



# Population and Environment in Australia: 2003

**A report commissioned by the Population and Environment Research  
Fund Committee of the Australian Academy of Science**

**by**

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**June 2003**



# Contents

Summary .....	5
Task.....	5
Approach.....	5
Background .....	5
Findings.....	5
Conclusion .....	6
1. Introduction.....	6
1.1 Sustainability.....	6
1.2 Population .....	7
1.3 Science and social values.....	8
1.4 Differing views concerning future Australian population size .....	8
1.5 The organisation of this report.....	8
2. Sustainability, carrying capacity and the Boserup hypothesis.....	9
2.1 Sustainability.....	9
2.2 Human carrying capacity .....	14
2.2.1 'Reserve human carrying capacity'.....	15
2.2.2 Human carrying capacity and economies of scale.....	17
3. Australian views on 'optimal' population.....	18
3.1 Anthropological and historical evidence for optimum population size.....	18
3.2 Scarcity of research concerning optimum population size .....	19
4. Population characteristics and optimum population size.....	19
4.1 Skilled immigration to Australia.....	20
4.1.1 Do skilled migrants contribute disproportionately to carrying capacity? .....	21
4.2 Social security, inequality and attitudes to migration.....	21
4.3 Unskilled migration to the First World: a thing of the past? .....	22
5. Social cohesion, conflict, and human carrying capacity.....	23
5.1 Push, pull and block factors affecting migration .....	23
6. Australian underpopulation: the perception.....	24
7. Australian population and environment reports.....	25
8. Recent research .....	25
8.1 Demographers .....	25
8.2 Political scientists.....	26
8.3 Economists.....	26

8.4 Australian State of the Environment Committee .....	27
8.5 CSIRO .....	27
8.5.1 <i>Future Dilemmas</i> .....	27
8.6 Australian Academy of Technological Sciences and Engineering .....	28
9. The environmental lobby .....	29
10. The business lobby .....	30
10.1 Conservationists and business: opportunities for coalition? .....	30
11. Conclusion .....	31
11.1 Summary .....	31
11.2 Findings .....	31
12. Glossary .....	33
13. Bibliography .....	34
14. Appendices .....	40
14.1 Main activities undertaken to prepare this report .....	40
14.2 Groups contacted in the preparation of this report .....	41
14.3 The Population Summit, Melbourne, 25 February 2002 .....	42

## Figures

1. Australian foreign aid, as a percentage of GNP .....	7
2. Index of global environmental change 1750-2000 .....	10
3. Global environmental integrity and affluence 1850-2100: the paradox .....	11
4. Global environmental integrity and affluence: pessimistic scenario .....	12
5. Global environmental integrity and affluence: optimistic scenario .....	12
6. Global average life expectancy 1950-2045 .....	13
7. Per capita global grain production 1966-2002 .....	13
8. Per capita global fish consumption 1950-2000 .....	14

# Summary

## Task

To compile an overview of the research being conducted in Australia on population and the environment, and the positions held by the various disciplines and lobby groups.

## Approach

The task was interpreted not as an investigation into two distinct elements (population and environment), but as a search for research that integrates these strands.

'Environment' was interpreted broadly to include social, economic and security aspects, as well as Australian ecosystems, climate and other natural elements. These issues were considered in both a regional and global context.

## Background

Debate concerning the optimum size, rate of change, and environmental and social effects of the Australian population reflects opinion, values, fears, research findings and technology as well as internal and external economic, political, environmental and military factors. The direction and effectiveness of official policy regarding these issues are a fluid consequence of the strength of the various lobby groups within Australian society, particularly from elite political and business leaders. This very old debate is re-emerging. Science can contribute far more to these debates than it has in the past, though it is never as free from the influence of broader social values as its practitioners and supporters might wish and sometimes believe. The comparative reluctance by science to contribute to the debate may be partly based on concerns that doing so would risk its credibility; on the other hand, scientific abstention risks the misuse of scientific positions by some lobby groups.

## Findings

Considerable scientific research expertise exists within Australia for demography and the environment, but comparatively *little* research was identified that integrates the two in a sophisticated manner. While environmental scientists and geographers often explicitly consider population issues in their work, demographers rarely consider environmental constraints. Another gap appears to be a scarcity of research by social scientists examining the social factors that influence population size. Economic opinion that is currently influential concerning a desirable population size for Australia was found to use particularly naïve assumptions. These warrant explicit articulation and broader public and scientific discussion.

Dissonance currently exists between the mainstream Australian public and elite business (Jones, 2001) and some academic opinion, though both major political parties – at least publicly – currently support a populist (population stabilisation) view. This is unlikely to dissipate without a broader, more open discussion. The Australian Academy of Science can play an important role in facilitating this.

Policy-makers attribute greater weight to the opinion and findings of leading demographers and economists than to correspondingly qualified geographers and environmental scientists. More involvement by social scientists in research relevant to carrying capacity is needed.

## Conclusion

Powerful forces, largely external, are likely to force substantial increases in the Australian population in the coming decades, even against the wishes of the broad population. Debate, scientific research and the adoption of new technologies, economic theories, and social and farming practices are essential to improve the economic, social and environmental resilience which Australia will need to cope with this challenge.

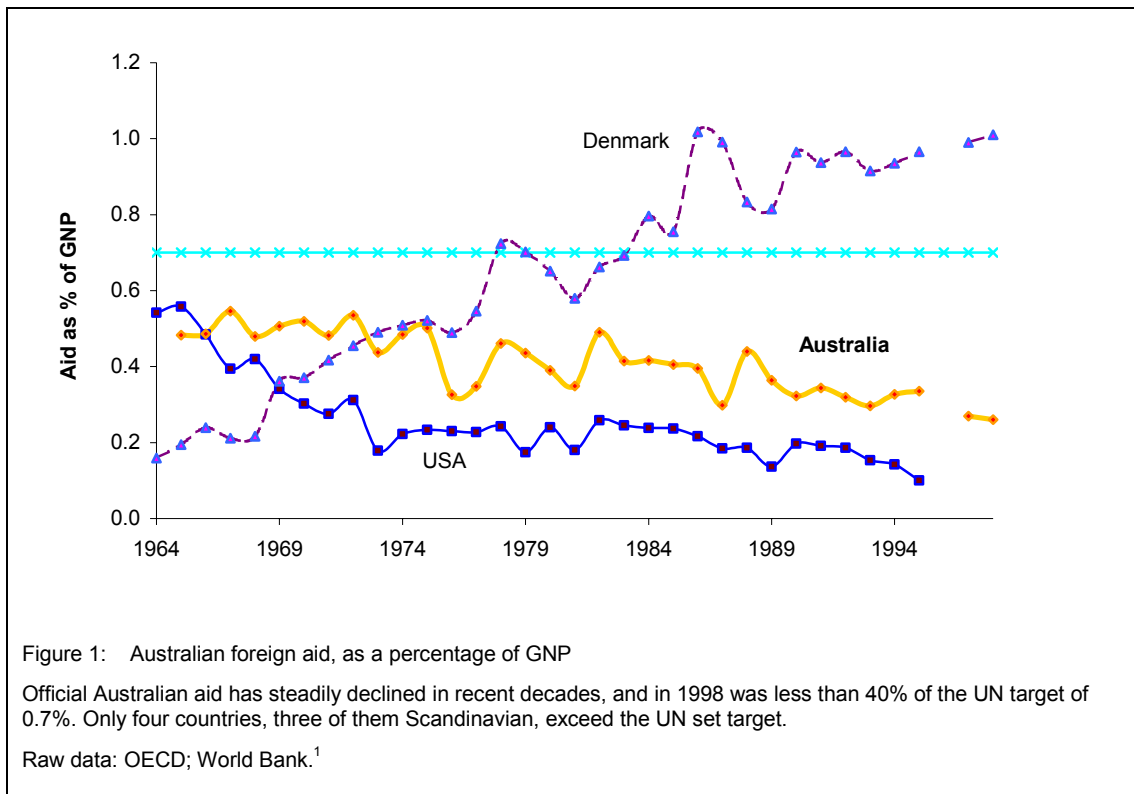
## 1. Introduction

### 1.1 Sustainability

Debate concerning the optimum size, rate of change, and environmental and social effects of the Australian population reflects opinion, values, fears, research findings and technology as well as economic, political, environmental, and military factors. The direction and effectiveness of official policy regarding these issues is a consequence of the strength of the various lobby groups within Australian society, including political leaders.

The issue of population *and* environment – especially when projected to the future – cannot be separated from that of sustainability. Despite the international importance of this issue (World Commission on Environment and Development, 1987), indicated for example by the scale of the 1992 Earth Summit, both sustainable development and sustainability in Australia have been marginalised. Even the term 'sustainable development', almost universally accepted by the international community, has been altered, to 'ecologically sustainable development' (ESD). This change was probably intended to emphasise the crucial environmental and ecological dimension to sustainability; I argue, however, that this has had several unfortunate consequences:

- A separation between the Australian and the international discourse and debate.
- An implication – probably quite unintended – that sustainability did not also significantly involve *other* social elements, especially concerning the economy and technology. This left sustainability vulnerable to marginalisation as *mainly* an ecological issue, therefore seen as boutique or optional by more powerful stakeholders, who, in turn, followed the dominant economic paradigm, which has long supported the view that the economy is a cake to be enlarged, rather than a balloon to be slowly inflated. It is suggested that this significantly delayed the emergence of sustainability as a central national priority.
- A distancing from Australian involvement in the issues of global poverty reduction, central to sustainable development as understood internationally, and as reinforced by the Johannesburg conference held in 2002 to mark the 10th anniversary of the Earth Summit. This distance is congruent with Australia's declining aid budget, expressed as a fraction of its Gross National Product (figure 1).



However, primary responsibility for the comparatively low level of engagement by Australian society with the issue of sustainability over the past decade clearly does *not* lie in the coining of a uniquely Australian version of the phrase 'sustainable development'. Instead, this failure, especially disappointing when compared to the enthusiasm that briefly followed the Earth Summit, has been driven by broad social, political and economic factors, which, for various reasons, saw the issue of sustainability, however defined, as either unimportant or irrelevant.

