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## Ways forward in the population and environment debate

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### Executive summary

Recent projections of higher than expected population growth in Australia over the next 40 years has refocused the attention of governments and communities on population policy. With concerns about climate change, water availability, land degradation and urban growth increasing, there are growing calls for inclusive, transparent and rigorous dialogue about the relationships between population and environment. However, the population debate is unfocused and confusing. It is several debates in one, including a debate about Australia's role and responsibilities for receiving immigrants, a debate about how many people can achieve fulfilling lifestyles in Australia in relation to the nation's natural resource base, a debate about the perceived relationships between population growth, immigration and economic growth, and a debate about what constitutes 'progress' in relation to overall well-being of Australians. Confusion between these different debates obscures key issues.

Past and current Australian governments have argued that an explicit population policy is not needed or desirable. Unless there is some process to develop a well-reasoned intent, however, Australia will continue to have 'strategy as pattern'—a de facto policy driven by public opinion that is ill-informed by confused and confusing partial information. Under such a drifting approach to population policy, it is likely that consumption of resources will outstrip supply leading to a decline in the quality of life for Australians.

There now exists a body of theory and information that should allow the elements of the

population debate to be brought together into an open and rational debate. Of particular significance are advances in understanding the dependence of humans on the natural environment, the potential for policy and/or technology to work synergistically with the natural resource base to maintain quality of life while minimising impacts on other species as population grows, and ways in which population strategies might be linked with other elements of government policy to maintain or enhance Australia's resilience, that is, its ability to deal constructively with anticipated and unanticipated future change. Current indications are that both Australia's resilience and the benefits to humans from the natural environment are declining to concerning degrees but that it is not too late to take action to minimise the deleterious impacts.

## About the Author

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## Population papers series

Population related issues were among the most contentious areas of public debate prior to and during the recent election period. Given its enduring and multifaceted nature, the debate on population is likely to be of continuing policy interest to senators and members of the 43rd Parliament.

The Parliamentary Library commissioned a series of papers from leading authors on a range of aspects of population including the environment, the economy, demographic trends, public opinion, urban transport and international comparisons. The views expressed do not reflect an official position of the Parliamentary Library, nor do they constitute professional legal opinion.

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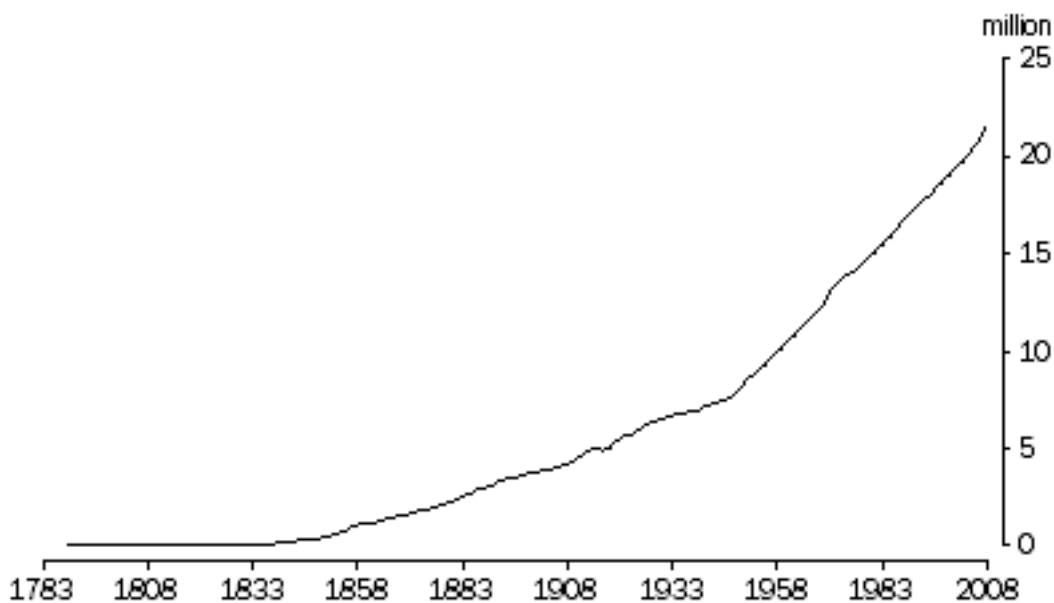
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## Introduction

Australia's population has grown by about 18.1 million since Federation and is currently around 22 million (Figure 1). In 2008–09 the Australian population grew at 2.1 per cent per annum, which was more than five times the average of high income countries and one-third higher than the average in low income countries. It is the fastest rate that the Australian population has grown since 1969.<sup>1</sup> The most recent Intergenerational Report projected a population of around 36 million by 2050.<sup>2</sup> This has helped to generate renewed debate about what the size of Australia's future population should be.

Figure 1: Population growth since European settlement



Source: Australian Bureau of Statistics (ABS), *Australia's environment: issues and trends 2010*, cat. no. 4613.0, ABS, Canberra, January 2010, viewed 19 October 2010, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4613.0/>

Debate about what population Australia should or should not have has been happening since before Federation.<sup>3</sup> It has taken on greater intensity over the terms of the past few Australian

1. G Hugo, 'Australia's future population growth: an important issue for all Australians', *Issues*, vol. 91, 2010, pp. 12–16.
2. Australian Government, *Australia to 2050: future challenges*, Intergenerational report 2010, Commonwealth of Australia, Canberra, 2010, p. 5, viewed 6 December 2010, [http://www.treasury.gov.au/igr/igr2010/report/pdf/IGR\\_2010.pdf](http://www.treasury.gov.au/igr/igr2010/report/pdf/IGR_2010.pdf)
3. R Harding, 'The debate on population and the environment: Australia in the global context', *Journal of the Australian Population Association*, vol. 12, 1995, pp. 165–95; D Cocks, *People policy: Australia's population choices*, UNSW Press, Sydney, 1996.

governments due to the surfacing of diverse views about rates and sources of immigration and perceived effects of population growth on environmental, social and economic aspects of quality of life for Australians.<sup>4</sup> Most neutral observers have typified the debate as strongly partisan with many contributors using selected facts to argue for policy positions that favour their own interests.<sup>5</sup> Consequently, many Australians are confused and do not understand many basic principles underpinning demography and the population debate, which is reflected in the types of reasons given for preferences in surveys.<sup>6</sup>

Cocks observed that the population debate is really two debates: one about immigration and one about the ideal size of the Australian population.<sup>7</sup> In recent debates, these two aspects have become confused, with arguments about human rights and humanitarian responsibilities being mixed with arguments about crowding in cities and the need for improvements to infrastructure.<sup>8</sup> The debate should have many dimensions, involving the economy, security, quality of life, environment and generally how Australian society functions, which will ultimately determine the size of population that can exist comfortably over the coming few decades.<sup>9</sup> However, in the campaigning for the recent federal election, and since, the three major parties focused on the immigration aspects of population and the perception that population pressures are reducing quality of life in some parts of Australia.<sup>10</sup> Only the Greens

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4. K Betts, 'A bigger Australia: opinions for and against', *People and Place*, vol. 18, 2010, pp. 25–38; K Betts, 'Population growth: what do Australian voters want?', *People and Place*, vol. 18, 2010, p. 49.
  5. Harding, op. cit.; Cocks, *People policy: Australia's population choices*, op. cit.; Betts, 'Population growth: what do Australian voters want?', op. cit.
  6. M O'Connor and W Lines, *Overloading Australia, how governments and the media dither and deny on population*, Envirobook, NSW, 2010; Betts, 'A bigger Australia: opinions for and against', op. cit.
  7. Cocks, *People policy: Australia's population choices*, op. cit.
  8. D Cocks, 'Reflecting on the population debate', *Australian Mosaic*, vol. 7, 2004, pp. 5–8, viewed 19 October 2010, <http://www.labshop.com.au/dougcocks/MOSAICARTICLE.htm>; F Kelly, 'Bring on the population debate', *The Drum*, Australian Broadcasting Corporation, 8 April 2010, viewed 19 October 2010, <http://www.abc.net.au/news/stories/2010/04/08/2867851.htm>
  9. B Foran and F Poldy, 'Between a rock and a hard place: Australia's population options to 2050 and beyond', *People and Place*, vol. 11, 2002
  10. T Burke, *The inaugural Population Australia 2050 Summit*, media release, Sydney, 29 June 2010, viewed 19 October 2010, <http://www.treasurer.gov.au/DisplayDocs.aspx?doc=speeches/2010/003.htm&pageID=005&min=tsb&Year=&DocType=1>; Liberal Party of Australia, *The Coalition's policy for population and immigration*, Liberal Party of Australia, Canberra, 2010, viewed 19 October 2010, <http://www.liberal.org.au/~media/Files/Policies%20and%20Media/National%20Security/0725x30LPAPopulationandImmigrationPolicy.ashx>; S Peatling, 'Debate on population targets immigrants', *Sydney Morning Herald*, 24 January 2010, viewed 19 October 2010,

and a number of interest groups gave attention to the environmental and resource limitations on population growth.<sup>11</sup>

In some ways it is understandable that the environmental aspects of the population debate get less attention, as the issues are more difficult to explain to the public and many uncertainties remain about what demands Australians might make on the nation's environments and, therefore, the ability of those environments to meet human needs and responsibilities. Nevertheless, the interaction of population and environmental policy is likely to be a key determinant of the quality of life of Australians in the future. Environmental policy has not been closely linked with population policy in any Australian jurisdiction, although there are signs that this is changing with the creation of the new Department of Sustainability, Environment, Water, Population and Communities.

This paper focuses on two areas of theory and research that have reached maturity over the past two decades, and which have contributions to make to linking population policy with other policy areas, especially environmental policy:

- improved understanding of human dependence on natural environments and how so-called 'ecosystem services' contribute to human well-being, and
- improved understanding of how ecological and social systems cope with shocks and other perturbations and how that knowledge can be used to build and maintain Australia's 'resilience' in the face of uncertain futures.

