent in Western Australia. In contrast, crime rates in Victoria and Tasmania tended to be below national rates for most offence categories.

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. Family factors, such as parental neglect, deviant parental behaviours and attitudes, conflict with parents and family disruption, are known to be strong predictors of juvenile involvement in crime.[4] And differences in crime rates between areas have been associated with poverty, unemployment and income inequality. Over time, increasing levels of drug dependence may have been a factor in increasing crime rates. 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. Common responses to increasing levels of crime include increasing prevention and detection activities, and increasing penalties, such as terms of imprisonment.

Links to other dimensions of progress

In the absence of clear evidence one can only speculate as to whether changes in crime rates have been associated with other indicators of progress presented in this publication. There are strong links to levels of economic disadvantage when comparing crime rates among population subgroups, but the association between crime rates and changes in levels of unemployment over time are known to be weak.[5] It is believed that the effect of changes in levels of economic disadvantage 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.[5] 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 attachment.

See also the commentaries *Work, Economic disadvantage and inequality,* and *Social attachment.*

Social attachment

Social attachment is important to progress, but difficult to define and measure. Rather than present a single indicator, this commentary presents some measures which illustrate changing social attachment in Australia.

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, or the absence of social support.

'Social attachment' refers to the nature and strength of relationships that people have with each other. It includes the more intimate relationships with family and friends as well as people's associations with individuals and organisations in the wider community. More generally, it refers to the way in which people bond, interact with, and feel about other people, organisations and institutions (such as clubs, business organisations, political parties, and various government organisations). At social attachment's opposite extreme lie notions of social detachment, social isolation and social exclusion.[1]

There is no conceivable single indicator that captures all that might be important. Therefore a selection of indicators is presented relating to various activities/behaviours or situations that reflect on social attachment. The indicators describe people's participation in various social activities, their propensity to form or break away from intimate social relationships (indicated through marriage and divorce rates), and their likelihood of living alone. Others, such as suicide and drug related death rates, focus on outcomes of low levels of attachment. These indicators do not describe the 'health' of communities per se and is a weakness of the current list of indicators. Moreover, there will undoubtedly be debate about the appropriateness and comprehensiveness of any set of indicators chosen; social attachment is a particular dimension on which the ABS will be seeking feedback. There is also international work taking place on measurements of social attachment and associated concepts which will feed into a review of this dimension before the next issue of *Measuring Australia's Progress*.

What do the indicators show?

It is important to recognise that the data which follow have come from a number of different sources and, depending on data availability, they relate to different periods in time.

Social attachment and related concepts

Closely related to the concept of social attachment is the notion of 'social capital'. Social capital, for which there are various definitions, embodies the concept of social attachment. But it also recognises that the stock of positive beliefs and values — such as altruism and tolerance — that facilitate social cooperation within a community, are important to societal wellbeing. Aspects of social co-operation are discussed further in the commentary *Governance, democracy and citizenship*.

Desired directions of change

Individual views about ideal levels of social attachment vary. Nonetheless, for some aspects of social attachment, people can generally agree whether change in a particular direction is good or bad. For instance, most agree that decreases in the suicide rate, in the incidence of drug-related deaths, or in the level of homelessness, represent improvements. But for many other aspects of social attachment, the choice and interpretation of indicators may be considered to be laden with the values of those involved in the selection or interpretation of those indicators.

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]

Patterns of participation in various social activities are changing

- Involvement in paid employment provides an important means of meeting people and developing close relationships with others. As noted in the commentary *Work: Looking more closely*, 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 engagements than in the past, and that for men levels of social attachment through work have decreased. However, there are important aspects of social attachment outside of the work situation, which may also be changing conversely, as women in employment have less time available for other community activities and as men can engage in other activities outside the work context.

- The likelihood of people going out to attend a live performance (specifically including venues involving: a popular music concert; opera or music theatre; theatre; dance; or classical music

concerts) as a member of an audience, has declined slightly. Between 1990 and 1999, those aged 18 years or over, attending a live performance at least once in the previous twelve months, declined from 48% to 43%. The proportion attending a performance on two or more occasions in each twelve month period declined from 34% to 30%. Data relating to people's attendance at sporting events are not available for the same time period. However, between 1995 and 1999, the proportion of people aged 15 years and over who attended a sporting event, match or competition at least once during the year before being interviewed remained the same at 43%.[3]

- Levels of participation in organised sports or physical activities (i.e. as a member of a team or club) among people aged 18 years and over have been changing over recent years. But as the data are only available for four years (i.e. 1996–97 to 1999–2000) and there have been both upward and downward shifts in the rates, the longer term trend is not clear. Over the three year period 1996–97 to 1998–99 the overall level of participation in such activities increased from 27% to 30%, but between 1998–99 and 1999–2000 it stabilised at about 30%. While women had lower participation rates than men (25% compared to 33% in 1999–2000) the changes over time were similar for both groups.

- The likelihood that people will voluntarily give their time to do some work for an organisation or group is often regarded as one of the stronger measures of social attachment, as it involves assisting others. Between 1995 and 2000, the proportion of people aged 15 years and over who reported that they did some voluntary work during the previous 12 months increased from 24% to 32%. The increases occurred for both sexes and across all age groups, but were proportionately greater for those in the age groups 18–24 years (17% to 27%) and 55–64 years (24% to 33%).[4]

Marriage less popular and divorce patterns changing

- The commitment to a formal marriage (in a church 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 1990 and 2000 the crude marriage rate declined from 6.9 to 5.9 marriages per 1,000 people, a continuation of a longer term trend.

  Although many people now choose to live together in de facto marriages, people are increasingly likely to live without a partner at all. Comparisons from the 1986 and 1996 Censuses of Population and Housing 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 37%. 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 55 years.[5]

  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 or so up to 1996, the data indicate a decline in divorce rates over more recent years. This needs to be viewed in the context of the decline in the number of registered marriages.

  Divorce rates in Australia were affected significantly by the introduction of the *Family Law Act 1975*, which made it easier to obtain a divorce. The Act allows only one ground for divorce, an irretrievable breakdown in a marriage, measured as the separation of spouses for at least one year. The change saw the crude divorce rate jump from less than 1.3 divorces per 1,000 people in the early 1970s to 4.5 divorces in 1976. After several years, while the backlog of applications was processed, the divorce rate settled at a level more than twice that before the introduction of the Act.

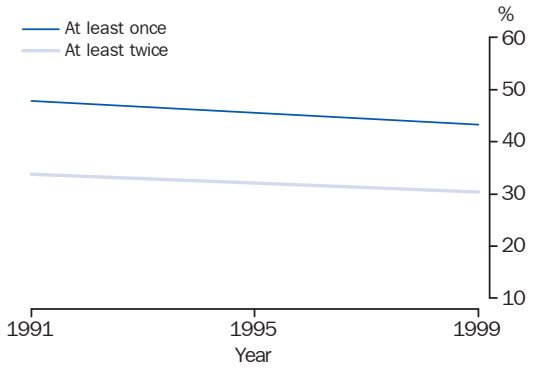
Homelessness

Homelessness may also be seen as an indicator of adverse levels of social attachment. 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 and the ABS, based on the 1996 Census of Population, showed some 105,000 homeless people in Australia on census night (August 1996).[6] The estimate prepared by researchers of the Consilium Group, using different methodologies but very similar definitions of homelessness to those used in the Chamberlain/ABS study and pertaining to June 1997, was smaller (53,000 people).[7]

There are no reliable time series data to say whether the numbers have been changing over time. 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 2000–01 (about 15,500 to 16,500 per day) than in 1996–97 (about 13,000 to 14,000 per day).[8] But these numbers are understood to represent only a fraction of homeless people in Australia on any one day, and cannot by themselves be taken as reliable evidence of deteriorating levels of social attachment.

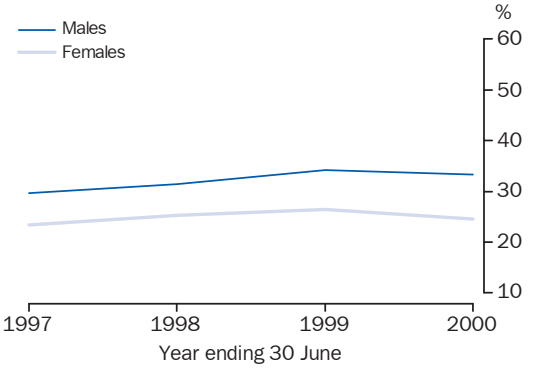
Attending live performances(a)



(a) Proportion of those aged 18 years and over who attended a live performance in the previous 12 months at any of the following venues: popular music concerts; opera or music theatre; theatre; dance; or classical music concerts.

Source: Data available on request, Attendance at Selected Cultural Venues Surveys.

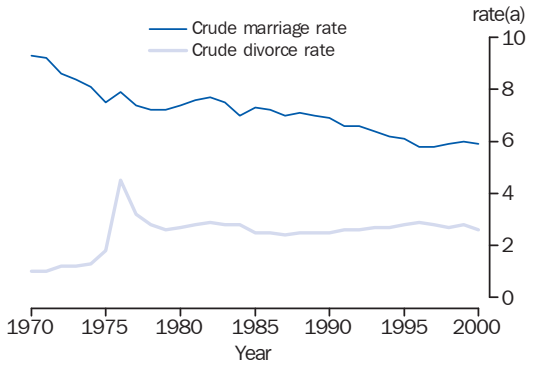
Participating in organised sports(a)



(a) Proportion of those aged 18 years and over who participated in organised sport or physical activity during the previous 12 months.

Source: Participation in Sport and Physical Activities, 1999–2000, Cat. no. 4177.0.

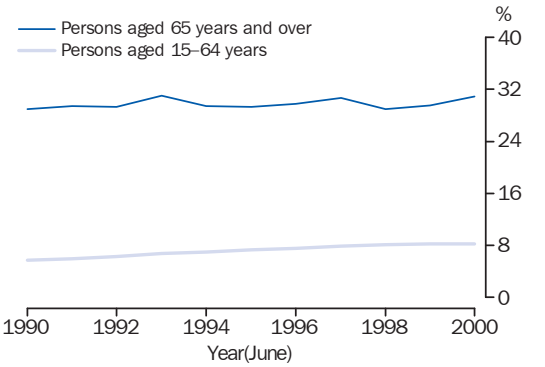
Marriage and divorce



(a) Marriages and divorces per 1,000 persons in the population.

Source: Australian Historical Population Statistics: Marriages and Divorces, Cat. no. 3105.0.65.001; Marriages and Divorces, Australia, 2000, Cat. no. 3310.0.

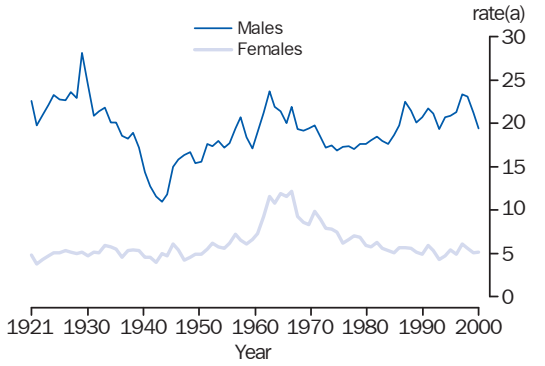
Persons living alone(a)



(a) Proportion living alone as a percentage of all people in the same age group.

Source: Data available on request, Labour Force Surveys.

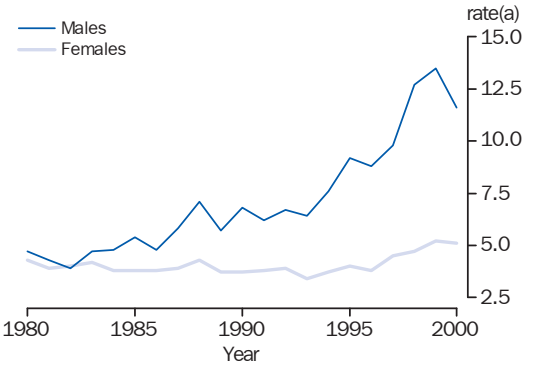
Suicide deaths(a)



(a) Age-standardised rate per 100,000 persons.[10]

Source: Suicides, Australia, 1921–1998, Cat. no. 3309.0; Deaths, Australia, 2000, Cat. no. 3302.0.

Drug-related deaths(a)[9]



(a) Age-standardised rate per 100,000 persons.[10]

Source: Data available on request, Causes of Death collection.

Further changes in the divorce rate occurred through the 1980s and 1990s. From 2.3 divorces per 1,000 people in 1987 there was a slow but continuous increase in the divorce rate, rising to a peak of 2.9 divorces per 1,000 people in 1996. In 2000, the crude divorce rate (2.6 divorces per 1,000 people) was lower than that in the preceding year (2.8 divorces per 1,000 people) and below the longer term peak recorded in 1996.

More people living alone and time spent alone also increasing

- Adults, of all ages, are increasingly more likely to live alone, which is partly a consequence of the changes just described. Between 1990 and 2000, the proportion of people aged 15–64 years who lived alone increased from 5.7% to 8.2%, and among those aged 65 years and over it increased from 29% to 31%.

- Partly associated with more people living alone, people are also more likely to spend 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, an increase of close to 2¾ hours per week. While the increases were greatest for people who lived alone, increases also occurred for people who lived with others. The increases occurred in most age groups, but were typically greater among men than women.[11]

Suicide rates have fluctuated, but drug-related death rates have increased since the 1980s

The suicide rate is a widely used indicator of social attachment.[12] The rate is particularly useful for looking at longer term trends because data are available for a long period. 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-related deaths is used as a measure of social attachment 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. Indeed the female rate was relatively low (between four and seven suicide deaths per 100,000 women) and stable through much of the century. The one exceptional period among females occurred through the mid to late 1960s when female suicide rates increased to between 11 and 12 deaths per 100,000 females. However, after that time, it gradually declined and by 1980 it had returned close to its pre-1960s level, at which it has remained with only relatively small annual variations. In 2000 the female suicide rate was 5.2 per 100,000 females.

  Among males, suicide rates reached both their highest and lowest levels in the first half of the century, with a peak in 1930 (28 suicide deaths per 100,000 males) during the time of the Great Depression and a pronounced low occurring during World War II (11 suicide deaths per 100,000 males in 1944). However, the rates for the war years are affected by the fact that troops serving overseas who committed suicide were excluded from the measure.[13]

  After World War II the next long term peak occurred in the early to mid 1960s (a little before the time when it was also relatively high for women). The peak year during that time was 1963 when there were 24 suicide deaths per 100,000 males. After falling to lows of around 17 and 18 suicide deaths per 100,000 males through much of the 1970s and early 1980s, the rates increased once more to a peak of 22.5 suicide deaths per 100,000 males in 1987; after some years of volatility in the rates, this was surpassed by a peak of 23.4 suicide deaths per 100,000 males in 1997.

  Despite a recent fall in the male suicide rate to 19.4 suicide deaths per 100,000 males in 2000, 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.

- Drug-related death rates are mostly due to the use of opiates such as heroin.[14] Like suicide, the drug-related death rate for females has been relatively low and stable over the last two decades, but for males the trend has been quite different. Starting at similar levels as for females in 1980 (about five 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 in 1999, falling to 12 deaths per 100,000 males in 2000.

  For females, on the other hand, the drug-related death rate at the end of the 20 year period was higher than at the beginning (4.3 and 5.1 per 100,000 females in 1980 and 2000, respectively). The increase among females has also largely occurred over the most recent years, with the rate having fallen during the intervening years to even lower levels than that recorded in 1980.

See also the commentaries *Crime, Health, Work, Culture and leisure,* and *Governance, democracy and citizenship*.

Endnotes — headline indicators

Health

1 Mathers, C. and Douglas, B. 1997, "Measuring Progress: is life getting better", in *Measuring Progress*, p.131, CSIRO Publishing, Melbourne.

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

3 Population Reference Bureau 2001, *World Population Data Sheet*, PRB, Washington D.C.

4 Australian Bureau of Statistics 2001, *Deaths Australia, 2000*, Cat. no. 3302.0, ABS, Canberra.

5 Australian Bureau of Statistics 2000, "Health — National Summary Tables", in *Australian Social Trends 2000*, Cat. no. 4102.0, ABS, Canberra; and de Looper, M. and Bhatia, K. 2001, *Australian Health Trends 2001*, AIHW Cat. no. PHE 24, AIHW, Canberra.

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

Education and training

1 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.

2 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.

3 There have been three major breaks in the series between 1990 to 2000. The breaks listed below are considered to have impacted mainly on the comparability of data relating to vocational education and training qualifications.

(a) In 1993 the ABS introduced a new method of classifying data relating to educational qualifications and level of course. More information can be found in Australian Bureau of Statistics 1993, *Classification of Qualifications (ABSCQ),* Cat. no. 1262.0, ABS, Canberra.

(b) In 1994 qualifications of nurses were treated separately, which resulted in some movement of data relating to level of qualification.

(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.

Further information can be found in the Explanatory Notes from Australian Bureau of Statistics 2000, *Transition from Education to Work, Australia, 2000*, Cat. no. 6227.0, ABS, Canberra.

4 Analysis of the 1997 Survey of Education and Training (which collected information about more than one non-school qualification) showed that almost 6% of persons aged 25–64 years 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, had both a Bachelor degree or higher level qualification and an Undergraduate or Associate Diploma or lower level non-school qualification.

5 Australian Bureau of Statistics 2001, "Coming to Australia", in *Australian Social Trends, 2001*, Cat. no. 4102.0, ABS, Canberra.

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

Work

1 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.

Biodiversity

1 The data were compiled from schedules to the Commonwealths acts, the *Endangered Species Protection Act 1993* and the *Environment Protection and Biodiversity Conservation Act 1999*. Species are listed (and so counted here) at the subspecies level. Not all listed species are included: cetaceans (whales and dolphins) and seabirds are excluded because their survival depends on factors outside Australia and Australian waters, while species found only on islands far offshore (such as Norfolk Island) are excluded because the indicator's focus is continental Australia. The extinctions data have been backcast to allow for recent knowledge (i.e. if a species was presumed extinct in 1993, but then rediscovered in 1997, it is not included here as extinct in 1993).

2 State of the Environment Committee 2002, *Australia — State of the Environment Report 2001*, CSIRO Publishing, Melbourne.

3 The Wilderness Society 1999, *Australia's Biodiversity — A Summary*. <URL: http://www.wilderness.org.au/members/tws/projects/General/biodivsum.html> last viewed 13 February 2002.

4 Saunders, D., Margules, C. and Hill, B. 1998, *Environmental Indicators for National State of the Environment Reporting — Biodiversity*, Department of the Environment, Canberra.

5 Environment Australia 2001, *Collective Australian Protected Area Database 2000,* Environment Australia,Canberra.<URL: http://www.ea.gov.au/parks/nrs/protarea/pa99/intro.html> last viewed 18 February 2002.

6 In October 2001 the NSW scientific committee determined the following six woodland species as vulnerable: Grey Crowned Babbler (eastern form), Hooded Robin (south-eastern form), Brown Treecreeper (eastern form), Black-chinned Honeyeater (eastern form), Speckled Warbler and Diamond Firetail. <URL: http://www.npws.nsw.gov.au/ news/tscdets/index.html> last viewed 18 February 2002.

7 AUSLIG (Australian Land Survey Information Group) 1993, *Land Tenure Map*.<URL: http://www.auslig.gov.au/ facts/tenure/index.htm> last viewed 14 February 2002.

8 Blamey, R. and Hatch, D. 1998, *Profiles and Motivations of Nature-based Tourists Visiting Australia*, Bureau of Tourism Research Occasional Paper No.2, BTR, Canberra.

Land clearance

1 State of the Environment Committee 2002, *Australia — State of the Environment Report 2001*, CSIRO Publishing, Melbourne.

2 National Land and Water Resources Audit 2001, *Australian Native Vegetation Assessment 2001*, National Land and Water Resources Audit, Canberra.

3 Department of the Environment, Sport and Territories 1996, *National Strategy for the Conservation of Australia's Biological Diversity*, DEST, Canberra.

4 Barson, M., Randall, L. and Bordas, V. 2000, *Land cover changes in Australia. Results of the Collaborative Bureau of Rural Sciences–State Agencies Project on Remote Sensing of Land Cover Change*, Bureau of Rural Sciences, Canberra.

5 National Parks and Wildlife Service NSW 2001, *Endangered Ecological Community Information: Cumberland Plain woodland*, National Parks and Wildlife Service NSW. <URL:http://www.npws.gov.au/wildlife/thr_profiles/Cumberland%20Plain%20Woodland.pdf> last viewed 18 February 2002.

6 Environment Australia 2001, *Collective Australian Protected Area Database 2000*, Environment Australia, Canberra. <URL: http://www.environment.gov.au/parks.nrs/protarea/pa99/index.html> last viewed 18 February 2002.

7 AUSLIG (Australian Land Survey Information Group) 1993, *Land Tenure Map* <URL: http://www.auslig.gov.au/facts/tenure/index.htm> last viewed 14 February 2002

8 Landcare Australia Homepage 2002, *The Dirt on Landcare* <URL: http://www.landcareaustralia.com.au/dirt> last viewed 18 February 2002.

9 Binning, C. And Young, M. 1999, *Talking to the Taxman about Nature Conservation*, Research Report 4/99, Environment Australia, Canberra.

Land degradation

1 National Land and Water Resources Audit (NLWRA) 2001, *Australian Dryland Salinity Assessment 2000*, NLWRA, Canberra. The NLWRA's salinity projections are based on a range of assumptions and data including an assumption of a continued rate of increase and no change to water balances.

2 National Land and Water Resources Audit (NLWRA) 2002, *Australians and Natural Resource Management 2001*, NLWRA, Canberra.

3 Dillon, B., Lewis, S., Holmes, A., McNamara, K., Burley, J., Hofman, H., Briggs, S., Lyon, P., Scott, A., Loan, L. and Saunders, D. 2001, *Implications of Salinity for Biodiversity Conservation and Management*, Task force report for ANZECC Standing Committee on Conservation.

Inland waters

1 The National Land and Water Resources Audit (NLWRA) has made estimates of the sustainable yield of Australian groundwater and surface water resources. It defines sustainable yield as the volume of water that can be extracted without affecting other users and the environment. These preliminary estimates were used in compiling the headline indicator data; additional scientific data and knowledge are required before the sustainable yields can be determined conclusively.

2 World Bank 2002, *2001 World Development Indicators*.<URL: http://www.worldbank.org/data/wdi2001/pdfs/tab3_5.pdf> last viewed 20 February 2002.

3 Gleick, P. 2000, *The World's Water 2000–2001*, The Biennial Report on Freshwater Resources, Island Press, Washington DC.

4 The National Land and Water Resources Audit 2001, *Australian Water Resources Assessment 2000*, National Land and Water Resources Audit, Canberra.

5 State of the Environment Committee 2002, *Australia — State of the Environment Report 2001*, CSIRO Publishing, Melbourne.

6 Australian Bureau of Statistics 2000, *Water Account for Australia 1993–94 to 1996–97*, Cat. no. 4610.0, ABS, Canberra.

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

8 Australian Bureau of Statistics 2001, *Australia's Environment: Issues and Trends*, Cat. no. 4613.0, ABS, Canberra.

9 Australian Bureau of Statistics 2001, *Australian System of National Accounts,* Cat. no. 5204.0, ABS, Canberra.

10 Murray–Darling Basin Commission (MDBC) 1999, *The Salinity Audit of the Murray–Darling Basin. A 100 year perspective*, MDBC, Canberra. (These forecasts are complex and should be treated cautiously.)

11 Land and Water Research Development Corporation (LWRDC) 1999, *Cost of Algal Blooms*. Submitted by the Atech Group to the LWRDC and the Murray–Darling Basin Commission, LWRDC Occasional Paper 26/99.

Air quality

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

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

3 Australian Bureau of Statistics 2001, *Australia's Environment: Issue and Trends*, Cat. no. 4613.0, ABS, Canberra.

4 Experts, such as those who wrote *Urban Air Pollution in Australia* (at 7 below) generally mention both smog and fine particles as the two forms of air pollution with the most serious impacts on health. But evidence is mounting that fine particles, in particular those less than 2.5 micrometres in diameter, are the most serious of all.

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

6 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 micrometres.* <URL: http://www.npi.gov.au> last viewed 7 March 2002.

7 Australian Academy of Technological Sciences and Engineering (AATSE) 1997, *Urban Air Pollution in Australia,* AATSE, Melbourne.

8 Cox, J. 2001, *Diesel Fleet Characteristics: Emissions Projections Update,* National Environment Protection Council, Adelaide.

9 Cohen, D. 1996, "Have fine particle lead concentrations fallen in Sydney during the last 4 years?", in (ed.) Smith, A. *Proceedings of the 13th International Clean Air and Environment Conference,* Clean Air Society of Australia and New Zealand, pp. 238–243.

10 Commonwealth Scientific and Industrial Research Organisation (CSIRO) 2000, *Urban and Regional Air Pollution: Information sheet*, <URL: http://www.dar.csiro.au/info/material/airpoll.htm> last viewed 8 March 2002.

Greenhouse gases

1 CO_2 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 Turton, H. and Hamilton, C. 2001, *Comprehensive Emissions per capita for Industrialised Countries,* The Australia Institute, Canberra.

3 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.

4 Australian Bureau of Statistics 2001, *Australia's Environment: Issues and Trends,* Cat. no. 4613.0, ABS, Canberra.

5 World Meteorological Organization, *WMO Statement on the Status of the Global Climate in 2000,* <URL: http://www.wmo.ch/web/Press/Press657.html> last viewed 21 February 2002.