## 1.2 Population

Recently, the very old<sup>2</sup> debate concerning the desired rate of Australian population size and growth (Hicks, 1978; Cocks, 1996a) has re-emerged, evidenced by:

- the prominence of immigration and asylum seeker policy issues in the 2001 Federal election campaign;
- wide media coverage of the debate, going beyond immigration policy and the treatment of asylum seekers to the social and economic effects of a comparatively ageing population, and reasons for the declining birth rate of Australian women (Summers, 2002);
- several high-profile conferences, including a Population Summit supported by the Victorian government, held in Melbourne, February 2002;
- the potential economic impacts of an ageing society (The Intergenerational Report) were an important component of the Federal Budget, in May 2002.

Environmental considerations, always an undercurrent in the debate concerning Australia's population, have rarely been accorded prominence, even in recent years. This is of particular concern for several reasons:

- A maturing of public opinion concerning environmental issues following the 1992 Earth Summit is yet to occur. The 'environmental decade' once predicted to occur in the 1990s did not eventuate.
- The scientific evidence for the unprecedented, risky and substantial rate of global environmental change has strengthened.
- The theoretical understanding of the Earth's systems, including the interaction with global society, though still developing, has been enhanced by new technologies, especially satellites and computers. As well, an emerging 'sustainability science' is developing, combining insights from many disciplines (Kates *et al.*, 2001; Lawton, 2001).
- Willingness by the scientific community to engage in debate concerning sustainability has increased, evidenced for example by the Intergovernmental Panel on Climate Change, the Millennium Ecosystem Assessment, and the Union of Concerned Scientists.

### **1.3 Science and social values**

Science, though never free of the influence of broader social values (Greenberg, 2001; Sarewitz, 2001), is traditionally reluctant to participate in many social debates, substantially from a concern that this may harm scientific credibility. However, abstention from this debate by science risks the misuse of scientific positions by less scrupulous lobby groups. The relationship between human population and its environmental impact is especially contentious, in part because scarcity means that these issues will inevitably intersect with resource availability, utilisation, human well-being and conflict.

### **1.4 Differing views concerning future Australian population size**

Inevitably, different individuals will have different goals, views and opinions on most issues. The Australian debate concerning future population size is polarised at present – probably more so than at any other time since European settlement. A small, but influential percentage of the community favours a far higher rate of population growth than the majority, which clearly does *not* advocate a substantial population increase. Are these concerns well-founded, or might misinformation or misunderstanding place the future well-being of this population at risk, as supporters for a larger population claim?

### **1.5 The organisation of this report**

This report has nine main sections, as well as the introduction and conclusions.

Section 2 provides an expanded discussion of the controversial topic of carrying capacity, after briefly reviewing the work of the Danish anthropologist Ester Boserup.

Sections 3 and 4 concern another contested concept; that of 'optimal' population. Attitudes to migration are considered in light of this.

Section 5 discusses social capital, identified in section 2 as an important component of human carrying capacity.

Section 6 argues that Australia has been perceived as underpopulated by non-Aboriginals virtually since the start of the European colony in 1788.



Section 7 considers other reports concerned with the interaction between the Australian population and its environment.

Section 8 examines more recent research into this topic, especially from the point of view of several key disciplines.

Section 9 discusses the perspective of the environmental lobby, while section 10 is concerned with the business perspective.

Thus, sections 2-5 discuss the academic literature concerning the general topic of human carrying capacity and optimal population. Sections 6-8 examine this topic in its Australian context, while the final sections compare and contrast the opinions of two leading lobby groups currently concerned with this topic.

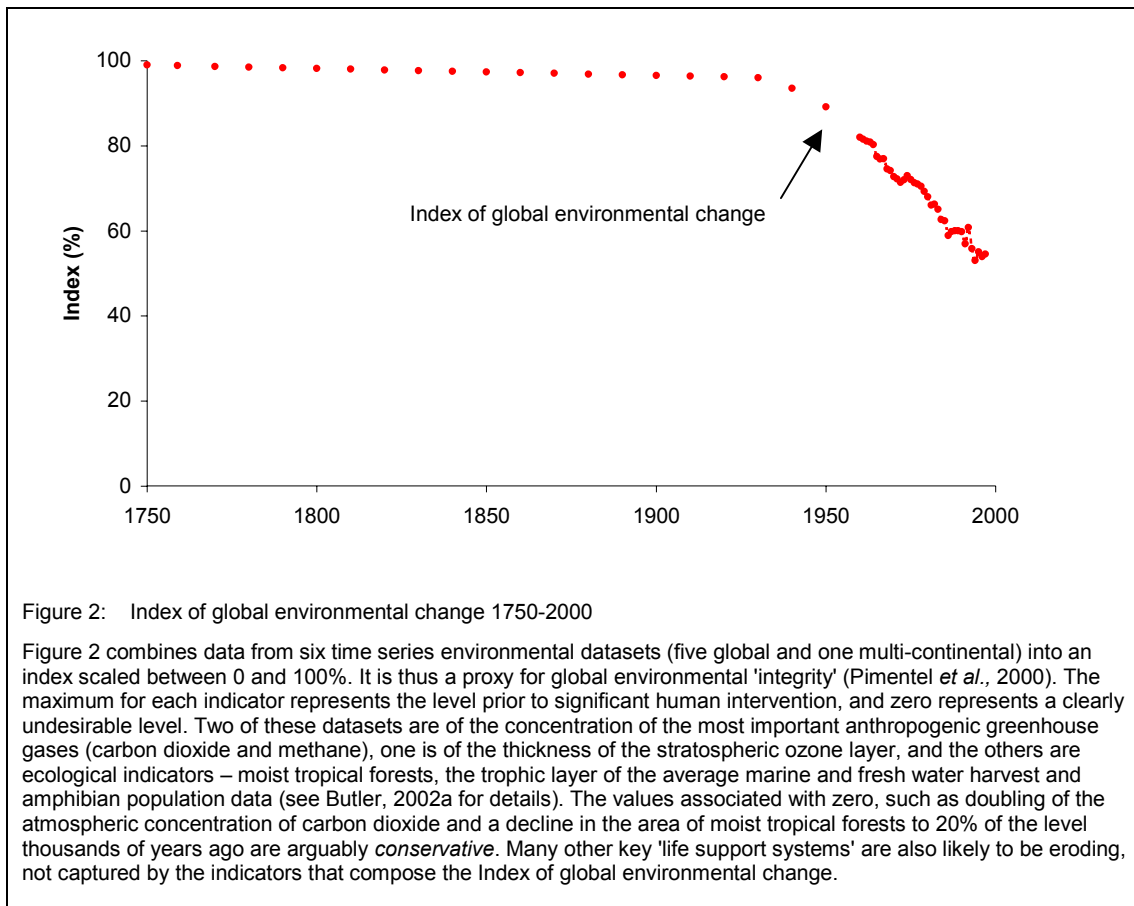
## **2. Sustainability, carrying capacity and the Boserup hypothesis**

### **2.1 Sustainability**

The issue of Australia's population and environment cannot be separated from that of 'sustainability'. This concept, in relation to the long-term survival of global civilisation and its supporting ecological and social services is of comparatively recent origin. However, the unwritten concept of preserving and conserving at least some common resources, in order to promote local and regional ecological and social sustainability is ancient (Gordon, 1954; Clarke, 1977; Buck, 1985; Dasgupta, 1996; Chakraborty, 2001).

The best-known definition of sustainability in its modern context is that used in *Our Common Future* (WCED, 1987). This argued that 'humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Despite its wide use, this definition is flawed by the use of several ambiguous terms. What, for example, are 'needs'? Do 'needs' justify all humans driving fossil fuel-consuming four-wheel drive vehicles in urban jungles? Even at the time *Our Common Future* was published, when the global population was less than 5 billion, it was clear that the Earth's resources could not provide an Australian living standard for all, using the technology of that time (Wackernagel and Rees, 1995). Fifteen years later the challenge of providing affluence to a population of over 6 billion has not been met, and the demand on the Earth's ecosystems, fresh water supplies and pollution sinks continues to increase (see figure 2).



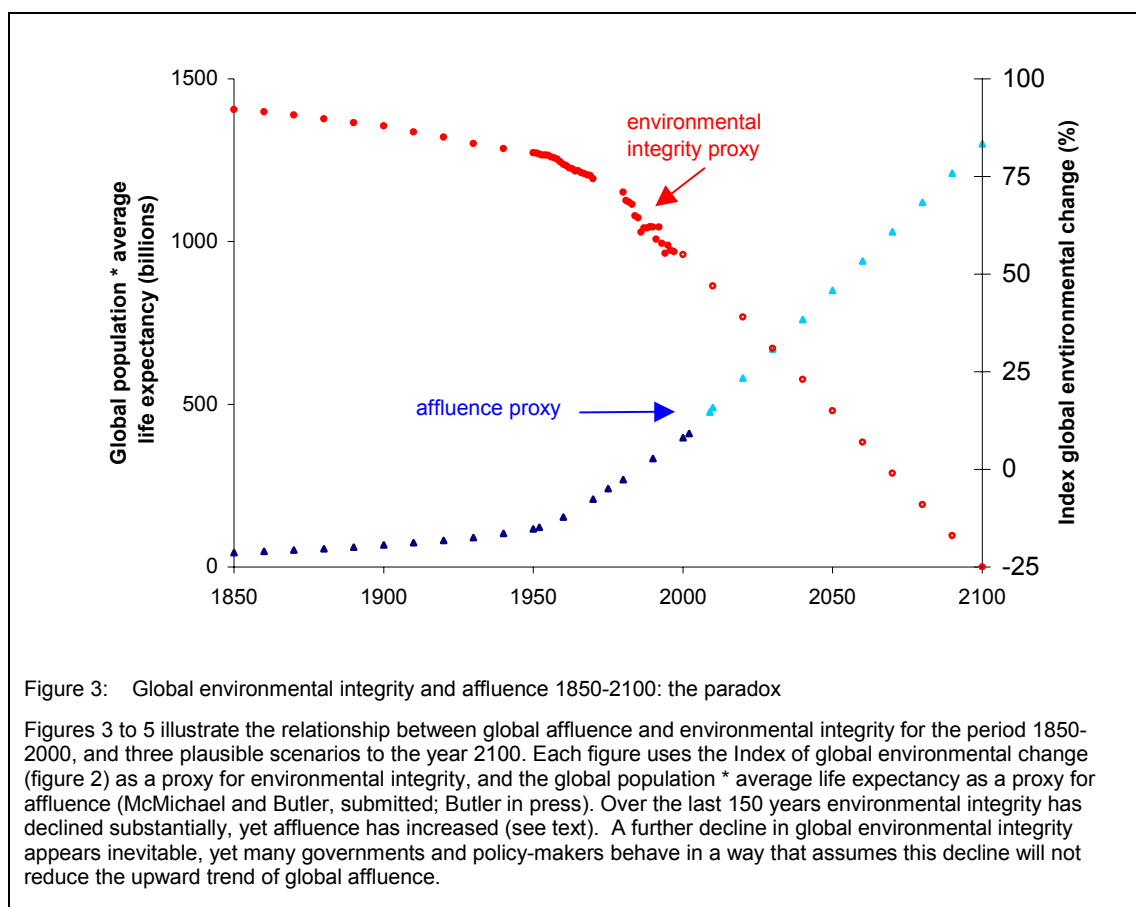
During the last decade, the size and affluence of the middle classes in countries *outside* Europe, North America, Australasia and Japan grew substantially. Myers and Kent (2003) estimate that the middle classes of 17 developing and transition countries now have a population in excess of 1 billion people, with a combined purchasing power equivalent to that of the US. But billions remain in poverty, and the Earth's capacity to provide sufficient environmental resources to allow the transformation of these into affluence for a population larger than the current 6 billion remains highly uncertain. A major problem with *Our Common Future* definition, therefore, is its failure to even suggest that 'affluence for all' means that the already affluent need to substantially *reduce* their consumption.