## **Basis for the population debate**

The focus of the debate about Australia's population has changed several times since Federation.<sup>12</sup> The idea of an optimal population, albeit a large one of up to 100 million, was in favour for most of the first three decades of the Commonwealth but then went out of fashion until it reemerged as concern grew about congestion in the 1970s and 1980s. Whether Australia should, or should not, identify an optimal population size and implement it through policy has continued to be part of the population debate through the 1990s and 2000s as concerns about environmental limits came and went and worries about climate change rose to prominence.<sup>13</sup>

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<http://www.smh.com.au/national/debate-on-population-targets-immigrants-20100123-mrni.html>

11. Australian Greens, 'Population', Australian Greens website, viewed 19 October 2010, <http://greens.org.au/policies/environment/population>;
12. Harding, op. cit.; Cocks, People policy: Australia's population choices, op. cit.
13. H Clarke, 'Should Australia target its population size?', *Economic Papers: A journal of applied economics and policy*, vol. 22, 2003, pp. 24–35.

The reemergence of the population debate in the past few years has been driven by the combination of the global financial crisis of 2008, concerns about climate change, and debate in the media about possible increasing pressures on Australia to accept immigrants from parts of the world beset by unrest. Whereas attitudes towards immigration and population were similar among all political parties for much of the past 100 years, there is now a divergence of viewpoints not only between political parties but also within them.<sup>14</sup> Comparable surveys in 1977, 2001 and 2009–10 show an overall trend of increasing preference among the Australian public for population stability over growth (50, 65, and 69 per cent in favour of stability respectively). But between surveys, preferences have fluctuated with attitudes towards multiculturalism, government stances on immigration issues and border security and rates of unemployment.<sup>15</sup> Since the initial Intergenerational Report in 2002 a new element has been introduced into the population debate: that of the growing ratio of older to younger people in the population and the implications that will have in the future for maintaining Australia's workforce and supporting retired Australians.<sup>16</sup>

## Arguments for and against growth

Cocks summarised substantive arguments for or against population growth (Box 1). His conclusions remain a balanced summary of the issues today, although the highly adversarial nature of the population debate means that some advocates would mount counter arguments. The relationships between population and natural resources are explored more fully later in this paper.

Perceptions about the effects of population size on quality of life dominate the current debate as illustrated by the 2010 federal election campaign in which concerns about overcrowding in major cities loomed large. Seemingly in conflict with these concerns, arguments are also being made for increased immigration to supply the labour market and counteract the effects of an ageing population. Clearly there is a need for an integrated policy approach that manages both the positive and negative effects of population growth.<sup>17</sup> Recent detailed analyses of the broader relationships between population growth and the Australian economy reinforce Cocks' conclusions that the relationships are weak and/or that effects are small, although importance to some businesses might be high.<sup>18</sup>

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14. Betts, 'Population growth: what do Australian voters want?', op. cit., p. 49.

15. Betts, 'A bigger Australia: opinions for and against', op. cit.

16. Australian Government, *Australia to 2050: future challenges*, op. cit.

17. G Bradley, 'If we want more people we have to plan better', *The Australian*, 31 March 2010, viewed 19 October 2010, <http://www.bca.com.au/Content/101668.aspx>

18. R Guest and I McDonald, 'Prospective demographic change and Australia's living standards in 2050', *People and Place*, vol. 10, 2002, pp. 6–15, viewed 19 October 2010, <http://elecpress.monash.edu.au/pnp/view/abstract/?article=0000010027>; C Hamilton, 'Population growth and environmental quality: Are they compatible?', *People and Place*, vol. 10, 2002, pp. 1–5, viewed 19 October 2010,



**Box 1: Summary of substantive arguments relating to the desirable size of Australia's population**

**Resource-availability arguments**

Resource-availability arguments relate to whether natural resources like water and land for food production, waste assimilation, recreation and other uses might limit the number of people that Australia can support. There is no reason to suspect that natural resources will impose a direct limit on population within the range of current projections, although the closer population gets to about 36 million and above the more doubt there is about this generalisation, especially given current concerns about water availability, other aspects of climatic variability, and declining soil quality in many parts of Australia's agricultural zones, as this would mean substantial or complete reductions in food exports. Cocks considered there was a high likelihood, however, that population increases above the 1998 level would incur increasing costs for technological interventions such as water filtration, waste treatment and pollution reduction, health interventions and food production and that lifestyles would be affected by reduced recreation, cultural, conservation and other environment-related activities.

The relationship between population increase, environmental impacts and quality of life reductions depends on consumption and waste production patterns and the ability of technology to substitute for values previously derived, usually at low cost, from the environment.

**Quality of life arguments**

Few arguments for an increase or decrease in quality of life with increasing population can be substantiated with reliable data. Most suggested benefits (for example, increased cultural diversity, efficiencies of resource use, transportation and the like) appear to increase only up to a point, while there are strong perceptions among the public that rising population is linked with rising crime rates and other sociopathic behaviour, quality of human relationships, quality of outdoor recreational opportunities, quality of community services including health, education and transport, ethnic tensions and conflicts over resource use.

A key consideration in addressing these potential issues is the rate at which Australian institutions can respond to emerging problems; the evidence is that this will often be too slow to minimise negative impacts even if the ways and means are available.

**Economic arguments**

Short-term population growth through migration potentially affects economic indicators such as GDP per head, the balance of payments, inflation, wages, employment, government expenditures, production and marketing costs and capital accumulation. Cocks concluded, 'The limited evidence suggests that short-term economic impacts of population growth through immigration lie between being slightly positive and slightly negative. There is even less evidence as to the effects on economic indicators of long-term population growth'.

**Other arguments**

Other arguments for an optimal population relate to national defence (rarely raised now), ethics and social justice (responsibilities to future generations, impacts on the well-being of current Australians), international or 'global citizen' arguments (how Australia should contribute to solving the world's population-related problems), food production and exporting policies (more people in theory means more of Australia's food production being consumed in Australia rather than being exported, affecting the

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<http://elecpress.monash.edu.au/pnp/view/abstract/?article=0000010026>; Productivity Commission, *Economic Impacts of Migration and Population Growth*, research report, Productivity Commission, Melbourne, 17 May 2006, viewed 13 December 2010, <http://www.pc.gov.au/projects/study/migrationandpopulation/docs/finalreport>; J Brown and OM Hartwich, 'Populate and Perish? Modelling Australia's Demographic Future', *CIS Policy Monograph*, vol. 112, The Centre for Independent Studies, 7 October 2010, viewed 13 December 2010, <http://www.cis.org.au/publications/policy-monographs/article/2201-populate-and-perish-modelling-australias-demographic-future>

balance of trade) and caution in the face of uncertainty (avoid the perceived risks of population growth until the consequences are better understood).

Source: Cocks, *People policy: Australia's population choices*, op. cit.

The issue of carrying capacity is particularly relevant to the discussion of sustainability and resilience developed in the rest of this paper.

## Australia's carrying capacity

There has been considerable confusion about what 'carrying capacity' means in terms of a country's population and there has been debate about whether it is even a meaningful concept for population policy. Depending on the quality of life that is considered acceptable, it has been argued that maximum populations of more than 1700 million (meeting only minimum food and water requirements for survival) down to around 17 million or less (with negligible impact on the environment) are possible.<sup>19</sup>

A more realistic and well-accepted definition of a country's carrying capacity is 'the estimated maximum number of people who can live there indefinitely and be given the opportunity to live long, healthy, self-fulfilling lives'.<sup>20</sup> Much of the population debate is based on perceptions about carrying capacity that do not consider all of the factors that might affect quality of life, including health, fulfilment and general well-being, into the future. Most authoritative reviews of this subject have concluded that it is not desirable to identify an 'optimal' population target as this would require considering numerous aspects of the future about which there will always be considerable uncertainty.<sup>21</sup> These aspects include future climatic conditions, technological advances, availability of land, policies relating to food production to support Australians versus for export, and trends in the quality and quantity of

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19. Harding, op. cit.

20. KD Cocks and BD Foran, 'Quality of life as a discretionary determinant of Australia's long-term population', in *Population 2040: Australia's choice*, Proceedings of the symposium of the 1994 annual general meeting of the Australian Academy of Science, Australian Academy of Science, Canberra, 1995, viewed 14 December 2010, <http://www.science.org.au/events/sats/sats1994/Population2040-section5.pdf>

21. S Dovers and T Norton, 'Population, environment and sustainability: Reconstructing the debate', *Sustainable Development*, vol. 2, 1994, pp. 1–7; House of Representative Standing Committee for Long Term Strategies, *Australia's population 'carrying capacity': one nation - two ecologies*, Australian Government Publishing Service, Canberra, 1994, viewed 13 December 2010, [http://www.aph.gov.au/house/committee/reports/1994/1994\\_PP457.pdf](http://www.aph.gov.au/house/committee/reports/1994/1994_PP457.pdf); Cocks, *People policy: Australia's population choices*, op. cit.; Foran and Poldy, 'Between a rock and a hard place: Australia's population options to 2050 and beyond', op. cit.; C Hamilton, 'An Optimal Population for Australia', *Policy*, vol. 30, 2002, pp. 63–71; Clarke, op. cit.; Australian Academy of Technological Science and Engineering (ATSE), *30 million in Australia by 2050 (report summary) 2007*, ATSE, Canberra, 2007, viewed 19 October 2010, <http://www.atse.org.au/resource-centre/func-startdown/104/>

natural resources available. Many advocates for high population growth assume that ways will be found to deal with any challenges arising from these aspects of the future, whereas advocates for stabilising Australia's population urge caution while future uncertainties and risks remain high.<sup>22</sup> The alternatives to setting an optimal population target are ongoing constructive dialogue to manage the balance between population and the environment or ad hoc, short-term responses that are highly likely to produce unintended consequences.