6 Commonwealth Scientific and Industrial Research Organisation 2001, *Climate Change: Impacts for Australia,* Marine Research Organisation, Hobart. <URL: http://www.marine.csiro.au/iawg/impacts2001.pdf> last viewed 21 February 2002.

7 United Nations 2001, *Climate Change.* <URL: http://www.un.org/cyberschoolbus/briefing/climate/climate.pdf> last viewed 21 February 2002.

8 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.

9 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.

10 Bureau of Meteorology 2000, *Australian Annual Mean Temperature Anomalies*, <URL: http://www.bom.gov.au/climate/change/amtemp.shtml> last viewed 22 February 2002.

11 Australian Bureau of Statistics 2001, *Energy and Greenhouse Gas Emission Accounts 1992–93 to 1997–98*, Cat. no. 4604.0, ABS, Canberra.

12 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.

National wealth

1 All data in this commentary are derived from Australian Bureau of Statistics 2001, *Australian System of National Accounts 2000–01*, Cat. no. 5204.0, ABS, Canberra.

National income

1 Unless otherwise indicated, all data in this commentary are derived from Australian Bureau of Statistics 2001, *Australian System of National Accounts 2000–01*, Cat. no. 5204.0, ABS, Canberra.

2 Australian Bureau of Statistics 2001, *Australian National Accounts: State Accounts 2000–01*, Cat. no. 5220.0, ABS, Canberra.

Economic disadvantage and inequality

1 The equivalence scale used to obtain equivalised incomes is that used in studies by the Organisation for Economic Co-operation and Development (OECD) that is referred to as the 'modified OECD scale'. This is among the most widely favoured by experts in the field. The scale gives a weight of 1.0 to the first adult in the household, and for each additional adult (persons aged 15 years and over) a weight of 0.5, and for each child a weight of 0.3. By weighting individuals within households the resultant income measures take account of the different needs of households of different size and composition. The scale recognises that there are economic advantages associated with living with others. These advantages (technically known as 'economies of size') occur because household resources, especially housing, can be shared. Where sharing takes place the expenditures per person do not need to be as high as when goods and services are not shared with others, as is the case when living alone.

2 Households in the lowest income decile mostly recorded incomes (in ABS income surveys) below that which can be provided through income support payments available from the social security system. Households may have income below levels provided by the social security safety net for various reasons. These include a recent, and possibly temporary, change in household circumstances so that households may not have applied for any income support payment, or because households otherwise failed the eligibility criteria for a pension or benefit. They may, for example, have substantial levels of assets or they may have recorded a net loss in the taxable income generated by their business.

The value of goods and services consumed by such households (sometimes supported by borrowings or the sale of assets) is often as high or higher than that of households in slightly higher income groups. If households with very low recorded incomes had been included this would have substantially lowered the average income values in a way that gave a misleading impression of the economic wellbeing of the most disadvantaged households.

3 For information about the reasons for the review of data available from the 1999–2000 and 2000–01 Surveys of Income and Housing Costs, refer to the article on data quality issues in these surveys published in Australian Bureau of Statistics 2002, *Australian Economic Indicators, April 2002*, Cat. no. 1350.0, ABS, Canberra.

Housing

1 Results published from the 1994 National Housing Survey (see Australian Bureau of Statistics 1995, *Housing characteristics, costs and conditions, 1994,* Cat. no. 4162.0, ABS, Canberra) showed that 86% of households were satisfied with their dwelling, 12% were neither satisfied or dissatisfied and only a small proportion (about 3%) were dissatisfied.

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 The equivalence scale used to obtain equivalised incomes is the same as that used for the income indicators presented in the commentary *Economic disadvantage and inequality*. For further details see Endnote 2 of that section.

4 Increasingly, the norm in Australia is to give all children their own bedroom, regardless of age or sex. And in older households, rooms that were once bedrooms (and still contain a bed) are often used for other purposes (e.g. computer rooms, studies), despite still being reported as bedrooms in censuses or surveys. At a more fundamental level, the standard only addresses suitability in relation to sleeping arrangements. It does not necessarily provide insight into general housing standards, which might also take account of the size of bedrooms, or the number and size of other rooms in a dwelling.

5 Australian Bureau of Statistics 2000, "Housing in remote Aboriginal and Torres Strait Islander communties", in *Australian Social Trends, 2000*, Cat. no. 4102.0, ABS, Canberra.

6 See Australian Bureau of Statistics 2001, "Aboriginal and Torres Strait Islander housing in non-remote areas", in *Australian Social Trends, 2001,* Cat. no. 4102.0, ABS, Canberra; and Australian Bureau of Statistics 2001, *Australian Housing Survey: Aboriginal and Torres Strait Islander Results*, Cat. no. 4712.0, ABS, Canberra.

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

Crime

1 See, for example, Walker J. 1992, "Estimates of the Costs of Crime in Australia", in *Trends and Issues in Crime and Criminal Justice*, No. 39, 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) 2002, *Report on Government Services 2002,* Vol. 1. Ausinfo, Canberra.

2 See Australian Bureau of Statistics 1999, *Crime and Safety, Australia, 1998*, Cat. no. 4509.0, ABS, Canberra for further details of differences in levels of reporting crimes to police according to types of offence.

3 The rate of murder and manslaughter offences recorded in national police statistics fluctuated between 1.8 and 2.0 per 100,000 persons between 1993 and 2000 with no apparent trend. See Australian Bureau of Statistics 2001, *Recorded Crime, Australia, 2000,* Cat. no. 4510.0, ABS, Canberra.

4 Weatherburn D., 2001 *What causes crime?* (Crime and Justice Bulletin B54) at <URL: http://www.lawlink.nsw.gov.au> last viewed 20 February 2002.

5 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.

Social attachment

1 Berger-Shmitt, 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) 2000, *Human and Social Capital and Sustained Growth and Development. Reconciling New Economies and Societies: The Role of Human and Social Capital.* DEELSA/ELSA/ED/CERI/CD(2000)3/REV1, OECD, Paris.

3 Australian Bureau of Statistics 1999, *Sports Attendance, 1999,* Cat. no. 4174.0, ABS, Canberra.

4 Australian Bureau of Statistics 2001, *Voluntary Work, 2000,* Cat. no. 4441.0, ABS, Canberra.

5 Australian Bureau of Statistics 2000, "People without partners", pp. 43–46 in *Australian Social Trends, 2000*, Cat. no. 4102.0, ABS, Canberra.

6 Chamberlain C. 1999, *Counting the homeless: implications for policy development,* Cat. no. 2041.0, ABS, Canberra.

7 Consilium Group 1998, *Estimating the number of homeless people in Australia*, FaCS, Canberra.

8 Australian Institute of Health and Welfare (AIHW) 2001, *SAAP National Data Collection Annual Report 2000-01 Australia.* AIHW Cat. no. HOU61, AIHW (SAAP NDCA Report, Series 6), Canberra.

9 Drug-related 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-related deaths from these different classifications have been matched to facilitate comparisons over time.

In this article, drug-related deaths include the following categories from the ICD–10:

- suicide by drugs (X60–X64);
- accidental drug-related deaths, which include two components: accidental poisoning by drugs (X40–X44) and mental and behavioral disorders due to drug use (F11–F16, F19 & F55); and
- drug deaths where the intent of the poisoning was undetermined (Y10–Y14).

10 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 1991 total population.

11 Australian Bureau of Statistics 1999, "Spending time alone", pp. 35–38 in *Australian Social Trends, 1999*, Cat. no. 4102.0, ABS, Canberra.

12 OECD 2001, *Society at a Glance: OECD Social Indicators*, OECD, Paris.

13 Australian Bureau of Statistics 1997, *Australian Demographic Trends, 1997,* Cat. no. 3102.0, ABS, Canberra.

14 For further analysis, see ABS 2001, "Drug-related deaths", pp. 71–74 in *Australian Social Trends, 2001*,Cat. no. 4102.0, ABS, Canberra.

The supplementary commentaries

Supplementary commentaries

The supplementary commentaries that follow include a variety of additional information and indicators necessary for a better understanding of Australia's progress. Again they are arranged according to whether they broadly relate to human, natural, produced and financial, or social capital. Some commentaries (those labelled *Looking more closely*) provide further information about headline dimensions of progress. Others discuss new dimensions of progress, not felt quite important enough to rank among the 15 headline dimensions.

Human capital

Commentaries look more closely at *Health*, *Education and training,* and *Work*.

Natural capital

Commentaries look more closely at *Biodiversity*, *Inland waters*, and *Atmosphere*. The commentary on *Land use* in Australia provides further information about the land beyond that given in the headline dimensions *Land: Land clearance* and *Land: Land degradation*. Three new dimensions are also included: *Marine ecosystems*, *Invasive species,* and *Waste.*

Produced and financial capital

Commentaries look more closely at *National wealth*, *National income* and *Economic disadvantage and inequality*. Several other new dimensions of progress are covered here that are important to understanding the workings of the Australian economy. There are commentaries and indicators that assess progress in dimensions of *Consumption*, *Saving*, *Inflation*, *Productivity*, *Capital formation*, *Knowledge and innovation, Competitiveness,* and *Openness*. How these dimensions fit together, and relate to the two headline indicators, is discussed in the box opposite.

Social capital

A commentary looks more closely at *Crime* and another discusses *Communication and transport*. Two short commentaries discuss the areas of *Culture and leisure* and *Governance, democracy and citizenship,* although no data are presented for these two dimensions.

How the economic indicators fit together

Two headline indicators, *National income* and *National wealth*, encapsulate key aspects of progress.

Part of national income may be used to acquire goods and services for *Consumption* today. Part may be set aside as *Saving* for future consumption. According to one view of economic progress, a country's material living standard has improved if its residents are today enjoying a higher level of consumption than yesterday (while leaving intact the wealth that will generate future income), or have accumulated additional wealth through saving (while enjoying the same level of consumption today), or both. Some assets (such as owner-occupied housing) may provide consumption services directly to their owners. Some (such as minerals and timber) may be transformed into goods and services that can be consumed or may otherwise generate income at the time of their extraction or harvest. Some (such as machinery) may be used along with labour to support the production processes. And some (such as Australians' equity in foreign businesses or loans to foreigners) may return flows of dividend or interest income to Australia. Regardless of their particular characteristics, all the assets that constitute national wealth can generate future national income and hence support future consumption. The pace of *Inflation* affects decisions about consumption, saving and investment — it is generally accepted that high rates of inflation can have a detrimental effect on individual and national economic wellbeing.

A strong influence on national income is the production of goods and services. Production can increase if the factors of production — capital, labour and so on — are built up or are used more effectively. Investment builds up stocks of capital (in national accounting terminology, this is the process of *Capital formation*). An important contributor to building up the stock of labour is education and training which enhance the skills of the labour force (the creation of 'human capital').

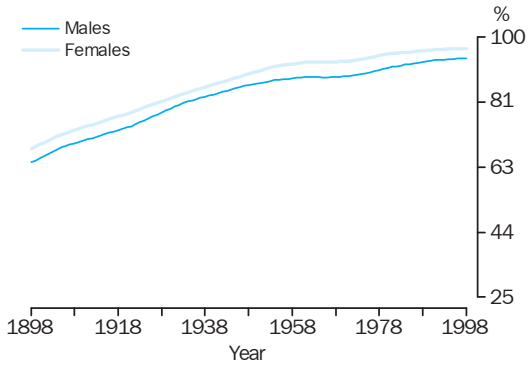
Effective use of the nation's factors of production has two aspects. The first is *Productivity* — the volume of goods and services that can be produced using, say, a given amount of labour and capital. The second is the degree to which available factors are being used or left idle — encapsulated for labour in the employment and unemployment rates and other labour indicators; and for capital it might be encapsulated in capacity utilisation rates. *Knowledge and innovation* can also enhance a country's productive potential, e.g. the creation and transmission of knowledge builds up human capital; new machines and other fixed capital may contain innovations; new or improved production processes may lead to novel goods and services or to more efficient production of traditional goods and services.

Australia's economic relations with other nations are also important. Increased *Openness* of a nation's economy means that a wider range of goods and services are available to its residents. Imported capital goods may embody new technologies or other innovations, enhancing Australia's productive potential. The extent of foreign ownership is also a part of openness. Foreign investment may provide access to expertise and processes not otherwise available to Australia.

Australia's *Competitiveness* affects our international trade, and hence our national production and income. A fall in competitiveness would imply that our goods and services have difficulty finding buyers in domestic and foreign markets — so the incomes of Australian workers and businesses may fall. One fundamental influence on a country's competitiveness in the long run is the rate of productivity improvement relative to other countries.

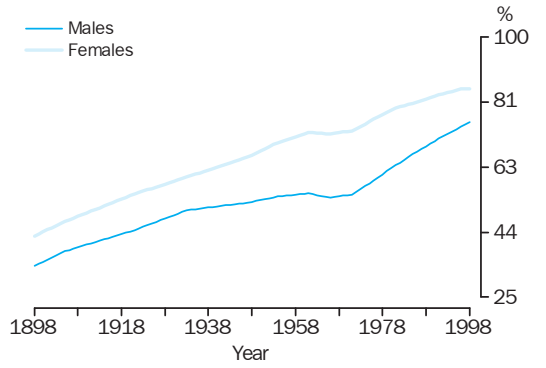
Health: Looking more closely

Proportion of people surviving to age 50



Source: Deaths Australia (various), Cat. no. 3302.0.

Proportion of people surviving to age 70



Source: Deaths Australia (various), Cat. no. 3302.0.

The headline indicator discusses life expectancy. This supplementary commentary examines health in more detail. It begins by considering the changing proportion of the population that are surviving to ages 50 and 70. Causes of death and the health of Australia's Indigenous people are examined, as is infant mortality. The overall burden of disease in Australia and people's lifestyles are also discussed.

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 50 and 70 increased dramatically.

In the late 1890s only about 64% of men and 68% of women lived to be 50 years old. At the end of the 1990s these figures stood at 94% and 97% 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 70. At the end of the nineteenth century only 34% of men and less than 43% of women reached their seventieth birthday. By the end of the 1990s these figures stood at 76% and 85% respectively. Improvement was relatively steady over the period, except during the 1960s when the increase in conditions such as lung cancer and 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 18 percentage points in 1970 to fewer than 10 in 1998).

In 2000 death rates were higher for men than for women in all age groups. Women are thought to have a genetic advantage which makes them more resistant to a range of conditions.[2] The remaining differences are attributed to different behavioural and lifestyle patterns of men and women. Women, for example, are less likely to be overweight or to smoke (although the proportions of women smoking, particularly young women, are still increasing, whereas they have been declining for men for some years).[3] 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.

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 1990 and 2000, death rates from cancer declined by 11% for men and 9% for women, and from heart disease they declined by 40% for men and 39% for women.

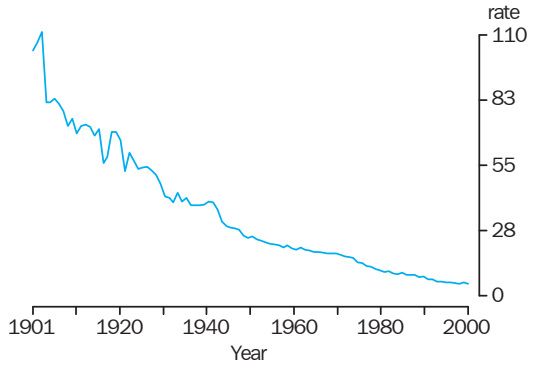
Leading causes of death — 2000

Cause of death	*Males* rate(a)	*Females* rate(a)	*Male to female ratio*
Malignant neoplasms (cancers)	212	128	1.7
Ischaemic heart disease	150	84	2
Cerebrovascular diseases (e.g. strokes)	54	48	1.1
Chronic lower respiratory diseases	38	19	2.0
Accidents	35	16	2

(a) Standardised death rate per 100,000 population.

Source: Deaths Australia, 2000.[4]

Infant mortality rate(a)



(a) The number of deaths of children under one year of age per 1,000 live births

Source: Australian Demographic Trends 1997, Cat. no. 3102.0; Deaths Australia, 2000.[4]

Infant mortality

The decline in infant mortality has been 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 2000 this figure was around five babies per thousand. 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.

Aboriginal and Torres Strait Islander peoples

The commentary for the headline indicator described the 20 year gap between life expectancy of Australia's Aboriginal and Torres Strait Islander peoples and that of the general population. Indigenous death rates in 2000 were more than double those of the non-Indigenous population.[4]

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 also smoke more;[3] and while many are less likely to drink alcohol that other Australians, those who do are likely to consume it at hazardous levels.[5] Indigenous Australians have high rates of infectious disease, obesity, diabetes, heart disease, kidney disease and cancer. They also experience high rates of injury and death from accidents and violence.[4]

Indigenous infant mortality declined during the 1990s,[3] as did infant mortality for the general population. The Indigenous rate, estimated at around 14 deaths per 1,000 live births in 2000,[4] is close to three times that of the general population (five deaths per 1,000 live births), and is similar to the level experienced by the non-Indigenous population in the mid 1970s.[3]

Burden of disease(a), Australia — 1996

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

(a) For nine major disease groups, health conditions or injury.

Source: Australian Institute of Health and Welfare 1999, Burden of Disease and Injury in Australia.[6]

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).[6]

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.

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 65 from causes attributable to alcohol and tobacco. But the number of illicit drug deaths increased by a third over the period.

Smoking is recognised as the single most preventable cause of death in Australia. There was little change in the proportion of people who smoked regularly (every day or most days) from 1991 (23%) to 1998 (22%).[7] However, the proportion of adults claiming never to have smoked rose from 23% to 34% over the period.

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.[6] The proportions of people undertaking sufficient physical activity (which AIHW defines as at least 150 minutes a week of walking, moderate activity or vigorous activity (weighted by two)) varied according to age and educational attainment in 1999. Only 50% of those aged 45–59 took sufficient exercise, compared to almost 69% of 18–29 year olds. Data for the period 1989–90 to 1995 suggest a small increase in the proportion of adults engaged in physical activity.[3]

Being overweight is closely related to lack of exercise and diet. Between 1980 and 1995 the proportions of overweight and obese Australians aged 25–64 in capital cities and urban areas increased from 27% to 43% for women and from 48% to 63% for men. In 1996 some 56% of Australians over the age of 18 were overweight or obese. In 1996 problems associated with being overweight or obese accounted for 4% of the total burden of disease in Australia.

Unless otherwise noted, all data are cited in *The National Health Performance Framework Report*.[7]

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.[8] 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).

Disability-free life expectancy

The data for burden of disease have been produced only for 1996. A simpler measure, which combines information on mortality and disability, is available over a long time period. This measure describes the average number of years for which a person might expect to live free from disability, and can be contrasted with the life expectancy measure to indicate the average years of life that a person could expect to live with a disability.

In 1988, disability-free life expectancy at birth was about 58 years for men and 63 years for women. Despite improvements in overall life expectancy over the following decade (by almost three years for men and two years for women, between 1988 and 1998) disability-free life expectancy at birth did not show any signs of improvement, remaining close to the levels recorded in 1988. It therefore appears that recent improvements in life expectancy have not been accompanied by similar improvements in reducing the burden of disability. This assessment is affected by a number of factors, including the increased identification of people with disabilities.[3]

Education and training: Looking more closely

Educational attainment and participation differ substantially among various population subgroups. This commentary looks more closely at some of the differences and how they have changed over time. Levels and trends are examined for people in different age groups, males and females, migrants, Indigenous Australians, and for the States and Territories.

Age group differences

People are most likely to undertake their initial vocational or higher education qualification during their late teens and early twenties. This is evident when comparing education participation rates of people in the 15–24 year age group to subsequent age groups. In 2000, 56% of people aged 15–24 years were attending an educational institution, compared to 12% in the 25–34 year age group and yet lower proportions in older age groups.

Partly reflecting ongoing increases in levels of participation in education among younger age groups, the proportion of people with a non-school qualification was highest for those aged 25–34 years (54%) in 2000. Between 1990 and 2000, the proportion of people with a non-school education qualification increased for all age groups.

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 years. Between 1990 and 2000, the proportion of people in this age group participating at 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 females.[1] The differences between males and females in regard to educational attainment have become less pronounced. In 2000, a higher proportion of females in the 15–24 age group had non-school qualifications compared to males of the same age group. However, in the 25–64 age group, males continue to have a higher proportion with a non-school qualification, the difference increasing with age.

Between 1990 and 2000, the proportion of females aged 25–64 years with a vocational or higher education qualification increased from 37% to 44%, but for males the proportion only increased from 54% to 55%. These changes are more pronounced among younger age groups, particularly in regard to the attainment of higher education qualifications. In 2000, the proportion of females aged 25–34 years with a higher education qualification exceeded that of males (25% and 20% respectively), whereas a decade earlier the reverse was the case (10% of females and 13% of males).

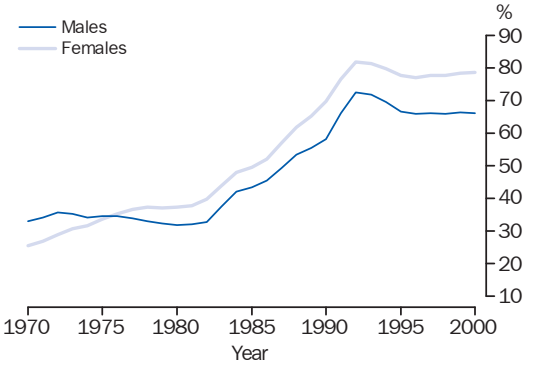
Increasing female participation in senior secondary school and tertiary education is also evident. Since the mid 1970s, females have been more likely than males to continue through secondary school to the uppermost level of schooling, as indicated by Year 7/8 to Year 12 apparent retention rates.[2] This difference between males and females has continued to grow. In 2000, the Year 12 apparent retention rate for females was 79% compared to 66% for males. The increasing difference in participation and achievement levels of males and females in the younger age groups, in particular in the school system, has recently given rise to concerns about male success in education.[3]

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

	Education participation rate		*Persons with a vocational or higher education qualification*	
	1990	2000	1990	2000
	%	%	%	%
Age group (years)	45.5	56.0	21.1	22.4
25–34	9.5	12.4	49.8	54.0
35–44	7.2	8.1	49.9	52.0
45–54	3.7	5.3	42.9	48.9
55–64	1.5	1.9	33.2	38.6
Total 25–64	*6.2*	*7.6*	*45.6*	*49.5*
Total 15–64	**15.7**	**17.8**	**39.7**	**43.8**

Source: Data available on request, Surveys of Transition from Education to Work.

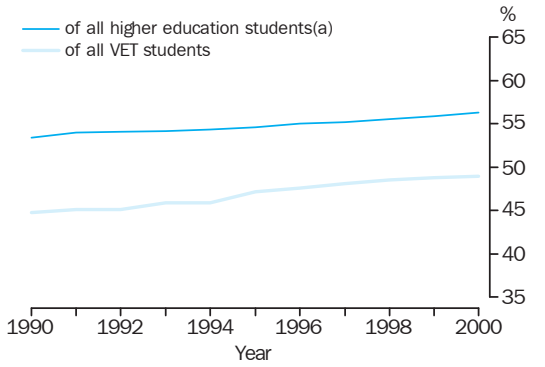
Year 7/8 to Year 12 apparent retention rate(a)[2]



(a) Refers to full-time students only.

Source: Data available on request, National Schools Statistics Collection; Schools, Australia, 2000, Cat. no. 4221.0.

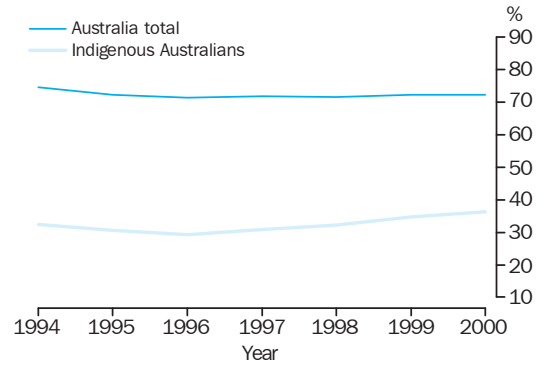
Female students as a proportion of all students



(a) Excludes overseas students.

Source: DEST 2000, Higher Education Students Time Series Tables, Selected Higher Education Student Statistics; NCVER 1998, 1999 and 2000, Australian VET Statistics: In detail.

Year 7/8 to Year 12 apparent retention rate(a)[2]



(a) Refers to full-time students only.

Source: MCEETYA. 2001, National Report on Schooling in Australia, 1999; Schools, Australia, 2001, Cat. no. 4221.0.

The representation of females in both the vocational education and training (VET) and higher education sectors has also increased over time. Females have outnumbered males in higher education throughout the 1990s, with the proportion of all students who were female rising from 53% in 1990 to 56% in 2000. In the VET sector, female students are yet to surpass male students, but the female proportion increased from 45% to 49% over the decade.

Migrants

Surveys conducted over recent decades have consistently shown that a higher proportion of Australia's overseas born population had a non-school qualification compared to the Australian born population.[4]

Levels of educational attainment have also generally increased among successive waves of migrants. Data from the ABS's 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 non-school 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.[5]

Aboriginal and Torres Strait Islander peoples

Levels of educational participation and attainment among Indigenous Australians remain well below those of non-Indigenous Australians, but there have been some increases over time. Data from the 1991 and 1996 Censuses of Population and Housing (2001 Census data are not yet available) showed that the proportion of Indigenous Australians aged 25–64 years with a vocational or higher education qualification increased from 10% to 14% between 1991 and 1996. The proportion with a Bachelor degree or above increased from 1% to 3% over the same period.[6]

Among Indigenous Australians aged 15–19 years, the 1996 Census data reveal a relatively low rate of participation in education (46%), which was similar to the proportion in 1991 (47%).

