



Naval Brigade Stores, Kangaroo Point, Brisbane, Qld.

The stores were built between 1886-87 for the Queensland colonial navy and taken over by the Commonwealth after Federation.

Source: Mike Pearson.

- continuing occurrence of vacant and deteriorating government buildings, demonstrating governments' lack of interest in funding heritage assets in the various jurisdictions
- growing ongoing and deferred maintenance for many churches will pose major conservation funding problems until 2010
- continuing low but steady rate of damage to heritage buildings by inappropriate works such as 'modernising' of shop fronts and interiors, and insertions of windows.

Management of heritage places has been affected during the reporting period by declining budgets allocated to public sector agencies for maintenance and conservation of heritage sites (with notable exceptions such as Victoria's Public Heritage Program). Cessation of the National Estate Grants program and the tax incentive scheme for owners of private heritage property and their replacement by a limited grants program has not helped. The trend is to support tourism infrastructure rather than conservation maintenance *per se* as exemplified by the range of funded heritage trails and localised grants for Centenary of Federation projects.

In many jurisdictions, there is still a lack of integrated management planning for the conservation of both natural and cultural heritage. This leads to unnecessary neglect of one or other aspect of heritage, even in conservation areas. This is despite some examples of this planning, especially in the RFA surveys.

Loss of historic heritage places continues at an uncertain pace as a result of:

- urban redevelopment due to main street redevelopments and loss of functions due to construction of shopping centres
- urban consolidation affecting the heritage character of older suburbs



The Norfolk Island convict-built pier being inspected for urgent repairs. It has been in constant use for more than 150 years.

Source: Jane Lennon.

- abandonment of rural structures due to changing technology and new markets and products
- public building redundancy due to movement of client population especially in rural areas, asset rationalisation and mergers
- loss of cultural landscapes through changing rural use.

These are difficult issues for people to respond to and it is hard to gauge community support for heritage issues statistically from the data collected. Media emphasis has been overwhelmingly on nationwide 'green' issues (e.g. forests or salinity), in comparison with local coverage of specific heritage places. These individual issues regarding heritage places have lacked coordination from peak interest groups because of the diffuse types and locations of heritage advocates. The exception has been the development of community interest in Centenary of Federation cultural heritage projects.



Surplus Mittagong (NSW) Railway Station building being offered for lease for alternative use.

Source: Ian Robertson.

### Trend: Conservation and management of heritage places

Condition of heritage places has remained static; however, losses are continuing and responses are adequate in some respects. In particular, there are uncertainties about future management arrangements.

### Indigenous involvement in heritage protection and management

Indigenous heritage issues seem to be increasingly handled and, to a certain extent, controlled by Indigenous peoples. This is demonstrated by, for example, the presence of Indigenous site officers in government, industry and community employment; and the general strength of concern expressed by Indigenous peoples for their cultural heritage.

Indigenous heritage issues have been at the forefront of the political debate during the reporting period. This has had some favourable results, but there has also been a strong polarisation of views especially in regional Australia, with some resentment of perceived favourable treatment for Indigenous Australians. Rejection by the government of significant aspects of the 'Stolen Generations' Inquiry Report (HREOC 1997) has led to public dispute about the facts of the treatment of Indigenous peoples since European settlement of Australia. Similarly, continued publicity (often inaccurate) about land rights and Native Title has made many country landowners suspicious of, or even destructive towards, Indigenous sites. These issues may have had some negative effect on Indigenous peoples contributing information about Indigenous heritage places. Several high profile controversial disputes concerning the importance of Indigenous sacred sites and their conservation versus other proposed land use demonstrate that there is still considerable disagreement and misunderstanding in the community about these complex issues and their resolution.

Work on Native Title and land claims is encouraging detailed research into Indigenous tradition and recent Indigenous history, with an increasing number of sophisticated and integrated studies which present a holistic



From redundancy to ruins—rural branch line railway, approaching Aramac in western-central Queensland.

Source: Jane Lennon.



Cobb & Co. Changing Station, Buangor, Vic. This coach and livery station dates from the 1860s. It has been modified for other uses but is now vacant.

Source: Mike Pearson.

view of Indigenous culture. The study and celebration of recent Indigenous history by Indigenous peoples is demonstrated by the healthy publication rate of memoirs and regional Indigenous histories, and by nominations to the Register of the National Estate of significant Indigenous historic sites like the Wave Hill Walk Off sites in the NT, the Cubbitch Barta National Estate Area (commonly known as the Holsworthy Military Training Area, NSW) and the Cyprus Hellene Club in Sydney, the site of the first Aboriginal Day of Mourning in 1938.

Major public events, cultural activities and media coverage, contribute to an increasing public awareness of Indigenous culture and heritage.

The active program through the NHT to augment the national reserve system in Australia continues to improve the conservation of Indigenous places conserved in natural environments. Since 1998, 13 Indigenous Protected Areas have been established as part of Australia's National Reserve System.

The number of heritage places and landscapes owned and managed by Indigenous peoples continue to increase above the 15.1% level that they held in 1996. The 1996 figure was an increase from 9.6% in 1983. This compares with almost 8% in National Park or conservation reserve tenures in 1996.

The Return of Indigenous Cultural Property Program instituted in 1998 is facilitating the return of cultural property to Indigenous peoples from Australian museums and other collecting institutions. There were increased efforts for the repatriation of Indigenous materials by Australian museums within the reporting period, especially for human remains and secret, sacred objects.

Although Indigenous peoples are involved in Indigenous heritage management, many of the protocols for consultation and involvement instituted by local Indigenous communities are not always recognised and used effectively.

**Indigenous languages**

The number of Indigenous languages and the percentage of people speaking these languages has continued to fall between 1986 and 1996 (Figure 36), the trend accelerating over the 10 years. By 1996, only 17 of the previous 20 strong languages were still strong and three had become endangered.

**Funding for heritage**

The NHT and the Centenary of Federation Fund provided substantial boosts to heritage conservation and management of heritage places and objects (e.g. World Heritage property management, the Queensland Heritage Trails Network and the new National Museum of Australia).

The NHT program contributes significantly towards improving the adequacy and representativeness of the conservation reserve system through its acquisitions program. However, it does not provide sufficient funding to reach the target percentage of reserved environmental types.

In contrast to the NHT's assistance for natural heritage places, there are no long-term national funding programs of similar magnitude specifically for Indigenous or historic heritage places.



Olsens Home Hardware Store, Warwick, Qld.

The store was built in stages from the 1870s to 1908. It is now covered with a hoarding that hides the facade—a common treatment in many towns.

Source: Mike Pearson.



Steel's Garage, Bolton Street, Newcastle, NSW.

Built in 1888 as skating rink, it was converted to a garage in 1939. Now it is mainly a pay car park. The facade is retained but the interior is largely modified.

Source: Mike Pearson.

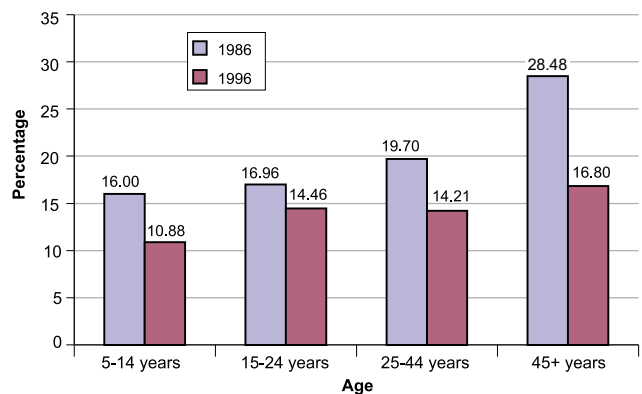


Figure 36: Comparison of 1986 to 1996 Census data on Indigenous language use in the home.

Source: ABS (1996) data, in McConvell and Thieberger (2001).



School lesson in an Indigenous language being held at the Halls Creek District High School in the Kimberley, WA.  
Source: Volodymyr Malanczak.