The word 'compromising' used in the definition is also problematic. Given that humans inhabit a planet in a universe subject to physical laws and biological principles, and that humans now occupy almost all easily inhabitable parts of the world, at least some degree of global environmental change has been and still is required to power human 'development'.<sup>3</sup> Just as the range of a vehicle with a fuel tank which is half-full can be described as 'compromised', so too the capacity of future human societies to develop will be limited if global change passes a critical and harmful threshold.<sup>4</sup> At the same time, given the state of recent and current science and technology, at least part of the recent decline in the integrity of the global environment was probably both necessary and desirable: a vehicle with a full fuel tank, permanently parked in the garage, also has a *de facto* compromised range.

For example, humanity is currently exhausting its stock of easily recoverable coal, oil and gas – sources of compressed, portable energy that have made the industrial revolution and modern civilisation possible. Future generations will not have as easy

access to these stocks, and in this way at least their options will clearly be compromised. Humans are also greatly reducing the stocks of easily available fresh water (Postel *et al.*, 1996; Rosegrant *et al.*, 2002) including that in aquifers. Fertile soil (Pimentel, 2000), fish stocks (Pauly, 2000; Pauly *et al.*, 2002) and biodiversity are degrading. Pollution 'sinks' and other environmental global public goods (McMichael *et al.*, 2003) are also in decline (see figure 2). The human impact on these resources is of such magnitude that many aspects of the Earth's agricultural, biological and even industrial productivity may also be reduced.

Optimists argue that technological breakthroughs made possible by the use of environmental goods, such as fossil fuels, will enable future generations to find substitutes (see figures 3 to 5). Pessimists are concerned that the recent steadily improving trajectory in most human indicators of well-being may slow, stop, or even be reversed, at some undetermined time in the reasonably near future – in other words be *non-sustained* (see figures 6 to 8).



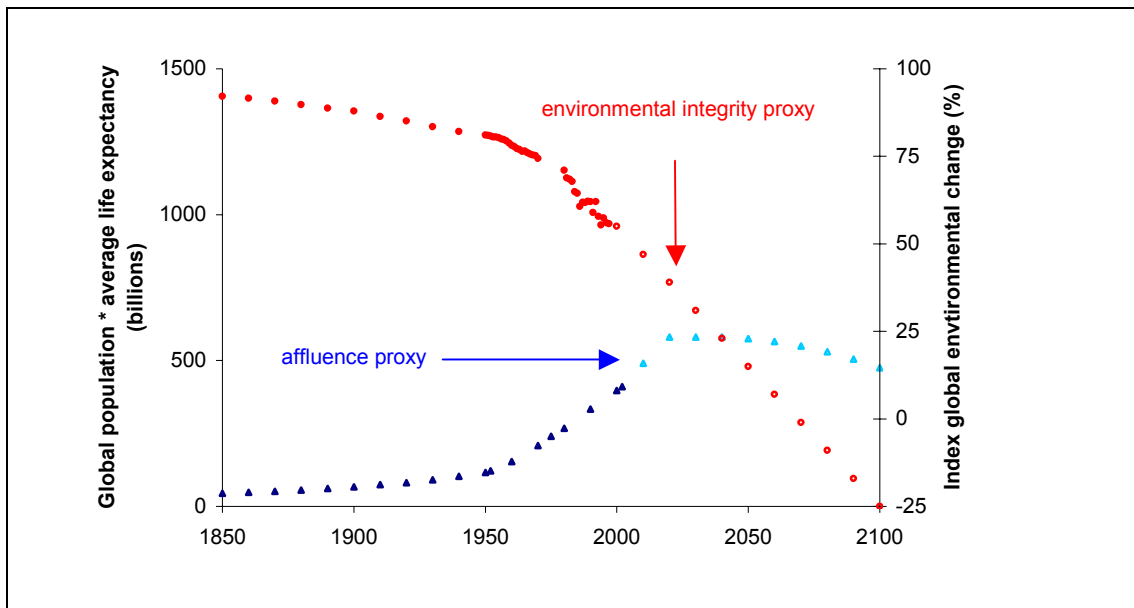


Figure 4: Global environmental integrity and affluence: pessimistic scenario

Beyond a threshold point, it is implausible that population affluence can continue to increase while environmental integrity continues to decrease. Ecological economists and systems theorists point to the existence of threshold effects, and argue that continued environmental depletion will eventually lead to a reduction in affluence, which could trigger a negative spiral leading to further reductions in affluence and environmental integrity (Butler *et al.*, submitted). This would not only cripple future large-scale population health gains but also threaten existing gains. There is concern that this process may have already started (see figure 7), (McMichael and Butler, submitted).