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, suggest that an increasing proportion of Indigenous Australians are progressing through to the highest level of secondary school. Between 1994 and 2000 the Year 12 apparent retention rate for Indigenous students increased from 33% to 36%. However, some of the increase may be affected by the increased tendency of some Australians to identify as Indigenous.[7]

State/Territory differences

The differences across the States and Territories in the proportion of persons aged 25–64 years whose highest level of educational attainment was a vocational qualification are relatively small (ranging between 30% and 34% in 2000). However, the proportions of persons with higher education qualifications differ more substantially, ranging from 33% in the Australian Capital Territory to 13% 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.

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 2000 (87%) while the Northern Territory had the

Highest level of educational attainment, people aged 25–64 years — 2000

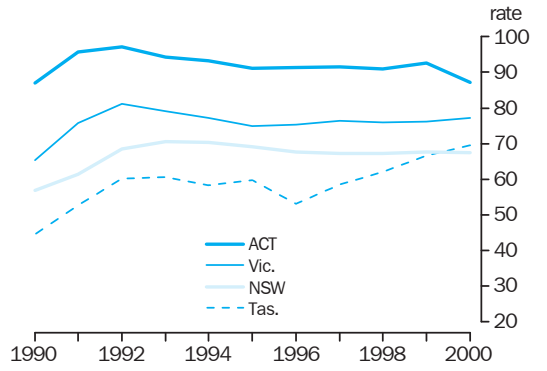
State	*Vocational qualification* %	*Higher education qualification* %	*Vocational or higher education qualification* %
NSW	32.4	19.8	52.2
Vic.	29.5	19.7	49.3
Qld	31.7	14.7	46.4
SA	30.3	14.7	45.0
WA	33.0	16.5	49.4
Tas.	30.1	13.2	43.4
NT	33.7	17.4	51.0
ACT	30.4	32.6	63.0
Australia	**31.4**	**18.1**	**49.5**

Source: Data available in request, Survey of Transition from Education to Work, 2000.

lowest (50%). 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 45% in 1990 to 70% in 2000.

Aside from students taking up options other than completing school education (such as vocational education and training, or employment), the greater fall in apparent retention rates seen in some States earlier in the decade, particularly South Australia, may be related to increasing numbers of students opting to complete upper levels of secondary school on a part-time basis.[8] Part-time students are excluded from the calculation of the Year 7/8 to Year 12 apparent retention rates.

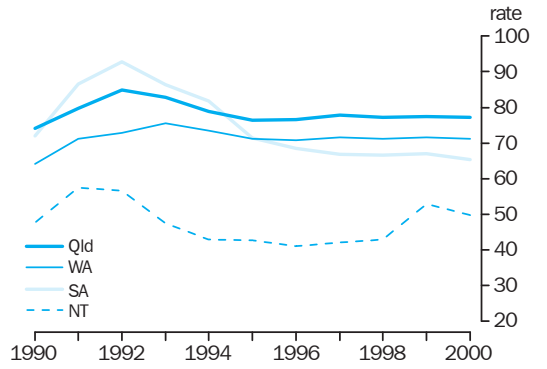
Year 7 to Year 12 apparent retention rate, States/Territories in which secondary school commences in Year 7(a)[2]



(a) Refers to full-time students only.

Source: Schools, Australia, 1995 and 2000, Cat. no. 4221.0.

Year 8 to Year 12 apparent retention rate, States/Territories in which secondary school commences in Year 8(a)[2]



(a) Refers to full-time students only.

Source: Schools, Australia, 1995 and 2000, Cat. no. 4221.0.

Work: Looking more closely

The headline commentary focussed on changes in levels of labour underutilisation. This commentary looks more closely at differences in levels of labour force participation and underutilisation among selected population groups, as well as some of the changes that have occurred in employment arrangements.

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, the increase in working hours and the general rise in unemployment. The impact of these changes has not been uniform across the various subgroups within the population.

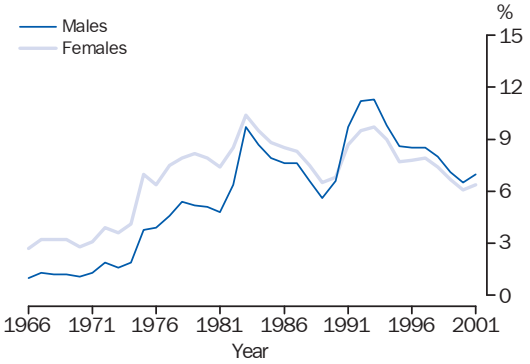
Male/female differences

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. The labour force participation rate for women increased from 46% in 1985 to 54% in 1995 and 55% in 2001. In contrast, the participation rate for men decreased from 76% in 1985 to 74% in 1995 and 72% in 2001.

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, whereas in previous decades they had been higher. Women accounted for 44% of total employment in 2001, compared with 38% in 1985.

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 2001). Although most of the workers in part-time employment prefer part-time work to full-time work, 5.3% of female part-time workers and 13.4% of male part-time workers preferred to work full-time and were actively looking for full-time work in August 2001.

Unemployment rates, by sex



Source: Data available on request, Labour Force Surveys.

Unpaid work

Although this section focuses on people in or seeking paid employment, a great deal of the work done in Australia is done outside the market economy as unpaid work. 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 $261b, 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%).

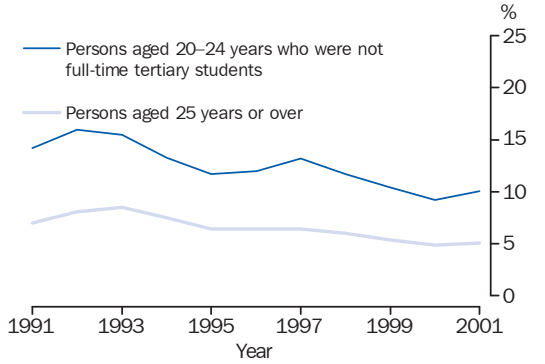
While there was an increase in the number of unpaid hours worked between 1992 and 1997 (up by 0.4 billion hours), the value of unpaid work relative to the GDP declined (down from 52% of GDP in 1992). The decline was partly due to the rapid increase in demand for labour in the market economy, so that 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, may have also had some effect on the value of unpaid work.

Differences according to life cycle stage — unemployment among younger people

Levels of involvement in the paid workforce vary through life cycle stages, initially increasing with age as young people move from education and training (often combined with part-time work) into full-time jobs, then remaining relatively high during prime working ages, and then declining towards the years of retirement. Participation in the labour force is interrupted for many women as they take time out to raise young families. However, the patterns of labour force participation of women are increasingly becoming more like those of men.[2]

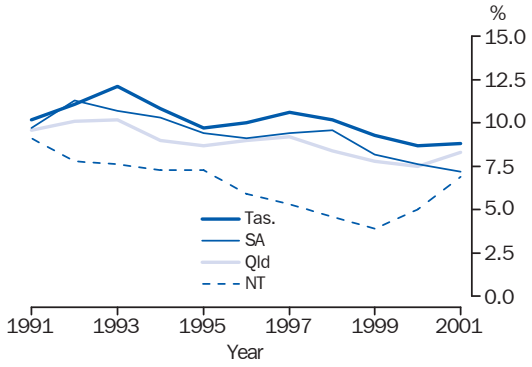
The likelihood of being unemployed is also partly related to life cycle stages. In particular, the unemployment rate tends to be highest among youth (i.e. those aged 15–24 years), who typically have less developed work-related skills than older

Unemployment rates, by age group and education status



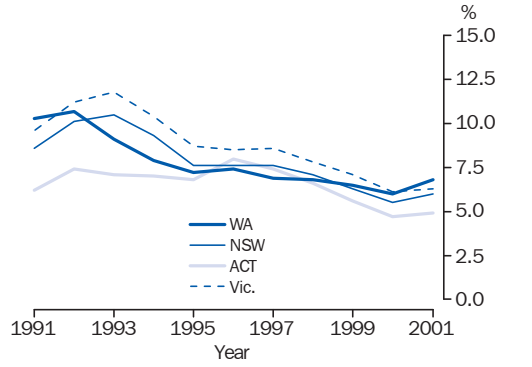
Source: Data available on request, Labour Force Surveys.

Unemployment rates, States and Territories with the highest rates in 2001



Source: Data available on request, Labour Force Surveys.

Unemployment rates, States and Territories with the lowest rates in 2001



Source: Data available on request, Labour Force Surveys.

people. Many young people are studying full-time, preparing for future employment, and some of these are also looking for part-time or full-time work. The difficulties that many young adults can have in finding paid work are highlighted by comparing the unemployment rates of those aged 20–24 years who were not full-time tertiary education students with those for people aged 25 years and over (10.1% and 5.1% respectively in 2001). These differences were apparent throughout the 1990s, with the unemployment rate for those aged 20–24 years who were not full-time tertiary education students being approximately twice that of people aged 25 years and over.

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 1996 Census of Population and Housing showed that the labour force participation rate among Indigenous people at that time was 53% (compared to 62% for non-Indigenous people) and that the unemployment rate for Indigenous people was 23% (compared to 9% for non-Indigenous people). Experimental estimates of Indigenous employment and unemployment since 1996 suggest that the unemployment rate among Indigenous Australians remains more than twice the rate for non-Indigenous Australians, and the Indigenous labour force participation rate remains substantially below that for Australia as a whole.[3]

Differences according to place

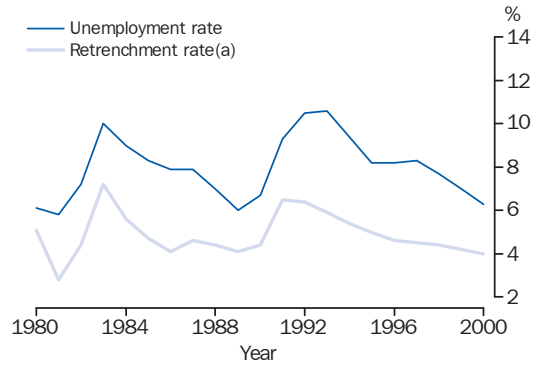
Opportunities for work vary across Australia with the nature and strength of the economic base and the relative growth of industries from place to place. This may reflect the fact that some places have been more adversely affected than others by restructuring within the economy, and in particular the move away from traditional manufacturing to service industries. Other factors, including the population's age composition and growth, and the occupation and skill base of residents, can influence regional differences.[4]

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 2001, the States with the highest annual average unemployment rates were Tasmania, South Australia, Queensland and the Northern Territory.

Job security

People's feelings of job security are thought to be closely linked to changes in the level of unemployment.[5] This may be a consequence of people seeing other employees being retrenched or made redundant. As might be expected, the retrenchment rate moves similarly to the unemployment rate through each economic cycle and has generally declined through the mid to late 1990s. In the 12 months from March 1999 to

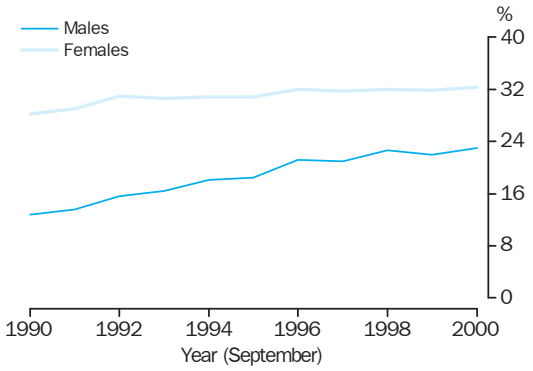
Unemployment and retrenchment rates



(a) Persons 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.

Source: Labour Mobility, Australia, February 1980 to February 2000, Cat. no. 6209.0; Labour Force Australia Cat. no. 6203.0.

Casual employees(a)



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

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

February 2000, some 384,600 people had been retrenched or made redundant. This number represented 4.0% 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 through the 1980s following the recession in the earlier part of that decade.

Casual employment

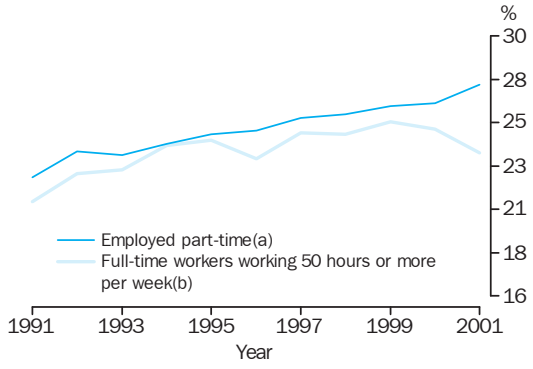
There has been strong growth in casual employment over the last two decades. Casual employees are those who are entitled to neither paid holiday leave nor paid sick leave.[6] The proportion of male employees who are casual employees has almost doubled, increasing from 13% in 1990 to 23% in 2000. Over the same period, the proportion of female casual employees increased from 28% to 32%. These changes, which occurred in association with rapid growth in employment in service industries, can be viewed by many employers and employees as beneficial. For example, for people employed in such jobs, often women and younger people, the flexibility associated with such arrangements may suit their particular needs. But the extent to which people's preferences for alternative work arrangements are not being satisfied also needs to be considered.

Hours worked

There has been a trend away from full-time hours confined to daytime weekday hours towards more diverse arrangements.[7] The increased availability of part-time work has provided flexibility for people to balance work with family responsibilities, participation in education, or transition to retirement. The proportion of employed people working part-time increased from 22% in 1991 to 27% in 2001. But not all part-time workers are working their preferred number of hours, with one in four part-time workers (26%) preferring to work more hours in August 2001. This compares with 13% of part-time workers who preferred to work more hours in August 1981 and 24% in August 1991.

The average number of hours worked by full-time workers, and the proportion of full-time workers who work long hours, have also increased in recent decades. Average hours worked by full-time workers in August 1991 stood at 41.1 hours, compared with 42.6 hours in August 1995 and 42.3 hours in August 2001. The proportion of full-time workers who worked 50 hours or more increased between 1991 and 2001, from 21.1% to 23.7%, while the proportion of full-time workers who worked very long hours (60 hours or more), increased from 10.8% to 11.3% over that same period.

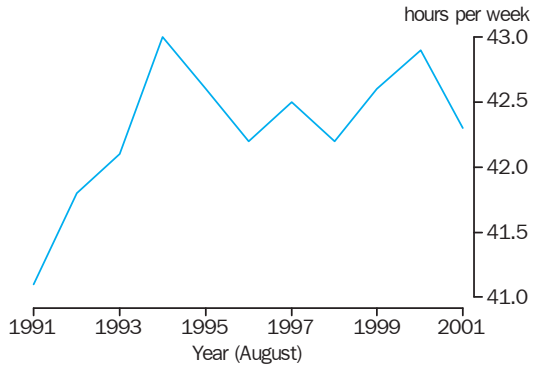
People in part-time jobs and jobs with longer hours



(a) An annual average of people employed in part-time jobs (i.e. working less than 35 hours per week) as a percentage of all employed people. (b) An annual average of all people in full-time jobs only.

Source: Data available on request, Labour Force Surveys.

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



(a) An average of aggregated hours actually worked, including overtime, by full time workers during the survey reference week divided by the number of full-time workers for August of each year.

Source: Data available on request, Labour Force Surveys.

Biodiversity: Looking more closely

The headline commentary focuses on threatened birds and mammals in Australia. This commentary explores other, wider aspects of biodiversity and some of the key pressures on it. The commentary looks in more detail at Australia's mammalian extinctions, and four case studies of endangered species illustrate how human activities can affect biodiversity.

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.[1]

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 below 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.[2] 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.[2] 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.[2] 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.[6]

Australia's botanical diversity

With over 15,500 species, Australia has more native higher plants (mainly flowering plants,)[3] than all of Europe (which has 12,500 species),[4] and Queensland and Western Australia each contain around 7,500 native species.[3] 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.[5]

Pressures on biodiversity

Change, such as evolution, 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.[7] 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.

Some of the threats to biodiversity are discussed elsewhere in this publication. Headline indicators of land clearance, 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.

Numbers of species in selected countries(a)

	Mammals			*Birds*			*Reptiles*		
Country	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
USA	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.

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.[8]

Invasive species, marine ecosystems and land use are also discussed in supplementary commentaries. Another factor, discussed in the box above, is changes to the patterns of fire.

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 at the end of 2001.

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 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.

Many endangered species face more than one threat. The box opposite looks in more detail at four of Australia's endangered animals, and discusses why they are assessed by the Commonwealth Government as threatened and what is being done to protect them.

Gilbert's Potoroo

Gilbert's Potoroo (*Potorous gilbertii*) is possibly the rarest mammal in the world. This rabbit-sized marsupial was thought to have become extinct last century. But in 1994 it was rediscovered at Two Peoples Bay Nature Reserve, near Albany in south-west Western Australia. Only about thirty of these small rat-kangaroos are thought to remain, and efforts to breed the animals in captivity are hampered by the potoroo's preferred diet of truffle-like underground fungi, which are very hard to find in sufficient quantity to feed captive animals.

Gilbert's Potoroo is thought to have been driven to the brink of extinction through predation by foxes and cats and the loss of its native habitat from land clearance, fires and more recently the introduced Dieback Fungus (*Phytophthra cinnamomi*). Scientists believe that it clung on in Two Peoples Bay because the area has escaped significant fires for the past 50 years or more.

Proserpine Rock Wallaby

The endangered Proserpine Rock Wallaby (*Petrogale persephone*), which was unknown to science until 1976, is found only in a small area of Whitsunday Shire on the central Queensland coast and nearby Gloucester Island. Because it occupies such a small area, it is extremely vulnerable to habitat loss, particularly from land clearing for tourist and residential developments around Airlie Beach. They are also threatened by predation from dogs and cats, road traffic and diseases spread by cats.[9] The rock wallaby recovery team is working with the local council and developers to minimise the impacts of developments on the animals and their habitat.

Regent Honeyeater

The Regent Honeyeater (*Xanthomyza phrygia*) has declined from a common woodland bird of the 1800s to an endangered species with a population estimated at fewer than 1,500 birds. The honeyeaters feed on nectar from flowering trees, and relied on those forests in south-eastern Australia that were particularly nectar-rich (such as White and Yellow Box woodland). These forests grew on the richest and most fertile soil and have been extensively cleared for agriculture; as the forests disappeared so did the honeyeaters.

Regent Honeyeaters are now found regularly in only three areas. The small town of Barraba in northern New South Wales has embraced the bird as its emblem and is encouraging eco-tourists to the area. In Chiltern, Victoria and the Capertee Valley in New South Wales, local communities are working to protect the honeyeaters' habitat by revegetating land. Revegetation is also helping to control salinity and erosion.

Bridled Nailtail Wallaby

The endangered Bridled Nailtail Wallaby (*Onychogalea fraenata)* once ranged through the semi-arid inland from the Murray River in Victoria to Charters Towers in north Queensland. In the early 1900s it was hunted for its beautiful pelt. It was thought to have become extinct because there were no confirmed sighting after 1937. In 1973 Darryl Challacombe read a magazine article about wildlife and realised that he often saw 'extinct' Bridled Nailtail Wallabies where he worked: a few hundred wallabies remained near Dingo in central Queensland. The two properties where the animal was observed were acquired as reserves, and some wallabies were relocated to Idalia National Park in western Queensland in 1993; their numbers are increasing.

In central Queensland at least, the decline of the wallaby appears to be associated with the pastoral industry: stock competed with the wallaby for food and disturbed ground cover. Dingos and cats prey upon the wallaby in Queensland, while further south, foxes once hunted the wallaby before it disappeared.

A longer term view

Declines in wildlife have occurred in most parts of Australia since European colonisation. Over the past 200 years 17 mammal species are thought to have become extinct here. 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.[10] 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.

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. The 1996 State of the Environment report assessed that since 1788:

- over 40% of forests had been cleared;
- more than 60% of coastal wetlands in southern and eastern Australia had been lost;
- about 75% of rainforests had been cleared;
- almost 90% of temperate woodlands and mallee had been cleared; and
- more than 99% of temperate lowland grasslands in south-eastern Australia had been lost.[2]

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.[2] 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.

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 Island.

Source: A Gap in Nature[10] *and Mammals of Australia*[11].

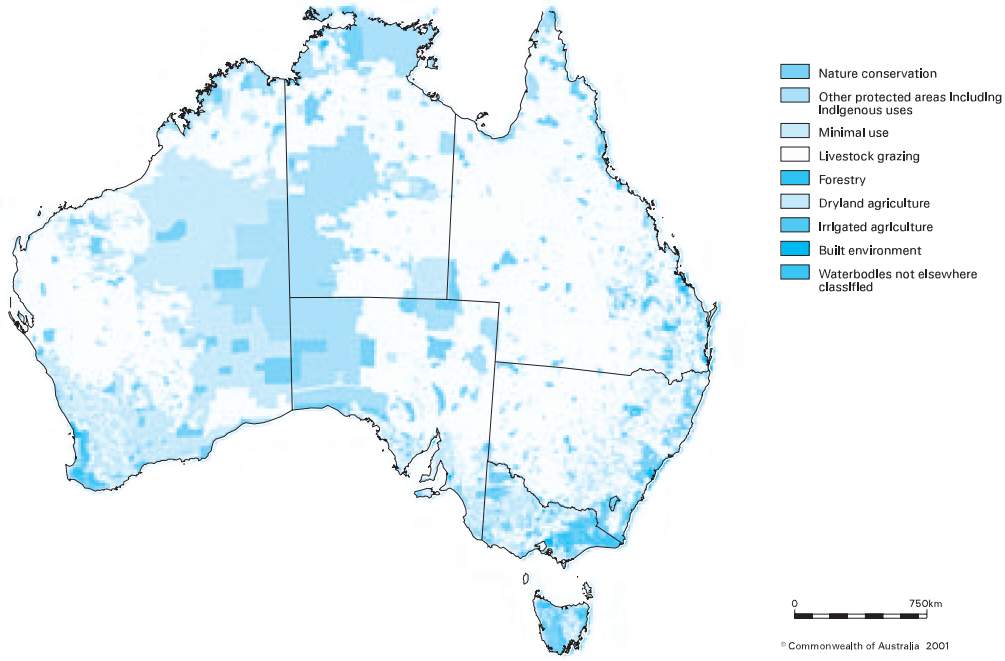
Seventeen species of mammals (and another 10 subspecies) are listed by the Commonwealth as presumed extinct in Australia since 1788. Ten of these species were last seen alive in the twentieth century, ten of these animals are marsupials, and 14 of them were found predominantly in the inland arid zone. However, other groups of animals have fared rather better, at least in terms of losses through extinction.

The table opposite 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 62 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).

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: 34 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 (27), while the Northern Territory has lost an estimated 14 species. Victoria and Western Australia have both lost ten mammal species and Queensland five. The ACT 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.

Land use: Looking more closely

Australian land use — 2001



Source: National Land and Water Resources Audit 2001.

The ways in which we use Australia's land can impact on the environment. Some types of land use (such as crop growing or urban development) depend on broad-scale tree clearance, which is discussed as a headline indicator. But other uses of the land do not depend on land clearance, yet still have a significant impact on Australia's environment.

This section briefly touches upon three such types of land use not discussed elsewhere in the publication: agriculture, mining and non-plantation forestry. Soil and land pollution are also discussed.

Agriculture

Agriculture is the major form of land use in Australia. In 2000, 59% of Australia was used for agricultural activity: 3% for crops, 3% for pastures and grasses, with the remaining 53% 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 headline indicator *Land clearance*.

Once land has been cleared of native vegetation, the impacts of agriculture depend on the crops grown and farming practices used. A detailed treatment of those impacts is beyond the scope of this publication, although the headline commentaries *Land degradation* and *Inland waters* discuss some of them. While 24 million hectares (ha) of Australian land were used for growing crops in 2000, far more of Australia was used for grazing sheep and cattle.

Pastoralism

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

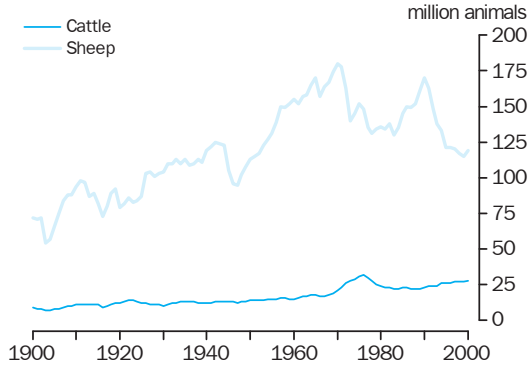
Improved land management

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.[1]

In 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 1999, 80% of farmers participated in some type of landcare activity.[1] 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 a third of the 900,000 ha Bookmark Biosphere reserve, which is managed by a partnership of government, non-government and private landholders.[2] 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.[1] Surveys indicate that farmers now plant or protect trees primarily for shade, environmental conservation or land rehabilitation, and not for commercial purposes.[1] And more than 7.5 million ha of Australian farmland are managed organically.[1]

Cattle and sheep numbers



Source: Data available on request, Agricultural Censuses.