### Legislation and strategies

In 1998, the Cultural Ministers Council released *Australia's Heritage Collections—National Conservation and Preservation Policy and Strategy*. A survey found that environmental conditions for storing heritage objects in the major collecting organisations appear to be reasonable across all sectors. The proportion of collections catalogued across all heritage sectors appears to be improving.

There were significant advances in heritage methodology and practice during the reporting period. The Australian Natural Heritage Charter was adopted in 1996. In 1999, a new version of the Burra Charter was released. The Burra Charter (see <http://www.icomos.org/australia/burra.html>) now addresses intangible aspects of heritage places such as understanding, meanings and use, in addition to its traditional concern with the



The new National Museum of Australia in Canberra, ACT, was created around the themes of land, people and nation.

Source: George Serras, National Museum of Australia.



Over three seasons, the AAP Mawson's Huts Foundation has conserved the historic 1911–14 Mawson's Huts in Antarctica.

Source: Rob Easter, Australian Antarctic Division.

physical fabric. There has been more regard for Indigenous heritage values other than the specifically archaeological, and this has led to integrated assessments in RFAs and other assessments.

Australia continues to be a leader in heritage practice. Within the reporting period, the Chinese government worked with the Australian Heritage Commission to adapt the Burra Charter to Chinese conditions. It remains the basic document from which all Chinese conservation policy is to be developed and implemented.

There is major challenge to the management of Australia's heritage presented by the proposed new Commonwealth legislation, which will close the Register of the National Estate and consequently leave a vacuum in measuring trends using existing information. The Register is the only source of national data across all environments and arguably assists Australians to think of their heritage in an all-encompassing way. Whereas the effect of the changes in legislation will be discussed in future reports, there is already concern that state, territory and local governments will not accept their responsibilities. At the heart of the matter are the lack of agreed national standards and the inconsistency of the heritage place legislation across different jurisdictions. This creates a barrier to bilateral agreements for funding.

The failure of the Commonwealth government to respond effectively to the Schofield Report on the condition of heritage stock in its possession is seen as a lack of leadership. It affects all Australians as, for example, post office buildings become redundant and are inappropriately reused or demolished. This remains a challenge and reminds us that what may be initially seen as progress can easily become a loss of familiarity and place in a local community. Similarly the Commonwealth government has failed to pass amendments to existing legislation to better protect Indigenous heritage places based on the recommendations of the Evatt Report.

### **Data availability**

There is a problem of collection of data for heritage indicators across a diverse range of sources—natural, Indigenous, historic places, Indigenous languages, heritage collections and objects. Constant changes to the information collected, or not collected, and reported, means that it has not been possible to have a set of constant, robust indicators applied across Australia. In addition, there has been no organised collection of standard data between SoE Reports on which to base an analysis of trends.

No suitable data are available for assessing condition of natural and Indigenous heritage places, other than that for natural heritage places within World Heritage Areas.

## Heritage objects

A survey of museums found that there is no coherent, agreed, national definition or shared view of what might constitute cultural heritage collections despite the presence of the National Conservation and Preservation Policy and Strategy. Most small museums have little idea of the significance of particular items in their collections, and despite the introduction of Australian Museums & Galleries Online (AMOL) database to collect this information, we do not know how many objects by category are held in these 2000 museums. Nor do we know their condition. Small and large museums generally have documentation systems that are idiosyncratic and inadequate to meet current demands of scholarly and public access. Many of the collecting institutions highlighted a shortage of storage space as an issue, thus affecting the condition of objects.

Heritage collections generally are not perceived as relating to heritage places in which they were located, yet that is a primary interest for SoE reporting. For museum curators, the object or collection may be significant for many reasons other than place of origin. The archival or scientific value is not related to their place of provenance but rather to their story, as can be seen for example with dinosaur fossils in a museum rather than *in situ* at Lark Quarry or Riversleigh.

### Trend: Heritage objects

There is improving documentation of objects in collections, pressures remain constant and responses are adequate to some extent.

## Role of professionals and volunteers in heritage

The role of the volunteer is an often masked issue in historic conservation. As heritage becomes more professional in its methodology and seeks to attract employees with professional education and training, there is an increased divide between the roles of the volunteer and the professional. It is a constant source of tension and remains unresolved especially as there is very little government funded or sponsored support for community involvement in historic heritage conservation. The lack of integration of effort or recognition of what we each have to offer has severely weakened the cultural heritage movement and may, in part, explain the discrepancy in funding between natural and cultural heritage. However,



Bicornial baskets with their distinctive pointed ends are only found in the Cardwell and Cairns districts of northern Queensland.

This basket was collected in the 19th century.

Source: National Museum of Australia.



The Hills Hoist has become an icon object of post-war suburban life in Australia. This rare 1955 model is part of the National Museum's extensive Hills Hoist collection.

Source: National Museum of Australia.



Newcastle (NSW) Convict Lumber Yard Archaeological Site of the 1814–1850 convict establishment. The site was excavated, and building outlines were marked with metal structures. The site is an additional tourism attraction in this regional town.

Source: Mike Pearson.

the growth of local heritage groups and the demand for protection of local heritage exemplified by the Save Our Suburbs movement in large cities indicates support for community involvement.

### Trend: Community involvement

There is increasing involvement in natural heritage but less for Indigenous and historic heritage.

### Effect of tourism on heritage

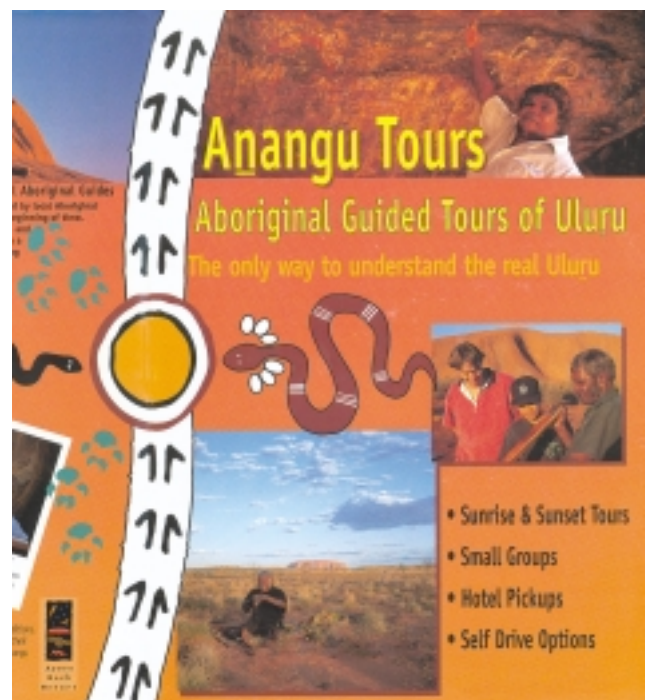
The effect of tourism reflects the positive–negative conundrum of heritage. Governments and tour operators encourage tourism for its revenue but there are insufficient controls in place to balance conservation with revenue. There is also concern that we present and interpret the heritage values of our special places appropriately. Development of management plans at sites of high tourist interest is being used increasingly to overcome these pressures.

### Threats to the sustainability of cultural and natural heritage

Sustainable heritage means that the nation's heritage is respected and appreciated by Australians and international visitors and that use of, and visits to, heritage places and objects contribute to the social and economic well-being of the nation without detriment to the heritage resources and its values. Yet there exist some significant threats to the sustainability of Australia's heritage (Table 11).

### Conclusion

Natural heritage has been the most important aspect of heritage over the last five years with many significant



Example of Indigenous tourism brochure.

Source: Anangu Tours.