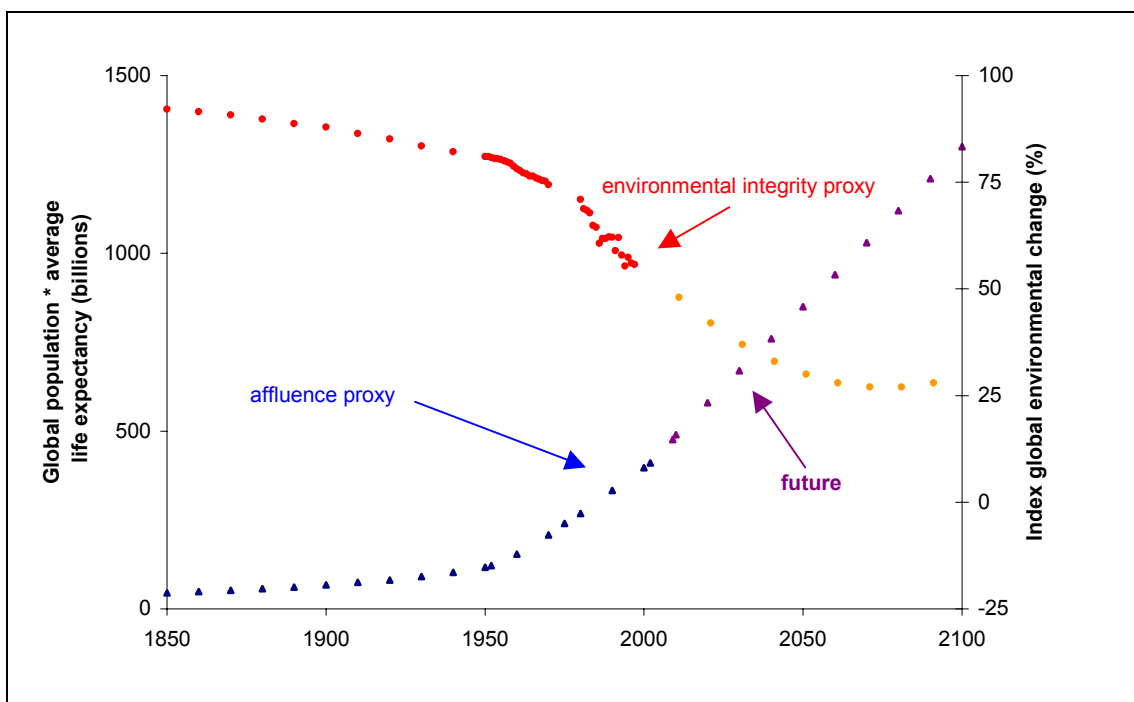
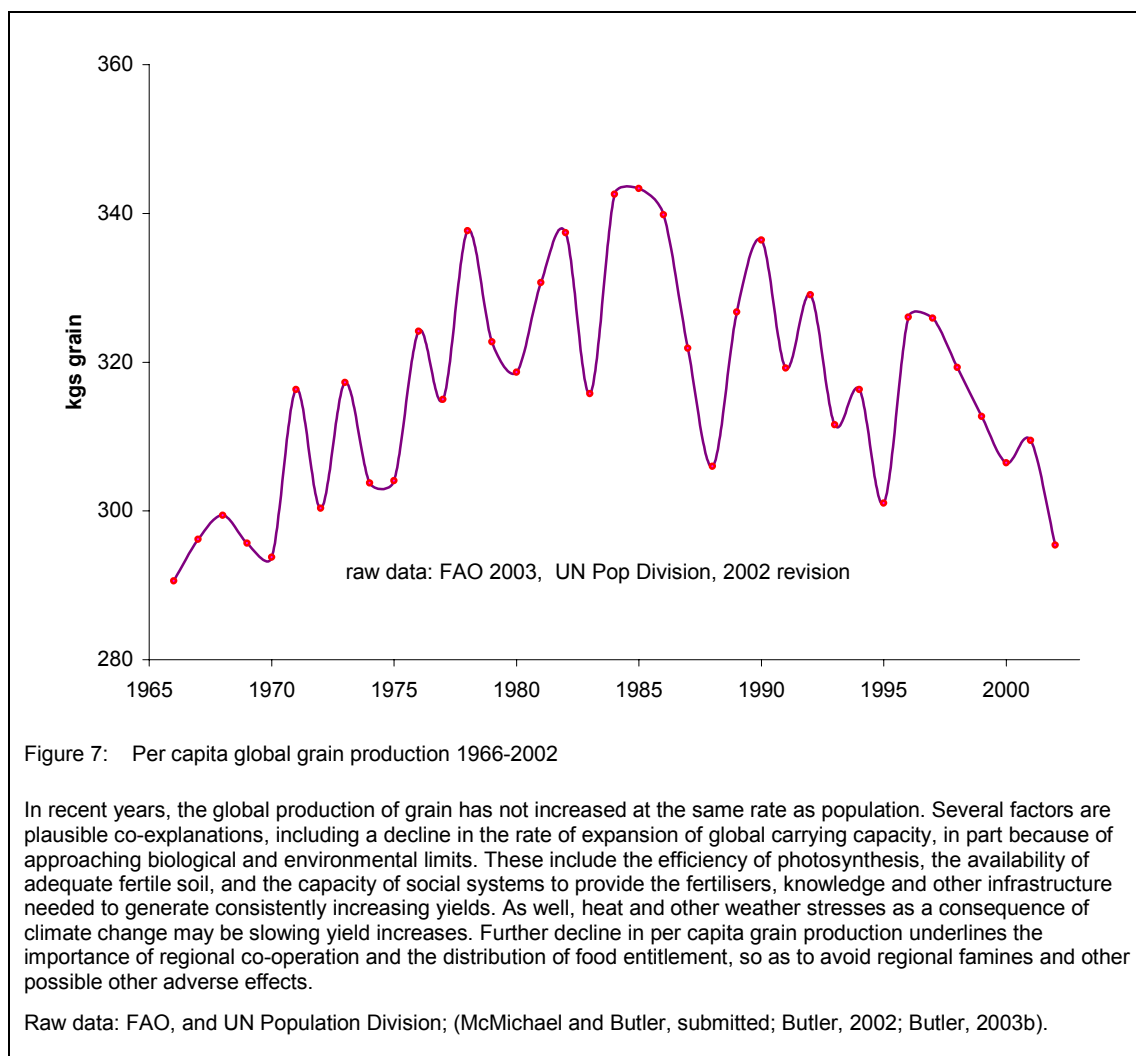
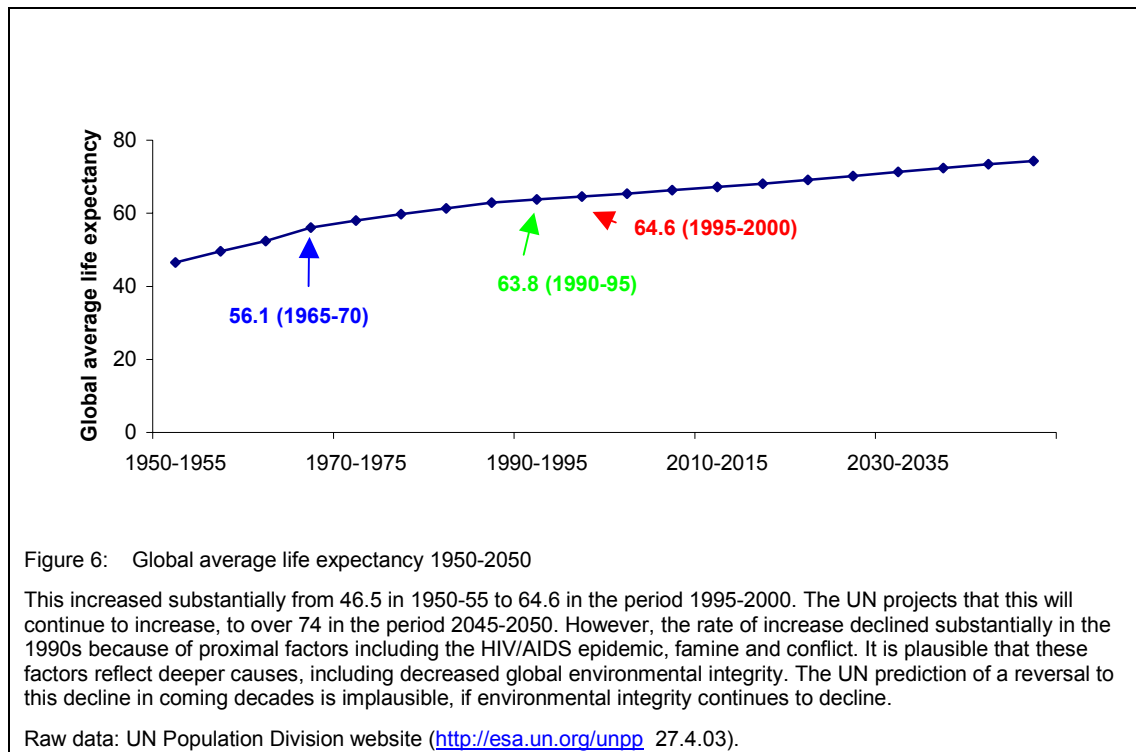
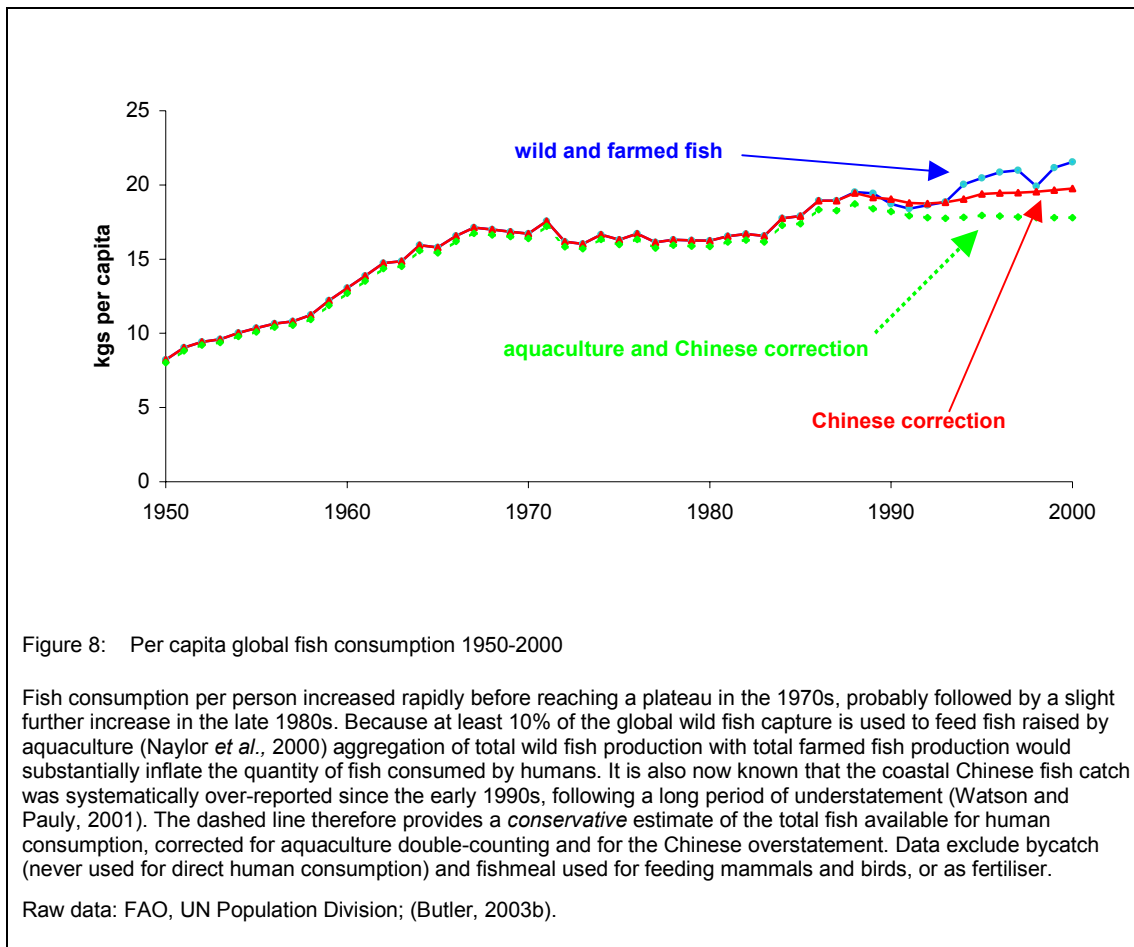


Figure 5: Global environmental integrity and affluence: optimistic scenario

Increased affluence and a recovery in global environmental integrity may still be possible, but will require immense global effort. More plausibly (but still optimistically) global population affluence may stabilise (curve not shown) until global environmental integrity has made a substantial recovery. In the most optimistic scenario the relationship between global population affluence and global population \* average life expectancy would change. More realistically, affluence would be used to improve the living standards for a larger proportion of a stabilising global population, rather than enabling a much larger population to survive.





No completely satisfactory definition of 'sustainability' exists (AtKisson, 1999; Dovers, 1997). One that avoids the problems of the definition in *Our Common Future* was framed by the late Donella Meadows and colleagues, who defined a sustainable society as 'one that is far-seeing enough, flexible enough and wise enough not to undermine either its physical or its social systems of support' (AtKisson, 2001; Meadows *et al.*, 1992). These authors added, 'sustainability, not better weapons or struggles for power or material accumulation, is the ultimate challenge to the energy and creativity of the human race'.

Less well appreciated, but importantly, 'sustainability' refers not only to the natural, physical environment, but also to the human economy and society supported by and co-existing with the physical environment.

Like many useful concepts 'sustainability' can be criticised as fluid, fuzzy and subjective. Clearly, this term is now part of the vernacular. A succinct (though circular) definition for sustainability is 'that which can be sustained'.<sup>5</sup> This definition is not entirely tongue in cheek – it also reflects an exasperation with the hijacking (or at least distracting) of what many think should be an urgent debate by overly semantic approaches.

## 2.2 Human carrying capacity

The human population living in the Simpson Desert or Antarctica is far smaller than that in the Sydney basin. The latter not only has a temperate climate, abundant surface water, and soils suitable for growing substantial food crops, but is also connected

physically and economically to a vast hinterland of natural, human and technological resources. Of course, in 1787, the population of the Sydney basin was far smaller than now; and large cities can flourish in the desert. Both facts indicate support for the position, argued for example by Ester Boserup, that human ingenuity and organisation can support large and, sometimes, growing populations, at least within limits (Boserup, 1981).<sup>6</sup> However, neither fact proves that growth is infinite.