The pastoral industry covers about half of the continent. Numbers of cattle have tripled since 1900, from 9.4 million cattle to 27.6 million. Numbers of sheep were 70% higher in 2000 than they were in 1900 (almost 120 million sheep in 2000 compared to a little over 72 million at the start of the last century). But sheep numbers at the end of the 1990s 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 semi-arid 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).[3]

Altered fire and hydrological regimes (see *Biodiversity*, and *Inland waters*) 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 certain species of kangaroos to increase in numbers in some areas. Kangaroos also put pressure on vegetation cover.

Mining

There are many mines throughout Australia, though less than 1% of our total land area is used for mining or by mining leases.[4] 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.[4] 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 companies had signed up to the revised code by June 2001.

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.[1] RFAs have led to an increase of 2.5 million ha of forest area included in conservation reserves between 1997 and 2000. And the area of protected old-growth forest has increased by about 40%.

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.

Native forests

In 2001 there were an estimated 164 million ha of native forest in Australia. 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, 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

Plantation forests

Plantation forests are an important source of timber: 65% of the $6b worth of wood products harvested in 1996–97 came from plantations.[6] 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.

Native forest tenure — 2001

	Area	
Native forest tenure	Million ha	%
Public multiple-use forests	11.9	7.2
Other crown land	17.7	10.8
Nature conservation reserves	20.4	12.4
Leasehold	74.5	45.3
Private	37.3	22.7
Unresolved tenure	2.7	1.6
Total area	**164.4**	**100.0**

Source: National Forest Inventory.[7]

and structure of forests.[5] 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.[8] Suitable large hollows tend only to develop in trees older than 150 years, but sections of forests are typically logged every 55–120 years,[8] 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.[9]

In 2001 there were over 164 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 (over 80%), with acacia forest accounting for another 10%.

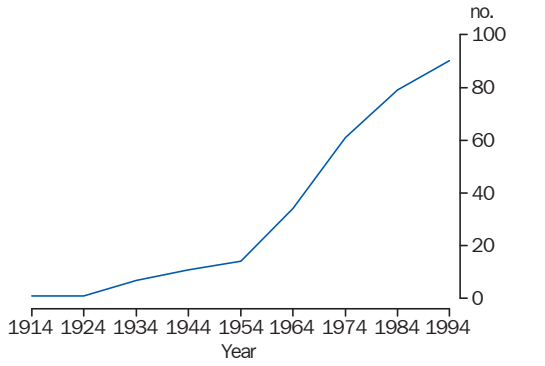
Assessing change in forest areas during the 1990s is difficult. Although the National Forest Inventory released data for Australia's forest area in both 1997 and 2001, changes between the two years come from a range of factors, particularly from improvements in mapping, as well as actual change in forest area.

See also the commentaries *Land clearance*, *Biodiversity*, *National income*, *National wealth*, *Work*, *Invasive species*, and *Greenhouse gases*.

Inland waters: Looking more closely

The headline commentary discusses the sustainability of water extraction across Australia. This commentary looks in more detail at the history of water use in Australia, and how the water that is extracted today is used. It goes on to discuss some of the ways in which some of our inland waters are deteriorating.

Dams greater than 100 gigalitres



Source: Register of Large Dams in Australia, Australian National Committee on Large Dams; Australians and the Environment, Cat. no. 4601.0.

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.[1] Dams were constructed 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 around 90 major dams, each with a capacity greater than 100 gigalitres (GL). (One hundred gigalitres is the volume of water contained in 100,000 Olympic-size swimming pools).[2] Dam construction and water diversions have influenced the hydrology and ecology of a number of Australian river systems. The patterns of flow in some rivers, once highly variable, have been stabilised and the flow of water has been reduced. Some of the impacts of these changes are discussed below.

Groundwater

Groundwater is also an important resource. Up to four million Australians are totally or partly dependent on groundwater for domestic water supplies.[3] In 1996–97 approximately 5,000 GL of groundwater were extracted.[4] 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 poorly understood.[3]

River condition (biota index), by State

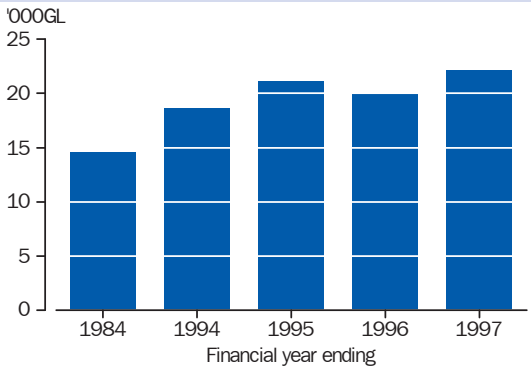
	% of sites assessed where biota was		
	Significantly impaired	*Severely impaired*	*Extremely impaired*
State	%	%	%
NSW	34	13	3
Vic.	20	13	1
Qld	17	2	1
SA	12	1	4
WA	29	6	1
Tas.	20	3	2
NT	10	2	. .
ACT	29	7	. .
Aust.	**23**	**6**	**2**

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] NLWRA's 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.

Net water use(a)



(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.

Net water use

In 1983–84, Australia used an estimated 14,600 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, 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.

Effects of development — water quality

The development of water resources has had many effects on our freshwater ecosystems. In 2002, the NLWRA produced an *Environment Index* that assesses river condition depending on the nutrient and sediment suspended in the water, the catchment and hydrological disturbance, and the condition of streamside vegetation.[5] 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; and
- 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.[5]

Irrigation and tree clearing have caused rising water tables and increased the salt in groundwater in many places. This increasing salinity is one of the most significant threats to the health of our aquatic ecosystems and our water supplies.[3]

Drinking water for most of South Australia and many inland towns in New South Wales is at risk from increasing salinity.[3] 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.[3] Nationwide, 80 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.[3] The causes of salinity and its impact are discussed in the commentary *Land degradation*.

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.[3]

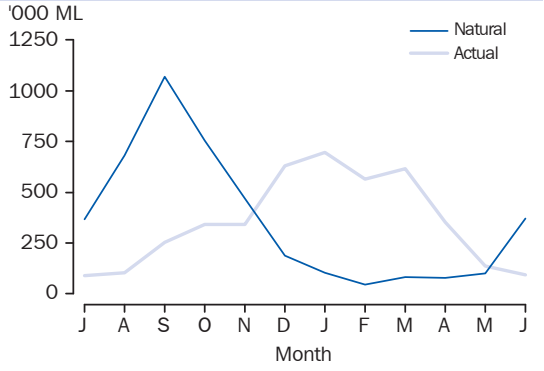
There are as yet few nationwide data on the extent and impacts of pollutants entering inland waters. Although Australia uses much lower levels of pesticides than other OECD countries, pesticide use is thought to have increased strongly here since the early 1980s.[3] Cotton, rice, sugar cane and horticultural crops are the highest users of pesticides.[3] Since 1990 at least 20 fish kills in New South Wales rivers have been attributed to pesticides.[3] 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.[3] 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.[3]

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 September and be at a minimum in February. Now, water is stored in spring and summer for irrigation, and peak flows, which are reduced, occur in summer, with minimum flows in July.[7]

Ecological processes have been altered by changes in flow patterns and reductions 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.[8] This, in tandem with the overall decrease in flows, has led to a reduction in available habitat and also reduced the reproductive

Natural and actual flows per month, Murray River at Albury — 1998–99



Source: Murray-Darling Basin Commission.

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.[10]

Outbreaks of algal blooms have been recorded as far back as 1878 in Australia;[10] 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.[3] It has been estimated that algal blooms cost Australian water users over $150m annually.[11]

cues of many aquatic species.[8,9] And so the reproductive patterns of both wetlands water birds and native freshwater fish have been affected, leading to a decline in their abundance.

The release of cold water from storages has also affected the reproductive cycle of many aquatic species,[7] while changes in flow patterns have helped exotic species, such as carp, to spread and out-compete native species.[9] Reduced flows are one factor that can lead to more severe algal bloom outbreaks because of stagnation (see box above).

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.[12] 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.[13]

The construction of dams, for example, has altered fish habitat by creating a barrier to movement, 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 the lowland regions of the Murray and Murrumbidgee rivers.[9]

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).[3] Although the use of water supplies has exceeded sustainable limits in some places, in parts of tropical Australia there is probably scope to collect more water without causing significant environmental damage. And 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.[4]

The key pressures on our inland waters relate to each other and the land that surrounds the water. 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.

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. 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.

Some 35 exotic fish species have become established in inland waters, with eight identified as having a significant impact.[3] Many were introduced into Australia for ornamental or fishing purposes (and in 1998–99 around half of the fish stocked in inland waters were exotic species).[14] Some of these species, such as trout and carp, are having detrimental effects on 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).[15]

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.[14] 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.[16]

Marine ecosystems

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 nation-wide time series data suitable for assessing the progress of Australia's marine ecocsystems. 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; and
- 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 biggest 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.

Our seas also support a vast array of life forms. More than 4,000 species of fish live in Australian waters, and about a quarter of them are found nowhere else (most of these are found in southern waters). Australia has the world's largest and most diverse area of seagrasses, largest area of coral reefs and highest diversity of mangrove species.[1]

There are substantial pressures on Australia's marine environment. Over 80% of the population live within 50 kms of the coast[2] and 97% of the volume of Australian trade is carried by ships.[3] In 1998–99 Australian fisheries produced about 230,000 tonnes of fish valued at over $2b, and over 22,000 people were employed in the fishing industry.[4] Over 516,000 people from overseas visited the Great Barrier Reef in 1995.[5]

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 marine ecosystems one would need information on a broad range of issues, and how they are changing over time. For many areas, information on some of these concerns is not available and so a thorough assessment of progress is not possible. Some data are available for many of the more important concerns and these are discussed here.

The Estuarine Condition Index is an indicator that has recently been developed by the National Land and Water Resources Audit (NLWRA).[6] 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 2000 the NLWRA assessed estuary conditions as:

- near-pristine — 50%;
- largely unmodified — 22%;
- modified — 19%; and
- extensively modified — 9%.

Fish and fishing

In 1999 four of the 30 major Commonwealth fisheries were classed as overfished, with the status of another 15 uncertain.[10] (A fishery — the collective enterprise of taking fish — is usually defined by a combination of the species caught (one or several), the gear and/or fishing methods used, and the area of operation.) Information on Commonwealth and State managed fisheries is overleaf. In terms of tonnage and value, Western Australia has the highest State production, and the combined produce of all States was much more than that of Commonwealth managed fisheries.

Over-fishing can occur when the catch rate exceeds the capacity of the natural population to renew itself through reproduction. A number of species have been, or are in danger of being, over-fished.

Aquaculture

The term *aquaculture* is used for the farming of any aquatic organisms, including fish, molluscs, crustaceans, and aquatic plants. Australian aquaculture, although growing at quite a fast rate, is still a small industry by world standards. In 1999 prawn farming in Australia produced around 2,400 tonnes. In Thailand production increased from 20,000 tonnes in 1984 to 200,000 tonnes in 1999.[7]

Aquaculture could be a viable way to meet the demand for marine products, given the pressure on some fish stocks. But aquaculture places different pressures on the marine environment. Aquaculture often uses fishmeal to feed farmed species; an estimated 2kg of fishmeal are required to produce 1kg of farmed fish or prawns, which places pressure on the fish species used for fishmeal.[8] Moreover, less than 30% of the protein in aquaculture feed is retained by the species farmed; the rest is either not eaten or excreted.[9] This protein adds to the increased nutrient load in coastal waterways, which in turn contributes to problems such as algal blooms. CSIRO is currently researching alternative feeds. [9]

Fisheries production, value and employment, by State — 1998–99

	Production		
	Weight	*Value*	*Employment*
State	tonnes	$m	no.
NSW	21 777	122	3 950
Vic.	7 531	80	2 250
Qld	29 652	242	4 254
SA	26 862	348	2 717
WA	39 652	592	4 585
Tas.	27 203	214	2 714
NT	4 107	82	292
C'wealth	77 052	408	. .
Total	**228 819**	**2 039**	**22 390**

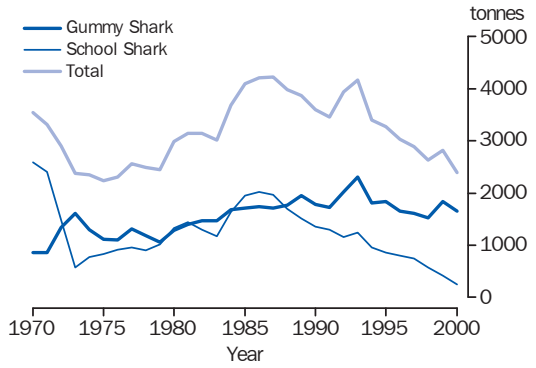
Source: Australian Bureau of Agricultural and Resource Economics.[4]

The Southern Bluefin Tuna is an example: a decline in numbers since the late 1950s resulted in the introduction by Australia, New Zealand and Japan of limits on the amount of fish that could be caught. These limits, together with the collapse in fish stocks, contributed to the decline in catches. Experts in Australia believe there is little chance of numbers recovering given the current global catch, whereas Japanese assessments suggest that a recovery is assured.[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 stock may also have decreased. In the Southern Shark fishery the annual catch in the late 1990s was similar to that of the 1970s, yet required two to three times the fishing effort. The increase in catch during the 1980s reflects the lifting of a ban on catching larger school sharks.[11]

Fishing for certain species can result in others being caught by accident (so called non-target catch). Species caught in this way include other fish, seaweed, seagrass, crustaceans, mammals, birds and reptiles. Longline fishing, which involves setting baited hooks along a line up to 100km in length, is a particular threat to several non-target species, especially seabirds.[13] Species of albatross are particularly at risk, not only because of the number of birds caught, but also because of their breeding patterns. Many are now listed as vulnerable by the Commonwealth Government, which put in place a threat abatement plan in 1998 with the aim of reducing bycatch to one bird per 20,000 hooks set, a reduction of 90% over a five year period, through techniques such as setting baits at night when seabirds are less active.[13]

Southern shark fishery catch



Source: Bureau of Rural Science Fishery Status Report 2000.

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.[12]

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.

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.[17]

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. These new regulations should help protect our marine environment from pest species entering it in this way.

Spotted Handfish

Handfish are found only in Australia and 'walk' on their pectoral and pelvic fins rather than swim. The Spotted Handfish, found only around the lower Derwent River in Tasmania, was once commonly seen and was among the first Australian species known to science. They are now considered to be vulnerable to extinction. The Northern Pacific Seastar, introduced to our waters through either ballast water or hull fouling, feeds on handfish eggs and is a possible cause of their decline. CSIRO is undertaking captive breeding trials and a monitoring program to try to protect the handfish.[14]

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 NSW 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.[19] 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 and cetaceans. 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.[20]

Coral reefs

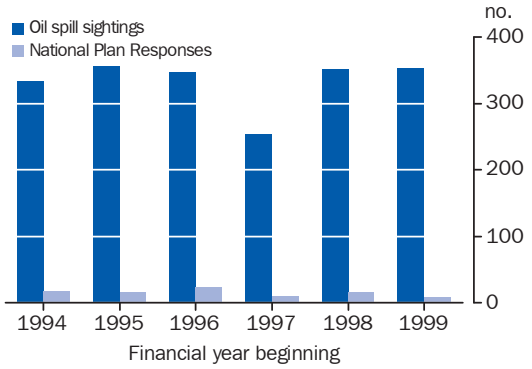
Australia has two major coral reefs: the Great Barrier Reef, which at 2,500 km long is the largest coral reef system in the world, and Ningaloo Reef in Western Australia which stretches for 230 km. Both are diverse marine systems that are home to many organisms, and provide commercial benefits to Australia, mainly through tourism.

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 coral reefs at risk from bleaching, which occurs when water temperature exceeds a certain threshold, usually just over 30ºC. At this threshold algae in the coral tissues are expelled, allowing the white skeleton to show through the clear tissue cover. If the temperature remains high for more than a few weeks the coral will die. Once a reef dies, the habitat it provides for a vast variety of biodiversity is lost. Such an event occurred in 1998, and although Australia was not affected as badly as other regions, bleaching was concentrated in certain areas. For example on Orpheus Island (of the Central Grear Barrier Reef) over 80% of coral became bleached. However, five weeks later, less than 20% of the coral had died. On Pandora Island, 10 km away, there was almost 100% mortality.[15]

Domestic sources placing the Great Barrier Reef at risk are sediment and nutrient runoff (often from land use practices far inland), commercial and recreational fishing, and the coral-eating Crown of Thorns Starfish, which periodically explodes in numbers. Scientists are still unsure what triggers the booms and declines in the starfish's population cycle, although some theorise that overfishing of the starfish's natural predators or increased nutrient levels in the water from pollution are to blame.[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.

Oil spill sightings and national plan responses



Source: Australian Maritime Safety Authority, Annual Reports.

The environmental impact of oil spills depends largely on the location of the accident and 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 1999–2000 there were almost 2,000 oil spill sightings in Australian waters. Over 90 of these were large and environmentally damaging enough to warrant a National Plan Response (a nationally coordinated cleanup plan).

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.[18]

Water quality

Experts on the State of the Environment Committee have indicated that the maintenance or restoration of water quality, particularly in coastal waters, is a critical marine environmental issue in Australia in 2001. Although they assess that many coastal areas have excellent water quality, they also assess that many areas do not.[20] 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). 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, called coliforms, between 1989–90 and 1998–99. None of the 23 beaches tested had a coliform density above health guidelines in the summer of 1998–99. In 1989–90, 11 had exceeded the limit.[21]

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.

The introduction of invasive species is a continual process, and they are an environmental 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 before had 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 sighted in Tasmania in early 2002 and the establishment of fire ants in Brisbane are two new concerns for the twenty-first century.

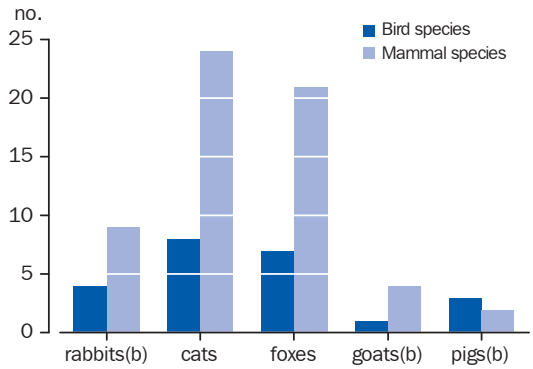
Some 30 animal pest species were estimated to cost the economy at least $420m a year (mainly in lost agricultural production).[1]

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 threatened by invasive animals(a)



(a) Key threatening processes listed under the Environment Protection and Biodiversity Conservation Act 1999. Species threatened on Norfolk and Christmas Island are excluded. (b) The threat includes associated threats such as land degradation.

Source: Threat abatement plans, Environment Australia 2002.

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 2002, cats were listed as threatening 24 mammals and eight bird species with extinction, while foxes threatened 21 mammals and seven bird species.

In 2001, some 25 mammals, 20 birds, four reptiles, one amphibian and at least 23 freshwater fish species introduced from overseas were established in Australia,[1] along with about 2,000 plants.[3] Because of human activity, the abundance and range of a number of native animals and plants have also changed. Not all of these species are invasive or widespread at the moment, but many are a cause for concern wherever they are established.

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 just 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).[4]

Rabbits have at times reached plague proportions over much of Australia, competing with native animals for scarce 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.[5] They compete for nectar with native insects as well as birds and mammals from which they also take nestholes.

All States and Territories have populations of fish introduced from overseas, which are thought to have played a role in the decline of 17 threatened and five other native fish species. Trout alone are assumed to be wholly or partly responsible for declines in five native fish species.[6] 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.[6]

Native species which are invasive

Outside their natural range or in increased numbers, native species may be as serious a threat to biodiversity as foreign 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. The Sweet Pittosporum, for example, is a rainforest tree from south-east Australia that now grows wild in Western Australia, South Australia and western Victoria. It grows now where it has never grown before, invading open woodlands and shading out rare plants.[5]

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. When Galahs arrive they compete for nest sites with birds native to the area, like Carnaby's Cockatoo, an endangered black cockatoo from south-west Western Australia.[6]

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.

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.[7]

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, diseases or viruses, 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 targetting 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) or for food (such as Northern Hairy-nosed Wombats which now eat Buffel Grass).[5]

Weeds of national significance, distribution — 1999

Common name	Origin of weed	Distribution in 1999 '000 km^2
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	USA	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.[8]

About 370 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).

Weeds also cause environmental damage that is difficult to quantify. Some species cover very large areas. Blackberry ranges over 9% of Australia and could potentially occupy twice this area. 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.[10] 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 recognised as a particular source of concern. 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.[5] It now grows along water courses in central Australia, changing the river flow, displacing red gums and raising water tables to contribute to salinity.[6]

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.[5]

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.[5] Dingos kill native wildlife and they have been implicated in the extinction of the Thylacine from mainland Australia (Dingos did not colonise Tasmania). 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.

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, some of which have become major weeds, in trying to improve pasture.

Continuing threats

Many plants and animals could potentially become invasive species in Australia, if introduced. There are many ways in which they might arrive.

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 habitats for water birds.[6]

Agriculture, Fisheries and Forestry~Australia 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.[11]

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.[5] 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).[8]

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.

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 Starfish, which eats oysters, mussels and other sedentary species, are having a major impact on our waters.[6] Ships also carry barnacles from around the world, while insects, spiders and reptiles arrive in cargo crates.

Two 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.[12]

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.[13] 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 (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.

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.[5] 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.[5]

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 *Biodiversity*, *Land clearance*, *Land degradation*, *Inland waters*, *Marine ecosystems*, *National income*, and *Openness*.

Atmosphere: Looking more closely

The Earth's atmosphere is made up of different gases, with concentrations which vary according to their distance from the surface. Human activity has altered some of these concentrations, which in some cases has had negative impacts on the health of people, plants, animals and other organisms, on economic activity, on the condition of buildings, and on the cycling of chemicals through the environment.

Fine particle air pollution and greenhouse gases are two headline indicators. This commentary looks more closely at other areas of concern linked to the atmosphere. The role of renewable energy in reducing greenhouse emissions is also discussed.

Air quality

The headline indicator focussed 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).

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.[1]

Most of Australia is now unaffected by sulfur dioxide pollution. And in 1999, prompted by a 30% reduction in SO_2 emissions during the late 1990s, there were only a few localities of concern.[2]

Maximum one hour averages of SO_2 in regional centres such as Mount Isa and Kalgoorlie have tended to decline since the late 1980s. Among the regional centres shown in the graph, concentrations breached guidelines in Mount Isa in 1999. But concentrations had fallen dramatically in Kalgoorlie in recent years (because of improved mineral extraction and processing), while there were no exceedences in recent years in the Illawarra and Gladstone areas, where coal-fired power generation occurs.[2]

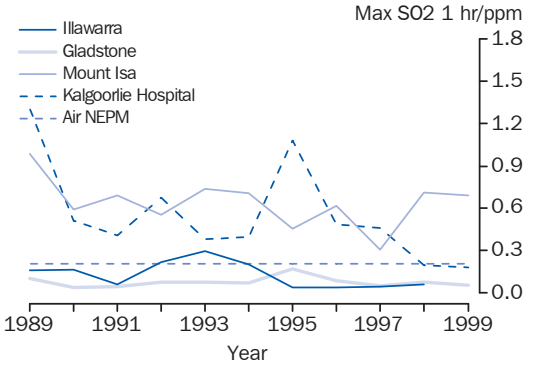
Ozone and photochemical smog

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. A recently published study linked ozone and nitrogen dioxide pollution with increases in daily death rates in Melbourne.[3]

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 1997 and 1999, four-hourly ozone guidelines were broken on 52 days in Sydney. Over the same three years, there were ten days or fewer in Brisbane, Melbourne and Perth when guidelines were broken, and no days in Adelaide in 1998 or 1999 (no data are available for 1997).

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



(a) Air NEPM refers to the National Environment Pollution Monitoring guideline for SO_2 concentrations of 0.2 parts per million.

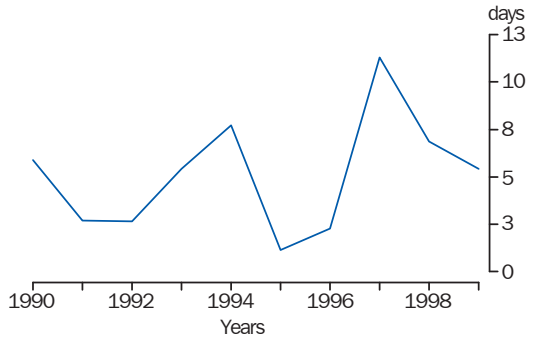
Source: Australian State of the Environment Committee 2001.[2]

Renewable energy resources

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 Australian Bureau of Agricultural and Resource Economics show that the proportion of Australia's overall energy consumption that came from renewable resources was a little under 6% in 1998–99, slightly lower than the proportion at the beginning of the decade. Although Australia's renewable energy consumption grew by 18% over the period, total energy consumption grew by 23%.

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 these harmful emissions. 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. And biomass generators are a source of fine particle air pollution. Wind turbines are noisy and some people find them, together with solar cells, aesthetically unpleasant.

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 0.08ppm it breaches NEPM guidelines. (b) Data are for Sydney, Melbourne, Brisbane, Perth and Adelaide and have been weighted together in proportion to these cities' populations. There are no data for Adelaide for 1997.

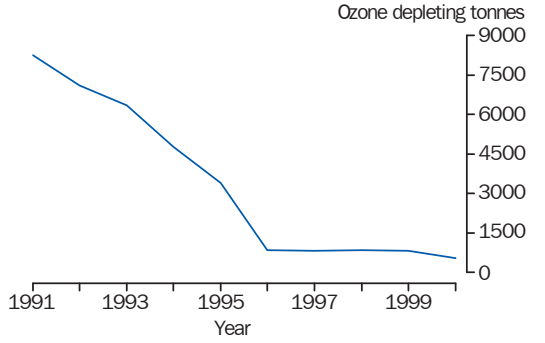
Source: Australian State of the Environment Committee 2001.