The conclusions of the House of Representatives Standing Committee for Long Term Strategies in 1995 have generally been borne out by detailed modelling of multiple social, economic and environmental factors:<sup>23</sup>

- populations above about 30 million are likely to require major changes in lifestyles and resource use, most of which would be politically and socially unpalatable<sup>24</sup>
- although there are strong advocates for populations between 20 and 30 million, detailed analyses of resource use suggest that populations in this range would be difficult to sustain if current rates of per capita resource use are maintained<sup>25</sup>
- there was, and apparently still is, strong public support for a population in the range of 17-23 million and environmental analyses support this being a safe population given

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22. P Hall, 'Carrying capacity: can a big country with very few people be overpopulated', *Emagazine.com*, vol. XIV, 2003, viewed 19 October 2010, <http://www.emagazine.com/view/?560>; J Whyte and N Beuret, 'Carrying capacity and borders', *Chain Reaction*, vol. 91, 2004, viewed 19 October 2010, <http://www.foe.org.au/resources/chain-reaction/editions/91/carrying-capacity-and-borders/>; B Lines, 'Australian ambitions: population and sustainability', *People and Place*, vol. 13, 2005, p. 21; Bradley, op. cit.; 'Future Australians could face starvation: Dick Smith', *ABC News Australian Broadcasting Corporation*, 25 January 2010, viewed 14 December 2010, <http://www.abc.net.au/news/stories/2010/01/25/2800081.htm>; Friends of the Earth Australia, 'Environment & Population', Friends of the Earth Australia website, viewed 19 October 2010, <http://www.foe.org.au/population>; J Curnow, 'Australia's Carrying Capacity', *Sustainable Population Australia*, 4 September 2000, viewed 19 October 2010, <http://www.population.org.au/index.php/resources/fact-sheets/159-australias-carrying-capacity>; Doctors for the Environment Australia, 'A Sustainable Population for Australia', Doctors for the Environment Australia website, viewed 19 October 2010, <http://www.dea.org.au/node/373>
  23. House of Representatives Standing Committee for Long Term Strategies, op. cit.
  24. B Foran and F Poldy, *Future dilemmas: options to 2050 for Australia's population, technology, resources and environment*, CSIRO Sustainable Ecosystems, Canberra, October 2002, viewed 13 December 2010, <http://www.cse.csiro.au/publications/2002/fulldilemmasreport02-01.pdf>; Foran and Poldy, 'Between a rock and a hard place: Australia's population options to 2050 and beyond', op. cit.; B Foran, M Lenzen and C Dey, *Balancing act: a triple bottom line account of the Australian economy*, CSIRO Resource Futures and The University of Sydney, Canberra, 2005, viewed 13 December 2010, <http://www.isa.org.usyd.edu.au/publications/index.shtml>
  25. Ibid.

conservative assumptions about efficiencies of resource use and demands on natural resources in the foreseeable future (although there are strong arguments suggesting that keeping the population within this range could be difficult given pressures for immigration from other parts of the world and there would need to be careful attention to maintaining a sufficient labour force as the overall population ages), and

- while some continue to argue for smaller populations, most analyses conclude that this would not be possible given the range of internal and external social and economic pressures and responsibilities that Australia faces.

## Population and environment

For several decades, resource and environmental components have been marginalised in the population debate.<sup>26</sup> There are at least two major reasons why this has occurred and why those with an understanding of environmental issues have found it hard to be heard:

- there are wide differences in assumptions made about the timing and magnitude of increased efficiencies in resource use that can be delivered by technology in the future and few data to resolve the differences, and
- many commentators do not understand the nature of human dependence on the environment and what is involved in replacing environmental support for human activities with technological alternatives.

The first of these issues will continue to be a challenge as predicting the pace and applicability of technological innovation will always involve high uncertainty. The second issue is more amenable to solution as science has gone a long way towards addressing understanding of human dependence on ecosystems in recent years. This is the subject of a following section.

## Measuring human dependence on the environment

Over the past two decades, ecologists and economists have considerably progressed thinking about the relationships between humans and the natural environments they are part of. Within the disciplines of environmental and ecological economics, approaches have been developed to acknowledge and assess the full range of market and non-market benefits that accrue to people from ecological systems.<sup>27</sup> Such approaches have contributed strongly, for example, to decisions where there are real or perceived tradeoffs between tangible economic returns (usually to private interests) from modifying ecological systems versus less tangible benefits (often to the public) that are likely to be lost due to the modifications. Examples of tangible

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26. Harding, *op. cit.*

27. N Bockstael, A Freeman, R Kopp, P Portney and V Smith, 'On measuring economic values for nature', *Environmental Science & Technology*, vol. 34, 2000, pp. 1384–1389.

returns include increased production of agricultural goods and sales of developed land or extracted resources. Examples of less tangible externalities of land modification include decreases in water filtration, waste absorption, carbon sequestration, stream stabilisation, pest control, biodiversity conservation, and recreational and cultural benefits.<sup>28</sup> The main purpose of such approaches has been to assess the implications of human impacts on the environment, largely independent of how many people are exerting those impacts. But there is increasing interest in using approaches like ‘industrial metabolism’, ‘ecological footprint’ and ‘ecosystem services’ analyses to inform the population debate.<sup>29</sup> This paper does not attempt a comprehensive review of these approaches but their potential applications are each illustrated below.

## Australia’s ecological footprint

According to the website of the Global Footprint Network:

The Ecological Footprint has emerged as the world’s premier measure of humanity’s demand on nature. It measures how much land and water area a human population requires to produce the resource it consumes and to absorb its wastes, using prevailing technology.<sup>30</sup>

This approach has become widely used in Australia and elsewhere.<sup>31</sup> While it is used mainly as a tool for steering policy towards sustainability, it also gives a good idea about the number of people an area of land can support given a level of consumption by those people. For example, in 1993 an area nearly equal to 60 house blocks was needed to meet all environmentally-related needs of Canberrans (Table 1). Similar analysis for the states around the Baltic Sea showed that the capacity of the environment to assimilate wastes has been far

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28. N Abel, S Cork, R Gorddard, J Langridge, A Langston, R Plant, W Proctor, P Ryan, D Shelton, B Walker and M Yialeloglou, *Natural values: exploring options for enhancing ecosystem services in the Goulburn Broken Catchment*, CSIRO, Canberra, Australia, 2003; S Cork, G Stoneham, K Lowe, K Gainer and R Thackway, *Ecosystem services and Australian natural resource management (NRM) futures*, Canberra, 2007, viewed 19 October 2010, <http://www.environment.gov.au/biodiversity/publications/ecosystem-services-nrm-futures/pubs/ecosystem-services.pdf>; R Gillespie, R Dumsday and J Bennett, *Estimating the value of environmental services provided by Australian farmers*, Australian Farm Institute, Surrey Hills, Australia, 2008.
  29. J Birkeland and J Schooneveldt, *Mapping regional metabolism: an essential decision support tool for natural resource management*, Land and Water Australia, Canberra, June 2003, viewed 19 October 2010, <http://lwa.gov.au/products/pr030521>
  30. Global Footprint Network, ‘Footprint basics - overview’, Global Footprint Network website, viewed 19 October 2010, [http://www.footprintnetwork.org/en/index.php/GFN/page/footprint\\_basics\\_overview/](http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_basics_overview/)
  31. Environment Protection Agency Victoria, ‘Ecological footprint - home’, Environment Protection Agency Victoria website, viewed 19 October 2010, <http://www.epa.vic.gov.au/ecologicalfootprint/default.asp>

exceeded, meaning that engineering solutions were needed to replace ecosystem services, at increasing cost and at the expense of other needs for financial capital.<sup>32</sup>

Table 1: Area of land required per person to meet the needs of Canberra's population in 1993

Category	Hectares	House blocks
Food	1.39	18.1
Housing	0.36	4.7
Transport	0.77	10.0
Consumer goods	0.67	8.7
Services	1.26	16.3
Total	4.44	57.8

Source: A Close and B Foran, *Canberra's ecological footprint*, CSIRO, Canberra, 1998, viewed 19 October 2010, <http://www.cse.csiro.au/publications/1998/canberraecofoot-98-12-2.pdf>

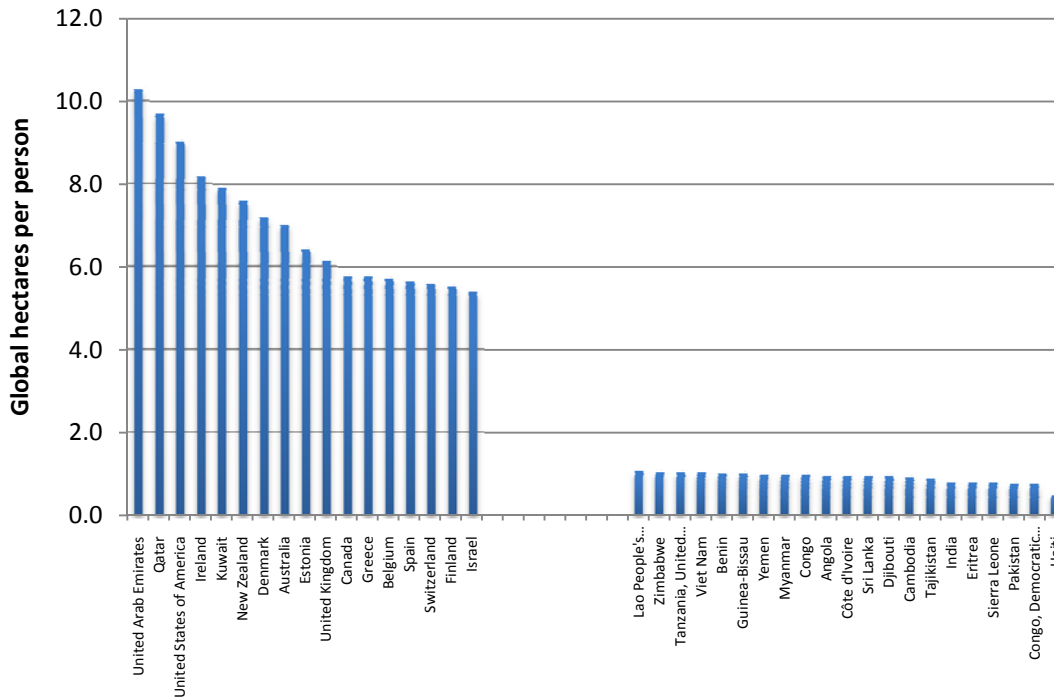
Australia ranks highly (performs poorly) in terms of consumption per person, having the eighth biggest ecological footprint globally on 2007 data (Figure 2). An illustration of what this means, when considered in the context of a range of factors affecting population comes from Lenzen and Foran's research, which concluded that if Australia's population were to grow, hypothetically, to 25 million people by 2050, and per-capita expenditure doubled, the annual water requirement may more than double to 50,000 gegalitres, which is equivalent to half the nation's water flows.<sup>33</sup> This is a clearly unsustainable scenario and action would need to be taken to limit population growth, consumption, or both. It illustrates the nature and extent of the challenge in balancing population and environment in coming years.