While I am unaware that Boserup used the term 'carrying capacity', her work is readily applied to theories of human carrying capacity<sup>7</sup>. Indeed, at its core, Boserup's position can be restated as 'humans play a vital role in the determination of a region's human carrying capacity'.

The carrying capacity of non-human species has long been a core concept for ecologists (Klein, 1968) but its application to human populations, though once central (Ravenstein, 1891) has become controversial, particularly since World War II (Bongaarts, 1995; Cohen, 1995a). King has suggested that this issue has been tabooed by demographers (King and Elliott, 1993; 1997; King, 2003; Butler and King, in preparation).<sup>8</sup>

Birdsall *et al.*, (2001) have also recently examined the debate concerning the relationship between the rate of population growth and the sustainability of economic growth. The economist Jeffrey Sachs, reviewing this book, comments on how the consensus of the early post World War II decades, which held that rapid population growth was harmful, in part because of the fixed supply of high quality natural capital such as fertile land, may be returning to prominence (Sachs, 2002).

Cohen (1995a, 1995b) points out that estimates of the human population that the Earth can support have become more, rather than less, variable with time, and that this should elicit scepticism about its true size. Cohen describes six methods for estimating the maximum size of the human population, but most are based on extrapolations of the supply of food, and, sometimes, other goods, from small areas to the world as a whole. Cohen points out that most methods make insufficient allowance for interactions, surprises, and stochastic events.

### 2.2.1 'Reserve human carrying capacity'

Given genuine debate concerning whether the concept of human carrying capacity is meaningful, it is unsurprising that the vocabulary about this topic, both scientific and lay, is limited. I argue that the poverty of this language both reflects the need for, yet hinders a more sophisticated debate on this topic.

An aspect of human carrying capacity worth distinguishing is that which can be called 'reserve carrying capacity'.<sup>9</sup> Like many species, squirrels stock up for the winter. When species hibernate they reduce their metabolic rate to compensate for reduced food. Humans store not only food, but resource stocks and liquid currency. These stores may be local (eg, in granaries and larders) or distant in space or time (eg, contracts guaranteeing delivery of future production, or proven but as yet unexploited oil or mineral reserves). The ability of populations to access stored goods and service is varied. Poor populations have limited capacity to draw down stored stocks, and often cannot even access credit (Yunus, 1998). In contrast, wealthy and powerful populations have many means to bridge periods of resource scarcity, such as purchasing goods produced elsewhere, credit access, and, if necessary, military force.

Goods and services obtained from elsewhere sustain the populations that consume them, just as any that are produced locally. These supplies contribute to the carrying capacity of the consuming populations. If these goods are traded, then Ricardo's principle of comparative advantage can mean that zero sum game limits are avoided, so that the trade can contribute to the carrying capacity of *both* parties. For example, seasonal, reciprocal trade of surplus food may reduce storage costs and enable both parties to consume fresher produce – of mutual advantage. In this case, the relationship established by trade not only provides an insurance policy, but adds to the carrying capacity of both regions. However, trade between unequal partners can result in asymmetric benefits, favouring the population with the greatest pre-existing power (Mehmet, 1999; Butler, 2002c).

Reserve carrying capacity can be classified as future and current. An example of current reserve carrying capacity concerns the distribution of the global food supply. This supply is grossly maldistributed, so that while large populations are over-nourished, even larger populations are severely under-nourished (Nestle, 2003). In other words, at any time, a substantial part of the global food supply is destined to supply a well-fed population, even though a substantial fraction of the global population is under-nourished.

There are well-documented cases, such as in India (Davis, 2001) and Ireland (Woodham-Smith, 1962) where substantial quantities of food have been exported despite severe *local* famine. In these cases, and, more contentiously, at any time, the existence of severe nutritional maldistribution implies that the carrying capacity of some parts of the world have been and are being transferred to other, more favoured areas, at the expense of less entitled populations (Sen, 1981).

Food that is exported cannot be eaten twice, just as a car cannot run on fuel that has already been combusted. The concept of reserve carrying capacity, if not the term, would seem central to any discussion of global carrying capacity. Yet, as far as I can tell, the population scientist Joel Cohen's book (*How Many People Can the Earth Support?*), often regarded as the most authoritative work on the subject of global carrying capacity, barely discusses this.<sup>10</sup>

As well as selfishness, humans rely extensively on co-operation (Nowak and Sigmund, 2000; McMichael *et al.*, in press; Butler, 2003b). However, even those who support a 'better manners' (Cohen, 1995a) approach to expanding human carrying capacity (Raskin *et al.*, 2002) have been unable to provide persuasive evidence that future human populations will behave in substantially more co-operative ways, at a global scale, than in the past. Thus, the successful feeding of a future global population of 8 or 9 billion people is likely to require the production of food sufficient to feed considerably more. The world currently grows enough food to feed at least 8 billion people. But whether it can grow one and a half times that amount remains to be seen. Already, the global fish harvest has plateaued and per capita fish consumption is probably declining (see figure 8).<sup>11</sup> The targets set at the 1996 World Food Summit and its follow-up meeting in 2001,<sup>12</sup> which aimed to reduce world hunger by 2015, are behind schedule by well over a century (FAO, 2002: 4).

The same principle applies for many ecosystem services other than food, such as water, coral reefs and charismatic species. Substantial doubt remains concerning the scale of human ingenuity and the Earth's bounty to provide this reserve. If adequate supplies of ecosystem services cannot be provided, then overt conflict on an



increasing scale – economically, militarily and pre-emptively – appears likely (Butler, 2000a; Klare, 2001; FAO, 2002: 23).

### *2.2.2 Human carrying capacity and economies of scale*

Boserup's position – that human carrying capacity can, in some cases, be increased by a higher population – is sometimes presented as antithetical to the mainstream environmental position. As with many insights, Boserup's view has previously been recognised. For example, Neurath (1994) discusses similar views proposed by Ibn Khaldian (1332-1406) and William Petty (1623-87). Hicks (1978: 79-80) reports that in the nineteenth century both Henry George and the Tasmanian politician A J Ogilvy argued that larger human populations can give larger returns than smaller ones, thus avoiding limits implied by simplistic interpretations of Malthusian theory.

Boserup's view is sometimes presented as contentious, but, in fact, only extreme interpretations of this principle<sup>13</sup> should be. The evidence that global human carrying capacity has expanded by several orders of magnitude since the start of the Holocene<sup>14</sup> (largely because of human-driven landscape and technological changes such as agriculture and the harnessing of non-human energy sources) is overwhelming (Cohen, 1995a).

Rather than denying the Boserupian position, environmentalists deny extreme interpretations of it, as set out for example by 'cornucopian' writers such as Julian Simon (Simon 1981; Simon and Kahn, 1984).<sup>15</sup> That is, environmentalists argue that limits exist, including limits to expansions in human carrying capacity.

Dasgupta (2000) succinctly summarises this extreme view as one that:

lays stress on new ideas as a source of progress, supposing that the growth of ideas is capable of circumventing any constraint the natural-resource base may impose on the ability of economies to grow indefinitely.

A flaw in overly simplistic interpretations of Boserup's hypothesis is suggested when the author herself (Boserup, 1981: 134) states that between 1880-1910 about 20% of the population increase in Europe migrated to the New World. Clearly, during this time, large numbers of people preferred to leave their familiar surroundings, language and culture, in order to seek improved economic – and, probably, social – circumstances. Put simply, this suggests that the potential to expand regional human carrying capacity was, at that time, greater in the New World than in the Old World.

Many facts indicate that economic gain is dependent not only on individual factors, but also on social and other population factors. In other words, individuals and populations at the economic margin of some societies<sup>16</sup> can sometimes find better lives elsewhere, especially in societies with a comparatively high ratio of resources<sup>17</sup> to population.

Human carrying capacity is expandable, but except in rare circumstances<sup>18</sup> this expansion is not easy. It is never infinite. If human carrying capacity were highly elastic, why would anyone choose to migrate? Furthermore, if this was the case, why would colonising populations, both in Australia and elsewhere, seek to displace the pre-existing human populations they found?

These reflections may seem self-evident to some readers, but it is my contention that many of the implications of these arguments remain obscured to most demographers and mainstream economists.<sup>19</sup> The reasons for this oversight are central to the

comparatively scanty and simplistic scientific research into population and environment, both globally and nationally.

In part, these reasons can be found in the control of history and theory imposed by victorious populations (thus discounting the losses and suffering of displaced human populations), by the repeated, albeit partial and possibly temporary, discrediting of earlier carrying capacity theorists<sup>20</sup> and by the expansion of capital and resource-intensive economic activity to an almost global scale.

The success of the latter in generating food supplies and other goods has repeatedly surprised the gloomier forecasters, such as the Paddock brothers whose 1967 book framed the question, *Famine 1975! America's decision: Who will survive?* (Paddock and Paddock, 1967). On the other hand, Kasun reports how in 1966, US President Lyndon Johnson indeed did insist that India expand its family planning program, in exchange for wheat shipments (Kasun, 1998: 68).

The slowing rate of global population increase, the large, growing, and increasingly desperate refugee populations, and the growing evidence of disturbances to the Earth's chemical, ecological and climatological cycles also suggest that limits to the maximum global population, at least as supported by current technologies, are approaching (Vitousek *et al.*, 1997; Loh, 2000; Butler, 2000a; Lawton, 2001; McMichael and Butler, submitted).

### **3. Australian views on 'optimal' population**

Similar to the debate about the value of human carrying capacity as a concept, so too is 'optimal population' disputed (McDonald and Kippen, 1999; Jones, 2001).<sup>21</sup>

Caldwell (2002) reports that efforts to promote this concept foundered between the two world wars, because of intractable disagreement. Cocks, far from a Simonian optimist concerning the ability of human ingenuity and environmental resources to provide for an indefinitely growing population, has argued that 'the debate is not about identifying an "optimum" population. No plausible, defensible method for doing this has been proposed or is foreseeable' (Cocks, 1996b).