**Table 11: Natural and cultural heritage: key threats to sustainability in 2001**

Issue	Detail	Comment
Knowledge about heritage places and objects	Surveys have been undertaken but the resulting data about heritage places has not been assessed for registration	Integrated assessments, identification and conservation of all heritage values on any particular piece of land is required
Physical condition of heritage places and objects	Little quantifiable data available and no national monitoring system is in place to assess the condition or health of heritage places	Demolition, clearing and incremental losses continue Heritage assistance programs at the local level are inadequate but could assist assessments
Cultural values of all types are being neglected in natural areas	Indigenous heritage places can only be conserved effectively <i>in situ</i> and as part of the natural environment of which they are an integral component Protocols not being always complied with, thus lack of sustainability of the heritage resource	Integrated conservation planning which provides for the protection for all values is essential Cultural landscape framework will assist in the integrated assessment of all values for a place
State of traditional Indigenous languages	The number of Indigenous languages and the percentage of speakers have continued to decline, although there is some language revival around one South Australian region	There are an estimated 55 000 Indigenous language speakers Only 17 Indigenous languages are regarded as 'strong' Lack of speakers in young age groups is a concern
Survival of heritage in areas of significant population change	Many places are under significant threat from urban expansion, redevelopment and rezoning on urban fringes and from neglect/abandonment in rural areas	Statistics reporting losses are poor especially for rural areas
Disposal of heritage properties	Government reorganisation in all jurisdictions has resulted in redundant heritage assets	Loss of function has resulted in changed and lost heritage values for many places
Community involvement	There has been a declining involvement of people in historic heritage and an increase in natural heritage issues Indigenous communities are participating more in heritage protection	As heritage becomes more professional in its methods and employment patterns change to shift and untenured work, there are fewer skilled volunteers available
Impact of tourism	Government policies encourage tourism for its revenue but there are negative effects from physical pressures on the heritage resource and from inadequate interpretation of the heritage values of places	Lack of monitoring of effects is a continuing concern Lack of evaluation of visitor understanding of heritage values of tourist places
Ignorance and lack of passion and vision for the future	Heritage, like beauty, has a subjective element to it; however, widespread ignorance of Australian settlement history, Indigenous history and basic ecology means that many citizens are unable to make contextual judgments	Heritage becomes a business and less able to inspire citizens about the privilege and responsibility of managing the only continent in the world occupied by one nation—Australia!
Changing legal and administrative arrangements for heritage conservation	Failure of national leadership to date to establish a set of minimum standards for the identification, listing and conservation of heritage places	Gaps in the identification and conservation of heritage places if implemented before state, territory and local systems are developed to fill the gaps left by the demise of the Register of the National Estate
No development or testing of models of sustainability applicable to heritage places	Places are only sustainable as heritage sites if adequately funded and protected so that their values are known and respected	Lack of monitoring of pressures affecting sustainability of historic heritage especially in urban areas

achievements. Australia's position has been enhanced with the inscription of three new World Heritage sites and the contribution of Australia's heritage expertise being recognised on a world scale.

Indigenous cultural heritage issues are becoming better known to Australians and the importance of heritage and culture recognised through the opening of the National Museum of Australia.

But for almost every advance in heritage, there has also been a retreat (e.g. a loss of heritage places and a loss of Indigenous languages). The uncertainty in the legislative framework for heritage raises questions about future heritage management.

## Human settlements

Human settlements are where most Australians live and work. Their design, planning, construction and operation are fundamental to the productivity and competitiveness of the economy, the quality of life of all citizens and the ecological sustainability of the continent.

Human settlement in Australia dates back at least 60 000 years to an Indigenous population engaged in hunting and gathering. With the arrival of Europeans just over 200 years ago, the first of a series of major societal, economic, technological and settlement transitions occurred.

There have been several improvements in recent years. Examples include cleaner air in our cities, reduced use of water by households on a per household basis, increased recycling of some materials, improved efficiency in the use of energy by households and improved streetscapes in many parts of Australia. Nevertheless, many problems remain. Most problems occur as a result of the very high level of material and energy consumption, which shows no sign of abating and continues to increase at a high rate for many materials.

In considering the condition of human settlements in Australia, there are seven key issues, discussed below:

- the pattern of human settlements
- infrastructure, particularly for Indigenous communities
- material and energy consumption
- urban water use
- transport use
- indoor air quality
- management of waste.

A summary is presented in *Key findings* (page 9).

## Key issues

### Environmental pressures are accentuated by the pattern of human settlements

Australia's population is estimated to be 19.3 million. The pattern of settlement is characterised by high rates of urbanisation but low density cities. Most Australians (about 60.7%) live in the five largest cities. Significant coastal non-metropolitan urban growth is also occurring, particularly in New South Wales, southern Queensland and south-west Western Australia.

Over the next 10 years, the population growth rate is expected to decline slightly from 1.1% to 0.9% per annum. The pattern of human settlement is not expected to change greatly although urbanisation is expected to increase. The five largest cities are expected to contain 61.6% of Australia's population in 10 years.

The main contributor to population growth continues to be natural increase (births minus deaths) but net immigration is also important. Its contribution is more variable (Figure 37).

The effect of this growth on human settlements is variable. Australia continues to experience very significant levels of population growth associated with the mega-metropolitan regions centred on the state capitals. The major component of this growth is continuing suburbanisation and the extension of urbanised area into the regions surrounding the officially designated metropolitan areas. These may develop further in prominence as high-speed ground transport (i.e. freeways, but more particularly high-speed rail) transforms provincial cities, such as Ballarat, Traralgon, Newcastle, the Gold Coast region and Toowoomba, into commuter areas of their respective state capitals because of reduced journey-to-work travel times.

The continued growth of these mega-metropolitan regions, particularly in the coastal margin, raises significant issues for policy and planning. For example the effect on often fragile coastal environments is substantial and in some jurisdictions, such as New South Wales, there are steps to regulate coastal development (see Premier's statement on Coastal Package, 26 June 2001). The implications for the supply of water, provision of transportation infrastructure, management of waste outputs and loss of biodiversity at the urban fringe present major challenges.

Increased residential construction activity is one of the consequences of population growth. The decline in the average size of households (2.6 persons in 1996 compared with 3.3 persons in 1976) and the increase in average floor space (3% per annum over the last 7 years) add to the pressures.

Suburbanisation of both population and jobs post-World War II has been an important, indeed dominant, process shaping the development of big cities, with settlement pushing further out into the urban fringes and peri-urban regions. The general pattern of development had been of population growth in outer metropolitan areas and a decline in the population of

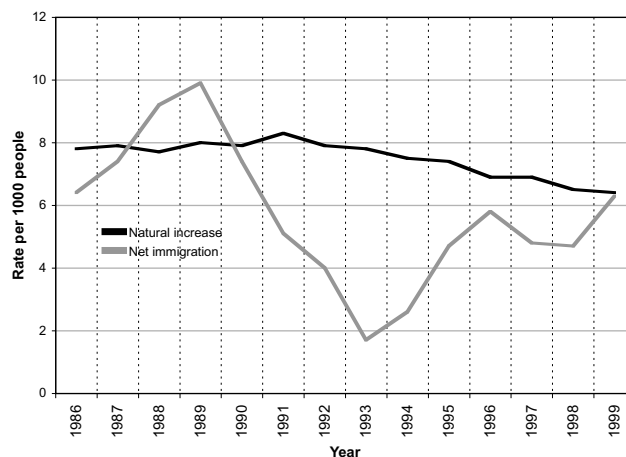


Figure 37: Components of population growth, Australia, 1986 to 1999.

Source: ABS (2000d).