Ozone depleting emissions

As indicated above, 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.

Consumption of ozone depleting substances



Source: Data available on request, Environment Australia.

Health effects linked to ultraviolet exposure

Australia has the highest incidence of skin cancer in the world. 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.

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. 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.[2] The largest losses have been observed over Antarctica (more than 60% of natural levels)[2] 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.

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. 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 tonnes* (ODTs: 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 2000, it had fallen, in response to international restrictions, to 550 ODTs, entirely 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.

Waste

Many economic activities generate waste — 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; and
- 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 *Marine ecosystems*.

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. And 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 in the first instance. 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.

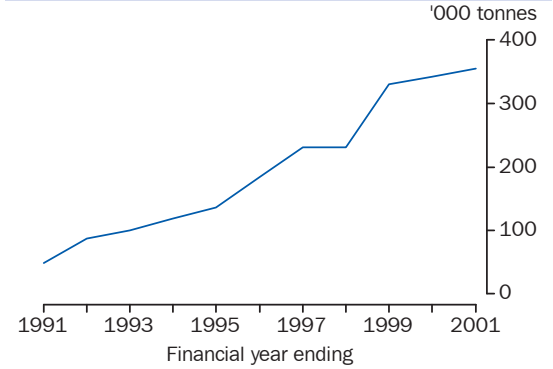
Waste can originate from a number of sources: households and councils; building and demolition sites; and commercial and industrial sources.

Quantities of solid waste disposed of at landfills — 1996–97

State	'000 tonnes
NSW	7 170.7
Vic.	5 020.1
Qld	4 428.8
SA	1 334.3
WA	2 429.1
ACT	236.0

Source: Waste Management Industry, Cat. no. 8698.0.

Recycling, Australian Capital Territory



Source: ACT Government 2002, NoWaste by 2010.

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.[1]

Recycling and waste reduction

In recent years, recycling has become more popular among many Australian households. This 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.[2]

In the ACT, for example, the volume of waste recycled increased from 48,000 tonnes to 355,000 tonnes between 1990–91 and 2000–01.[3] 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.[2] 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 National Waste Minimisation Act was introduced. The Act set a target of a 50% reduction in national waste from 1990 levels by 2000.[4]

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.[2]

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.[5]

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.[6]

Links to other dimensions of progress

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).

National wealth: Looking more closely

The headline indicator — real national net worth per capita — contains important information about Australia's capacity to generate future income and support future consumption. An assessment of national progress is enhanced by understanding the patterns and influences that underlie the components of our national assets and liabilities.

Assets used in production — produced capital

Machinery, buildings and some other assets are inputs to the production of goods and services, and are an important repository of a nation's wealth. Australia's stock of these assets has been growing for many years. Real net capital stock per capita grew on average by 1.4% a year between June 1991 and June 2001. In June 2001, such fixed assets accounted for around 51% of the total value of Australia's assets (down from 59% a decade earlier).[1]

The increase in capital stock has in turn led to an increase in the amount of capital services 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% a 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, as was the case for most of the twentieth century.

Underlying the aggregate growth pattern there may be diverse trends, such as more or less rapid capital deepening in individual industries or shifts in the composition of economic activity toward industries that are more or less capital intensive. 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 1991 and 2001, the types of capital showing the most rapid growth were dwellings (up 2.1% a year), machinery and equipment (up 1.4% a year) and software (up 16.2% a year). The commentary *Capital formation* discusses the investment trends that underlie these growth patterns.

Between 1991 and 2001, the industries showing the most rapid growth in capital stock were Communication services (up 4.8% a year in real per capita terms) and Cultural and recreational services (up 5.8% a year).

Measuring Australia's capital stock

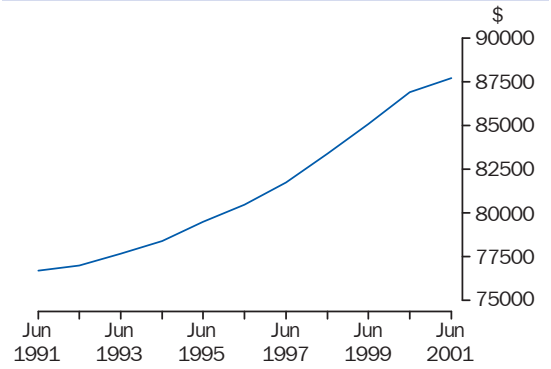
Broadly, economic statisticians have adopted two approaches to measuring a nation's stock of capital — direct measurement and the perpetual inventory method (PIM). Direct measurement involves surveying the owners of capital to ascertain the values of their machines, buildings and so on.

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) per capita



(a) Chain volume measure; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

Real net capital stock(a) per capita

Asset class	*30 June 1991* $	30 June 2001 $	*Average annual growth rate* %
Dwellings	25 136	30 805	2.1
Other buildings and structures	35 466	37 532	0.6
Machinery and equipment	14 234	16 367	1.4
Software	284	1 275	16.2
Other assets	1 578	1 727	0.9
All assets	**76 698**	**87 705**	**1.4**

(a) Chain volume measure; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

Real net capital stock(a) per capita, by industry — June 1991 and June 2001

Industry	30 June 1991 $	30 June 2001 $	Average annual growth rate %
Agriculture, forestry and fishing	3 174	2 553	-2.2
Mining	4 633	5 803	2.3
Manufacturing	4 598	5 023	0.9
Electricity, gas and water supply	5 846	5 747	-0.2
Construction	1 364	1 310	-0.4
Wholesale trade	1 847	1 779	-0.4
Retail trade	1 714	2 140	2.2
Accommodation, cafes and restaurants	1 538	1 996	2.6
Transport and storage	7 821	7 883	0.1
Communication services	2 102	3 372	4.8
Finance and insurance	3 221	3 364	0.4
Property and business services	3 573	4 550	2.4
Government administration and defence	3 179	3 039	-0.5
Education	3 417	3 628	0.6
Health and community services	2 319	2 829	2.0
Cultural and recreational services	565	994	5.8
Personal and other services	687	915	2.9
Ownership of dwellings	25 139	30 805	2.1
All industries	**76 698**	**87 705**	**1.4**

(a) Chain volume measure; reference year 1999–2000.

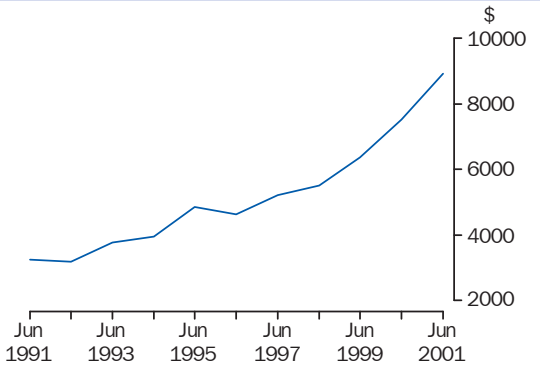
Source: *Australian System of National Accounts.*[1]

Some natural 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 persistent growth in Australia's known mineral resources. The net present value of economically demonstrated resources (EDR) per capita grew on average by around 10.6% a year between June 1991 and June 2001. For comparison, between June 1992 and June 2001 (the longest period for which estimates are available) the *real* per capita value of Australia's subsoil assets grew by a little over 2.6% a year.

Economically demonstrated resources(a) per capita



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

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

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.

At the end of the decade, 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

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.

Economically demonstrated resources(a) per capita, by mineral — June 1991 and June 2001

Mineral	30 June 1991 $	30 June 2001 $	Average annual growth rate %
Bauxite	116	263	8.5
Black coal	313	2 092	20.9
Copper	90	443	17.3
Iron ore	15	715	46.7
Magnesite	22	166	22.3
Mineral sands	111	211	6.6
Nickel	260	554	7.8
Petroleum — crude oil	746	1 181	4.7
Petroleum — natural gas	812	1 731	7.9
Petroleum — condensate	139	729	18.1
LPG naturally occurring	99	295	11.5
Uranium	146	191	2.7
Zinc	172	156	-1.0
Other minerals	221	190	-1.5
All minerals	**3 262**	**8 917**	**10.6**

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

Source: Australian System of National Accounts.[1]

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.

Among the minerals showing strongest annual growth in the net present value of EDR per capita between 1991 and 2001 were iron ore (up 47%), magnesite (up 22%) and black coal (up 21%).

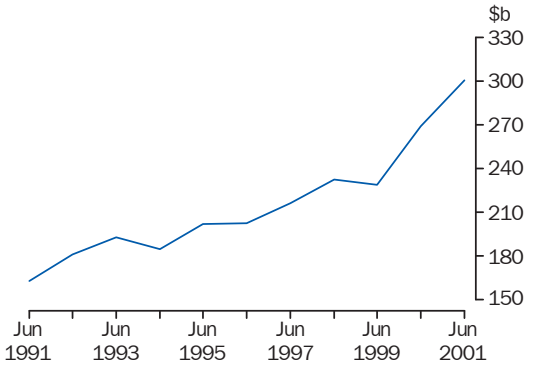
External liabilities — foreign debt

In recent years, Australia's debt to the rest of the world has increased. Real net foreign debt grew on average by 6.3% a year between June 1991 and June 2001.[2]

Some of Australia's foreign debt has financed the acquisition of capital goods and other assets that can be used to generate future income and support future consumption; some debt has financed current consumption.

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 — the nation experiences a deficit on its current account. 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

Real net foreign debt(a) — June 1991 to June 2001



(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 for the deflator is 1999–2000.

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

Real net foreign debt(a), by sector — June 1991 and June 2001

Sector	30 June 1991 $b	30 June 2001 $b	Average annual growth rate %
General government	18.2	13.1	-3.3
Other public sector	20.3	-2.6	..
Private financial corporations	59.0	224.8	14.3
Private non-financial corporations	65.6	65.5	. .
Australia	**163.0**	**300.8**	**6.3**

(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 for the deflator is 1999–2000.

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

conceptually the same phenomenon; they may be financed by, say, selling equity in enterprises to residents of other countries, or by borrowing from residents of other countries, or by running down financial assets held abroad.

Foreign holdings of Australian equity and debt were both rising through much of the twentieth century. 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 will 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.

Measuring Australia's foreign debt

Australia's foreign debt is the net outcome of:

- Australian borrowing from overseas ($490b in current-price terms at 30 June 2001); and
- foreign borrowing from Australia ($173b in current-price terms at 30 June 2001).

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 service 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 19.4% in 1990–91 to 9.5% in 2000–01.

The real net foreign debt of the public sector rose from $38.5b in June 1991 to a peak of $74.1b in June 1995. Thereafter, it fell and reached $10.5b in June 2001.

The real net foreign debt of the private sector, after having been fairly steady at around $120–130b in the first half of the 1990s, rose throughout the second half of the decade to reach $290.3b in June 2001.

National income: Looking more closely

The headline indicator — real net national disposable income per capita — contains important information about the nation's material living standards. An assessment of Australia's progress is enhanced by understanding the patterns and influences that underpin the national indicator. This commentary examines the ways in which the pace of output growth as measured by GDP (see box) varies across the States and Territories and between industries.

Domestic economic events are not the only influence on material living standards. In particular, changes in the relative prices of Australia's exports and imports (the terms of trade) affect national income.

Growth in per capita income may be accompanied by changes in the equality of income distribution. At present, it is not possible to analyse how net national disposable income is distributed, but one can examine the distribution of household income. This is discussed in the commentary *Economic Disadvantage and inequality*.

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 Australians' incomes. So GDP and the headline indicator exhibit broadly similar trends.

The volume of goods and services produced in Australia (measured by GDP) is a major influence on material living standards. The average annual growth rate in real per capita GDP between 1990–91 and 2000–01 (2.4%) was appreciably above the average recorded since the early 1960s. Moreover, the past nine years or so represent the longest run of growth observed during the past thirty years.[1]

State and Territory output

Gross State Product (GSP) 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. The sum of the eight GSPs is equal to Australian GDP.

Although GSP is a major influence on the material living standards of residents in a State or Territory, there are other influences such as Commonwealth government taxes and expenditures, and incomes transferred to or from other States or Territories and the rest of the world.

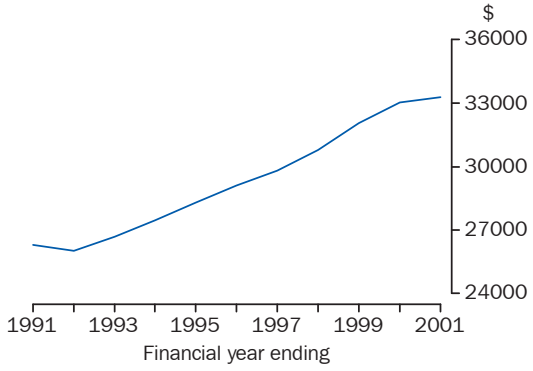
Real gross state product(a) per capita, average annual growth rates — 1990–91 to 2000–01

State	%
New South Wales	2.5
Victoria	2.7
Queensland	2.6
South Australia	1.7
Western Australia	2.3
Tasmania	1.3
Northern Territory	1.5
Australian Capital Territory	2.2
Australia	**2.4**

(a) Chain volume measure; reference year 1999–2000.

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

Real gross domestic product(a) per capita



(a) Chain volume measure; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

During the past decade, although there have been some shifts in the relative economic positions of some States and Territories, there has been a fairly persistent pattern. GSP per capita was above the national average throughout the period 1990–91 to 2000–01 in New South Wales, Victoria, Western Australia, the Northern Territory and the Australian Capital Territory, and below the national average in the other States.[2]

Industry output

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.

Real industry gross value added(a), average annual growth rates — 1990–91 to 2000–01

Industry	%
Agriculture, forestry and fishing	1.9
Mining	4.3
Manufacturing	2.0
Electricity, gas and water supply	2.1
Construction	1.5
Wholesale trade	4.5
Retail trade	3.6
Accommodation, cafes and restaurants	3.8
Transport and storage	3.6
Communication services	10.2
Finance and insurance	3.5
Property and business services	5.6
Government administration and defence	2.6
Education	2.3
Health and community services	3.2
Cultural and recreation services	3.6
Personal and other services	4.1
Ownership of dwellings	3.8
Gross Domestic Product	**3.6**

(a) Chain volume measures; reference year 1999–2000. The sum of IGVA across industries differs from GDP to the extent of taxes less subsidies on products.

Source: Australian System of National Accounts.[1]

During the past decade, different industries have exhibited substantially different rates of real output growth. Among the industries showing strongest growth in real IGVA between 1990–91 and 2000–01 were Communication services and Property and business services.

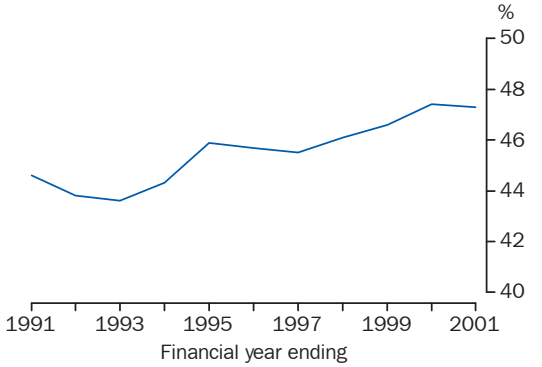
Effect of changes in world prices — terms of trade

In recent years, Australia's terms of trade have shown fairly wide oscillations, but overall between 1990–91 and 2000–01 there was a modest improvement. Changes in our terms of trade have reflected 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.

Population in work(a)



(a) Total employed persons as a proportion of population.

Source: Labour Force Australia.[2]

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.

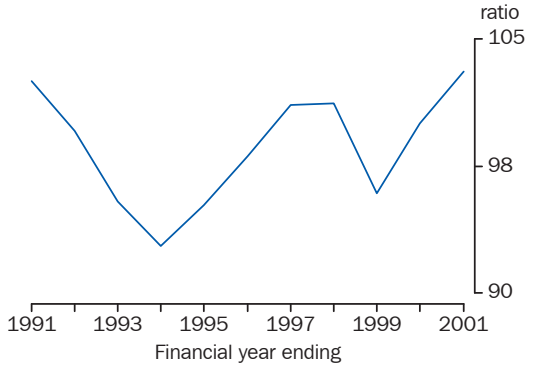
First, this proportion provides a broad indicator of the degree of economic dependency in Australia --- the relative sizes of the total population and of that part of the population engaged in income-generating economic activity. Economic dependency may increase owing to, say, a rise in the number of 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 1990–91 and 2000–01, the proportion of the Australian population that was employed rose from 44.6% to 47.3%.[2]

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.

Australia's terms of trade(a)



(a) Reference year 1999–2000.

Source: Australian System of National Accounts.[1]

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 accounts for a fairly large proportion of Australia's exports, whereas manufactured goods and some services account for a large proportion of our imports. 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.

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.

Between 1990–91 and 1993–94, there was almost a 10% deterioration in Australia's terms of trade, reflecting falling export prices and strongly rising import prices. The terms of trade had improved by 1997–98 (returning to just under their 1990–91 level), then again deteriorated 5% in 1998–99, owing largely to fluctuations in import prices. Rising export prices thereafter brought the terms of trade in 2000–01 back to a little above their level of a decade earlier.[3]

Economic disadvantage and inequality: Looking more closely

Both headline commentaries *National income* and *Economic disadvantage and inequality* showed appreciable growth in the average income of Australian households through the 1990s. During the period 1994–95 to 1997–98 the rate of increase for low income households was much the same as for households with higher incomes. This commentary provides further perspectives on the distribution of income among households in Australia and how that changed between 1994–95 and 1997–98. The commentary also provides more information about the most economically disadvantaged households in Australia.

The distribution of household income

There are many measures used to assess the distribution of income, of which the more commonly used are presented in the table on the following page. Most of the movements shown have been small and differences across the income distribution are not statistically significant,[1] showing little or no overall change in the level of income inequality among households during the period 1994–95 and 1997–98.

The average income measures given in the commentary *Economic disadvantage and inequality* (presented in the headline graph) are shown again in the first rows of the following table. The next measure shown in the table focuses on the relationship between the income levels of those at different points of the distribution, namely at the 20th, 50th and 80th percentiles from the bottom of the distribution. As can be seen, the trends over time of the two series are very similar — percentage increases between 1994–95 and 1997–98 in the income of lower income households have generally been very similar to those in the middle and towards the top of the distribution.

Changes in incomes of the respective (low, middle and high) income groups relative to each other are highlighted by the ratios of incomes of households at the respective percentiles. For instance, when comparing households towards the top of the distribution with those at the bottom (illustrated by the P90/P10 and P80/P20 ratios) it is apparent that the households at the bottom of the distribution have generally maintained their position compared to those at the top (the ratios have remained much the same). In addition, as seen by the P20/P50 ratio (i.e. the income of those at the twentieth percentile compared to those exactly in the middle of the distribution), the relative position of the more disadvantaged group compared to those in the middle of the distribution also remained virtually the same. Moreover, when seen in terms of the changes in the share of all income received by high and low income households, the changes have not been significant. In 1997–98 the share of all household income of the 20% of households with low incomes (i.e. those in the second and third deciles) was 10% while that for households at the top of the distribution, the highest 20% of households, was 39%. These proportions were the same as in 1994–95.

The Gini coefficient (a commonly used summary measure of income distribution) also shows minimal change. The Gini coefficient is a single number that summarises the distribution. It takes values between zero and 1 — higher values indicate greater inequality in the distribution of income; lower values indicate greater equality. While a little lower during the intervening years the coefficient in both 1994–95 and 1997–98 was the same (at 0.32).

Other commonly used indicators of economic disadvantage are the proportion of households with income less than half the average weekly equivalised disposable income of all households and half the median weekly equivalised disposable income of all households. These income cut-offs are sometimes used as poverty lines.[3]

The number of households below the half median indicator shows a small increase between 1994–95 and 1997–98 (2%), but this change is not statistically significant. In addition, this indicator

Household amenities

An indicator of economic disadvantage is whether or not households have access to basic amenities which might be considered necessary for a comfortable life. The most recently available data, from several ABS surveys,[2] shows that almost all households in Australia have many of the amenities that might be expected to be normal.

These amenities include a working bath/shower connection, a toilet, working cooking facilities, and a working refrigerator (more than 98% of households in 1999), at least one television (99% of households in 1997), and a telephone (97.5% in 1996). Not all households owned a registered motor vehicle (10% did not have one) and the most disadvantaged (in terms of the socioeconomic status of the areas in which they live) were less likely to own a personal computer. In 1997, 26% of households in the lowest quintile (20%) of areas (when ranked by socioeconomic status of the area in which they lived) owned a personal computer, and 7% had Internet access compared to 53% and 20% for the households in the top 20% of areas when ranked by socioeconomic status. It would also be expected that the quality of the amenities owned by higher income households would generally be better than those owned by low income households.

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 to help those in need. Information about the exact numbers of people in such circumstances, and about their circumstances, is difficult to obtain, partly because such groups are highly mobile. See *Social attachment* for more information about homelessness.

Selected measures of household disposable income(a)

Indicator	Unit	Year				Change 1994–95 to 1997–98	
		1994–95	1995–96	1996–97	1997–98	Absolute	%
Equivalised mean weekly income for selected groups of households(b)							
Low income(c)	$	408	408	427	427	19	4.7
Middle income(d)	$	687	680	707	720	33	4.9
High income(e)	$	1 556	1 518	1 561	1 642	86	5.5
Equivalised income of households at top of selected income percentiles(b)							
20th(P20)	$	402	404	419	420	18	4.4
50th(P50)	$	687	676	704	716	29	4.3
80th(P80)	$	1 122	1 121	1 160	1 180	58	5.2
Ratios of incomes of households at top of selected income percentiles							
P90/P10	Ratio	3.92	3.90	3.84	3.96	0.04	1.0
P80/P20	Ratio	2.79	2.77	2.77	2.81	0.02	0.7
P80/P50	Ratio	1.63	1.66	1.65	1.65	0.02	1.2
P20/P50	Ratio	0.59	0.60	0.60	0.59	0.00	0.0
Share of total income received by households with							
High incomes(e)	%	39.1	38.6	38.3	39.2	0.1	0.3
Low incomes(c)	%	10.2	10.4	10.5	10.2	0.0	0.0
Gini coefficient(f)	Ratio	0.320	0.315	0.309	0.322	0.002	0.6
Households with equivalised weekly income below							
Half the mean weekly income	%	18.7	17.6	17.3	19.6	0.9	4.8
Half the median weekly income	%	8.4	8.6	7.5	8.6	0.2	2.4

(a) All estimates have been adjusted using the OECD equivalence scales (b) Adjusted for changes in the Consumer Price Index; values are given in 1997–98 dollars. (c) Households in the 2nd and 3rd income deciles after being ranked by their equivalised income. (d) Households in the middle income quintile (5th and 6th deciles) after being ranked by their equivalised income. (e) Households in the top income quintile (9th and 10th deciles) after being ranked by their equivalised income. (f) A summary measure of income distribution between *0 and 1*. If the measure approaches the value of 1 income inequality increases and vice versa.

Source: Data available on request, Surveys of Income and Housing Costs.

needs to be used with caution for two reasons. First, there is a considerable clustering of households with income relatively close to the half median value of income, reflecting the fact that the half median value is close to the value of benefits provided by the age pension and other benefits under the social security system. A relatively small change in the benefits available from social security can result in relatively large changes in the percentages shown by the half median indicator, and therefore it has the potential to be relatively unstable. Second, many of the households in the first decile and reporting very low incomes are not believed to be the most economically disadvantaged (see Endnote 1 of *Economic disadvantage and inequality*). Therefore changes in the half median measure may also be influenced by changes to the proportion of households reporting very low incomes which are not economically disadvantaged.

While the increase from 1994–95 to 1997–98 in the number of households receiving less than half the mean household weekly income is statistically significant (up 5%), as with the median, the mean is also affected by the incomes of households in the lowest income decile and interpretation of change in this indicator can be difficult.

Low and high income households

The circumstances associated with economic disadvantage among households are well known. These include a lack of savings or other assets and the absence of a substantial income from sources other than pensions and benefits provided by the

Household characteristics of selected income groups(a), 1997–98

Household characteristics	*Low income (2nd and 3rd deciles)*	*Middle income (5th and 6th deciles)*	*High income (9th and 10th deciles)*	*All households*
	%	%	%	%
Household composition (selected types)				
One parent family in one family households with dependent children	11	8	1	7
Couples in one family households				
Couples without children	25	22	31	23
Couples with dependent children only	18	34	18	25
Other couples in one family households	5	14	17	12
Other family households	4	6	6	6
Non-family households				
Lone persons	36	13	18	23
Group households	1	5	7	4
Total	**100**	**100**	**100**	**100**
Principal source of household income				
Wages and salaries	13	66	86	54
Own unincorporated business	4	6	8	6
Government pensions and allowances	79	15	1	30
Other sources	5	13	6	8
Total	**100**	**100**	**100**	(b)**100**
	no.	no.	no.	no.
Average number of earners(c)	0.3	1.2	1.9	1.1
Equivalised disposable weekly income at lower and upper bounds of the income range(d)	$	$	$	$
At bottom of the income range	369	597	1 180	..
At the top of the income range	501	853	..	..