Nevertheless, a number of other writers, including several Australian demographers, have given indirect support to the concept of both an optimum population (Young and Day, 1994) and, less contentiously, an optimum age structure (McDonald and Kippen, 1999). In the same article quoted above, Cocks points out that societies have limited choice concerning the population trajectories available to them. Clearly the Australian people and politicians agreed, after World War II, that the size of the Australian population was undesirably small.<sup>22</sup> They may not have known what size was 'optimum', but public and elite opinion agreed that it was larger than was then the case. 'Optimal' may not be identified precisely, but it can be known roughly.<sup>23</sup>

#### **3.1 Anthropological and historical evidence for optimum population size**

Abernethy (1979, 1993) refines a simplistic interpretation of the extreme Boserupian position<sup>24</sup> by proposing that optimum populations exist for any given set of technology and resources. She presents examples (from New Guinea, the Inuit and ancient Rome) of societies that have self-organised in order to reduce, maintain, or expand their populations in order to approach this desired level. Easterlin (1971) points out that at the start of the 19th century, fuelled by abundant natural resources,

the American fertility rate was higher than that ever recorded for any European country. After the Black Death depopulated large parts of Europe some villages, perceiving themselves as vulnerable, offered free land and other inducements to new settlers.

Both globally and locally, other authors have implied the usefulness of the concept of optimal population (Daily *et al.*, 1994; Jones and Pearson, 1995; Pimentel *et al.*, 1999; Willey, 2000). Arrow *et al.*, (1995) wrote: 'Carrying capacities are contingent on technology, preferences, and the structure of production and consumption'. Though arguing that 'a single number for [human carrying capacity] would be meaningless', they point out that human appropriation of the products of photosynthesis is about 40% (Vitousek *et al.*, 1986; Rojstaczer *et al.*, 2001), implying that limits to this human impact must be approaching.

More pragmatically, the evidence reviewed by Abernethy suggests that population thresholds exist below which productivity and security are compromised, and above which migration or other forms of population stabilisation are desirable. I agree with Cocks that no *consensus* is close concerning either a target or a methodology to identify, with precision, an optimal population, either for Australia or globally. However, the topic should not be ignored.

### **3.2 Scarcity of research concerning optimum population size**

No academic or political consensus exists concerning the optimum population for Australia; and randomly selected individuals are unlikely to respond cogently to polling questions concerning this issue. Nonetheless, the national attitude towards immigration provides powerful *indirect* evidence of how close society believes the population is to its optimum. The 'fuzziness' of this topic and its quantification problems may indicate lack of relevant research rather than the trivial or unanswerable nature of the question. An additional factor thwarting this kind of research may be anxiety of provoking either racially based support or criticism.

## **4. Population characteristics and optimum population size**

Important migrant factors include marketable skills, ambition, health, age and cultural and language background. These can be summarised as a prospective immigrant's ability to add or subtract from the per capita national carrying capacity. For example, aged, ill and financially dependent immigrants are unlikely to be welcomed. They will be seen as free riders (Bowles and Gintis, 2002) by the host population, with a net contribution to carrying capacity clearly likely to be negative. On the other hand, such individuals may be tolerated and even welcomed if supported by family members who not only pledge to provide for the ill person's needs but also contribute substantially to carrying capacity.<sup>25</sup> This may be possible if such individuals are especially talented, filling otherwise empty vacancies, or bring a large sum of foreign currency, effectively transferring a degree of foreign carrying capacity to Australia.

The *expectation* of an individual's likelihood of making a low, moderate or high contribution to carrying capacity has a substantial subjective component, influenced by characteristics and values of the receiving community. This expectation may be self-fulfilling. For example, in Australia prior to World War II, few migrants were of non-British or Irish origin. This was largely due to a greater supply of British

migrants, a higher Australian birthrate<sup>26</sup> and less perceived vulnerability compared to after WWII. As well, it was widely considered that the migration of substantial numbers of non-English speaking migrants<sup>27</sup> would adversely affect the cohesiveness, and perhaps loyalty, of the young, British-identifying nation. Thus, migration by non-British populations to Australia was not encouraged, and in some cases actively discouraged. Following WWII, the Australian perception of being underpopulated increased substantially. In part because of a lack of sufficient potential migrants of British origin, migrants from many other parts of Europe were also actively sought in this period.

#### **4.1 Skilled immigration to Australia**

Potential migrants to Australia were, and are, not selected on purely income-generating grounds. Social and cultural characteristics are also important. In the past, Australian immigration policies discriminated against those who were non-white; today it discriminates against those who are poor – the vast majority of whom are non-white. Though impossible to measure precisely, some of these subjective measures are influenced by the perceived impact upon social cohesion, which in turn helps to determine economic productivity and carrying capacity. Following WWII, under the White Australia Policy, most potential non-European migrants continued to be discriminated against, not necessarily because they were less capable of contributing to the Australian carrying capacity than Europeans but primarily<sup>28</sup> because the racist, conservative attitude of the dominant Australian population empowered this view.

Recent national policy places an emphasis on the skill level, rather than the ethnic origin of most migrants, including the relatively new phenomena of skilled temporary migrants (Hugo, 2002). This reflects a more sophisticated and pragmatic approach to immigration and carrying capacity, as well as indicating increased Australian sensitivity to international public opinion. Though the language of 'carrying capacity' is not prominent in these policies and relevant publications, desirable immigrants are clearly considered more likely to contribute to both the national economy and to carrying capacity than the vastly longer queue of unskilled potential immigrants.

The pragmatism of the modern policy is founded upon the comparative under-supply of highly skilled potential migrants of European origin, in a highly competitive international market. This is driven by the low total fertility rate in many European countries (McDonald and Kippen, 1999).

Preferred immigrants to Australia are comparatively well-educated,<sup>29</sup> healthy, young,<sup>30</sup> and financially independent. McDonald and Kippen (1999) suggest a desirable range of net national immigration as 80,000-120,000. This figure has two main justifications:

- to compensate for the current below-replacement fertility of the Australian-born population, to avoid the outcome of spiralling population decline and a 'coffin-shaped'<sup>31</sup> aged profile;<sup>32</sup> and
- because higher figures are unlikely to be absorbed without considerable economic pain.

A close reading of McDonald and Kippen's paper suggests that it may not be the *absolute* figure of net immigrants that is crucial, but their skill levels. They point out that significant problems arose in the late 1980s when net immigration briefly rose to

an average approaching 150,000 people per annum. They point out that the unemployment rate among this cohort of immigrants was comparatively high because 'as numbers (of immigrants) increase, skill levels decrease'.

#### *4.1.1 Do skilled migrants contribute disproportionately to carrying capacity?*

It seems clear that current policies are based on the view that immigrants defined as skilled, and thus preferentially admitted to Australia, are thought to add significantly to the Australian carrying capacity and are of net benefit. This may be true over short periods, but the argument is more problematic over the longer term. Birrell (1998) discusses the brief experiment undertaken to aggressively expand skilled migration in the late 1980s, following a report by the Committee to Advise on Australia's Immigration Policies. A member of this committee, the economist Helen Hughes, had previously advocated increased Asian immigration as agents of economic dynamism because 'they work hard to save for houses and cars, increasing average productivity in the economy' (Hughes, 1985).<sup>33</sup>

Birrell reports that the committee recommended an annual migration target of 150,000 people per annum, over a 10-year period. Migrants were to be selected according to a ranking (in order of priority) of labour market skills, entrepreneurial and special talents, age and language capacity. This proposal was adopted by the Hawke government, but scaled back within only a few years. Birrell attributes this reversal not only to the recession of the early 1990s, but also to the program's comparative lack of occupational targeting, so that some highly-skilled migrants had difficulty finding work.<sup>34</sup>

There are several important aspects of this debate which, though difficult to investigate, may benefit from further consideration:

- Historically, some of the most entrepreneurial and ultimately successful migrants<sup>35</sup> to Australia arrived with little money and few marketable skills.
- The drive and risk-taking behaviour that brings asylum seekers to Australia may (or may not) be associated with skills that would disproportionately increase the Australian carrying capacity, if measured over many years.
- Even industrialised economies will continue to need comparatively unskilled workers for the near future. The exclusion of comparatively poorly skilled immigrants from the labour force is likely to result in a disproportionate number of the Australian-born population filling such positions. Could this, paradoxically, cause resentment?
- A disproportionate reliance on highly-skilled immigrants, many of whom, by definition, have portable, internationally recognised skills that facilitate on-migration, should they wish. Are such individuals likely to be as loyal to Australia as lesser-skilled immigrants and humanely-treated asylum seekers might become?

## **4.2 Social security, inequality and attitudes to migration**

Unskilled migrants are likely to be far more desired if arriving in a nation with a low pre-existing average skills base and either:

- a widespread perception of under-population; or

- a large potential carrying capacity that can be developed by low-skilled workers<sup>36</sup>.

The social security system and the level of minimum wages affect the acceptability of low-skilled workers. Comparatively laissez faire economies, especially if marked by relatively high inequality, are far more likely to welcome low-skilled workers than are economies with high minimum wages, generous social security systems, and low inequality. Economies based mainly on the free market are more likely to welcome low-skilled immigrants because they will perform undesirable jobs at low wages and, in the absence of a reasonable safety net, not be perceived as free-riding on the overall economy. On the other hand, those who are poor in such economies are far less likely to be welcoming, because the resultant over-supply of cheap labour will depress their wages and stymie efforts to improve working conditions and to reduce overall inequality.

The Australian economy has several characteristics likely to cause particular resentment of low-skilled immigrants, for example:

- subsidised health care and the existence of other relatively generous safety nets mean that unemployed immigrants are likely to be seen as free-riders by both wealthy and poor – unless their access to these public goods is severely restricted;
- minimum wage regulations limit participation of unskilled immigrants in the formal economy.

On the other hand, the growing inequality<sup>37</sup> in Australia (Harding and Greenwell, 2002), together with the existence of an underground economy means that some tolerance of illegal immigrants is likely. This helps explain the paradox of bipartisan intolerance towards asylum seekers, yet comparative indifference towards the far larger number of visa overstayers, many of whom, presumably, supply labour for this underground economy.<sup>38</sup>

### **4.3 Unskilled migration to the First World: a thing of the past?**

In the 19th century, countries such as the US and, to a lesser extent, Australia, welcomed large numbers of comparatively low-skilled immigrants. Social security systems were rudimentary.<sup>39</sup> The arguments given above suggest why wealthy components of both national populations saw large-scale immigration as desirable, even if low-skilled. Crucially, low-skilled and comparatively poor individuals were also less likely to oppose such immigration because the marginal contribution to carrying capacity by the average immigrant was comparatively high.