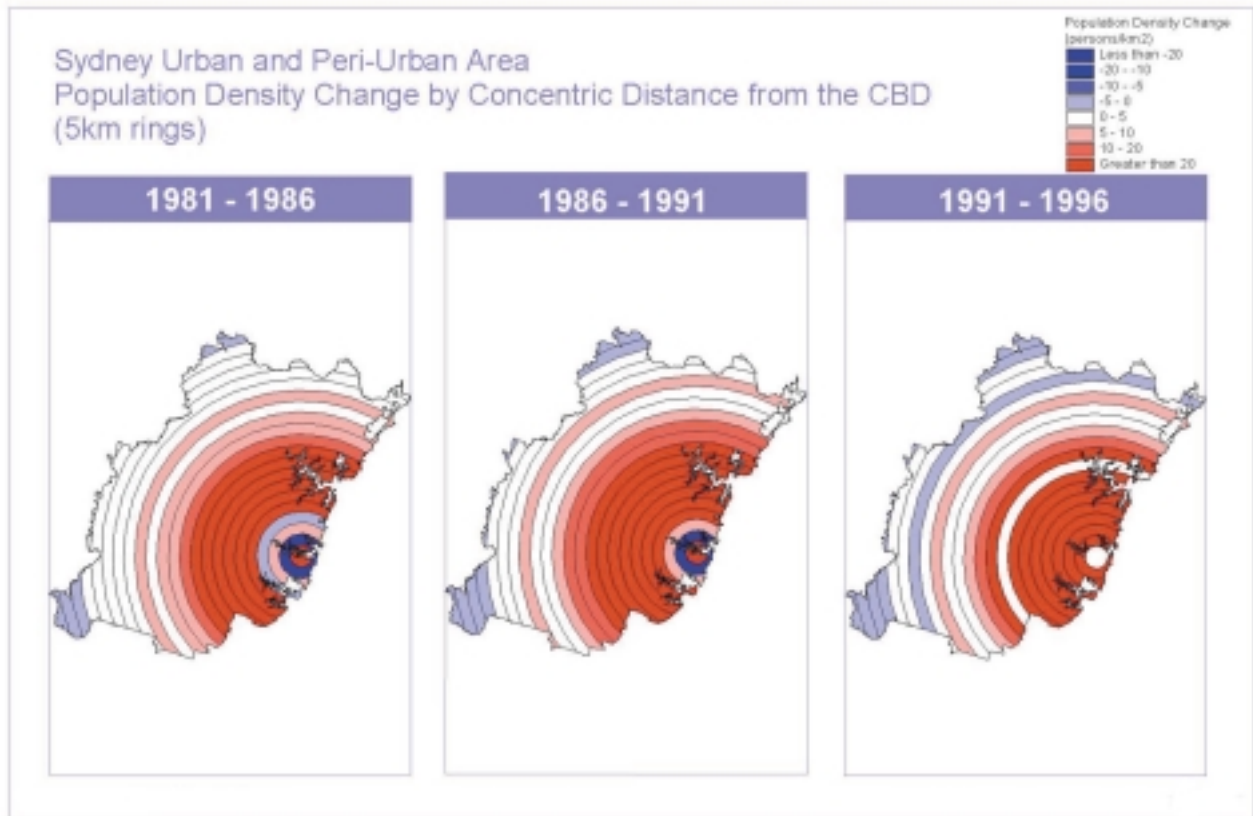


Figure 38: Change in population density, Sydney, 1981 to 1996.

Source: Baker et al. (2001).

the inner city suburbs. In the 1990s, a new trend is counteracting some of the push to further suburbanisation. Population numbers in inner-city suburbs have begun to increase in all five of the nation's big cities (Figure 38). After decades of decline, many of the older sections of the inner cities have taken on a new lease of life. The rates of population growth in the inner-city suburbs are, however, still well below those occurring in the outer suburbs and fringe areas. Thus, the relatively small aggregate effect of reurbanisation in redistributing population growth patterns in the big cities needs to be put in its proper perspective, as there is a tendency to exaggerate the overall impacts of the inner-city renaissance on growth patterns.

The previous Commonwealth government commissioned an Urban Design Task Force which published a report in 1994 on urban design in Australia. Subsequently, the current government decided to leave issues of urban design to the states and territories. There has been considerable research into good urban design but little in the way of programs apart from a few notable exceptions.

Outside the metropolitan areas there is significant growth along the coast, particularly in New South Wales and Queensland. The pattern of inland regional and rural settlement in Australia is characterised, however, by periods of growth and decline as the fortune of regions and their associated cities and towns rise and fall with demographic, social and economic change. There has been growth in several inland regions, mainly the larger provincial towns, but the population of smaller towns and rural areas has declined.

An important issue affecting the viability of many smaller towns is the impact that surrounding larger centres can have on economic and social activity. Over several decades many small inland towns have declined as a result of their rural hinterland populations bypassing them. A wider range of goods and services are available in the larger regional towns. This decline is expected to continue. This reduces the capacity of smaller settlements to deal with environmental and heritage issues from their own resources.

Another important influence on human settlements is the significant increase in short-term visitors. The lure of Australia as a tourist destination since the mid-1980s is reflected in the continuing increase in the numbers of short-term visitors; the annual growth rate has been nearly 10%. This increase affects Australia's cities and regions in a variety of ways and it is also spatially selective. Often it is responsible for significant growth in service-based industry and

## The Green Games

The Sydney Olympic Games of 2000 (see <http://www.sydneyolympicpark.nsw.gov.au>) provided an opportunity to showcase sustainability of a human settlement. The main benefits of the Green Games were:

- hazardous waste site remediation into a world-class sporting, residential, business, recreational and conservation precinct
- water conservation through on site rainwater collection and irrigation, recycled water for toilet flushing, environmental flow enhancement for Boundary Creek
- energy conservation measures which include: passive cooling to reduce air-conditioning loads; one of the world's largest solar-powered suburb; and natural-gas-run buses. These measures considerably reduced greenhouse gas production
- waste management measures which included: 90% reuse and recycling of construction waste; recycled cardboard furniture and food and beverage packing; biodegradable cutlery and serviettes to maximise the utilisation of organic waste into saleable compost; excess seating provided with relocation and reuse prearranged.

employment and can provide an important economic stimulus, especially in regions that have declined as a result of the downturn in traditional industries. Overall, non-metropolitan locations attract fewer numbers of international tourists, the exceptions being the Whitsunday (Great Barrier Reef) coast in Queensland and the Uluru–Alice Springs area in the Northern Territory.

In summary, the particular pattern of human settlement in Australia accentuates pressures on the environment. The population in most of Australia's major cities will continue to increase. We need to plan for this increase. Good urban design is one way of reducing the environmental impact. But little is being done in the way of real change in urban design. There has been considerable research on the topic but there is no agreement on preferred urban form, taking account of environmental considerations; although there is growing evidence that developments with a more concentrated form of settlement deliver environmental benefits of lower VKT, energy consumption, carbon dioxide emissions and urban water use. Other factors such as improved streetscapes, noise, access and security are also important.

### Trend: Form of human settlement

Pressures on the form of human settlements have remained constant since 1996 while responses have been inadequate in most respects.

### Inadequate infrastructure, particularly for Indigenous communities

Indigenous demography and settlement patterns differ from the rest of Australia in several important respects (see *Growth in the number of Indigenous Australians* box on page 99). Proportionately, Indigenous peoples are more likely to live in rural and remote areas and are less likely to live in major urban centres than other Australians. Problems of isolation and access compound problems of these types of settlements. There are several Commonwealth and state programs aimed at improving the living conditions of Indigenous communities. Although some progress may have been made, a lot more needs to be done as many communities still have inadequate housing, power and water supply, sewerage and road access. Such developments may contribute to improved health outcomes and other benefits.

Australia has experienced considerable reductions in mortality in the 20th century, largely as a result of improvements in many social and environmental amenities and conditions (e.g. hospitals, sanitation, health education, quality of food and water supply). However, these improvements are not uniform. Indigenous peoples, and those living in rural and remote areas have higher death rates than the general population.

Although environmental hazards are increasingly seen as important factors influencing health, there is no strong evidence that morbidity rates due to these factors are increasing. The quality of drinking water is good as outbreaks of waterborne diseases are few. Although there

## Growth in the number of Indigenous Australians

The official estimate of the number of Indigenous peoples has been increasing rapidly. Between 1991 and 1996, the population grew by around one-third to almost 353 000. This increase in numbers is influenced strongly by the change in the propensity for individuals to identify as Indigenous.