(a) Households have been ranked from high to low income groups according to their equivalised disposable income. (b) Total includes households with zero or negative income. (c) Persons receiving income from wages or salary or have their own unincorporated business. (d) Equivalised incomes assume that all households are composed of a couple with two children aged less than 15 years.

Source: Data available on request, Survey of Income and Housing Costs 1997–98.

social security system. People whose major source of income is from pensions and benefits include those who are unemployed, those unable to work due to disability, illness or old age, or those with caring responsibilities for others (such as persons with disabilities or dependent children). Aside from factors associated with life-cycle stage (i.e. relative youth or old age), not having a paid job or having a low paid job is often associated with lower levels of educational attainment and limited job opportunities within the areas in which people live. It is also often associated with problems in other aspects of life, including those related to physical and mental health and the size and strength of people's social networks. 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).

Comparing households of various types in low and high income groups helps to characterise the types of households most likely to be economically disadvantaged. Households are classified in several ways in the table above, presenting data for 1997–98. The patterns shown could be expected to be broadly representative of the patterns seen throughout the 1990s.

There are some substantial differences in the representation of certain household composition types in low and high income groups. One parent families in one family households with dependent children, for example, were over-represented (11%) in the low income group (those in the second and third lowest deciles of the income distribution) and under-represented (1%) in the highest income group (those with income in the top two deciles of the income distribution). Possibly associated with their age and employment circumstances, couples without children were over-represented in the highest income group and under-represented in the middle of the income distribution. Lone person households were over-represented in the lowest income group and many would have been receiving the age pension.

In contrast, while significant proportions of households in the lowest and highest income groups were couples in one family households with dependent children only (18% in both groups), households of this type were over-represented among middle income households (34% of all middle income households).

In terms of the principal source of household income, households in the low income group (i.e. with income in the second and third lowest deciles of the income distribution) were, as might be expected, most likely to have government pensions and allowances as their major source of income (79% of households). In sharp contrast to those in the low income group, most households (93%) in the highest income group had employment related income (from wages or salaries or their own unincorporated business) as their principal source of income.

The number of earners (i.e. with employment related income) present in a household is an important determinant of household income. Clearly those with two or more earners will tend to have higher incomes than those with only one earner. In 1997–98, the average number of earners per household in the low income group was 0.3 persons, which contrasts with 1.2 and 1.9 earners per household in the middle and high income groups respectively.

Aboriginal and Torres Strait Islander peoples

Data from the 1996 Census of Population and Housing show the average household income of households with at least one Aboriginal or Torres Strait Islander person aged 15 years or over to be well below that of households in the wider community. The household income per capita in 1996 was $158 per person per week for households which included at least one adult Indigenous Australian, compared to $310 per person per week for all households.

In terms of those who were employed at the time of the Census, the median gross weekly income of Indigenous Australians ($365) was substantially less than the median of non-Indigenous Australians ($493).

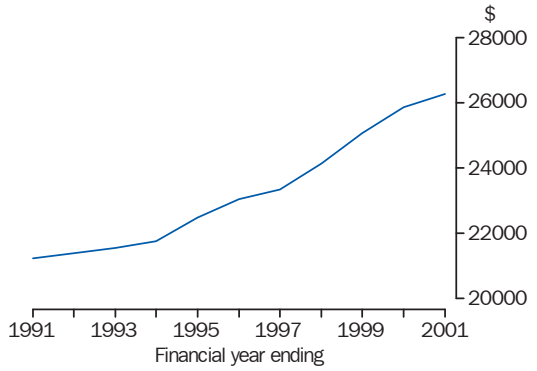
Consumption

Attaining higher levels of consumption now or in the future is a major goal of almost all individual and national economic activity.

Real final consumption expenditure per capita increased at an average annual rate of almost 2.2% between 1990–91 and 2000–01.[1]

Household consumption expenditure accounts for around three-quarters of total final consumption, a proportion that remained fairly constant throughout the past decade. Government accounted for the remainder.

Real final consumption expenditure(a) per capita



(a) Chain volume measure; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

Final consumption expenditure (FCE) is the acquisition of goods and services used for the direct satisfaction of individual or collective wants. Among the different forms of consumption, FCE is most directly relevant to an assessment of Australia's progress, and is the focus of this commentary. 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).

Trends in consumption

Consumption grew throughout the 1990s. Between 1990–91 and 2000–01, real FCE per capita rose by almost 2.2% a year.

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 1990–91 and 2000–01, households accounted for about three-quarters of the total and government for about one-quarter.

Real per capita household consumption expenditure grew by 2.3% a year between 1990–91 and 2000–01.

Household expenditure on communication showed particularly strong growth (an increase of over 10% a 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 and transport*.

Real household final consumption(a) per capita

	1990–91	*2000–01*	*Average annual growth rate*
	$	$	%
Food	1 992	2 085	0.5
Alcoholic beverages and tobacco	916	783	-1.6
Clothing and footwear	675	744	1.0
Housing, water, electricity, gas and other fuels	3 393	4 216	2.2
Furnishings and household equipment	896	1 091	2.0
Health	784	918	1.6
Transport	1 857	2 415	2.7
Communication	192	507	10.2
Recreation and culture	1 567	2 464	4.6
Education services	406	463	1.3
Hotels, cafes and restaurants	1 200	1 472	2.1
Miscellaneous goods and services	2 238	2 817	2.3
Total	**15 966**	**19 975**	**2.3**

(a) Chain volume measure; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

Household expenditure on recreation and culture also grew strongly (up by more than 4.6% a year).

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 37.5% in 1990–91 to 35% in 2000–01).

Real government consumption expenditure per capita grew by 1.8% a year between 1990–91 and 2000–01. Education and health were among the largest expenditures throughout the decade.

Factors influencing change

A major factor underlying the increases in total final consumption during the 1990s was the growth in real income.

The composition of household consumption expenditure has changed appreciably throughout the decade — in part reflecting new technologies and the growth in expenditure on some services. Changes in government consumption have in part reflected policy emphases and some changes in the mix of public and private provision of services.

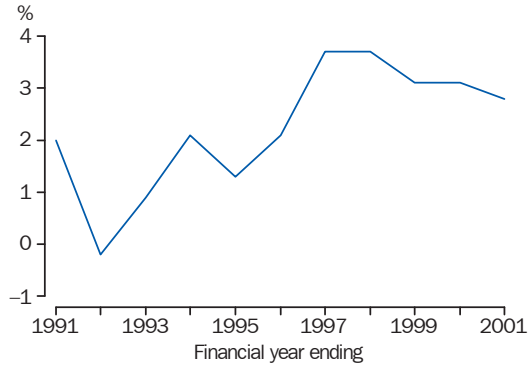
Links to other dimensions of progress

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

See also the commentaries *National income*, and *Saving*.

Saving

Net national saving as a proportion of GDP



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

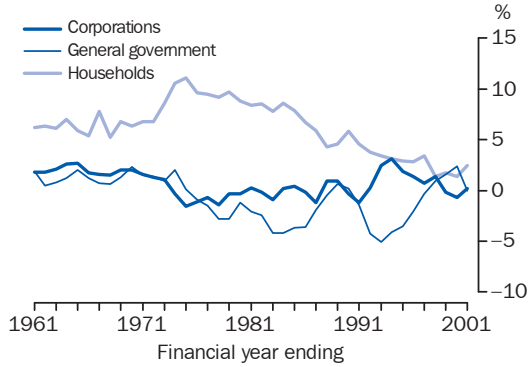
Net national saving as a proportion of GDP has fluctuated a good deal during the past decade; between 1990–91 and 2000–01 the ratio rose from 2% to around 3%. But the longer term trend during much of the past forty years has been downward.[1]

Income that is saved rather than being spent on current consumption can be used to accumulate assets (wealth) that will generate future income and support future consumption. In particular, saving is one means of funding investment (the formation of fixed capital used in the production of goods and services).

During the past decade, there was a 0.8 percentage point rise in the ratio of net national saving to GDP (from 2% to 2.8%). But the longer term trend has been downward; between 1960–61 and 2000–01 the ratio fell overall from around 10% to around 3%. Similar downward trends in national saving have been observed in some other 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 88% during the 1990s. This means that proportionately less of Australia's saving has been devoted to increasing the national stock of fixed capital and more to replacing the existing stock.

Net national saving as a proportion of GDP, by sector



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

Measuring national saving

Saving is not measured directly in the Australian national accounts. 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). National and sectoral net worth provides 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 owing to changes in volumes (such as the discovery of mineral deposits) and prices (such as capital gains).

Some differences within Australia

Net national saving can be dissected to show the trends in saving by the various 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. During the 1990s, however, the net saving of the household sector has fallen relative to GDP.

The general government sector went from being a net saver during the 1960s to a net dissaver during the 1970s, 1980s and early 1990s. During the 1990s, however, government dissaving was progressively reduced; between 1997–98 and 2000–01 the government sector again became a net saver.

For the corporate sector (financial and non-financial corporations) there have been considerable fluctuations in saving since the 1960s. For much of the 1990s, however, the corporate sector has been a net saver — possibly reflecting an increasing tendency for corporate profits to be retained rather than distributed to households in the form of dividends.

Factors influencing change

National and sectoral saving may be affected by both cyclical and behavioural influences.

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 the late 1990s in part reflected sustained economic growth and fiscal consolidation. The possible changes to the corporate sector's distribution of profits in the form of dividends during the 1990s are referred to above.

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.

Links to other dimensions of progress

The links between national income, consumption, saving, capital formation and wealth are discussed in accompanying commentaries.

Inflation

Inflation can have significant economic effects. It can, for example, 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 reduces 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 of goods and services (inefficiencies known as 'menu costs'). Frequently changing 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 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 are of the view that zero inflation might be undesirable. Changes in relative prices can act as a signal during times of economic restructuring. This restructuring could be brought about by, say, changes in tastes and technology, and could 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 — 1990 to 2001

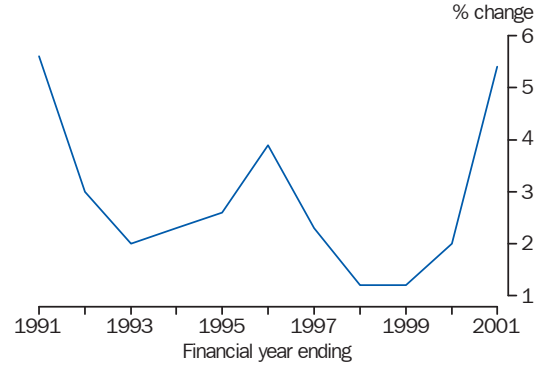
A commonly quoted indicator of inflation is the rate of change in the Consumer Price Index (CPI), which reflects the price of a fixed basket of goods and services consumed by households. Other important indicators include the national accounts chain price index for Domestic Final Demand (DFD), and the (currently experimental) price index of Domestic Final Purchases (DFP). Both the DFD and DFP price indexes are more comprehensive than the CPI because they cover purchases by businesses and government as well as households.

The DFP index is currently being developed by the ABS as a preferred measure of inflation: it is both more comprehensive and aligned more closely to market transactions. Unlike the DFD index, the DFP index excludes notional transactions such as imputed rent for owner-occupied dwellings, and non-market influences such as government taxes and charges paid by households.[2]

The graphs below show percentage changes in the CPI and DFD indexes for 1990–91 to 2000–01. The CPI referred to in this commentary excludes housing costs. The treatment of housing in the CPI changed significantly in September quarter 1998,[3] so the CPI exclusive of housing provides a more consistent view of inflation over time.

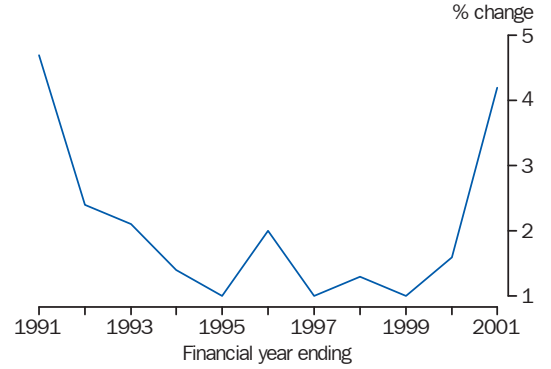
Aside from a rise in 1995–96, inflation was relatively stable from the early 1990s to 1999–2000. Economic growth began to slow towards the end of the decade, and inflation returned to lower levels. The introduction of The New Tax System (TNTS) saw a large increase in the CPI between June 2000 and September 2001, though underlying inflation (i.e. the inflation rate excluding volatile items and price movements due to changes in tax regimes) is thought to have stayed relatively low.

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.

Trends in inflation — 1950 to 2001

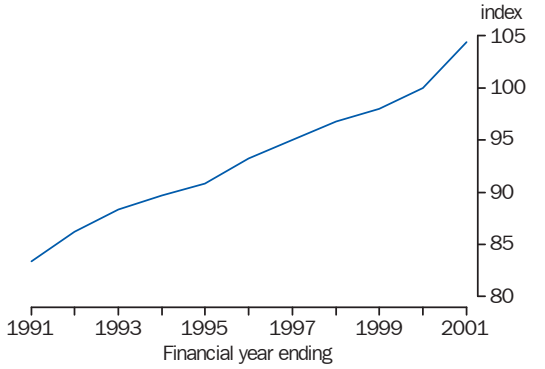
Inflation was relatively low in the 1950s and 1960s. The sharp rise in inflation in the first half of the 1970s was influenced by higher oil prices, wage growth and other factors. These inflationary pressures persisted into the 1980s, partly due to a second oil price shock.[4] Although at relatively 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.

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).

While the consumption series rose steadily between 1990–91 and 2000–01, the capital series was more volatile, and was comparatively flat during the periods 1993–94 to 1995–96 and 1996–97 to 1999–2000.

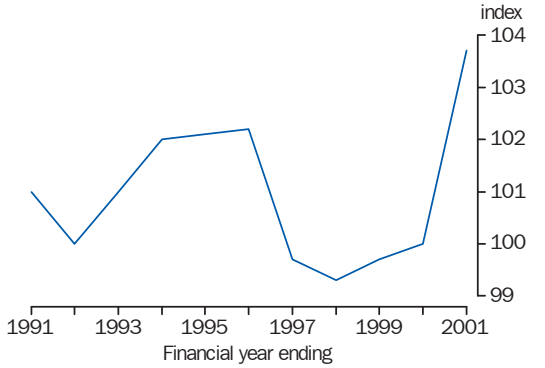
Chain price index of total final consumption expenditure(a)



(a) Reference year 1999–2000.

Source: Australian System of National Accounts, Cat. no. 5204.0.

Chain price index of total gross fixed capital formation(a)



(a) Reference year 1999–2000.

Source: Australian System of National Accounts, Cat. no. 5204.0.

Factors influencing change

The overall rate of inflation during the period 1990–91 and 2000–01 has been 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.[5]

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.[6] At the end of the decade, high petrol prices as well as the introduction of TNTS made a large contribution to the rise in the CPI and other price indexes between June 2000 and June 2001.

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.

Some of the increases in housing expenditure during 1999 and early 2000 may have been due in part to many Australians making property purchases and alterations and additions, before the introduction of the Goods and Services Tax 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.[7]

Capital formation

Capital formation (commonly termed 'investment') is the process of creating fixed 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.

Real gross fixed capital formation per capita grew strongly during most of the 1990s. Between 1990–91 and 2000–01 it rose by 3.1% a year on average. During the past decade, private sector capital formation accounted for around four-fifths of the total. Purchases of information technology (including computer hardware and software) are among the fastest growing components.[1]

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.)

Trends in capital formation

Between 1990–91 and 1991–92, real gross capital formation per capita fell by more than 6%. This was associated with the recession experienced by Australia in the late 1980s and early 1990s. However, capital formation recovered in 1992–93 and continued to increase through the remainder of the decade. Between 1992–93 and 2000–01, real gross capital formation per capita grew by almost 37%.

Some differences within Australia

During the past decade, there was strong growth in investment in dwellings (up 19% in real per capita terms between 1990–91 and 2000–01); investment in machinery and equipment also grew appreciably. By 2000–01, machinery and equipment accounted for about 36% of total private capital formation. Capital formation is undertaken by three sectors: general government, and private and public corporations.

Gross versus net capital formation

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

During the years 1990–91 to 2000–01, depreciation was equivalent to around 70–75% 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.

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

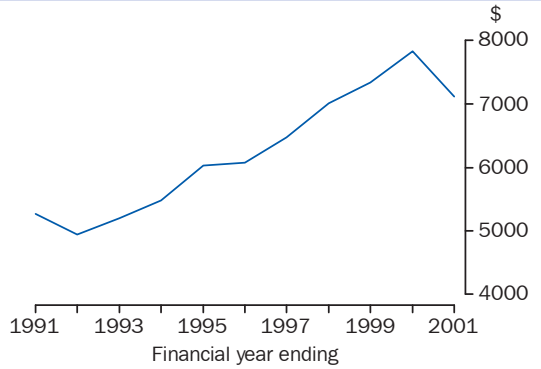
Asset type	*1990–91* $ per capita	*2000–01* $ per capita	*Average annual change* %
Dwellings	1 206	1 504	2.2
Other buildings & structures	1 010	958	-0.5
Machinery & equipment	1 217	2 212	6.2
Livestock	112	76	-3.9
Intangible fixed assets	165	612	14.0
Ownership transfer costs	374	420	1.2
Total	**3 962**	**5 782**	**3.9**

(a) Chain volume measures; reference year 1999–2000.

Source: Australian System of National Accounts.[1]

The private sector consistently contributed most to overall capital formation during the past decade. After an initial decrease in the early 1990s, private sector investment recovered and grew by 46% during the decade to 2000–01. The private sector's contribution to overall gross fixed capital

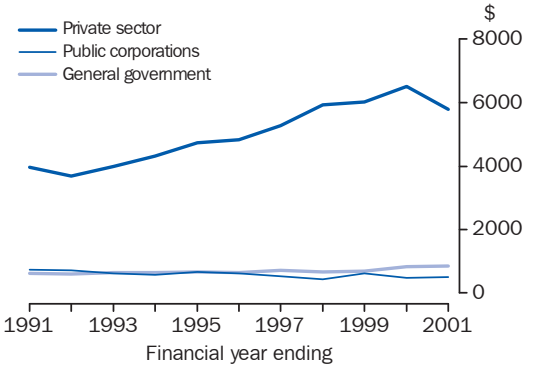
Real gross fixed capital formation per capita(a)



(a) Chain volume measures; Reference year 1999–2000.

Source: Australian System of National Accounts.[1]

Real gross fixed capital formation per capita(a), by sector



(a) Chain volume measures; Reference year 1999–2000.

Source: Australian System of National Accounts.[1]

formation rose from just over 74% in 1990–91 to about 82% in 2000–01. Government and public corporations made a smaller contribution to total real gross fixed capital formation per capita. Government investment accounted for about 12% of the total investment figure in 2000–01, while public corporations accounted for about 7%.

Investment patterns varied considerably from industry to industry during the 1990s. Real gross fixed capital formation in Communications rose by an average of almost 11% per year. Investment also increased substantially in Finance and insurance and Cultural and recreational services, both of which experienced growth of almost 10% a year.

Factors influencing change

The 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

Capital formation supports higher levels of production and income generation.

Gross fixed capital formation can be financed by either Australian saving or foreign saving.

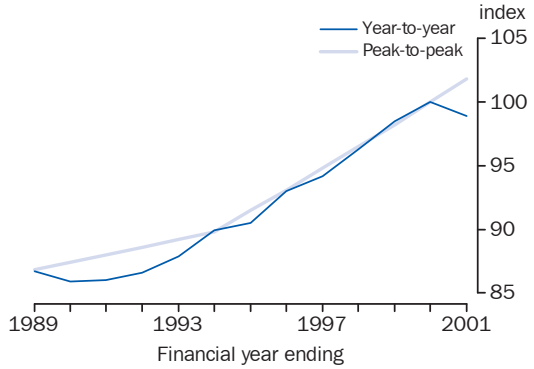
See also the commentaries *National income*, *National wealth*, *Saving*, and *Productivity*.

Productivity

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 that are distributed among those who provide the labour, or own the capital, land, etc. Benefits might also accrue in the form of lower consumer prices.

In recent years, Australia has experienced improved rates of productivity growth. During its most recent growth cycle (from 1993–94 to 1999–2000), Australia's multifactor productivity rose by 1.8% a year on average.[1] This was higher than the average rate of rise observed during the preceding thirty years.

Multifactor productivity(a)



(a) Reference year for MFP indexes is 1999–2000 = 100.

Source: Australian System of National Accounts.[1]

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. For example, during the six years of the most recent growth cycle, real output grew by 4.7%. In part, this reflected 1.7% growth in labour and 4.7% growth in capital, or 2.9% growth in labour and capital combined; the remaining 1.8% 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).

The intensity with which inputs to production are used varies with the ups and downs of economic activity (the 'growth cycle'). For example, during the early stages of a downturn, firms may retain the same quantity of labour as before even though their sales and output have been reduced. Influences of this kind can mask the underlying trends in productivity. So it is common practice to assess a rate of productivity change only for a whole growth cycle (say, from peak-to-peak).

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 the measures lies in which inputs are used in the denominator of the productivity ratio.

The most comprehensive measure of productivity is *total factor 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) — so this is 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 total factor productivity are available for very few countries.

More easily implemented are *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'), but this is not done at present, so such improvements flow through to the MFP measure.

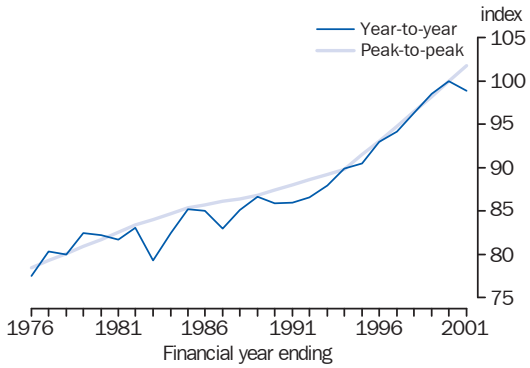
If only one input appears in the denominator, a single factor productivity measure is obtained. The most common such measures are *labour productivity* (the ratio of output to labour input) and *capital productivity* (the ratio of output to capital input). MFP is superior to such single-factor measures because the latter may be distorted by 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.

A longer term view

Multifactor productivity estimates for Australia extend back to the mid-1960s. Australia has experienced seven growth cycles during the past thirty five years. The 1.8% average annual improvement in multifactor productivity recorded during the most recent growth cycle (1993–94 through 1999–2000) is the highest rate of average annual improvement observed over any single cycle. The average rate of productivity improvement during the preceding seven growth cycles was 1.1% a year, and not since the growth cycle that ended in the mid-1970s had annual average improvement exceeded 1%.

Multifactor productivity: longer term view(a)



(a) Reference year for MFP indexes is 1999–2000 = 100.

Source: Australian System of National Accounts.[1]

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.

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. 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.

Labour productivity(a), average annual growth rate — 1993–94 to 1999–2000

Industry(b)	%
Agriculture, forestry and fishing	2.7
Mining	7.3
Manufacturing	2.8
Electricity, gas and water supply	6.7
Construction	1.0
Wholesale trade	6.0
Retail trade	1.9
Accommodation, cafes and restaurants	1.2
Transport and storage	2.4
Communication services	6.0
Finance and insurance	3.9
Health and community services	1.2
Cultural and recreational services	-0.5
All market sector industries	**3.0**

(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 last growth cycle, the most rapid increases in labour productivity were achieved by: Mining (7.3% a year on average), Electricity, gas and water supply (6.7%), Communication services and Wholesale trade (both 6.0%). Some of these industries have experienced significant technological advance or industrial reorganisation.

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, countries that experience higher rates of productivity growth than others can enhance their international competitiveness.

Knowledge and innovation and a more highly educated work force can contribute to productivity growth because they enhance the prospects of technological advances and of improvements to management and workplace practices.

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 require less draw-down of these resources and so have a smaller impact on the environment.

See also the commentaries *National income*, *Competitiveness*, *Inflation*, *Knowledge and innovation*, *Openness*, *Education and training*, *Land degradation*, and *Inland waters*.

Knowledge and innovation

Knowledge and innovation are important contributors to a nation's progress. For example, the development of new technologies and the application of technologies developed in other countries can improve Australia's productivity and raise national income.

No single indicator encapsulates all aspects of knowledge and innovation (see box below). This commentary focuses on three aspects for which data are available: some of Australia's investments in knowledge (namely expenditure on research and development, education and computer software); businesses' use of the Internet; and the number of knowledge-based workers.

Between 1990–91 and 2000–01, expenditure on education, research and development and computer software all rose, as did the proportion of the workforce in knowledge-related occupations. And since the late 1990s, the number of businesses using the Internet has grown very rapidly.

Worldwide during recent decades, new goods and services have emerged that account for rapidly growing shares of total expenditure. New production processes and whole 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.[1]

Research and development

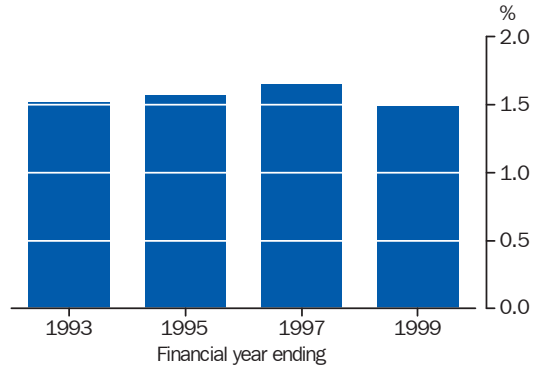
Research and development (R&D) can be viewed in many ways. One international standard definition is:

> "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."[2]

R&D encompasses both basic research (undertaken primarily to acquire new knowledge without a specific or immediate application in view) and applied research. The proportion of Australia's GDP devoted to R&D expenditure rose during the early part of the 1990s, and peaked in 1996–97 at 1.65%. However, by 1998–99 it had fallen back to 1.5%.