High rates of comparatively unskilled migration continue to the US, a country with a strong ethic of free enterprise, low minimum wages and modest social security safety nets (Jencks, 2001a). In Australia, many low-skilled immigrants were tolerated in the decades following WWII, despite the existence of a generous social security system. In the 19th century, substantial natural resources existed on a per capita basis. Even unskilled migrants with little recourse to social security nonetheless could expect rapid improvements in their incomes and quality of life. After WWII, immigrants, as well as baby boomers, appear to have been absorbed in part by the astounding per capita rate of technological improvements.<sup>40</sup> As well, though immigrants to post-WWII Australia were comparatively unskilled by modern standards, they were probably closer to the contemporary average.

Unless another astonishing increase in technology occurs, this situation is unlikely to recur. Several other elements reduce the likelihood of a sufficiently rapid increase in per capita carrying capacity occurring to support renewed scenarios of mass low-skilled immigration to Australia:

- the decline in per capita natural capital in recent decades;<sup>41</sup>
- the comparatively high skill level in 'developed' countries;
- the increased ethnic, language, religious and racial mixtures that mark modern society, and that, without careful management could lead to social powder-kegs.

## **5. Social cohesion, conflict, and human carrying capacity**

The decline in social cohesiveness – real or putative – consequent to the forced and rapid mixing of people of different origins, customs and beliefs is neither uniquely Australian nor European. Conflict between populations who identify as belonging to separate groups and who compete for the same resources is a virtually universal phenomenon. It is particularly evident in many parts of sub-Saharan Africa (Schwab, 2001), Indonesia (Aglionby, 2001), the Pacific, and the Indian sub-continent (Preston, 2002). Such conflict is not only economic but also frequently violent. It is impossible to disentangle the comparative shortage of per capita natural capital that underlies many of these conflicts from other contributors to the consequent reduced carrying capacity (André and Platteau, 1998; Butler, 2000b; McMichael and Butler, submitted).<sup>42</sup> In other words, perhaps, many such countries *have* exceeded their optimal population size.<sup>43</sup>

The famed social cohesion of the US<sup>44</sup> may also be threatened. A recent article about immigration to the US concludes:

Fifty years from now our children could find that admitting millions of poor Latinos had not only created a sizable Latino underclass but – far worse – that it had made rich Americans more like rich Latin Americans (Jencks, 2001b).

In turn, the emergence of a US society, similar to the fortress-like inequality that characterises some Latin American countries (Martin and Schumann, 1997; George, 1999: 10) could reduce economic productivity and total carrying capacity. Corruption by elites is credited as a major factor in the economic collapse of Argentina; it is also an important factor in the numerous accounting scandals that have recently characterised leading Australian and US corporations. Though no society is free of corruption, its scale and adverse effects are likely to be intensified in societies with high inequality, low regulation and a scanty social safety net (Butler *et al.*, 2001).

### **5.1 Push, pull and block factors affecting migration**

Migration is extensively influenced by 'push' and 'pull' factors in exporting and importing populations. The wider the gap between these populations, the larger these factors are likely to be. These gaps are economic, social, political and environmental. An important caveat applies: push and pull factors for long-distance, international migration are not likely to apply as strongly to *extremely* poor populations, who lack the means to consider such an option. Such populations may hardly be aware that wealthier countries exist, though of course this is changing with the penetration of

media and increased literacy. Other populations, such as those of the USSR during the Cold War, or North Korea today, may be prevented from migrating because of domestic policies.

Reducing inequality between and within nations appears to provide a powerful mechanism to reduce both the pull and push factors. So doing would also reduce the increasingly harsh 'block' factors, used by the Australian government and an increasing number of European governments to not only exclude undesired immigrants but also to block lawful requests for asylum by refugees. Brain drain is a likely consequence of encouraging the selective migration of highly-skilled migrants of non-European background to First World nations such as Australia (Pang *et al.*, 2002). Though such policies can sometimes result in a substantial two-way flow of human and financial capital, the long-term consequences of this issue warrant more research. At worst, this may not only increase international inequality but also exacerbate instability in poor countries. Australia is vulnerable, economically, socially and militarily by any resulting regional instability, as is South Africa by Zimbabwe's current turmoil.

Australian population and environment research, policy and debate merits extensive investigation of these factors (Short, 2001). There appear to be major gaps in this area.

## **6. Australian underpopulation: the perception**

Many events in Australia's European history illustrate perceived underpopulation by elite and poor sections of the Australian community. Such perceptions have led to attempts to increase immigration and the natural birth rate. The 1903 MacKellar Royal Commission was formed to investigate and, if possible, reverse the steep decline in the birth rate that occurred during the hard economic times of the 1890s that followed the fertility boom of earlier decades, when Australian population growth briefly exceeded 3% per annum (Hicks, 1978).

In the 1920s, University of Sydney geographer, Thomas Griffith Taylor, argued that the maximum Australian population was handicapped by the limited availability of water<sup>45</sup> and fertile soil. So unpopular were Taylor's views to mainstream and elite Australian opinion that he went into voluntary exile, migrating to Canada (Stone, 1995: 3-4). Taylor's opinion is unlikely to have surprised Charles Darwin, who reached similar conclusions nearly a century earlier (Flannery, 1995: 47) and whose theory of natural selection was influenced by Malthus (Desmond and Moore, 1991; Short, 1998).

Much of the motive for an increased white population in Australia in the early part of the 20th century was racially based. It was not fear of low population per se that drove the debate, but concerns that the demographic, economic and political dominance of European Australians was vulnerable to a gradual military Asian takeover (Hicks, 1978). Laws that tried to slow Asian immigration had existed since at least the 1850s, when Chinese goldminers were forced to walk to the Victorian diggings from South Australia, rather than from Melbourne.

In recent decades, fear of Asian invasion has been downplayed, but it clearly remains an integral part of the Australian psyche, particularly to those of Anglo-Celtic origin. It is difficult to understand the scorn with which some commentators regard this fear (Manne, 2002), at least over the long run, given that the Australian mainland was



indeed attacked by an Asian power in the 20th century, with invasion prevented only by US intervention.

These fears, together with the slowed rate of population increase in Britain, led to a pragmatic relaxation of the 'White Australia' Policy, enabling the assisted immigration of large numbers of non-British, though still white Europeans, especially from the Mediterranean region. Unpredicted, the baby boom also led to a substantial increase in the Australian fertility rate in the decades following WWII. Changing national and international values led to the abolition of the 'White Australia' Policy and advocacy by the Fraser government led to the admission of a substantial number of comparatively unskilled Vietnamese refugees in the 1970s.

## **7. Australian population and environment reports**

Since WWII, several major reports have been prepared on Australian population policy (Shinnick, 1996; Newman, 1997):

- National Population Inquiry, 1975;
- National Population Council, 1991;
- House of Representatives Standing Committee for Long-Term Strategies, 1994;
- Australian Academy of Science, 1995;
- Australian Academy of Technological Sciences and Engineering, 2000.

## **8. Recent research**

In general, Australian (and global) research into population *and* environment is sparse. This is inappropriate given the enormous consequences of this interaction, not only to ecological conditions but also to population health, economic sustainability and conflict. A roundtable discussion held in Brisbane in November 2001 by 'Australia 21'<sup>46</sup> found that very little co-ordinated research was being conducted into this topic and that no body exists to oversee relevant research (Australia 21, 2001: 36). Dasgupta (2000) has also recently commented on the lack of global research into the interface of population, resources, and welfare:

The study of possible feedback loops between poverty, demographic behaviour, and the character and performance of both human institutions and the natural-resource base is not yet on the research agenda of modern growth theorists.

According to the CSIRO, the report of the House of Representatives Standing Committee for Long-Term Strategies (1994) also noted that most submissions contained little, if any, substantive data sources or analytical approach.

### **8.1 Demographers**

Mainstream demographic projections of Australia's future population assume, albeit implicitly, that no significant environmental constraints will limit the various population scenarios that are analysed. Very little recent demographic research considers both population *and* environment. Increased interaction between

environmental scientists and demographers appears highly desirable and could lead to scenarios that have greater credibility.

The mainstream demographic position, though supported by an economic discipline indifferent to putative environmental constraints (Daly, 1996), risks increasing intellectual isolation and, ultimately, marginalisation without such interaction. The evidence for environmental stress at a global scale is increasingly deafening. If demographers do not feel competent as a profession to assess this evidence (Bongaarts, 2002), then consultation with those who do is imperative. Environmental scientists would also benefit from collaboration with demographers, thereby avoiding egregious errors in constructing population scenarios (McDonald and Kippen, 1999).

## **8.2 Political scientists**

Lack of time has precluded an extensive review of political science and the relationship between population and environment in Australia. However, because the perception of economic and military vulnerability has been, and continues to be, a major force for an increased Australian population, it is relevant to this report.

Speaking at the Population Summit held in Melbourne in February 2002, the former diplomat Rawdon Dalrymple claimed that a commonly held view in South-East Asia is that Australia is underpopulated. The ratio of population of the five most populous Asian countries to that of Australia is more than 70 times the corresponding ratio of land area, and is projected to increase to more than 80 by 2050. Dalrymple warned that Australia must avoid a shrinking, economically declining population in order to counter putative threats.

At the same summit, former Prime Ministers Bob Hawke and Malcolm Fraser argued that the perception of Australia by South-East Asian populations is very important and that respect and regard for Australia has declined. They argued that Australia needs a vibrant, wealthy economy to repel any threat.

At a subsequent population conference, economist and former diplomat Ross Garnaut advocated a continuing program to accept a limited number of asylum seekers, as a form of 'insurance' should Australians ever find themselves in similar circumstances.

At neither conference, nor in the literature that I have so far reviewed, have I found speakers or writers with this perspective who have commented on the possible destabilising effect of the brain drain in our region, though this problem is common in relation to the net outflow of health and scientific workers from many developing countries (Poveda, 2001; Pang *et al.*, 2002).<sup>47</sup> As well, the decline in Australian foreign aid, including the reduced funding of Indonesian family planning programs is rarely discussed (Short, 2001) (see figure 1). Nor is there much discussion of the resentment towards Australia that is likely to build in the Pacific and on other low-lying islands, including because of Australia's policy towards climate change.