About half of the net increase can be explained by births, deaths or migration. Factors which may help to explain the remaining increase include changes in the rate at which children with only one Indigenous parent are identified as Indigenous; changes in the propensity of

Indigenous peoples to record themselves as such on the census form; and improvements to census counting procedures.

The age distribution for Indigenous Australians differs markedly from that of the rest of the population. About 60% of Indigenous Australians are aged less than 20. The corresponding figure for all Australians is 35%. This is also reflected by the substantial differences in median ages—20 for Indigenous Australians compared with 33 for all Australians.

has been some increase in reported outbreaks of foodborne diseases, our food contains low levels of chemical residues and metals. There has been some increase in vectorborne diseases (e.g. encephalitis) in recent years, although they are still at low levels. Some believe global warming is a factor but there is no hard evidence.

However, the decline in spending on public sector infrastructure could have environmental consequences. For example, ageing sewer pipes are considered a major problem, with many between 50 and 100 years old. A report from the Institution of Engineers Australia (see <http://www.infrastructurereportcard.org.au>) on infrastructure rated the condition of the roads, bridges, railways and water and sewerage networks as relatively poor.

### Trend: Urban infrastructure

The condition of some urban infrastructure is deteriorating, pressures on it are increasing and responses have not been fully adequate.

## High material and energy consumption

### Materials

Australia's level of per capita material flows is very high by world standards and continues to grow rapidly. Australia generates material flows of almost 180 t/person per year and there has been little progress on decoupling economic growth and material consumption. The current trend is not sustainable and the pressure to achieve dematerialised economies will require much more attention to, and analysis of, material flows in urban areas.

Studies of metabolic flows in European cities (e.g. the study of the urban metabolism of Vienna) show that it is not only important to measure flows of energy and materials into and out of urban areas, but also that it is important to look at accumulations of materials. Accumulations can be a significant potential source of both future pollution and stocks of materials for future recovery and use (Figure 39).

The use of most materials is largely set at the design stage of products and processes and therefore the focus for reduced material use should be at this stage. Ecodesign and cleaner production can reduce material consumption in production of products and services. However, gains from these type of initiatives have been more than offset by increases in per capita use of these products and additional features included with the products. Ecolabelling and product declarations have been used to try to drive consumer behaviour toward selecting products with recycled material, water and energy efficiency, or low toxicity in production or disposal, but have had limited success.

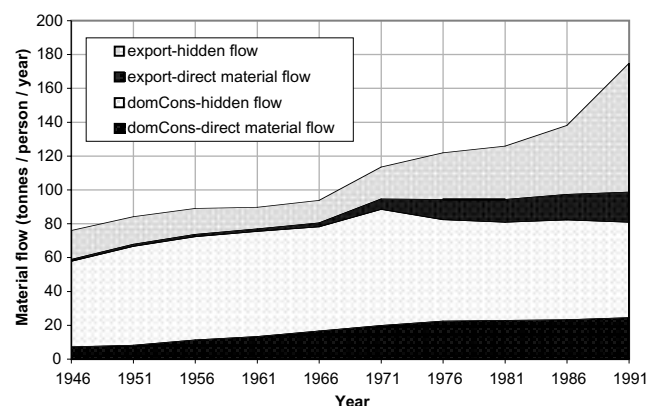


Figure 39: Components of total material flow per person, exports and domestic consumption each disaggregated into direct material input and hidden flow.

Source: Foran and Poldy (2000).

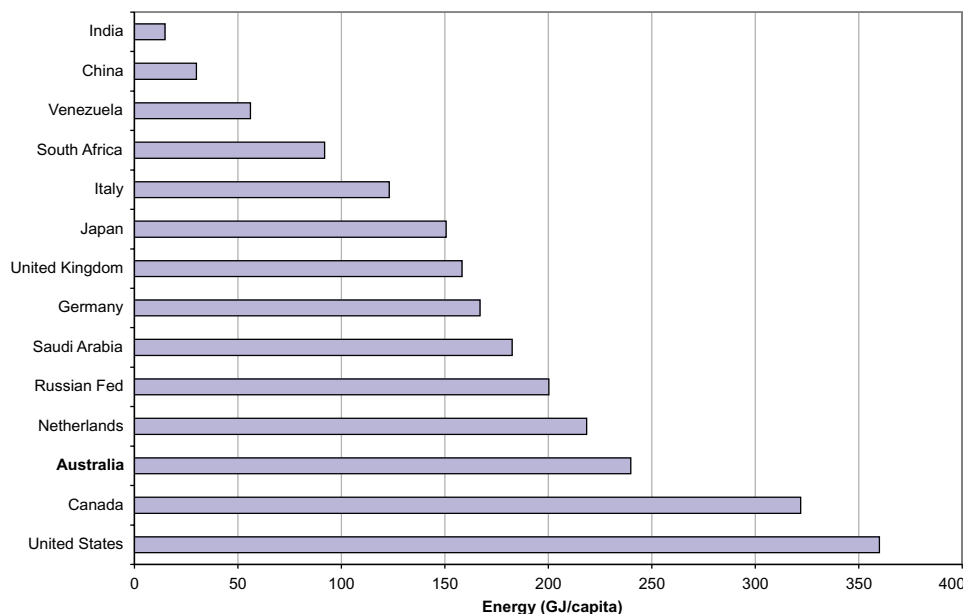


Figure 40: Comparison of Australian energy use per capita in 1995 with selected countries.

Source: WRI (<http://www.wri.org>).

A lack of regulatory and financial pressures (i.e. relative prices of ecoefficient energy and materials) limits the penetration of ecodesign and cleaner production technologies.

### Trend: Material use

Material use per capita has continued to increase since 1996 while responses have been adequate to some extent.

### Energy

Australia's per capita energy use is also very high by world standards (Figure 40) and continues to grow rapidly. Total energy use has doubled over the last 25 years and, unlike most other developed countries, at a faster rate than the GDP. With one of the highest rates of growth in energy use in the world, and the associated increasing emissions of greenhouse gases, energy usage is increasing at an unsustainable level. The main contributor to the growth in energy use is the generation of electricity to support the needs of a range of end users.

One of Australia's responses to global warming has involved increased emphasis on development of renewable energy and stronger policies on energy efficiency. The AGO was formed to stimulate and encourage these types of initiatives. Programs aimed at increasing energy efficiency (particularly in the household sector), and the use of sustainable energy sources are having an effect but are not enough to offset the impact of increasing demand. More efficient electricity generation would significantly improve the situation.

Schemes such as Green Power tariffs, where consumers voluntarily pay extra for energy derived from renewable sources, have only met with moderate success. We are still well short of the Commonwealth government's 2% renewable target, a mandatory requirement that electricity suppliers buy extra renewable energy.

Programs run by agencies such as the New South Wales Sustainable Energy Development Authority, the Sustainable Energy Authority of Victoria, agencies in other states, and the Commonwealth government's AGO and Department of Industry Science and Resources are all contributing to the development of sustainable energy products and services, as well as the growth of the industry itself. There has been higher take up in New South Wales than other parts of Australia. There is also an increasing interest at the local government level. Over 85 councils now participate in the Cities for Climate Protection program, which involves them in preparation of greenhouse inventories, action plans and targets, as well as implementation of measures to reduce emissions.

Despite these initiatives, energy from 'cleaner' renewable sources (Figure 41) is growing at a much slower rate than energy derived from other (non-renewable) sources (e.g. coal).

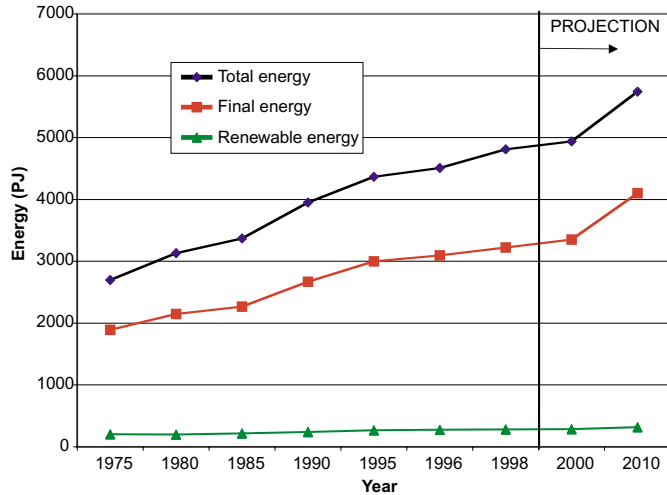


Figure 41: Trends in total energy, final energy and renewable energy consumption in Australia 1975–2010.