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 3.1%, for the USA 2.7%, for Germany 2.3% and for Canada 1.6%. But Australia also imports technology and processes embodying R&D from other countries.

Research and development expenditure, proportion of GDP — selected years



Source: Research and Experimental Development, All Sector Summary.[2]

The sources of funds for expenditure on R&D have changed appreciably during recent years. In 1988–89 governments funded 64% of the total, but by 1998–99 this proportion had fallen to 48%; during the same ten years, the proportion funded by business rose from 33% to 45%.

Expenditure on education

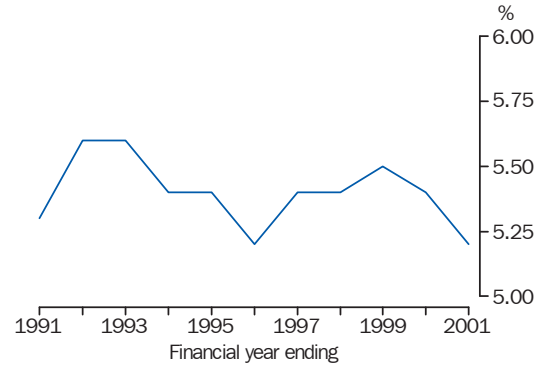
Education and training are important means by which Australians can participate more fully in economic and social life. A major source of growth in Australia's output and income has been improvement in human capital (the skills embodied in the Australian labour force). A more highly educated workforce is better able to develop or adopt technologies and organisational practices that enhance productivity. Skills enhancement can occur in a range of places (from formal educational institutions to on-the-job training and self instruction). Formal education remains a major contributor.

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 economic resources devoted to education, an indicator of which is the ratio of consumption and investment spending on education to GDP.
- 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.

Expenditure on education(a), proportion of GDP



(a) The sum of household and government consumption expenditure and private and government capital formation.

Source: *Australian System of National Accounts.*[3]

Educational institutions such as universities and schools both create and disseminate knowledge and innovation. During the past decade, education expenditure has been fairly steady as a proportion of GDP (between 5% and 5.5%). Government expenditure is by far the larger component (3.7% of GDP in 2000–01, compared to 1.5% accounted for by private expenditure).[3]

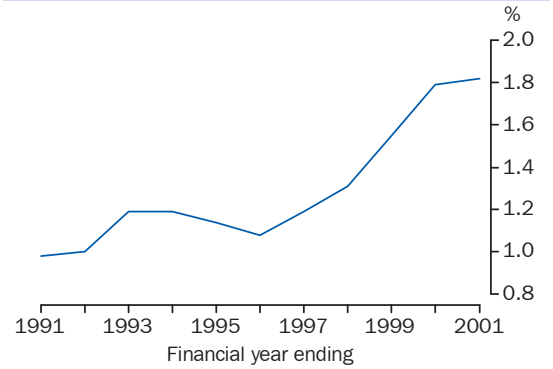
More information is provided in the commentary *Education*.

Investment in computer software

In recent years, information technology has become progressively more important to the Australian economy, as it has in most other countries. Innovations in this field 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.

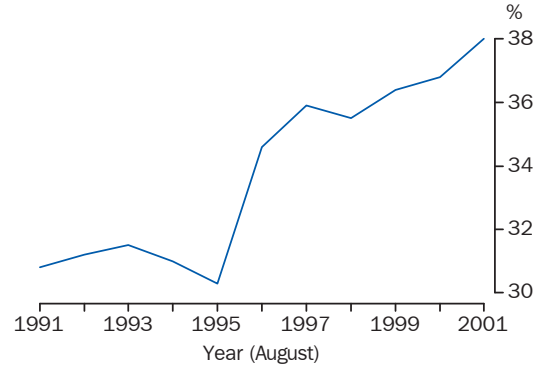
During the 1990s, Australian investment on software as a proportion of GDP has risen rapidly (from 1% in 1990–91 to 1.8% in 2000–01) despite falling software prices.[3]

Investment in software, proportion of GDP



Source: *Australian System of National Accounts.*[3]

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]

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; and
- 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 a little under 31% of employees in August 1991 to 38% in August 2001. The number of professionals and associate professionals grew particularly strongly (up 83% in the ten years to August 2001, whereas total employment rose by just 19%).[4]

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 1997–98, 6% of business had a Web site or home page; by 1999–2000, this proportion had risen to 16%.[5]

Proportion of businesses with Website or Homepage — 1997–98 and 1999–2000

	1997–98	1999–2000
No. of employees	%	%
1–4	4	9
5–19	8	24
20–99	21	46
100 or more	58	68
All businesses	**6**	**16**

Source: Business Use of Information Technology, 1997–98 and 1999–2000, Cat. no. 8129.0.

Links to other dimensions of progress

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 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.

Education both disseminates existing knowledge among the Australian population and enhances the probability that Australians will generate or adopt new technologies and other innovations.

See also the commentaries *Education and training*, *Health*, *Work*, and *Productivity*.

Competitiveness

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, in part reflecting exchange rate movements. Overall between 1990–91 and 2000–01, Australia's real effective exchange rate (one indicator of competitiveness) fell by more than 30% (an improvement in our competitiveness).[1]

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. The real effective exchange rate (REER) is one indicator of this kind. When compiling a REER, there is a variety of price measures to choose from; this commentary uses a measure based on relative unit labour costs adjusted for changes in exchange rates (see box).

Australia's REER fluctuated a good deal during the 1990s, largely reflecting exchange rate movements. The REER fell by just over 22% between 1990–91 and 1993–94, then rose by almost 23% to 1996–97. But it has fallen by more than 27% during the past four years, putting Australia in a more competitive position than a decade earlier.

Factors influencing change

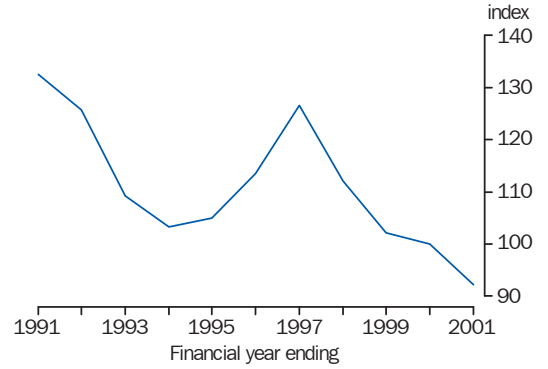
Changes in a nation's competitiveness are the outcome of many interconnecting influences. Most fundamental in the long run are such factors as technological advance and productivity improvement.

Changes in a REER indicator reflect the relative pace of change in productivity and prices in Australia and overseas. And because our headline indicator of competitiveness focuses on unit labour costs, its movements can be dissected into the influences of three factors:

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

Real effective exchange rate(a)



(a) Other things equal, a fall in REER indicates improved competitiveness. Base year is 1999–2000=100.

Source: Australian Economic Indicators; and the Commonwealth Treasury Economic Round-up.[1]

Nevertheless, relative unit labour costs changed only marginally between 1990–91 and 2000–01 exchange rate movements were the major influence on changes in Australia's international competitiveness during the past decade.

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. But overall there was a fall during the past decade — between 1990–91 and 2000–01, our exchange rate with the US dollar, for example, fell by 34%. There were also falls relative to the

Measuring Australia's competitiveness

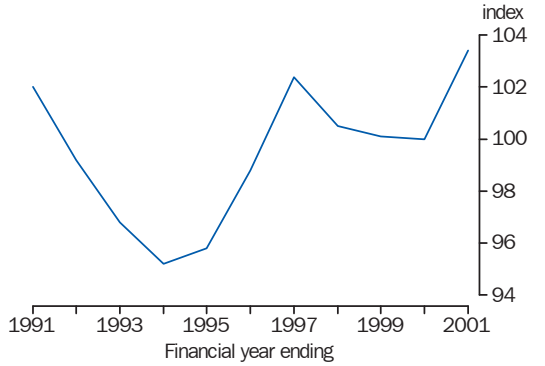
A country's international competitiveness can be measured in many ways. For the kind of measure adopted in this commentary, the real effective exchange rate, two influences are particularly important.

- 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.

Several choices have to be made when deriving a REER measure.

- Choosing the measure of price movements. One might use, say, a consumer price index or a national accounts price deflator as one's measure of price movement. The headline competitiveness measure uses unit labour costs — that is, an index of the wages paid per unit of output. In recent years, REERs based on the three different price indexes have all shown quite similar movements.
- Choosing the measure of exchange rate movements. One has to choose a measure of exchange rate relevant to the competitiveness of both imports and exports. The headline competitiveness measure is based on trade-weighted exchange rates relative to the currencies of four major trading partners — Japan, the USA, the UK and Germany.

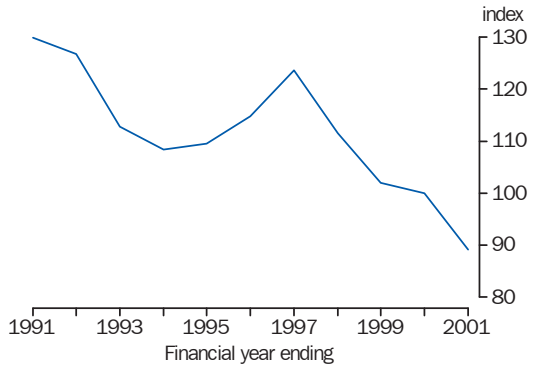
Relative real unit labour costs(a)



(a) Base year is 1999–2000=100.

Source: Australian Economic Indicators; and the Commonwealth Treasury Economic Round-up.[1]

Nominal exchange rate(a)



(a) Trade-weighted index relative to major trading partners. Base year is 1999–2000=100.

Source: Australian Economic Indicators; and the Commonwealth Treasury Economic Round-up.[1]

currencies of other major trading partners such as the Japanese Yen (down almost 41%) and the United Kingdom pound (down almost 24%). Other things being equal, these depreciations have made Australia more competitive.

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.

See also the commentaries *National income*, *Productivity*, *Inflation,* and *Openness*.

Openness

Openness — the interaction of Australia's economy with other economies — can provide benefits to Australians. An increased openness to imports means that Australians have a wider range of goods and services to choose from, often at more competitive prices. And 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: Australia's imports of goods and services, and foreign investment flows into Australia.

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.[1] 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 weights, that should be assigned to the various restrictions.[2]

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.

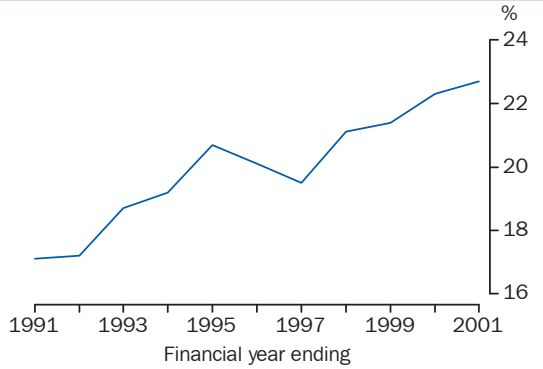
Australian imports of goods and services

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 1990–91 and 2000–01 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 1990–91 and 2000–01.

Ratio of imports to GDP



Source: Australian System of National Accounts, Cat. no. 5204.0.

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.[3] To measure this aspect of progress in openness, we look at the ratio of foreign investment in Australia to Australia's gross domestic product.

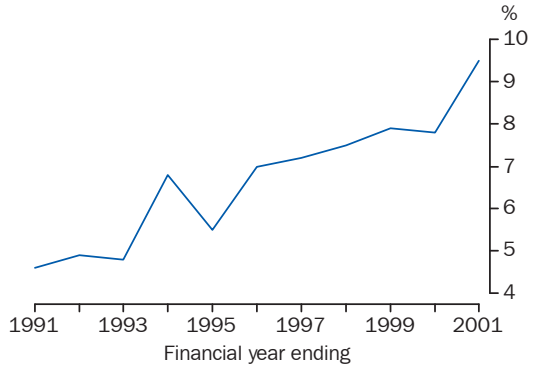
Trends in openness

The first graph shows the ratio of imports to GDP, from 1990–91 to 2000–01. During this period, the ratio increased from just over 17% to a little under 23%. The second graph shows the ratio of foreign investment in Australia to GDP. The value of incoming foreign investment transactions has generally risen over the period 1990–91 to 2000–01.

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

Ratio of foreign investment inflow into Australia to GDP



Source: Balance of Payments and International Investment Position.[4]

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; and
- other investment — transactions not included as direct or portfolio investment, such as trade credits.[5]

In June 2001, portfolio investment accounted for 56% 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 2001 were Finance and insurance, and Manufacturing.[4]

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.[6] World trade negotiations have played an important part in this gradual dismantling of border protection.

Another way in which economic policy has led to an increase in openness in Australia is through the liberalisation of capital flows. Since the deregulation of the financial system in the mid-1980s, capital transactions, including foreign investment in Australia, have greatly increased in volume.

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

Capital imports tended to increase at a much slower rate than consumption imports over the decade. For example, the nominal value of machinery and industrial equipment imports increased by only 98% between 1990–91 and 2000–01, compared with a 172% increase in the value of imported household electrical items and a 290% increase in the value of motor vehicle imports.

Other factors influencing the size and importance of Australia's imports include changes in the relative prices of imports and exports brought about by fluctuations in the exchange rate (see the commentary *Competitiveness*), and changes in the tastes of domestic consumers.

Links to other dimensions of progress

Increased openness to imports can be linked with greater competitiveness, and can affect the consumption patterns of Australians. Improvements in productivity can also be associated with greater openness to foreign investment.

Crime: Looking more closely

The headline commentary *Crime* discussed national trends in the prevalence of unlawful entry with intent, assault and homicide. This supplementary commentary looks at these and other crimes and how their prevalence differs across the States and Territories. Imprisonment rates are also discussed.

Statistics from various sources show that crime rates can differ greatly between places, be they cities, suburbs or particular rural areas.[1] There are likely to be many reasons for the differences. Places with high rates tend to have often interrelated problems of disadvantage (such as low income, high unemployment, low levels of educational attainment, family relationship problems, and high levels of drug use). But 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. While high crime rates are often associated with particular localities, differences can also be seen when crime rates in wider communities are compared. For instance, they tend to be higher in metropolitan than in non-metropolitan areas.[2] 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.[3]

State/Territory differences

In 2000 crime victim rates, based on police records, varied considerably among Australia's States and Territories, and no single State had the highest (or lowest) rate for all offence categories. New South Wales had by far the highest crime rate for robbery and kidnapping/abduction offences, but murder, assault and sexual assault were more prevalent in the Northern Territory, while property crimes (excluding motor vehicle theft) were more prevalent in Western Australia. Motor vehicle theft rates were highest in the Australian Capital Territory (ACT) followed by South Australia. Despite exceptions for some categories of offence, Victoria and Tasmania were generally more likely to have crime rates below the national average across the offence categories shown. The ACT also had below average rates for all the personal offence categories and Queensland had below average rates of property crime.

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 or victims of crime and some of these groups are more highly represented in certain States. For example, States and Territories with relatively young 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).[4] The extent to which there are 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 use in each community may also be important. Yet other factors such as the level of policing activity and the way police record crimes may be important, as may differences in the proportions of victims who actually report the crime to police.

It should be noted that differences in reporting rates for selected offences across the States and Territories (as described in a later section) suggest

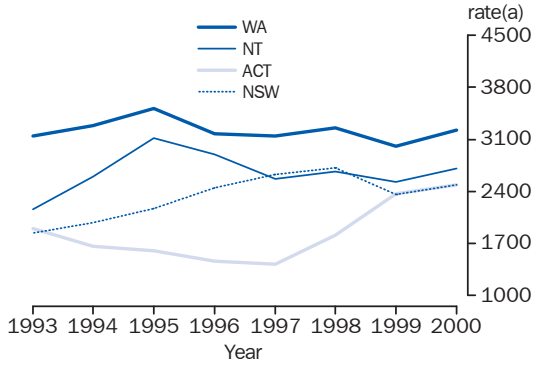
Victims of selected offences recorded by police(a) — 2000

Selected offences	NSW	Vic.	Qld	SA	WA	Tas.	NT	ACT	Aust.
	rate	rate	rate	rate	rate	rate	rate	rate	rate
Personal crime									
Murder	1.6	1.2	2.2	1.5	1.6	1.5	3.1	np	1.6
Assault	1 063.1	347.1	526.0	1 029.8	749.8	577.8	1 579.8	565.2	736.8
Sexual assault	92.4	51.9	102.8	97.8	81.2	41.2	117.2	31.5	81.6
Armed robbery(b)	72.5	37.5	33.7	39.1	52.3	16.6	16.4	37.6	49.5
Unarmed robbery(b)	133.6	32.3	32.6	72.3	58.3	19.8	17.9	61.8	72.3
Kidnapping/abduction	5.9	2.2	2.7	2.9	2.3	2.1	np	1.6	3.6
Property crime									
Unlawful entry with intent(c)	2 484.9	1 652.9	2 166.4	2 424.0	3 299.5	2 131.1	2 711.5	2 493.9	2 280.8
Motor vehicle theft(d)	792.9	767.8	522.6	899.0	632.4	715.8	510.6	924.6	726.2
Other theft(b)	3 594.0	2 963.1	3 171.2	4 591.7	4 685.5	2 750.8	3 196.0	3 854.4	3 523.1

(a) Victims (which refer to individual people or other entities as noted in the subsequent footnotes) per 100,000 people. (b) Victims can include organisations as well as individuals. (c) Victims are places/premises entered. (d) Victims are motor vehicles.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

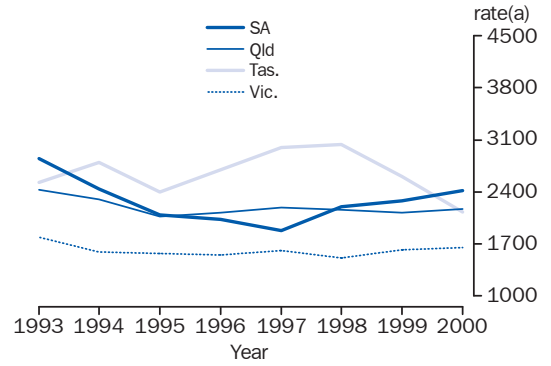
Unlawful entry with intent victimisation rates, States and Territories with the highest rates in 2000



(a) Rate per 100,000 people.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

Unlawful entry with intent victimisation rates, States and Territories with the lowest rates in 2000



(a) Rate per 100,000 people.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

that the relative ranking of the States and Territories may have differed somewhat if all crimes had been reported to police.

Recent trends

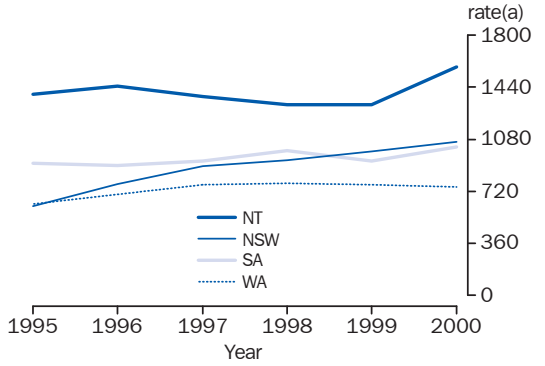
Changes in crime rates, based on police records, within each of the States and Territories through the 1990s show some quite different trends, which also differ according to the nature of the offences involved. Such differences are illustrated by focusing on the two major offence categories presented as the headline indicators (unlawful entry with intent and assault) and are shown in the graphs on this page.

While national rates of unlawful entry with intent increased slowly between 1993 (when comparative statistics first became available) and 2000, this trend was not uniform. The annual rates fluctuated in many of the States, but in Western Australia, the Northern Territory, the ACT and New South Wales (the four States/Territories with the highest rates in 2000, listed from highest to lowest) the rates were higher in 2000 than in 1993, while in South Australia, Queensland, Tasmania and Victoria they were lower. New South Wales, closely followed by the ACT, experienced the greatest increases over the period (the rates for unlawful entry with intent increased by 35% and 31% respectively).

It is not known why the large fluctuations, evident in most States and Territories, occurred. However, some of the changes may have been associated with changes in levels of drug-related crime, changes in policing strategies, and changes in levels of reporting.

Comparative data relating to the prevalence of assault cover a shorter time period than for unlawful entry with intent, and have generally been less volatile. In the six year period 1995 to 2000, assault rates increased in all States and Territories except Victoria (the State with the lowest rates over the entire period) and Queensland (which also had relatively low rates). New South Wales, being among the States with the highest rates (see graphs below), experienced the greatest increase in rates: up by 72% between 1995

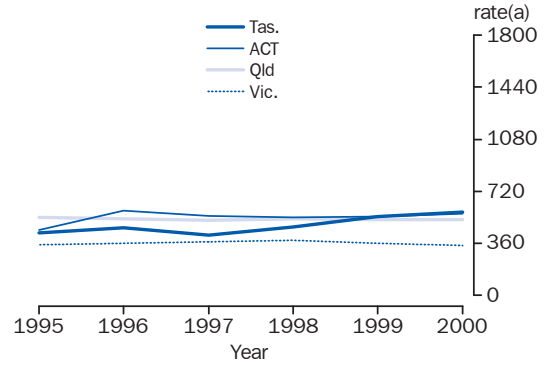
Assault victimisation rates, States and Territories with the highest rates in 2000



(a) Rate per 100,000 people.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

Assault victimisation rates, States and Territories with the lowest rates in 2000



(a) Rate per 100,000 people.

Source: Recorded Crime, Australia, 2000, Cat. no. 4510.0.

International comparison

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 by researchers for the Home Office of the United Kingdom, are presented below.

For the period 1997 to 1999, 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 0.8 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 that recorded in Canada (1.9) and New Zealand (2.0). Higher homicide rates were recorded in some other parts of the world. For instance the rates in the USA and South Africa were 6.3 and 56.5 respectively.

Homicide rates(a) — 1997 to 1999

Selected countries	Homicide rate
European Union member States	
Austria	0.8
England and Wales(b)	1.5
France	1.6
Greece	1.7
Northern Ireland(b)	3.1
Italy	1.6
European Union — average for 17 member States	1.7
Other countries	
Australia	**1.9**
Canada(c)	1.9
Japan(d)	1.0
New Zealand(e)	2.0
South Africa	56.5
USA	6.3

(a) Homicides per 100,000 of the population, three year average. (b) Data relate to financial years beginning 1 April of each year. (c) Excluding euthanasia. (d) Includes attempts. (e) 1998 to 1999 only.

Source: Barclay G., Tavares C. and Siddique A. 2001, International Comparisons of Criminal Justice Statistics, 1999. Home Office, United Kingdom.

and 2000, with the rate increasing each year over this period. The next highest increase occurred in Tasmania (34%) and the ACT (24%), although in 2000 the assault rates there (578 and 565 per 100,000 persons respectively) remained substantially below the Australian average (737 per 100,000 persons). As previously noted, the Northern Territory had the highest assault rate in 2000, which continued the pattern seen in previous years.

Crime reported to police

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.

The table below outlines results for each of the States and Territories. For break-ins (which exclude attempted break-ins) the national reporting rate in 1998 was 78%, with Victoria having the highest rate (83%) and the Northern Territory the lowest rate (66%). For assault, victims were much less likely to report the most recent incident to the police — for Australia the reporting rate was 28%, ranging from 31% in South Australia to 20% 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.

Despite some changes in the way in which data were collected between surveys,[5] there is evidence to suggest that the propensity to report some crimes has changed over time. Thus comparisons with similar data from the 1993 Crime and Safety Survey show a decrease in the reporting rates for assaults (32% in 1993 compared to 28% in 1998 nationally). The results show that a decrease occurred in all States and Territories except Queensland. However, the reporting rate for break-ins had remained much the same at the national level with only relatively small changes occurring in some States and Territories. At the national level the reporting rates for break-ins were 79% and 78% in 1993 and 1998 respectively.

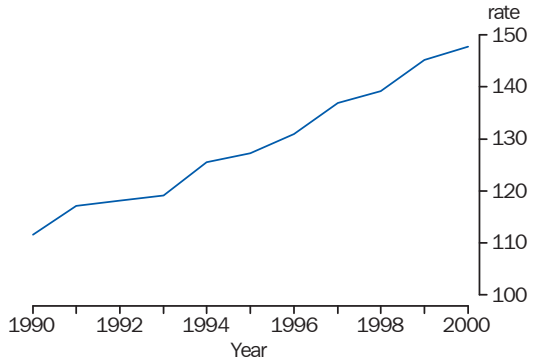
Crime reporting rates(a) — 1993 and 1998

State/ Territory	*Break-in*		*Assault(b)*	
	1993	*1998*	*1993*	*1998*
	%	%	%	%
NSW	73.4	74.7	31.9	30.4
Vic.	82.9	83.2	35.3	23.2
Qld	74.9	74.6	28.6	30.2
SA	81.2	79.8	31.5	30.8
WA	85.1	80.8	35.3	25.3
Tas.	80.5	77.8	31.9	23.8
NT(c)	n.a.	66.4	n.a.	28.8
ACT	72.1	76.0	30.9	19.7
Aust.	**78.5**	**77.5**	**32.1**	**27.7**

(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.