The impacts of population on natural resources go far beyond the direct impacts that most people are aware of (Figures 3 and 4). Water, energy and other resources are used directly by households in activities like cooking, heating, gardening and travelling, but they consume a far greater amount of resources indirectly because resources are used to produce food, clothing and a range of other goods and services that households consume. Importing food and other resources from overseas to make up for shortages in Australia merely transfers the impact elsewhere—a hidden aspect of population growth that should be considered in any population strategy adopted by Australia.

32. C Folke, L Jansson, J Larsson and R Costanza, 'Ecosystem appropriation by cities', *Ambio*, vol. 26, 1997, pp. 167–72.

33. M Lenzen and B Foran, 'An input-output analysis of Australian water usage', *Water Policy*, vol. 3, 2001, pp. 321–40.

Figure 2: Ecological footprint for consumption for a range of high-consuming and low-consuming countries



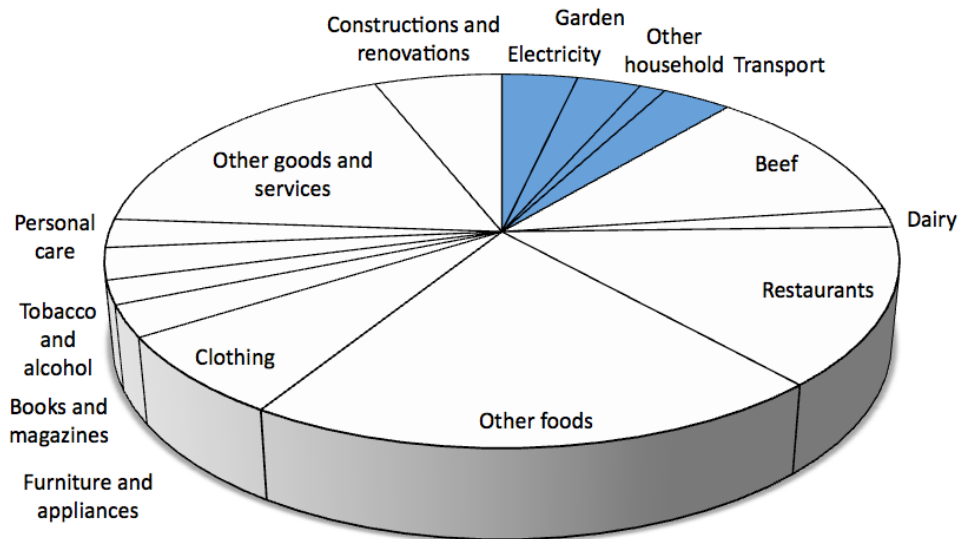
Source: Global Footprint Network, 'Footprint for Nations (2010 data tables)', Global Footprint Network, viewed 19 October 2010, [http://www.footprintnetwork.org/en/index.php/GFN/page/footprint\\_for\\_nations/](http://www.footprintnetwork.org/en/index.php/GFN/page/footprint_for_nations/); Global Footprint Network, 'Australia', Global Footprint Network, viewed 19 October 2010, <http://www.footprintnetwork.org/en/index.php/GFN/page/trends/australia/>

Modelling suggests that expecting households to reduce their consumption will not achieve the reduction in per capita consumption required to allow quality of life to be maintained if population increases substantially over the next few decades. Major improvements in technology will be required and this technology will need to be applied so that new houses, other infrastructure and industries are functioning at best-practice levels of efficiency. This is unlikely to be achieved through market forces alone and will probably require strong intervention by governments.<sup>34</sup>

34. Foran and Poldy, *Future dilemmas: options to 2050 for Australia's population, technology, resources and environment*, op. cit.

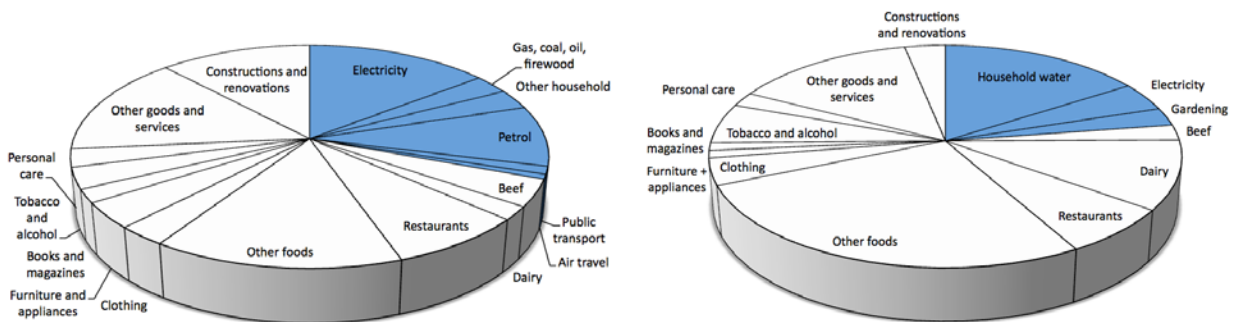


Figure 3: Breakdown of the ecological footprint of the average Australian as reported in 2007



Note: the blue shaded components are direct impacts, while the unshaded components are indirect.  
 Source: C Dey, C Berger, B Foran, M Foran, R Joske, M Lenzen and R Wood, 'Household environmental pressure from consumption: an Australian environmental atlas', in G Birch, ed., *Water, wind, art and debate: how environmental concerns impact on disciplinary research*, pp. 280–315, Sydney, 2007.

Figure 4: Breakdown of total greenhouse gas emissions (left) and water use (right) by the average Australian as reported in 2007



Note: the blue shaded components are direct impacts, while the unshaded components are indirect.  
 Source: C Dey, C Berger, B Foran, M Foran, R Joske, M Lenzen and R Wood, op. cit., pp. 280-315.



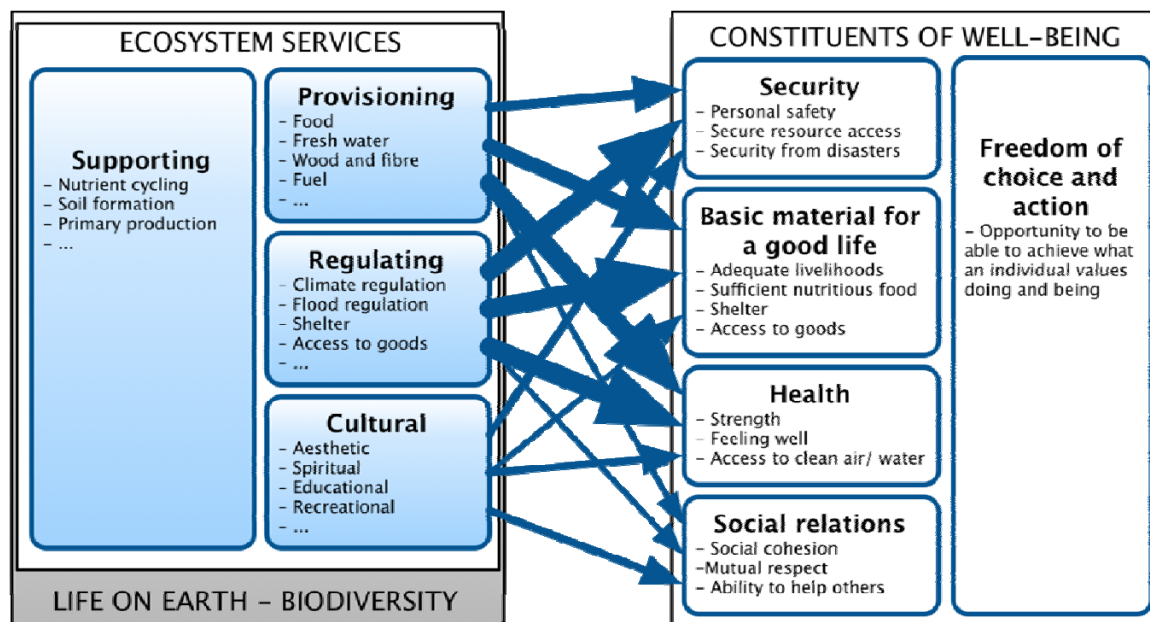
## Ecosystem services

It is widely accepted by economists and ecologists that the environment is undervalued in most decision-making. The fundamental problem is that the traditional ways in which humans recognise value (that is, through exchanging things in some sort of market) fail to protect resources that either belong to everyone (that is, have public rather than private benefits) or are not recognised as valuable (for example, most people do not know about the role that some beneficial insects play in controlling pests). Various approaches have been developed to remedy this ‘market failure’. One of these is the concept of ‘ecosystem services’.<sup>35</sup>

The terms ‘ecosystem services’, ‘environmental services’, ‘nature’s benefits’ and similar combinations have been used increasingly over the past decade in research publications, reports and government policies worldwide. The Millennium Ecosystem Assessment used ecosystem services as the basis for its assessment of past changes in natural environments globally and sub-globally, plausible future changes in the relationships between natural environments and human well being, and past and possible future policy responses.<sup>36</sup> It defined ecosystem services as ‘the benefits people obtain from ecosystems’. A major step forward by the Millennium Ecosystem Assessment was the establishment of a framework explicitly relating drivers of change and ecosystem processes to the elements of human well-being (Figure 5).