Source: Newton et al. (2001).

Reform of the energy market was originally seen as a greenhouse gas strategy, but the lowering of energy prices is encouraging higher use. The reforms have been specifically targeted at lowering energy prices, without internalising the full costs of energy production and use (i.e. the cost of their environmental effects). In contrast, the higher cost of renewable energy sources is discouraging their use and may explain their relatively low growth. Figure 42 compares electricity prices in Australia with other countries, confirming our relatively low energy prices.

Community awareness of the implications of their high energy use appears to be low. Increased awareness may influence some behaviour. Furthermore, there is little movement towards designing goods and services so that they have reduced energy and material inputs (e.g. by using recycled materials) even though this is technically feasible. Some market intervention that affects relative prices may be necessary to provide the incentives to move towards lower use of the energy sources with greatest environmental impacts.

### Trend: Energy use

Energy use continues to grow while responses have been inadequate.

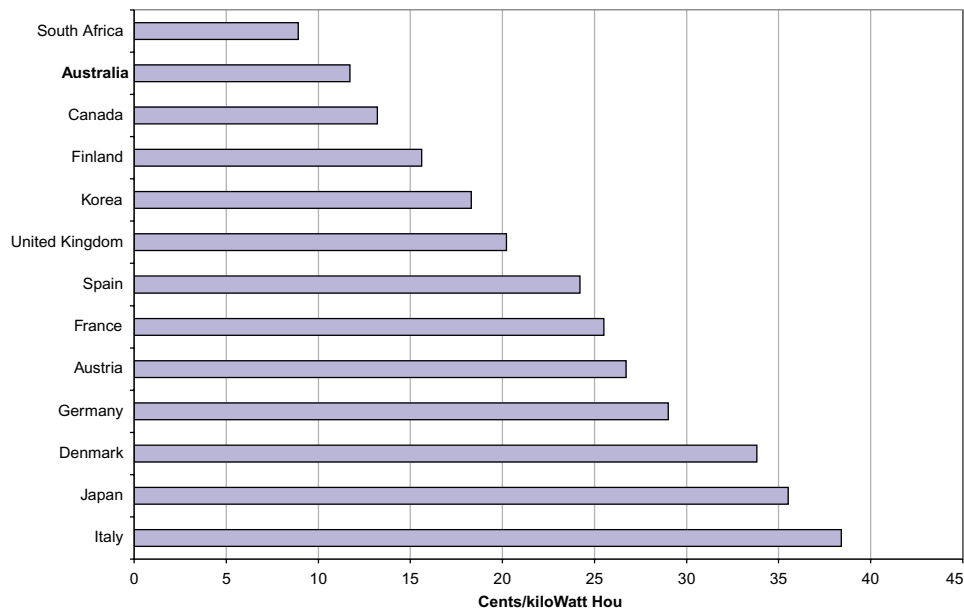


Figure 42: Residential electricity price comparison, January 1999.

Source: ESAA (1999).

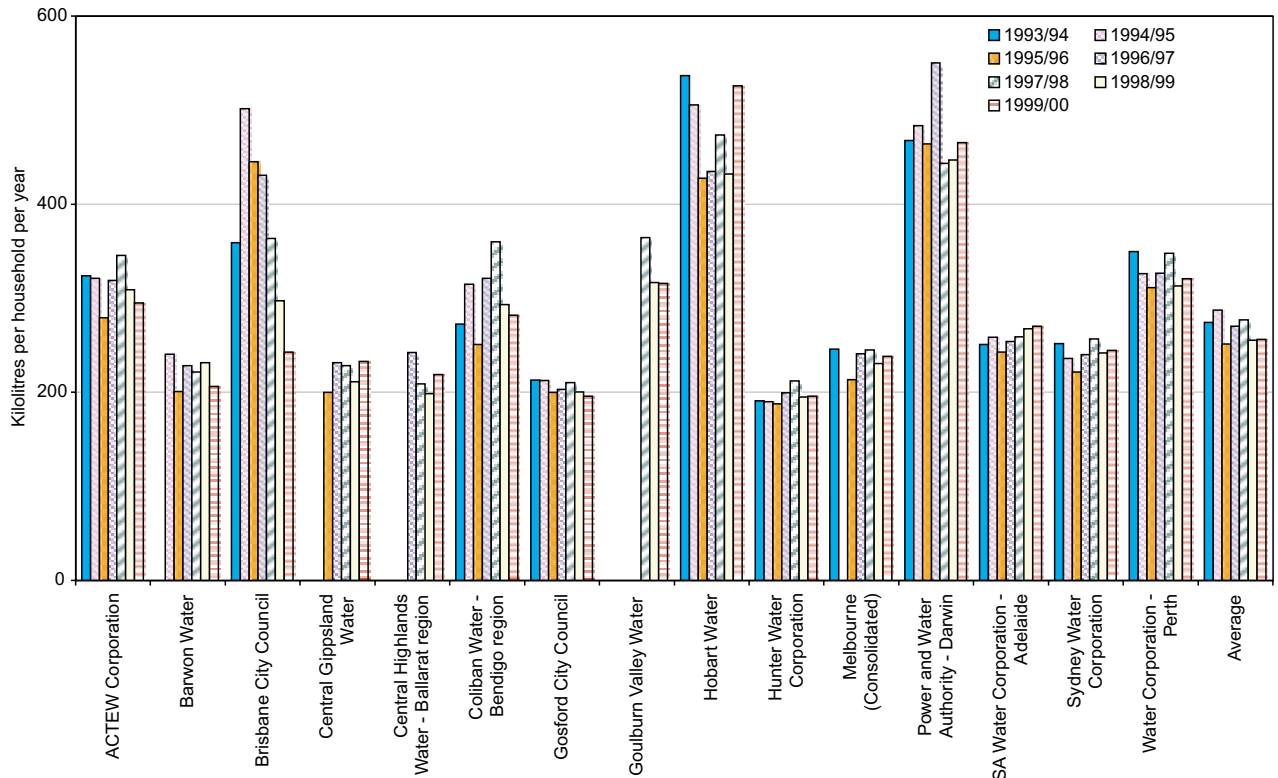


Figure 43: Average per capita household water use for major urban areas.

Source: Water Services Association of Australia (1999).

### Urban water use

Residential use of water per household has decreased in most major urban areas in recent years. The urban water industry has changed considerably, largely in response to the COAG Water Reform Framework. There has been an emergence of a more mature water industry with a shift in emphasis from development to management. Pay-for-use price systems have been introduced as well as further organisational restructuring and reform.

Policy, regulatory, and commercial (operator) functions of organisations have been separated through restructuring and reform in order to clarify accountabilities. For example, urban water businesses are now provided with clear commercial goals of customer service, environmental compliance and sound business operation, free of other conflicting objectives. Regulatory roles have been transferred to regulatory authorities. Overall, these programs are viewed as successful. For example, true cost pricing of water supplies, in line with COAG requirements, has reduced urban water demand in most major areas (Figure 43).

Potential utilisation of alternate sources of water, such as stormwater and wastewater, is now being considered. Under the Commonwealth's 'Living Cities' Program, three programs, the Urban Stormwater Initiative, the Industry Partnership Program and Water Watch Australia, together aim to monitor and improve the health of urban waterways. Several state and territory-based programs have been introduced, together with community programs such as Streamwatch and Waterwatch. In addition, stormwater management plans for urban catchments are being developed by local authorities with financial support from state and territory agencies. Stormwater is increasingly seen as a resource to be collected and utilised rather than a waste to be disposed of. Programs to encourage greater reuse of stormwater and wastewater should be encouraged.