Source: Crime and Safety Survey, Australia, 1993 and Crime and Safety Survey, Australia, 1993, both Cat. no. 4509.0.

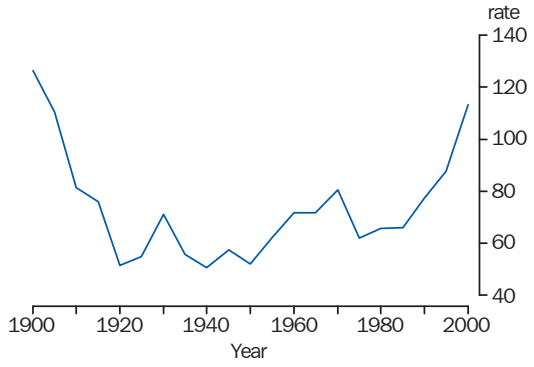
Imprisonment rates, per 100,000 adults(a)



(a) Rate per 100,000 persons aged 17 years and over.

Source: Prisoners in Australia, 2000, Cat. no. 4517.0.

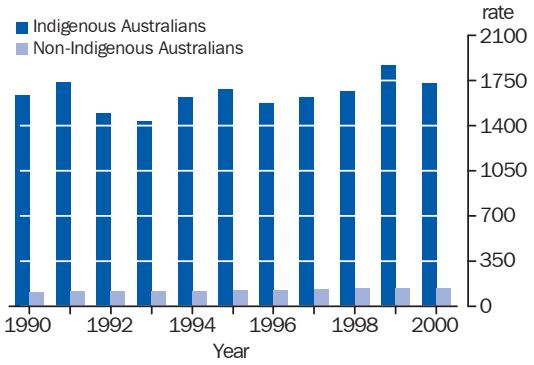
Imprisonment rates, per 100,000 persons(a)



(a) Rate per 100,000 persons 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, 2000, Cat. no. 4517.0.

Indigenous and non-Indigenous imprisonment rates, per 100,000 adults(a)



(a) Rate per 100,000 persons aged 17 years and over.

Source: Prisoners in Australia, 2000, Cat. no. 4517.0.

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.

As seen in the graph above, the rate of imprisonment has increased every year over the decade 1990–2000 so that by 2000, 148 adults (those aged 17 years or over) in every 100,000 were serving a prison sentence — up from 112 per 100,000 in 1990.

Historical data compiled by the Australian Institute of Criminology, given in the graph opposite, show that this trend has been part of a longer term trend over the last twenty 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), the graph also shows that imprisonment rates in 2000 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 2000 there were 113 prisoners per 100,000 persons (of all ages) compared to 126 in 1900.

The imprisonment of Indigenous Australians has been a major issue of social concern in Australia, with imprisonment rates much higher than those of the general population. There have also been related concerns about the high proportion of Indigenous Australians in prisons dying of unnatural causes, especially by suicide.[6]

In 2000, there were 1,727 Indigenous prisoners per 100,000 adults of Aboriginal or Torres Strait Islander origin, an imprisonment rate over 14 times the rate for non-Indigenous people (122 prisoners per 100,000 adults). The Indigenous imprisonment rate fluctuated through the 1990s, but in 2000 it was higher than in 1990 when the rate was 1,638 prisoners per 100,000 adults. In June 2000, there were close to 4,100 Indigenous prisoners in Australia; they represented 19% of the 21,714 people in prison at that time.

Communication and transport

Access to the Internet among Australian households grew rapidly between 1996 and 2000, and 37% of households were using the Internet at home by November 2000.[1] However, there are substantial differences in levels of access between different groups of the population.

Access to motor vehicles also increased through the 1990s, and in 2001 there was about one passenger vehicle for every two Australians.[2]

Communication

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 focusses on the Internet, a new and 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. On-line 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 1996 (when data were first collected) and 2000. In February 1996, about 260,000 households (fewer than 4%) had access to the Internet.[3] By November 2000 this figure had risen to 2.7 million (37% 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 2000, adults were more likely to access the Internet at home than at any other place.[1]

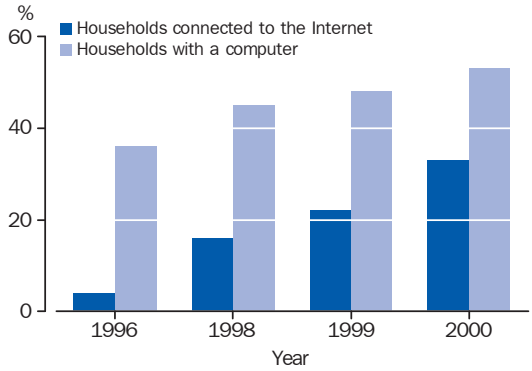
Between 1996 and 2000, 99% of households connected to the Internet used a computer for access. Households' ownership of computers increased over the period, though not as strongly as their use of the Internet. In February 1996 just under 2.2 million households owned a computer (34% of households); one in nine of these households was connected to the Internet.[3] By November 2000 some 4 million households owned a computer (56%), and more than two-thirds of these households were connected to the Internet. About 45% of households with access to the Internet used it daily, while a very high proportion (93%) accessed the Internet at least once a week.[1]

Some differences within Australia

In November 2000, access to the Internet at home differed according to the characteristics of households, such as income, location and family structure. Households with incomes of $50,000 or more were nearly three times as likely to have access to the Internet at home than those with incomes under $50,000 (57% compared to 21%). Households with children under 18 years old were more likely to have access than those without children (48% compared to 32%). Metropolitan households with different incomes or family structures were more likely than their counterparts outside the cities to access the Internet at home (some 40% of households in metropolitan areas used the Internet at home, compared to 32% of those living outside these areas).[1]

Among the States and Territories, the ACT had the highest proportion of households connected (48%) in 2000, possibly because of the ACT's relatively high average incomes and young age profile. Other States with a relatively high proportion connected were the NT (36%), Victoria and Western Australia (both 34%) and New South Wales (33%). Tasmania had the smallest proportion connected, just 26%.[3]

Computer ownership and Internet access, households



Source: Household Use of Information Technology, 1996–2000, Cat. no. 8146.0.

Telephones

Telephones remained one of the major communication tools throughout the 1990s. According to the OECD, the number of fixed phone lines in Australia rose by over a third between 1990 and 1999, from 7.8 million to almost 10.5 million.[8] There was also a very significant rise in mobile phone ownership during the decade. Data from the International Telecommunications Union show that in 1990 there was about one mobile phone for every hundred Australians.[9] By 1995 this figure had increased to 13 mobile phones per hundred people. In 1999 the OECD put the figure at almost 40 mobile phones per hundred Australians.[8,9]

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 increased rapidly between 1998 and 2001, 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 to have the full opportunities to participate in social, economic and political life.

Adults using the Internet

One can also consider the characteristics of the individuals — rather than the households — that use the Internet. In the 12 months to November 2000, half of the adults in Australia accessed the Internet at home or elsewhere. Almost a third of all adults accessed the Internet at home, while a quarter used it at work. A further 24% 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 74% of adults aged 18–24 years were Internet users, but only 19% of those aged 55 years or over used the Net. Adult men were slightly more likely than women to have been Internet users (53% to 47%). Those in employment were also much more likely to have used the Internet than other adults. Some 63% of employed adults used the Internet in the 12 months up to November 2000, compared to 25% 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 US).[4] Comparing information from different countries can be problematic, and these 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 a quarter of all children accessing from home and almost a 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%).[5]

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.[3]

Well over half of the 3.3 million households without a computer reported either that they had no need for a computer or no interest in having one at home. A little less than a quarter reported high costs as the main reason for being without a home computer.[3]

Half of the 4.8 million households without access to the Internet at November 2000, reported that the household either had no need for the Internet or had no interest in having access. And another fifth said that high costs were the main reason the household did not have home Internet access.[3]

Although the ABS has little information about the changing cost of Internet access, the price of home computers has fallen steadily during the 1990s, while the capability of those computers has improved dramatically.[6]

Interest in the Internet is likely to rise as the breadth of on-line services increases and people become more accustomed to using them. For example, the proportion of adults using the Internet for financial transactions is on the increase. Between 1999 and 2000 the proportion of adults performing a transaction via the Internet rose from 3% to 9%. Internet shopping is becoming more common too. In 2000, 15% of adult Internet users were Internet shoppers compared to only 12% in 1999. In that year, almost 1.3 million adults accessed government services, primarily for paying bills or accessing taxation information and, to a lesser extent, employment information.[3]

Other factors believed to influence Internet use include lack of skills and training and concerns over security. The use of the Internet in the workplace is also 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

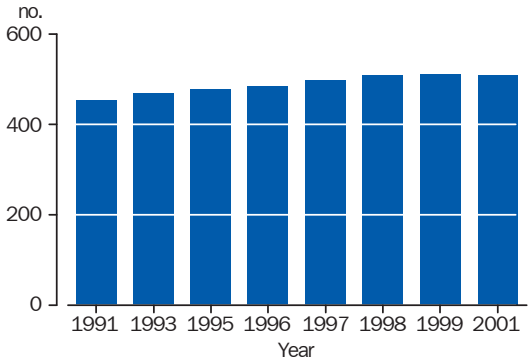
Using the Internet at home can affect the way people work. In 2000 some 430,000 adults had an ongoing agreement with their employers to work from home some or all of the time.[3] Around 35% of these employees accessed their employer's computer system using a modem.[1]

The Internet can be used for education; it is a powerful research tool and many education institutions are developing distance learning courses over the Net. 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 attachment: 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 Net 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. Economic theory suggests that this might make Australian industry more competitive, both domestically and internationally.

Passenger vehicles per 1,000 people



Source: Motor Vehicle Censuses, Australia, 1991–2001, Cat. no. 9309.0.

Transport

Many aspects of transport have a bearing on Australia's progress. The movement of people and goods (from home to work, from producers to consumers, etc.) depends on the availability of efficient and affordable transport.

It is difficult to conceive of 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 decent or affordable is a matter of personal opinion and is hard to measure. Even if data were available, there is no obvious way in which these aspects could be combined into one number.

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. In 2001, an estimated 90% of registered vehicles used petrol. The proportion of the entire fleet using diesel fuel rose between 1991 and 2001, from 6% to almost 9%, and there was particularly strong growth in the proportion of passenger vehicles using diesel, which almost doubled from 1.3% to 2.5%.[2] But although Australians were using more fuel per capita, vehicles were more fuel efficient in 2001 than in 1991. Passenger vehicles used an average 12.3 litres per 100 km in 1991. By 2001 this had fallen to 11.7 litres per 100km.[7]

Government policy aimed at reducing lead emissions from car exhausts provoked a strong shift away from leaded petrol over the decade 1991–2001. In the 12 months to September 1991 unleaded petrol accounted for less than 40% of petrol sold in Australia. In the twelve months to March 2001 it accounted for almost 85%. There was also a shift towards the use of LPG/CNG/dual fuel by passenger vehicles between 1991 and 2001. The amount of such fuel used increased from 840,000 litres in 1991 to 1.3 million litres in 2001, and gas's share of total fuel consumed by passenger vehicles increased from 6% to 8%.[7]

Environmental concerns associated with motor vehicle use, primarily some types of air pollution and greenhouse gas emissions, are measured here by indicators relating directly to those concerns (see box). This commentary focusses on access, and access to the motor car remains important to many Australians. Statistics on motor vehicle registrations can tell us how access to cars might be changing over time.

On 31 March 2001 there were over 9.8 million registered passenger vehicles in Australia, up from around 7.8 million in 1991. In 2001, passenger vehicles accounted for over 80% of the vehicle fleet, with trucks, buses, motor cycles and light commercial vehicles comprising the rest (another 2.6 million vehicles). The motor vehicle fleet grew more quickly than the population in the 1990s. By 2001 there were 509 passenger vehicles for every 1,000 people in Australia, up from 453 vehicles per 1,000 people in 1991.[2]

Each passenger vehicle travelled an average 14,800 kms in the year to 31 October 2000, about the same distance as in the year to 30 September 1991.[7]

Some differences within Australia

The highest levels of passenger vehicle registrations were in South Australia, with 568 vehicles per 1,000 resident population, up from about 502 vehicles per 1,000 people in 1991. The Northern Territory had the lowest rate with about 345 vehicles per 1,000 resident population in 2001, up from about 331 vehicles per 1,000 people in 1991.[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 2001, some 3.1 million passenger vehicles (30% of all vehicles) were registered in New South Wales, more than any other State or Territory. Between 1991 and 2001 there was a strong rise in the proportion of registrations in Queensland, where the fleet grew by almost 40% in the ten years to March 2001. Population growth in Queensland was 21% over that period. By contrast, growth in the Tasmanian fleet was slowest (up by 9% over the period), with a slight growth in the population (0.5%).[2] In 2000, passenger vehicles registered in the ACT travelled most, on average 16,200 kms a year, while South Australia-registered vehicles recorded the lowest average distance travelled, of 12,600 kms.[7]

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. A growing trend of working from home, using the Internet and other 'dial-up' facilities, might help to decrease car use in Australia.

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 air pollution in Australia, and also an important source of greenhouse emissions.

See also the commentaries *National income*, *Education and training, Knowledge and innovation*, *Work*, *Social attachment, Air quality,* and *Greenhouse gases*.

Culture and leisure

People need time to participate in cultural and recreational activities. Also, 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.

Although the ABS recognises the importance of this aspect of progress, 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 often considered an improvement in the quality of life. 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. Others may work longer hours, possibly taking on a second job, to invest for future leisure and recreation. 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 *Economic disadvantage and inequality.* Some of the barriers to access are considered in the *Communication and transport* commentary.

The *Social attachment* 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, Economic disadvantage and inequality,* and *Social attachment.*

Governance, democracy 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.

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 regarded as more controversial questions than economic output and health, and partly because they were harder to measure than more concrete statistics, e.g. for the value of goods produced or the rate of infant mortality.

More recently a number of projects from academics and national and international organisations including the United Nations, the World Bank and the European Union, have been trying to measure this area of progress.[1]

During ABS consultations with experts and community representatives, a number of people suggested that indicators of governance and citizenship should be included in any publication that was trying to provide a comprehensive view of Australia's progress.

Our consultations and an examination of the literature have brought to light a wide range of views about what aspects of governance, democracy and citizenship are most important to Australia's progress.

For example, a recent research note prepared by Parliamentary Library listed four possible definitions for the term 'governance':[2]

1. the management of public resources and other public administration;
2. the activities of government and the system of governing;
3. government's interaction with civil society and citizens in general — which covers such matters as the accountability mechanisms under which Parliamentarians operate; and
4. the interactions of traditions, values, institutions, and processes that shape society (or the exercise of power in society by governments and others).

Also, various indicators that encapsulate some of these aspects have been proposed during our consultations. Some people have said that a commentary on governance and citizenship should provide indicators of such things as:

- philanthropy (gifts to domestic charities and overseas aid);
- public trust in governments and institutions;
- the proportion of women in government; and
- people's active participation in democratic decision making (such as the proportion of people who vote in non-compulsory elections, or the proportion of young people on the electoral roll).

Others have said that the commentary should focus more on 'societal governance' — say, the capacity of people to conduct their relations civilly with one another, to achieve workable compromises among differing views, and to cooperate without the intervention of government. This last is sometimes characterised as 'active citizenship'. Relevant indicators might cover:

- trust between people;
- the size of the nonprofit sector; and
- the level of volunteering (say, the percentage of people who report that they are volunteer members of management committees and the like).

There is some overlap between this view of citizenship and the headline commentary *Social attachment* covered earlier in this publication.

The ABS agrees it should include indicators of governance, democracy and citizenship in future issues of *Measuring Australia's Progress.* But in the light of the wide variety of views and suggestions we have received, we are of the view that we need to consult more widely about how to give statistical expression to this important dimension of national progress.

The ABS would welcome readers' views. (Contact details are in the Foreword.)

Endnotes — supplementary commentaries

Health: Looking more closely

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4 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.

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Work: Looking more closely

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Appendix I: Criteria for selecting indicators

Headline indicators

Measuring 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 an unambiguous '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; and
- 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.

Appendix II: Acknowledgements

The expert group

The expert group was formed in 2000 to help guide this publication's development. It met three times: in October 2000, February 2001 and August 2001. Each member is expert in one or more areas of Australian progress, and members of the group also commented on parts of the draft publication.

The members were:

Mr Ian Castles	Australian National University
Mr Richard Eckersley	Australian National University
Dr Clive Hamilton	The Australia Institute
Professor Ann Harding	National Centre for Social and Economic Modelling
Ms Betty Hounslow[1]	formerly Australian Council of Social Services
Professor Max Neutze[2]	formerly Australian National University
Ms Eleri Morgan-Thomas[3]	New South Wales Federation of Housing Associations
Dr Michael Salvaris	Swinburne University
Dr Denis Saunders	Sustainable Ecosystems, Commonwealth Scientific and Industrial Research Organisation

1. Betty Hounslow left the group in early-2001.
2. The late Professor Neutze attended the first meeting.
3. Eleri Morgan-Thomas joined the group in mid-2001.

Other people and organisations we would like to thank

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New South Wales agencies and departments: Department of Housing; Department of Land and Water Conservation; Department of Public Works and Services; Department of State and Regional Development; Department of Urban Affairs and Planning; Department for Women; Environment Protection Authority; Police Service New South Wales; Roads and Traffic Authority; Department of the Treasury.

Victoria agencies and departments: Department of Education and Training; Department of Human Services; Department of Infrastructure; Department of Natural Resources and the Environment; Department of Premier and Cabinet; Department of State and Regional Development; Department of Treasury and Finance.

Queensland agencies and departments: Arts Queensland; Commission of Children and Young People; Department of Emergency Services; Department of Employment and Training; Department of Housing; Department of Industrial Relations; Department of Innovation and Information Economy; Department of Justice; Department of Local Government and Planning; Department of Main Roads; Department of Natural Resources and Mines; Department of Premier and Cabinet; Department of Primary Industries; Department of Public Works; Department of Sport and Recreation; Department of State Development; Department of the Treasury; Department of Transport; Environment Protection Agency; Multicultural Affairs Queensland; Office of Economic and Statistical Research; Queensland Health; Queensland Railways.

South Australia agencies and departments: Attorney-General's Department; Australian Centre for Policing Research; Division of State Aboriginal Affairs; Department for Administrative and Information Services; Department of Education, Training and Employment; Department of Environment, Heritage and Aboriginal Affairs; Department of Human Services; Department of Industry and Trade; Department of Justice; Department of Premier and Cabinet; Department of Treasury and Finance; Department of Transport, Urban Planning and the Arts; Information Economy Policy Office; Senior Secondary Assessment Board of South Australia.

Western Australia agencies and departments: Aboriginal Affairs Department; Chamber of Commerce and Industry; Chamber of Minerals and Energy; Department of Commerce and Trade; Department of Conservation and Land Management; Department of Environmental Protection; Department of the Treasury; Family and Children's Services Policy Office; Health Department; Ministry of Justice; Office of Housing Policy; Office of Seniors' Interests; Ministry of Planning; Ministry of Premier and Cabinet; Office of Citizenship and Multicultural Interest; Office of Energy; Sport and Recreation; Western Australia Police Service; Women's Policy Office.

Tasmania agencies and departments: Arts Tasmania; Department of Health and Human Services; Department of Premier and Cabinet; Department of Primary Industries, Water and Environment; Department of State Development; Resource Planning and Development Commission; State Library of Tasmania.

Northern Territory agencies and departments: Attorney General's Department; Department of Asian Relations and Trade; Department of Lands, Planning and Environment; Key Centre for Tropical Wildlife Management; Office of Aboriginal Development; Office of Supervising Scientist; NT Tourist Commission; Department of Transport and Works; Treasury.

ACT agencies and departments: Chief Minister's Department; Department of Health, Housing and Community Care; Department of Planning, Land and Management; Department of Urban Services.

Local government: Adelaide City Council, South Australia; Brisbane City Council, Queensland; City of Banyule, Victoria; City of Darebin, Victoria; Delatite Shire Council, Victoria; Gleneira City Council, Victoria; Gold Coast City Council, Queensland; Palmerston City Council, Northern Territory; Sutherland Shire Council, New South Wales.

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Other Organisations: Access Economics; Australian Conservation Foundation; Australian Council of Social Services; Australian Institute of Family Studies; BIS Shrapnel; Brotherhood of St Laurence; Chamber of Commerce (Northern Territory); Community Business Partnership; Council of Australian State Libraries; Council of Social Services of New South Wales; Futures Foundation; KPMG; Leader of the Opposition (Northern Territory); Local Government and Shires Association; Local Government Association (NT); Mission Australia; National Industry Association for Disability Services; North Sydney Health Service; New South Wales Farmers' Federation; Outlook Management — South Australia; Queensland Council of Social Services; Tasmanian Minerals Council Ltd; Tasmanian Chamber of Commerce and Industry; ThreeSixty; Victorian Local Governance Association; Western Sydney Regional Information and Research Service; Women's Electoral Lobby (South Australia).

Appendix III: 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; or
- 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; and
- 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:
<URL: http://www.gpionline.com>.

A national accounting framework

The System of National Accounts (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.

Commonwealth of Australia's headline indicators of sustainable development

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 Commonwealth 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.

The first report does not set out to assess whether or not our way of life is sustainable, but rather, to provide a base line for the measurement of future trends. Several of the indicators, especially for ecological wellbeing and natural resource management, have been developed very recently. There are therefore, at this stage, limited time series data on which to assess overall trends.

More information should shortly be available on

<URL: http:// www.ea.gov.au>

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 publish more of the indicators throughout 2002, as data sources are evaluated and appropriate methodologies for producing reliable indicators are finalised.

More information on *Growing Victoria Together* can be accessed on

<URL: http://www.growingvictoria.gov.au>

Tasmania Together

Tasmania Together is a 20-year plan for achieving the vision of a group of Tasmanian community leaders appointed by the Government of Tasmania. The vision is that:

> "Together Tasmanians will make Tasmania an icon for the rest of the world by creating a proud and confident society where people live in harmony and prosperity."

The vision — and a draft set of goals which gave a framework to the vision — was the subject of extensive consultations within the Tasmanian community during the year 2000. Based on issues raised during those consultations, benchmarking standards were adopted by expert committees. Twenty-four goals were benchmarked in the areas of Community, Economy, Environment, Democracy, and Culture. A total of 212 benchmarks were identified, and targets have been established for 104 of them.

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 0–29 years due to external causes*. For this indicator, a target has been set for a 15% annually compounding reduction up until the year 2020.

More information on *Tasmania Together* is available at

<URL: http://www.tasmaniatogether.tas.gov.au>

During 2001, by an Act of the Tasmanian Parliament, a Tasmania Together Progress Board was established to report progress, and to review and upgrade progress benchmarks.

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 is due by April 2003. The IGR is to be published on a five-year cycle, reflecting its focus on long-run issues.

Other initiatives

There are countless initiatives at the international, national and sub-national level around the world. A selection is mentioned below.

- The United Kingdom Government's *Indicators of Sustainable Development*, at

  <URL: http://www.sustainable-developmentgov.uk/indicators/index.htm>

- The Danish government reports entitled *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

  <URL: http://www.fm.dk/uk/pubuk/benchmark00_uk/>

- 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 a report *Where are we going: comprehensive social, cultural and environmental reporting*. It can be found at

  <URL: http://www.tya.org.au/australiancollaboration>

- 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

  <URL: http://www.SourceOECD.org>

Other useful references are provided at the International Institute of Sustainable Development's website

<URL: http://www.iisd.ca>

FOR MORE INFORMATION...

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LIBRARY	A range of ABS publications is available from public and tertiary libraries Australia-wide. Contact your nearest library to determine whether it has the ABS statistics you require, or visit our web site for a list of libraries.
CPI INFOLINE	For current and historical Consumer Price Index data, call 1902 981 074 (call cost 77c per minute).
DIAL-A-STATISTIC	For the latest figures for National Accounts, Balance of Payments, Labour Force, Average Weekly Earnings, Estimated Resident Population and the Consumer Price Index call 1900 986 400 (call cost 77c per minute).

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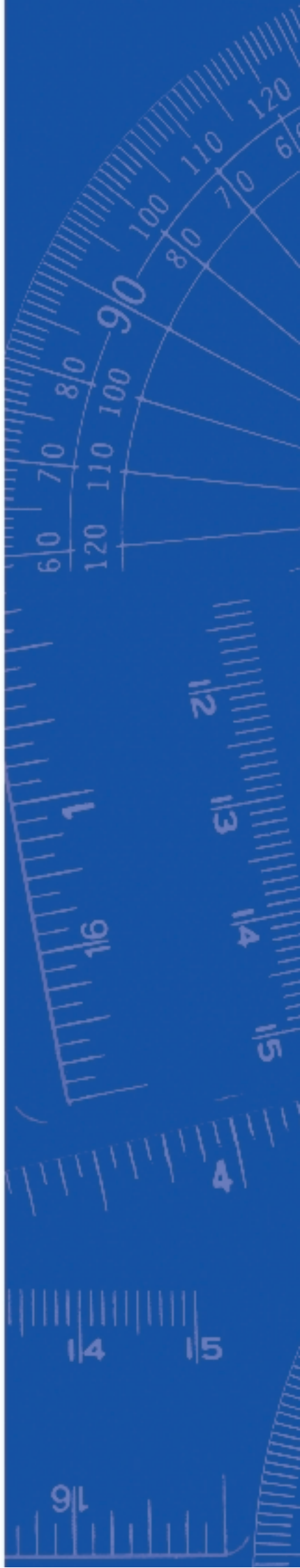

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