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35. W Reid, H Mooney, D Capistrano, S Carpenter, K Chopra, A Cropper, P Dasgupta, R Hassan, R Leemans, R May, P Pingali, C Samper, R Scholes, R Watson, A Zakri and Z Shidong, ‘Nature: the many benefits of ecosystem services’, *Nature*, vol. 443, 2006, p. 749, viewed 19 October 2010, <http://search.ebscohost.com/login.aspx?direct=true&db=aph&AN=22770948&site=ehost-live>
  36. Millennium Ecosystem Assessment, *Ecosystems and human well-being: synthesis*, Island Press, USA, 2005, viewed 19 October 2010, <http://www.maweb.org/documents/document.356.aspx.pdf>

Figure 5: Relationships between ecosystem services and human well-being as developed by the Millennium Ecosystem Assessment



Note: the width of the arrows indicates intensity of linkages.

Source: Millennium Ecosystem Assessment (MA), *Ecosystems and Human Well-Being: Synthesis*, Island Press, Washington DC, USA, 2005, viewed 19 October 2010, <http://www.maweb.org/documents/document.356.aspx.pdf>

The concept of ecosystem services was developed by ecologists and economists to explain ecological and economic concepts to non-scientists and to bridge conceptual and methodological gaps between the two disciplines.<sup>37</sup> It is a useful tool for dialogue about integrating a range of policy areas like those relevant to population policy.<sup>38</sup> Central to the approach is the identification of the range of benefits that might come from a particular area of land. This forces those involved to consider social, economic and ecological issues simultaneously.

37. G Daily, ed., *Nature's services: societal dependence on natural ecosystems*, Island Press, USA, 1997; R de Groot, M Wilson and R Boumans, 'A typology for the classification, description and valuation of ecosystem functions, goods and services', *Ecological Economics*, vol. 41, 202, pp. 393-408.

38. Cork, Stoneham, Lowe, Gainer and Thackway, op. cit.; Australian Government, 'Welcome to caring for our country', Caring for our Country website, viewed 19 October 2010, <http://www.nrm.gov.au/>

Ecosystem services approaches have primarily been applied to estimate the economic value and/or other importance of ecological processes for meeting the needs of humans. For example, a semi-quantitative analysis of relationships between ecosystem services and land uses in the Goulburn Broken catchment in Victoria suggested that most land uses rely on most ecosystem services and that there are several situations in which economic and other benefits could be gained by more attention to environmental management (Figure 6).

Figure 6: Relationships between ecosystem services and land uses in the Goulburn Broken catchment as judged by a range of experts

		LAND-USES											
		Dairy	Fruit and grapes	Vegetables	Grazing	Crops	Intensive animals	Forestry	Food processing	Housing	Water production	Recreation	Culture/ biodiversity
SERVICES	Pollination		■										
	Life-fulfillment	■			■					■			■
	Climate regulation	■	■				■		■				
	Pest control		■	■	■	■							
	Genetic resources				■								
	Habitat regeneration		■	■	■			■		■		■	■
	Shade and shelter	■	■		■	■				■			
	Soil health	■	■	■	■	■							
	Healthy waterways	■	■		■			■	■		■	■	
	Water filtration			■	■	■					■		
	River regulation	■	■		■						■	■	
	Waste absorption	■	■	■	■	■	■		■	■	■	■	

Note: where cells are shaded, the experts considered that the relationship between land use (column) and the service (row) was at or near a critical point at which more or less of one could mean a substantial change in the other.

Source: C Binning, S Cork, R Parry and D Shelton, *Natural assets: An inventory of ecosystem goods and services in the Goulburn Broken catchment*, CSIRO, Canberra, Australia, 2001.

For example, the service of pollinating crops or native vegetation by insects was thought to be at a sufficiently high level such that a little more or less pollination would not affect any land use except for fruit and grape growing. In that case, research suggested that an increase in pollination would increase the yield of some fruit and grapes. On the other hand, it was considered that the service of waste absorption, which is the process of breaking down human and animal wastes and is performed by soil organisms, was at a critically low level and that this was affecting all but two land uses. In addition, most of these land uses was in turn contributing to the decline in the service of waste absorption. Analyses like these allow the dependence of humans on environmental processes to be assessed and considered in decision making. Increases or decreases in human impacts affect the delivery of ecosystem services,

and increased demand for food production, water filtration, pest control, flood regulation and other ecosystem services increase the need for land in suitable condition to supply the services. The alternative is to meet these needs using technology, such as fertilizers, pesticides, water filtration facilities, waste disposal systems, flood barrages and the like, which can be much more costly than maintaining the natural ecosystems that serve multiple purposes.

Elsewhere in Victoria, advances in identifying and assessing ecosystem services have allowed the state government to develop efficient approaches for purchasing environmental benefits from land managers at best value for public investment.<sup>39</sup> Research in the Gwydir catchment in NSW has shown that strategic management of remnant vegetation makes major contributions to carbon sequestration, erosion prevention, improved grazing on flood plains, bird breeding events, and biodiversity conservation generally.<sup>40</sup> The benefits of only four ecosystem services were estimated at \$94 million over 30 years. CSIRO research has shown the importance of soil biodiversity in supporting horticulture.<sup>41</sup> A report commissioned by the Australian Farm Institute showed that public benefits of environmental services from agricultural land are in the order of tens of millions of dollars for individual industries and several billion dollars overall.<sup>42</sup>

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39. Department of Sustainability and Environment Victoria, 'EcoTender', Department of Sustainability and Environment Victoria website, viewed 19 October 2010, <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/F18669E8E2A4C02FCA256FDB00031592DC837B2FCBEF4B4BCA2573B6001A9728>
  40. F Katanja, Ecosystem service provision from natural resource management interventions in the Gwydir catchment, north-western New South Wales: Spatial bio-economic evaluation at catchment, district and farm scales, University of New England, Armidale, NSW, 2008, viewed 14 December 2010, [http://une-academia.edu/Karanja/Papers/278329/Ecosystem\\_Service\\_Provision\\_from\\_Natural\\_Resource\\_Management\\_Interventions\\_in\\_the\\_Gwydir\\_Catchment\\_North-Western\\_New\\_South\\_Wales\\_Spatial\\_Bio-economic\\_Evaluation\\_at\\_Catchment\\_District\\_and\\_Farm\\_Scales](http://une-academia.edu/Karanja/Papers/278329/Ecosystem_Service_Provision_from_Natural_Resource_Management_Interventions_in_the_Gwydir_Catchment_North-Western_New_South_Wales_Spatial_Bio-economic_Evaluation_at_Catchment_District_and_Farm_Scales); R Smith, Biodiversity and ecosystem services associated with remnant native vegetation in an agricultural floodplain landscape, University of New England, Armidale, NSW, 2010.
  41. M Colloff, G Fokstuen and T Boland, Toward the triple bottom line in sustainable horticulture: Biodiversity, ecosystem services and an environmental management system for citrus orchards in the riverland of South Australia, CSIRO Entomology and Australian Landscape Trust, Canberra, 2003, viewed 19 October 2010, [http://www.ecosystemservicesproject.org/html/publications/docs/soil\\_final\\_report.pdf](http://www.ecosystemservicesproject.org/html/publications/docs/soil_final_report.pdf)
  42. R Gillespie, R Dumsday and J Bennett, *Estimating the value of environmental services provided by Australian farmers*, Australian Farm Institute, Surrey Hills, Australia, 2008.

At the national scale, ecosystem services are the basis for the Australian Government's various land stewardship programs, and the term 'ecosystem services' appears in virtually all major state and national environmental management policy documents in Australia.<sup>43</sup>

While not all ecologists or economists agree on the language or approaches that are used under the banner of ecosystem services (many prefer other approaches aimed at similar issues), there is general agreement that questions need to be addressed to resolve debate about how many people can be supported by any given set of natural environments. Such questions include:

- what benefits do people get from natural environments?
- how essential are these benefits (for example, which ones are needed for life support, which meet needs that improve quality of life, and which can be replaced partially or fully by technological alternatives)?
- how much of the different benefits will human populations need in the future in relation to lifestyles, consumption patterns, technologies and economic constraints? and
- what aspects of natural environments provide which services and what does that tell us about managing natural systems to achieve multiple goals (including provision of clean water, production of food, meeting conservation responsibilities and supporting cultural and others social needs of societies)?

The key issue for public policy is how to consider the public and private costs and benefits of having ecosystem services available to support future populations when there is presently insufficient information to gauge in what ways different ecosystem services will be required under different population, consumption and technological scenarios. As discussed above, research suggests that population growth could severely reduce quality of life in Australia if current levels of resource consumption continue.