#### Trend: Urban water use

Residential water use per capita is decreasing while pressures are increasing and the response is adequate in most respects.

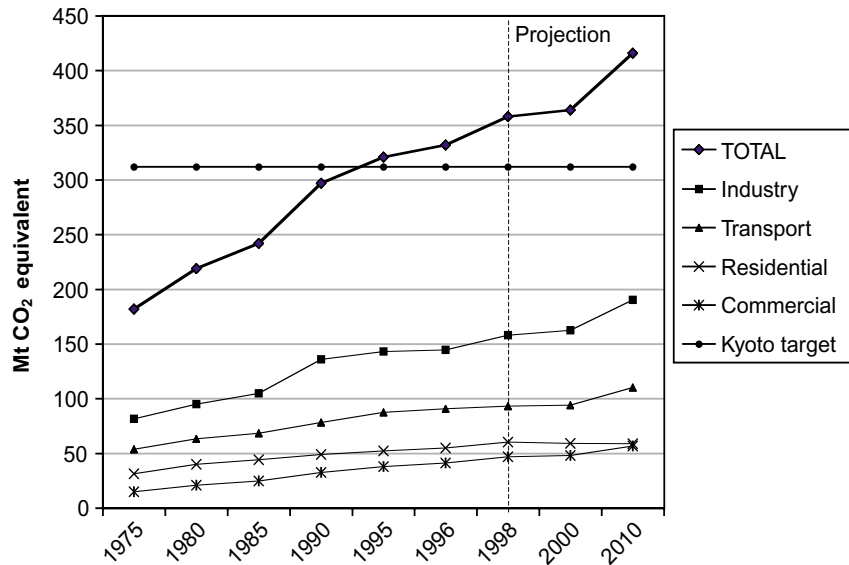


Figure 44: Energy-related greenhouse gas emissions, Australia.

Emissions from energy conversion and fugitive emissions have been allocated to end-use sectors.

Source: ABARE energy data; ABS data; Wilkenfeld and Associates (1998); Bush et al. (1999).

### Increased transport use

Australia has a very high level of vehicle ownership by international standards. Increased out-of-home activities and road freight have also led to a significant increase in kilometres travelled (63% increase between 1981 and 2000).

These increases, particularly the high use of private transport, constitute a factor leading to Australia's high levels of per capita greenhouse gas emissions. The transport sector accounted for 16.1% of Australia's greenhouse gas emissions in 1999 (AGO 2001) and is one of the fastest growing sources of these emissions. Our per capita transport emissions are one of the highest in the world. Figure 44 shows past and projected greenhouse gas emissions from various sectors.

Increased transport use is also contributing to increased traffic congestion and environmental noise, accentuated by trends such as increased residential density and more evening activities. One in 10 dwellings in Australia's cities experience levels of road traffic noise over an 18-hour period, which exceeds recommended levels. This is occurring when workplace noise is decreasing because of the changing structure of Australian industry and improved occupational health and safety practices.

The extent of public transport use remains stagnant. Improved public transport could help to reduce private transport use. The level of public transport use depends on effective urban form and design as well as factors such as relative cost and convenience.

Vehicle fuel efficiency is improving, as is the level of emissions as a result of new government standards. New public infrastructure, such as motorways and highways, may have helped to reduce emissions. Improved motorways and highways are likely to increase usage, but whether these improvements will outweigh the increase in fuel efficiency is debatable. Positive developments have been more than offset by increased use, particularly of larger four-wheel drive vehicles, the ageing motor vehicle fleet and freight transport. Although the transport contribution to greenhouse gas emissions has increased, lead and carbon monoxide emissions are declining as a result of phasing out of leaded fuel and the introduction of higher emission standards for motor vehicles (see the *Atmosphere* theme report).

#### Trend: Transport use

Transport use is continuing to grow at a faster rate than population growth (i.e. more cars, more often and further). The condition of transport is deteriorating (i.e. increasing congestion, ageing vehicle fleet and infrastructure). However, there has been an adequate response in some respects (i.e. efficiency and emissions initiatives).

**Table 12: Indoor and outdoor air pollutant levels for some Australian buildings**

Pollutant	Health goal ( $\mu\text{g}/\text{m}^3$ , 0°C/ 101 kPa)	Typical indoor air concentrations ( $\mu\text{g}/\text{m}^3$ )			Typical outdoor air concentration ( $\mu\text{g}/\text{m}^3$ )
		New house/office	Established house	Established office	
Formaldehyde	130 (NHMRC)	100–800	20–120	40–120	10–20
Total VOCs	500 (NHMRC)	5 000–20 000	200–300	100–300	20–100
Nitrogen dioxide	225 (NEPM)				
No unflued gas heater		—	10–35	—	10–50
Unflued gas heater		—	60–1 500	—	(300 peak)
Fine particles (PM10)	50 (NEPM)				
Smoking		—	>90	100–300	5–30
Non-smoking		40–60	5–40	10–40	
Dust mite allergens (per gram of house dust)	2–10 $\mu\text{g}/\text{g}$ (WHO)	<0.1	10–60 coastal <1 inland	<2 (data limited)	<0.1

Source: Brown (1996, 1997, 1998a,b, 2000) and Manins et al. (2001).

## Indoor air quality

Urban air quality is good, compared with cities of a similar size, with a range of Commonwealth and state programs having assisted. However, over 90% of our time is spent in enclosed environments (including vehicles), resulting in increasing concern about indoor air quality. Although there is a paucity of data on indoor air quality, the main issues include the initial periods of occupation for new or renovated houses and offices, urban transport and environments where smoking is allowed (Table 12). Insufficient information is available to determine changes in indoor air quality. Although the increasing prohibition of smoking in enclosed environments is positive, 39% of all children live with at least one adult who smokes. More information needs to be obtained on indoor air quality and its effects on human health and productivity. However, there are encouraging reports on prohibition of smoking in public places.

### Trend: Indoor air quality

There are insufficient data to determine trends, and responses are inadequate in most respects.

## Management of waste

Settlements depend upon energy, food, water and materials coming from a great diversity of places. Water, in particular, could become a limiting resource on the growth of some human settlements (e.g. in Adelaide). The level of reuse (Table 13) is starting to increase and this also provides a promising opportunity to increase available water supply to human settlements. Despite its potential, however, reuse of wastewater and stormwater is low in comparison with many other countries, particularly when Australia is regarded as one of the driest continents on earth.

Settlements also export wastes and emissions which can affect neighbouring areas, sometimes at considerable distances from them. Waste generation is at a high level with the per capita disposal rate for domestic waste at 620 kg/year, placing us second only to the USA among the OECD countries (Figure 45). Over 95% of solid waste is disposed to landfill, of

**Table 13: National wastewater reuse volumes and percentage by water sector**

Year	Volume reuse (ML)	Water sector			
		Domestic	Industrial	Commercial	Rural
1993–94	93 902	0	36	30	34
1994–95	101 292	0	35	26	39
1995–96	109 238	0	37	25	38
1996–97	134 427	0	43	26	31

Source: ABS (2000e).

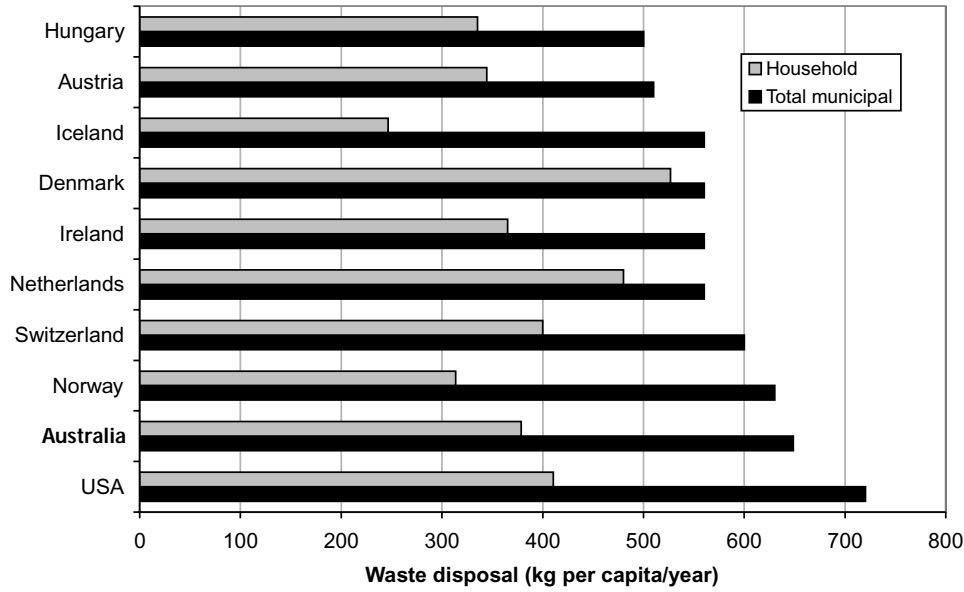


Figure 45: Top 10 municipal waste disposers in the OECD.

Source: OECD (1999).

which construction and demolition of buildings contributes between 40 and 50%. The level of household waste is not vastly different to other countries (Figure 45).

### Trend: Waste management

As a result of increasing pressures and adequate responses in most respects, the condition is static.

The *National Waste Minimisation Act* was adopted in 1992, after which states and territories set waste reduction targets. Several important initiatives have followed. Although the waste reduction targets have not been met, the program has had a positive effect in several jurisdictions (Figure 46).

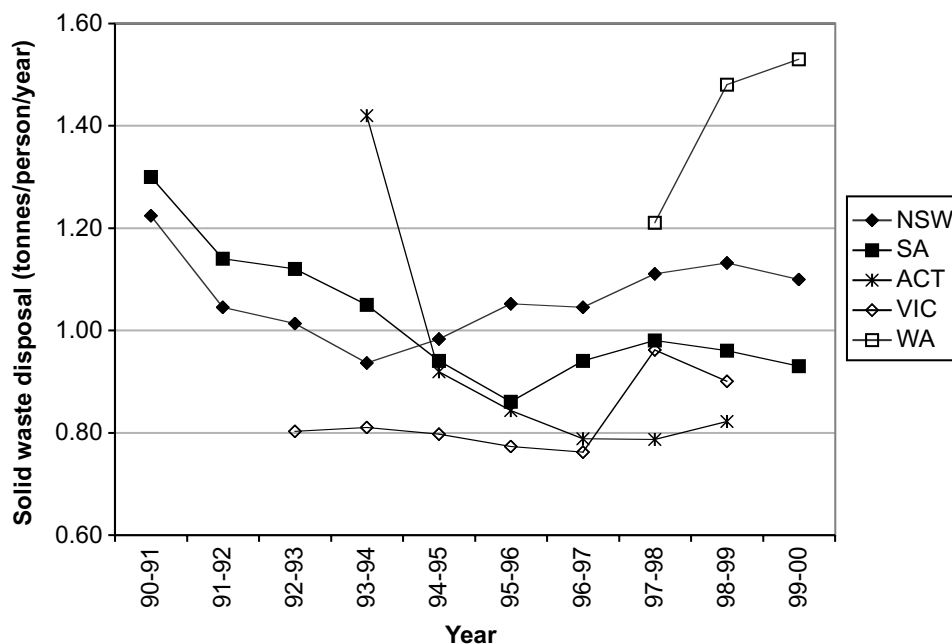


Figure 46: Solid waste disposal rates (t/person per year).

The definition of solid waste disposal for Victoria changed between 1996–97 and 1997–98 and this accounts for the apparent increase.

Source: EcoRecycle Victoria, EPA NSW, EPA SA, ACT Government, DEPWA.

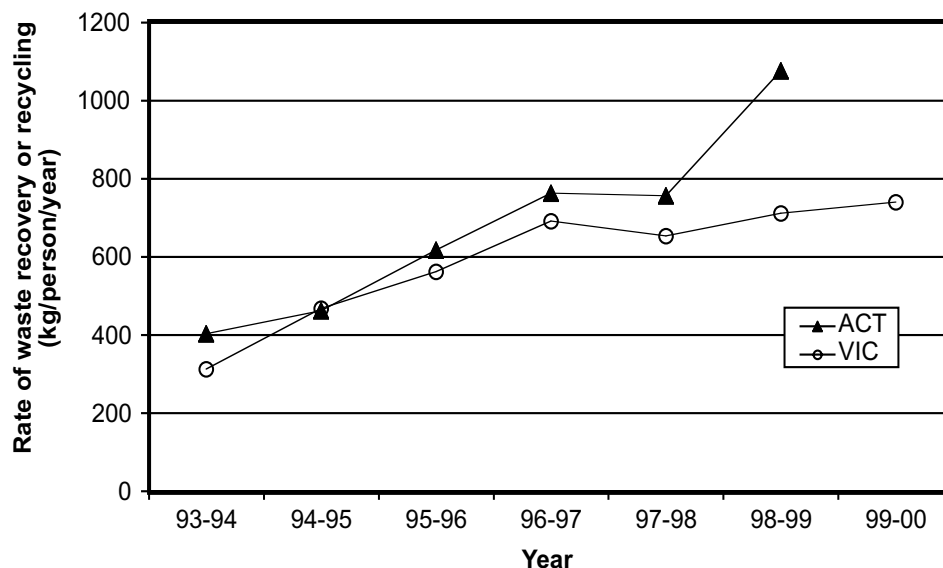


Figure 47: Per capita waste recovery and recycling rates in the Australian Capital Territory and Victoria.

Source: ACT Government (2000) and EcoRecycle Victoria (1998, 2000).

Programs to increase recycling have had some success, particularly with kerbside recycling and the reuse of materials from demolished buildings. In the five years between 1993–1994 and 1998–1999, quantities of waste disposed at landfills in the Australian Capital Territory were reduced by 40%, while the amount of wastes that were recycled more than doubled from 118 000 to 331 000 tonnes (ACT Government 2000). In Victoria, the quantities of wastes that were recovered and recycled have also steadily increased from 1.4 million tonnes in 1993 to 3.2 million tonnes in 1998–1999 (EcoRecycle Victoria 2000) (Figure 47).

Although waste recovery and recycling rates have improved in all jurisdictions, these fell well short of the national target of 50% reduction by 2000 (set in 1992). In Sydney, the level of waste reduction achieved by 2000 against the 1990 baseline was close to 18%. Further reductions are necessary and the targets set in 1992 should be revisited. Strengthening existing waste management programs is likely to be the best option.

The volume of wastewater and stormwater to be disposed has risen, but has been offset to some extent by the level of treatment, reuse and land-based disposal. Yet despite considerable investment in infrastructure and an improvement in coastal water quality, Sydney Harbour water quality is still affected by sewer overflows.

The quantity of hazardous waste generated has also been increasing rapidly. For example, in Sydney between 1992 and 1996, the amount of hazardous waste increased from 170 000 to 422 000 tonnes.

## Conclusion

If existing trends continue, pressures from human settlements are not consistent with a sustainable environment. This is accentuated by:

- the form of settlement, particularly the high growth in coastal areas and urban fringes and the dispersed low-density form of settlement
- the very high per capita material usage which is still growing
- the very high per capita energy usage which is also still growing and leading to increases in greenhouse gas emissions, particularly through electricity generation and transport usage
- a high level of per capita waste by world standards although it appears to have stabilised in recent years
- the uneven distribution of wealth means that some settlements (e.g. many Indigenous settlements and small rural towns) do not always have the capacity to look after their environment and heritage.

Several responses by governments of all jurisdictions have been successful or partly successful. However, more needs to be done, to focus on more efficient resource use, i.e. doing more with less for longer. Creating sustainable settlements will require significant institutional and individual changes.