## **Dilemmas and safe operating limits**

Taking the sort of thinking behind ecosystem services and ecological footprints to a global scale, a team of scientists recently assessed the state of the world in relation to a set of 'safe operating limits'.<sup>44</sup> They identified ten aspects of the way the Earth functions and assessed the impacts of the world's population on these. They concluded that safe operating limits have been exceeded for three of these (rate of biodiversity loss, nitrogen inputs to the biosphere and oceans, and climate change), that limits are being approached for two others

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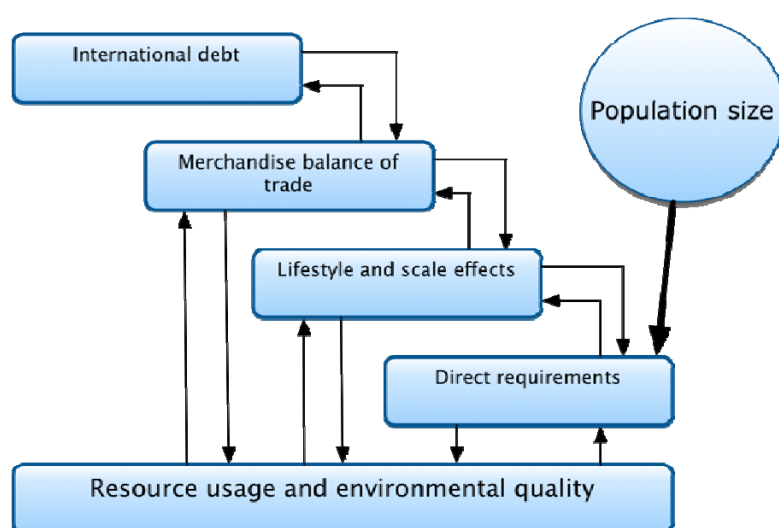
43. Cork, Stoneham, Lowe, Gainer and Thackway, op. cit.; Australian Government, 'Welcome to caring for our country', op. cit.

44. J Rockström, W Steffen, K Noone, et al., 'Planetary boundaries: exploring the safe operating space for humanity', *Ecology and Society*, vol. 14, 2009, p. 32 [online], viewed 19 October 2010, <http://www.ecologyandsociety.org/vol14/iss2/art32/>

(stratospheric ozone depletion and ocean acidification), that there is a need to take urgent action on three others (phosphorus cycles, change in land use and freshwater use), and that insufficient information exists to assess the other two (atmospheric aerosol loading and chemical pollution). There was considerable controversy over their selection of the limits, but this exercise illustrates both the importance of having this sort of dialogue and the difficulty that even scientists have agreeing on what the limits of environmental function are in relation to population. This should not discourage Australian governments from facilitating such dialogue as only when these arguments are put on the table can they be refined and future risks assessed objectively. The past three Australian State of the Environment reports raised concerns in Australia about the same issues flagged in the global study.<sup>45</sup>

In one of the few attempts to consider all major factors affecting the relationships between resource use and population, a CSIRO team modelled physical stocks and flows in relation to internal needs of Australians (such as for food, houses, cars, and institutions) and the exports required to pay for imports.<sup>46</sup> Optimistic assumptions were made about technological innovation and improvements in efficiency of resource use. Three population scenarios (20, 25 and 32 million by 2050) were explored. Figure 7 illustrates the complexity that needs to be considered. The distinction between direct and indirect requirements for natural resources was illustrated in Figures 3 and 4.

Figure 7: Four levels of population influence on physical stocks and flows in Australia



Source: Foran and Poldy, 'Between a rock and a hard place; Australia's population options to 2050 and beyond', op. cit.

45. Department of Sustainability, Environment, Water, Population and Communities, 'State of the environment (SoE) reporting', Department of Sustainability, Environment, Water, Population and Communities website, viewed 2 December 2010, <http://www.environment.gov.au/soe/>
46. Foran and Poldy, 'Between a rock and a hard place: Australia's population options to 2050 and beyond', op. cit.

The project revealed six dilemmas that will need to be considered in developing formal or informal population policies:

- an ageing population is expected to lead to a reduced labour force
- higher population growth might help to address the impact of ageing but there is the possibility that more of Australia's resources will be consumed internally, reducing exports and leading to a lower balance of physical trade
- unless consumption patterns change more than is assumed, larger populations may mean less available resources per person, which could reduce quality of life
- higher population growth is expected to drive greenhouse gas emissions directly through population size and indirectly through affluence and trading activities
- even with optimistic assumptions about the current status of resource stocks, the modelling raises concerns about the loss of agricultural land, the decline of marine fish stocks, and the depletion in domestic reserves of oil and gas under high population growth scenarios, and
- high rates of population growth appear likely to affect water quality, biodiversity quality, and air quality in the air sheds of capital cities.

These dilemmas are not independent; they interact with each other, which is why the authors in the above project concluded there is a need to integrate population policy with a range of other policy areas. They considered that most resource and environmental issues are manageable but quick solutions are generally scarce and finding solutions will require support from across Australian society.

## **Sustainability and resilience**

The concept of sustainability has been central to most of Australia's policies relating to resource management (including management of human resources) across all portfolios for many decades. The concepts of resilience and adaptability are increasingly becoming important as ways to steer Australia towards sustainability in uncertain times. These concepts have important implications for the development of population policy as the number of people that can live healthy and fulfilling lives in Australia will be determined not just by how many of them there are but how they interact with one another and the resources that they will need to support their lives and lifestyles. Political parties have generally failed to explain how sustainability and resilience objectives can be harmonised with decisions about population, and it is becoming increasingly urgent that they do.<sup>47</sup> Recent advances in thinking about these concepts potentially help to focus the population debate and give it more of an evidence base.

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47. Lines, *op. cit.*, p. 21.



## Sustainability

The population debate in Australia has become inextricably linked with the concept of sustainability. This link is stronger than ever with the creation of the Commonwealth Department of Sustainability, Environment, Water, Population, and Communities.<sup>48</sup> Talking about sustainability and population together reinforces the link between environment and population but it also creates the impression that there is a ‘carrying capacity’ that can be determined and applied. This is similar to the misconception around sustainability generally, that is, that there is a formula that can be applied to determine what is a sustainable state for Australia, or part thereof, and all that is needed is to apply that formula.

Thinking about how to put the objective of sustainability into practice has led to several conclusions that are increasingly guiding research, policy and management:

- social, economic and ecological systems should be seen as coupled rather than separate, and
- the most effective way to facilitate long-term sustainability of human habitation is to ‘keep options open’ by avoiding development trajectories that are clearly unsustainable and maintaining the capacity of coupled social-economic-ecological systems to prepare for and adapt to future challenges.

One of the approaches to addressing these goals is the concept of ‘resilience’, which is discussed below.

## Resilience

The concept of ‘resilience’ is becoming more common in Australian policy. It now appears in many State and Commonwealth environmental policies;<sup>49</sup> the Council of Australian Governments has endorsed resilience measures in early childhood development and the health sector and recently agreed to a ‘new whole-of-nation resilience-based approach to

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48. Department of Sustainability, Water, Population and Communities (SEWPAC), ‘About us’, SEWPAC website, viewed 19 October 2010, <http://www.environment.gov.au/about/index.html>

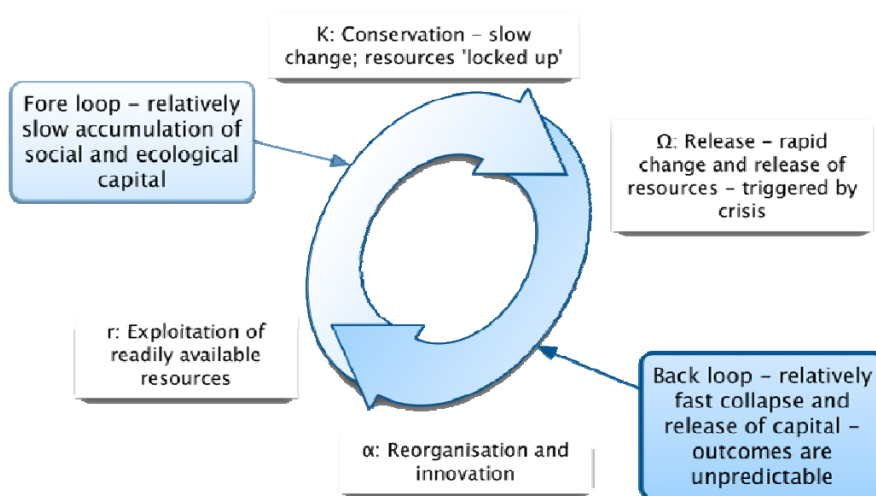
49. Australian Government, ‘Welcome to caring for our country’, op. cit.; The State of Victoria Department of Sustainability and Environment, *Securing our natural future: A white paper for land and biodiversity at a time of climate change*, Department of Sustainability and Environment Victoria, Melbourne, November 2009, viewed 19 October 2010, <http://www.dse.vic.gov.au/DSE/nrence.nsf/LinkView/9DB1809566C926A1CA25767E001128C7A87712F40FADECFCA25767300162346>



natural disaster policy and programs;<sup>50</sup> and resilience is now central to the Attorney General's strategy for dealing with critical infrastructure and disaster preparedness.<sup>51</sup>

Resilience has been developed in many disciplines from many different perspectives.<sup>52</sup> One that is proving to have a particularly useful application in a range of policy contexts in Australia emerged from research on ecological systems that showed that these systems never stay in one state for long. Rather, they move through predictable 'adaptive cycles' in which they increase or decrease their complexity and the amount of resources being used (Figure 8).

Figure 8: The adaptive cycle



Source: Adapted from B Walker and D Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, Island Press, Washington DC, USA, 2006.

Ecological systems become established with a few species using abundant resources (for example, colonisation of a clearing after a tree-fall or a fire) and gradually become more complex as more species become involved. These species utilise more resources and interact with one another in increasingly complex ways until the system becomes 'grid-locked' and unable to adapt. During the early and mid stages of this part of the adaptive cycle, the ability

50. Council of Australian Governments (COAG), *Council of Australian Governments' Meeting - 7 December 2009*, Council of Australian Governments (COAG), Canberra, 2009, viewed 19 October 2010, [http://www.coag.gov.au/coag\\_meeting\\_outcomes/2009-12-07/index.cfm](http://www.coag.gov.au/coag_meeting_outcomes/2009-12-07/index.cfm)
51. Australian Government Attorney-General's Department, 'Critical Infrastructure Resilience', Australian Government Attorney-General's Department website, Canberra, viewed 19 October 2010, [http://www.ag.gov.au/www/agd/agd.nsf/Page/Nationalsecurity\\_CriticalInfrastructureProtection](http://www.ag.gov.au/www/agd/agd.nsf/Page/Nationalsecurity_CriticalInfrastructureProtection)
52. S Cork, ed., *Resilience and transformation: preparing Australia for uncertain futures*, CSIRO Publishing, Collingwood, Victoria, Australia, 2010.

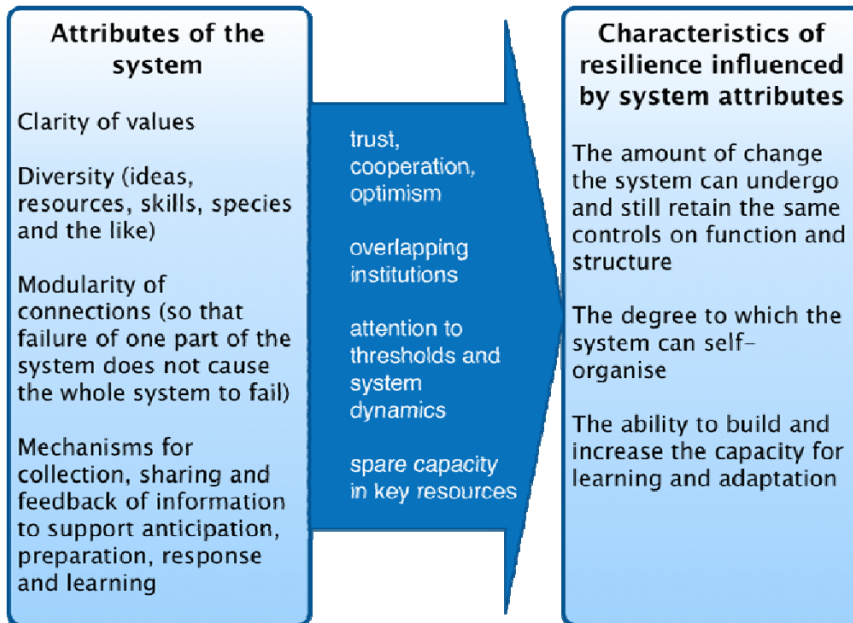
of the system to re-organise itself and adapt to change while retaining its essential functions and 'identity' is high. As the system becomes more complex, however, its options are reduced due to the locking up of resources, and the freedom of any individual or species within the system to adapt is constrained by its intricate interactions with others. This makes the system vulnerable to shocks, which often cause the system to change in major ways—often called a system 'collapse'. Such shocks release resources and simplify the system so that a new system can emerge.

From this thinking, 'resilience' has been defined as 'the capacity of a system to absorb disturbance and reorganise while undergoing change so as to still retain essentially the same function, structure, identity and feedbacks'.<sup>53</sup> This definition captures the understanding that resilient systems adapt and change, but within limits. Resilience theory also recognises that it is not always desirable for a system to be resilient and that transformation into a different set of states might be desirable sometimes.<sup>54</sup>

This adaptive cycle appears to apply to a high degree to social and economic systems as well as ecological ones. The rise and collapse of organisations, businesses, governments, even societies, can be understood by considering such factors as the diversity of resources and possibilities, the ways in which parts of the system are connected and the ways in which information is collected, shared and learned from (Figure 9).

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53. B Walker, CS Holling, SR Carpenter and A Kinzig, 'Resilience, adaptability and transformability in social-ecological systems', *Ecology and Society*, vol. 9, 2004, p. 5, viewed 19 October 2010, <http://www.ecologyandsociety.org/vol9/iss2/art5/>
54. Ibid; B Walker and D Salt, *Resilience thinking: sustaining ecosystems and people in a changing world*, Island Press, Washington DC, USA, 2006.

Figure 9: Some of the key attributes that give a social, ecological or coupled social-ecological system resilience and adaptability



Source: adapted from: B Walker, CS Holling, SR Carpenter and A Kinzig, 'Resilience, adaptability and transformability in social ecological systems', *Ecology and Society*, vol. 9, 2004, p. 5, viewed 19 October 2010, <http://www.ecologyandsociety.org/vol9/iss2/art5/>; B Walker and D Salt, *Resilience Thinking: Sustaining Ecosystems and People in a Changing World*, Island Press, Washington DC, USA, 2006; Ditchley Foundation, 'Society's resilience in withstanding disaster', Ditchley Foundation, London, viewed 19 October 2010, <http://www.ditchley.co.uk/page/343/societys-resilience.htm>; BH Walker personal communication, October 2010.

#### Lessons from resilience research

A large body of research on the resilience of coupled social-ecological systems has relevance to the population debate. Key lessons from resilience research include the following.

Firstly, it is important to ask 'resilience of what to what?'<sup>55</sup> For example, if we want Australia to be resilient to future pressures, we need to consider what we mean by 'Australia' and what it is about Australia that we want to keep in the face of pressures. Then we need to consider what those pressures might be (and also that there will be pressures that we cannot predict). These factors should be key parts of the development of population policies that are aimed at building and maintaining Australia's resilience.<sup>56</sup> The previous discussion about

55. S Carpenter, B Walker, J Anderies and N Abel, 'From metaphor to measurement: Resilience of what to what?', *Ecosystems*, vol. 4, 2001, pp. 765–81.

56. Cork, Resilience and transformation: preparing Australia for uncertain futures, op. cit.

identifying what services Australians want from ecological systems is one part of this process.

It is not useful to think of resilience as ‘staying the same’. For example, societies or parts of societies that try to resist change rather than adapting frequently make themselves more susceptible to shocks. We see examples around the world of ruling elites holding on to power only to precipitate violent upheavals. The fall of communism in Eastern Europe is a good example and perhaps the recent unrest in Thailand is another. In the same way, failing to address coupled social-environmental challenges like climate change, salinisation and acidification of agricultural land, overuse of water, and loss of habitat for native species in a timely way is a form of resistance to change that is almost certainly increasing the vulnerability of ecological and social systems in parts of Australia to climatic and market shocks. For Australia to remain resilient as the world changes there needs to be open dialogue so that people understand the nature of change, are not afraid of it and are able to engage in developing well-considered, rather than reactionary, population policies.

Overinvestment in building resilience to specific, known pressures (for example, floods or terrorism) can reduce general resilience to a range of often unexpected shocks. In the population debate, for example, there might be a danger that focusing on issues like illegal immigration and perceived overcrowding in parts of some cities is detracting from Australia’s ability to cope with, and gain from, its relationships with other parts of the world.

A systems-thinking approach is vital. Complex systems like ecosystems and human societies have resilience because of many complex interactions among the human and other resources parts that make up the system. Approaches to population policy that consider single issues are not only doomed to be ineffective but also are likely to have perverse effects.

It is important to think about thresholds and other forms of non-linear change. Change often is not gradual or obvious. Some change happens quickly and obviously, while other change occurs slowly until the conditions are right for a period of rapid ‘threshold’ change after which the systems’ functions and structures are different and might not be able to return to their original conditions. For example, the structure of vegetation and litter in most landscapes determines how well they retain water, seeds, nutrients and other resources. Once a critical loss of this structure is passed, landscapes rapidly lose functionality, start to ‘leak’ resources and fail to support the species that would otherwise have sustained the system.<sup>57</sup> Attitudes can also go through thresholds (or ‘tipping points’), which is evident in surveys discussed previously in this paper.<sup>58</sup> Tipping points in public attitudes could be debilitating to the development of widely acceptable population policy if not managed through good communication strategies. On the other hand, understanding that progress towards consensus

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57. D Tongway and N Hindley, *Landscape function analysis: procedures for monitoring and assessing landscapes*, CSIRO Sustainable Ecosystems, Brisbane, 2004.

58. M Gladwell, *The tipping point*, Little, Brown & Company, New York, 2000; Betts, ‘A bigger Australia: opinions for and against’, *op. cit.*

on population issues could require a long period of slow progress before a tipping point is reached could be an important consideration in government strategies.

Perturbations are important for maintaining resilience. The process of regular, but often unpredictable, challenges from disturbances that happen in nature tends to retain multiple species that can perform essential functions under different conditions.<sup>59</sup> The population debate has probably built the resilience of competing factions to counter arguments, so getting them to agree on population policies might require extra effort to break down unproductive resistance. On the other hand, the shocks to people's thinking about population in recent times is also likely to generate innovative solutions if these can be channelled into productive dialogue and action.

## Population policy and Australia's resilience

### Is the form of the debate helping Australia's resilience?

How do trends in the population debate over the past two decades, and in the past year in particular, relate to the question of Australia's resilience as we enter a period of higher than ever social, economic and environmental uncertainty? There are major reasons to be concerned but there are also substantial opportunities to build diverse viewpoints into a process that uses that diversity to strengthen Australia's resilience rather than erode it.

There is no shortage of diversity in opinions and ideas about population policy in Australia. Advocates for increasing the population include those who see it as vital to support business and economic growth, and who see undeveloped potential to improve the efficiency of resource use in Australian settlements. Some politicians compare Australia with other countries and conclude that Australia is underpopulated. Those expressing concern that Australia might not cope with a population approaching 36 million by 2050 include the majority of those who have done detailed research into resource use by Australians, non-government organisations like the Australian Conservation Foundation, some senior bureaucrats such as Ken Henry, Secretary to the Treasury, private entrepreneurs and some politicians from Labor, Liberal and Green parties as well as minor parties.<sup>60</sup>

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59. B Walker, A Kinzig and J Langridge, 'Plant attribute diversity, resilience, and ecosystem function: the nature and significance of dominant and minor species', *Ecosystems*, vol. 2, 1999, pp. 95–113.

60. Australian Conservation Foundation, 'Key threatening process nomination form - For adding a threatening process under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)', Australian Conservation Foundation website, viewed 19 October 2010, [http://www.acfonline.org.au/uploads/res/EPBC\\_nomination\\_22-3-10.pdf](http://www.acfonline.org.au/uploads/res/EPBC_nomination_22-3-10.pdf); K Henry, *The shape of things to come: long run forces affecting the Australian economy in coming decades*, address to the Queensland University of Technology Business Leaders' Forum, 22 October 2009, pp. 6–9, viewed 2 December 2010, <http://www.treasury.gov.au/contentitem.asp?NavId=008&ContentID=1643>; Betts, 'A bigger

This diversity of ideas and opinions could be harnessed to build Australia's ability to anticipate, prepare for and appropriately respond to future shocks if mechanisms were in place for bringing advocates together to seek mutual understanding and to explain the issues clearly to the public. The overwhelming conclusions from resilience research around the world is that resilience of societies requires institutions that engage stakeholders at a range of scales, from local to national and international, in dialogue and decision-making so that those in the best position to detect and respond to different scales of change are provided with the necessary understanding, information, authority and resources.<sup>61</sup> At present, alternative views about population are aired in adversarial ways, both through the media and via influence on political parties that have so far failed to adopt a bipartisan approach to population policy or even agree that a population policy is necessary.

By restricting the dialogue about population policy to a relatively narrow range of issues, the current debate risks reducing Australia's ability to anticipate, prepare for and respond to future shocks. The work of leading futurists has shown that humans have strong tendencies to ignore aspects of the future that are uncertain or do not fit within their current view of the world.<sup>62</sup> Thus we fail to imagine the sorts of changes that can come as surprises, even though the evidence is strong that social, economic and ecological surprises are inevitable and can be devastating.<sup>63</sup> The solution to this blind spot is structured thinking about what factors have driven, or could drive, change and how these factors might play out in usual or unusual ways in the future.<sup>64</sup>

These warnings from futurists are echoed by the call from resilience researchers to consider general as well as specific resilience. The current debate is potentially running down Australia's general resilience in several key ways:

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Australia: opinions for and against', op. cit.; 'Future Australians could face starvation: Dick Smith', op. cit.

61. B Walker, S Barrett, S Polasky, V Galaz, C Folke, G Engstrom, F Ackerman, K Arrow, S Carpenter and K Chopra, 'Looming global-scale failures and missing institutions', *Science*, vol. 325, 2009, p. 1345; G Marshall, 'Governance in a surprising world', in Cork, *Resilience and transformation: preparing Australia for uncertain futures*, op. cit., pp. 49–56.
62. K van der Heijden, *Scenarios. The art of strategic conversation*, John Wiley & Sons, Chichester, 1996; R Slaughter, *Pathways and impediments to social foresight*, Monograph Series 2003–2006 No. 10, Strategic Foresight Program, Swinburne University, Melbourne, Australia, 2006.
63. P Schwartz, *Inevitable surprises: thinking ahead in a time of turbulence*, Gotham Books, New York, USA, 2003; J Diamond, *Collapse: how societies choose to fail or succeed*, Viking Press, New York, USA, 2005.
64. D Scarce, K Fulton and Global Business Network Community, *What if? The art of scenario thinking for non-profits*, Global Business Network, California, USA, 2004, viewed 19 October 2010, [http://www.gbn.com/consulting/article\\_details.php?id=27](http://www.gbn.com/consulting/article_details.php?id=27)

- drawing attention to a few issues away from others that could be equally, or more, important
- causing disengagement or unnecessary confusion among many of the public by presenting opposite views without clear explanation of the evidence
- running down spare capacity of goodwill and tolerance among people
- inhibiting the development of a clear vision for Australia's future, and hence reducing the motivation and ability of individual Australian's to contribute to shaping that future, and
- potentially allowing population and the consumption of natural resources by Australians to get unnecessarily close to limits beyond which costs of maintaining human well-being could escalate and or lifestyles could be reduced due to environmental limitations.

The population debate is not unique in these respects. A recent study by Australia21 found evidence for declining resilience in many aspects of Australian life, environments and institutions, including with respect to peak oil, health, education, the well-being of young people, organisational resilience, environmental resilience, and disaster management.<sup>65</sup>

### Potential solutions

A consistent call is coming from a wide range of informed commentators for a more inclusive, transparent and rigorous dialogue about population policy. In 1995, Geoffrey McNicoll concluded that one of the most significant constraints on the development of effective population policy in Australia is

‘the tendency of government to see its constituency only in terms of organized groups and its role that of arbitrating competing claims. ... A consequence ... is the difficulty of conducting a continuing discourse on matters, like demographic change, that are believed to conflict with - or are merely unaligned with - perceived group interests.’<sup>66</sup>

In 2004, Doug Cocks was still calling for open and honest dialogue about population issues under the conditions that participants:

- explain their policy agenda
- explain how their policy agenda promotes their own interests
- explain what they understand by ‘the public interest’ in the context of population-immigration policy and how their agenda would promote the public interest

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65. Cork, *Resilience and transformation: preparing Australia for uncertain futures*, op. cit.

66. G McNicoll, ‘Institutional impediments to population policy in Australia’, *Journal of Population Research*, vol. 12, 1995, pp. 97–112.



- identify who would ‘win’ and who would ‘lose’ under their policy agenda
- suggest how losers might be compensated
- be willing to respond explicitly to subsequent critiques of their arguments, and
- be willing to explain their understanding of what other stakeholders are trying to say and to keep explaining until those others agree that it is a fair statement of what they are arguing.<sup>67</sup>

More recently, research on development of peri-urban Australia has focused on the risks of inadequately thought through guidance for expansion outside major cities, and the Grattan Institute’s report on the cities that Australia needs emphasised the need for improved dialogue about what Australians want and how to achieve it.<sup>68</sup>

All of these calls for better dialogue are consistent with research on achieving a resilient nation. Population policy cannot be achieved through scientific analysis alone. Unless stakeholders are informed and involved in the process, they can and will disrupt it to their own ends.

With the improvements that have been made in thinking about human needs from, and impacts on, ecological systems over the past decade or two, and the emergence of organising frameworks like ecological footprints, industrial metabolism, ecosystem services and resilience, there is a good foundation for a productive dialogue about how Australia might organise to meet its needs under a range of possible future population scenarios. Such a dialogue could broaden the population debate beyond perceptions of overcrowding to consider all benefits and disadvantages of different scenarios. To achieve a truly resilient Australia this process would need to have, at least, the following characteristics:

- participants from across Australian society
- an evidence base that was accessible to all participants
- an aim to inform the Australian public about future population options and their consequences for all aspects of Australian landscapes, lifestyles and livelihoods

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67. Cocks, ‘Reflecting on the population debate’, op. cit.

68. D Choy, C Sutherland, B Gleeson, J Dodson and N Sipe, *Change and continuity in peri-urban Australia: peri-urban futures & sustainable development*, Monograph 4, Urban Research Program, Griffith University, Queensland, May 2008, viewed 19 October 2010, <http://periurban.org.au/references/monograph4.pdf>; J-F Kelly, *The cities we need*, Grattan Institute, Melbourne, June 2010, viewed 19 October 2010, [http://www.grattan.edu.au/pub\\_page/report\\_the\\_cities\\_we\\_need.html](http://www.grattan.edu.au/pub_page/report_the_cities_we_need.html)



- an aim to establish new governance arrangements to involve relevant people with relevant skills and experience at relevant scales to develop and implement policies and strategies to manage the relationships between people and the environment
- an aim to develop appropriate incentives and regulations to match human needs with environmental function, and
- an aim to ensure that this dialogue can continue productively and independently of political cycles.

It is not helpful to simply conclude that low or high population growth is the best option, it is important to consider the way that all aspects of the relationships between people and the environment interact and to look for how these combinations might play out. New ways of encouraging productive dialogue around these issues offer new hope that constructive dialogue can be achieved to support thinking and planning about Australia's future population.

## Conclusions

The debate about the number of people Australia could or should have is unfocused and confusing. It is several debates in one, including a debate about Australia's role and responsibilities for receiving immigrants, a debate about how many people can achieve fulfilling lifestyles in Australia in relation to the nation's natural resource base, a debate about the perceived relationships between population growth, immigration and economic growth, and a debate about what constitutes 'progress' in relation to overall well-being of Australians. Confusion between these different debates obscures key issues. Calls for population growth to support growth of some industries are often made without consideration of evidence that current population size is unsustainable unless per-capita consumption of resources is reduced. The debate about reducing consumption through modification of lifestyles is often conducted separately from the debate about what technological advances are possible and when they might be possible. The debate about Australia's responsibilities to accept people displaced from other countries is rarely conducted alongside debates about the role of immigration in Australia's economy when, in fact the magnitude of this source of immigrants is often either unstated or suggested to be larger than it is. This makes balanced consideration of the issues by the public very difficult. Facts are used by advocates in all aspects of the debate, but there is currently little help for the public to understand why these facts seemingly contradict one another or enable the public to weigh one fact against another.

Past and current Australian governments have argued that an explicit population policy is not needed or desirable. Unless there is some process to develop a well-reasoned intent, however, Australia will continue to have 'strategy as pattern' – a de facto policy driven by public opinion that is ill-informed by confused and confusing partial information.<sup>69</sup> A body of

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69. H Mintzberg and JB Quinn, *The strategy process*, Prentice-Hall, Harlow, 1988.

theory and information now exists that should allow the elements of the population debate to be brought together in an open and rational debate. This requires support and active encouragement by the Australian Government to develop an effective population strategy as an outcome, even if a formal population policy is not an output.

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