## **8.3 Economists**

Like most mainstream demographers, conventional economists pay little attention to potential environmental and social constraints upon future population scenarios. Past successes at expanding the human carrying capacity are instead asserted as evidence that that process is infinitely repeatable. The fate of populations displaced as a result of previous carrying capacity overshoots<sup>48</sup> is ignored, while environmental problems,

such as salinity, greenhouse gas accumulation and biodiversity decline are assumed to be either soluble, unimportant, or exaggerated.

In contrast, the ecological economic literature accepts the reality of limits as fundamental and that population increase is a fundamental driver of environmental change. Consequently, this field has developed many economic strategies to further the sustainability transition. However its dissident, marginal status as an irritating subset of economics, at least in Australia, was again evident by the omission of any leading ecological economists as speakers at the Population Summit.

#### **8.4 Australian State of the Environment Committee**

The Australian State of the Environment Committee produced major reports in 1996 and 2001. The earlier report identified population growth as a major driver of serious environmental problems evident in Australia, stating, in its executive summary:

The problems are the cumulative consequences of population growth and distribution, lifestyles, technologies and demands on natural resources over the last 200 years and more (Australian State of the Environment Committee, 1996: 8).

The recent report appears more circumspect concerning this relationship. Rather than explicitly identifying population as a general driver of environmental change, population is identified as having a role in coastal Australian urban sprawl, energy consumption, stormwater pollution and biodiversity decline<sup>49</sup> (Australian State of the Environment Committee, 2001: 1).

#### **8.5 CSIRO**

The CSIRO Resource Futures Program was established partly as a response to the lack of analytical work commented upon in the submissions to the House of Representatives Standing Committee for Long-Term Strategies. It seeks to analyse 'the interactions between population, development and environment in the context of continental Australia out to the year 2050'.

This program accepts that links and interactions – even if not always direct – exist between population and environment. From what I have seen, this research appears to be by far the most sophisticated yet undertaken in Australia regarding potential population and environmental scenarios. Its most obvious weakness – one that seems very difficult to model – is an apparent lack of explicit discussion of the primary arguments used by economists, political scientists and to some extent demographers to justify large increases in the Australian population. This argument is that an insufficient population may leave Australia vulnerable in an increasingly unstable and possibly violent region.

##### **8.5.1 Future Dilemmas**

Coinciding with the submission of this report a major review of population and environment in Australia, *Future Dilemmas*, was released. Written by two CSIRO scientists (Foran and Poldy, 2002), and commissioned by the Department of Immigration and Multicultural and Indigenous Affairs, it is beyond the scope of this report to analyse this lengthy and comprehensive review, except for a few comments.

The launch of *Future Dilemmas* received extensive media coverage. It is too soon to evaluate its impact, but the early evidence is not encouraging. Commenting on this

report, the senior journalist Paul Kelly noted that the Minister in charge of Australian Immigration, Philip Ruddock 'rejected absolutely the notion of a population carrying capacity for Australia'. Kelly quotes Minister Ruddock as stating: "If you add value to a sheep property, then you can carry more sheep" he said, dismissing the capacity notion as primitive' (Kelly, 2002).

This quote, rather than demonstrating that human carrying capacity is primitive, instead suggests a simplistic understanding of a complex topic. This report has repeatedly argued that no farmer (or ecologist) would deny that the carrying capacity of a paddock can be altered – in either direction – by management. In addition, this report has reviewed a substantial scientific literature which argues that the same principle applies to human populations. Indeed, the Minister's own comments support the idea that human carrying capacity can be increased. These comments may instead reflect a debate more divisive in appearance than reality, in part because of an inadequate terminology concerning the concept of human carrying capacity.<sup>50</sup>

## **8.6 Australian Academy of Technological Sciences and Engineering**

The Australian Academy of Technological Sciences and Engineering played an important role in the development of *Population Futures* (Australian Academy of Technological Sciences and Engineering, 2000), prepared for the Business Council of Australia (see section 10). In its policy statement on sustainable development<sup>51</sup> the Academy states (guiding principle 7):

Continuing high rates of population growth, particularly in the less developed countries, threaten prospects for sustainable development and a better life for present and future generations. Technological sciences and engineering can help reduce constraints on population growth but some restriction of that growth is a necessary aim.

In contrast to the conclusions of the CSIRO Resource Futures Program and the Australian State of the Environment Committee, *Population Futures* concludes that many environmental impacts are *not* related to population size, but instead arise from other activities that might be broadly described as 'resource development'. *Population Futures* admits only four effects that are clearly related to population size. These are three forms of pollution<sup>52</sup> and the depletion of freshwater stocks near major urban areas. As well, it admits a 'tenuous' relationship between population increase and another nine issues, classed as five kinds of depletion,<sup>53</sup> two kinds of pollution<sup>54</sup> one kind of adverse change,<sup>55</sup> and loss of amenity (eg, from increased noise or congestion). It concludes that no relationship exists between population growth and a number of other factors, including alteration of river and lake systems in rural and remote areas; and the depletion of marine habitats, including fish stocks.

While it is true that the relationship between population growth and most of the factors classed as 'tenuous' is indirect, and not necessarily certain, this classification is disingenuous. For example, the depletion of arable land can be prevented (or at least substantially delayed) by appropriate use of fertiliser and other inputs, by leaving it fallow, or by more intensive agriculture elsewhere. But, nevertheless, a higher Australian population will drive a higher demand for agricultural production, either for domestic consumption or for export, in order to finance desired imports. Similarly, although it is possible to imagine a future in which existing fish stocks and marine biodiversity are voluntarily preserved,<sup>56</sup> it is more plausible that population increase, both in Australia and globally, together with the choice to sacrifice future stocks for

current profits, will continue to degrade fish stocks and biodiversity. Rather than analyse fisheries in this way, *Population Futures* simply asserts that the cause of changes to fish stocks are 'primary industry practices'. It makes little if any attempt to analyse the factors that drive these practices, one of which, clearly, is population.

*Population Futures* also asserts that Australia's contribution to greenhouse gas emissions can be ignored, even if the population increases, because Australia's emissions are a small fraction of the global total, though high on a per capita basis. This argument is equivalent to advocating Australia becoming a 'free rider' on this issue, a position arguably likely not only to harm Australia's reputation but to delay business participation in the emerging post-carbon economy (Hawken *et al.*, 1999). At the worst, such policies could increase resentment towards Australia and even lead to trade or other sanctions. Jones (2001), in reviewing this report, concludes: 'it will be seen by opponents of population growth as an advocacy document serving narrow sectional interests rather than a balanced assessment that could inform the public and government policy.'

However, in a paper given at an Australian Academy of Technological Sciences and Engineering symposium, Nicklin (2000) argues that the Academy supports a much more holistic view of sustainability, including, crucially, the development of improved economic indicators that account for bads as well as goods.

## 9. The environmental lobby

The position of the environmental lobby is most clearly articulated by the non-government organisation Sustainable Population Australia. This organisation convincingly points to many links between population increase and environmental damage. Its recommendation to stabilise national population size as soon as possible is laudable, but problematic given that the global population is predicted to increase substantially further.

Were Australia's neighbours experiencing similar demographic profiles and trends to that of Australia, such a future might be very attractive from an environmental position. But they are not. Most populations in the Asian region will continue to become larger and younger compared to Australia. Resentment towards Australia in this region (Broinowski, 2003) may increase, as could political instability. Even in the best case, well before 2050, Australia may have to deal with refugee flows that are an order of magnitude larger than present, including from Melanesia. In the worst case, global climate change could adversely harm food production throughout South-East Asia and the Indian sub-continent (Fischer *et al.*, 2001). This or other adverse scenarios could interact with poor and corrupt governance on a regional scale, leading to civil war and millions of additional refugees (Butler, 2002c). If, at that time, the Australian population is little more than it is today, then Australia could easily be perceived as selfish, economically vulnerable and deserving of invasion.<sup>57</sup>

Sustainable Population Australia has called for Australia's foreign aid to increase to at least 0.7% of GNP, including an increased emphasis on aid that will directly reduce birth rates, such as education and primary health care. The Australian population may need to be convinced that this aid can be well spent before supporting such a position; even making this an important subject of debate would be useful. A mechanism to encourage this debate would be to tie aid to the defence budget.

Abernethy (1993) argues against indiscriminate foreign aid on the grounds that by providing an illusion of abundance it slows the demographic transition. Hughes (2003) has also recently criticised aid as failing the Pacific, for rather similar reasons, including its ready diversion towards consumption, rather than investment. While reduction in trade subsidies and debt relief is likely to reduce global inequality, aid that is targeted towards education, health care and family planning could have a net benefit for population growth rates. Certainly the reduction in foreign aid<sup>58</sup> over recent decades appears to have had net negative effects. There is widespread support for defence spending; might not foreign aid also be seen as a form of defensive expenditure?

## **10. The business lobby**

The business lobby favours an expanded Australian population, mainly by increasing skilled migration (Jones, 2001). Its core arguments for a larger population (Berg, 2001) are:

- increased economic competitiveness and growth;
- reduced perceived disadvantages of an ageing population; and
- enhanced military security.

Increasing the fertility rate of Australian women would also achieve a larger population, but this appears less attractive economically as such populations would have to be cared for and educated while non-economically productive. Even more problematic would be reorganising the Australian economy to remove the very substantial economic disincentives that currently impede a higher Australian total fertility rate. Recent moves to introduce widespread paid maternity leave are likely to be resisted by many employers, and in any case still prove an insufficient incentive.

The major recent contribution of business to the national debate has been through the Australian Population Institute. Because of their economic, media<sup>59</sup> and political influence, this group's policies warrant particular consideration.

The Australian Population Institute's website explicitly links Australian population with environment, as well as 'employment, economy, cultural harmony, national security and other issues'. This broad view is thus similar to that taken by me in preparing this report. The group's main concern is one of advocacy rather than promotion of research. I have argued in this report that relatively little sophisticated research exists within Australia into the issues identified as vital by the Australian Population Institute, which clearly advocates a larger population – a position based mostly on assertion rather than research.

### **10.1 Conservationists and business: opportunities for coalition?**

The Business Council's lobbying for a greater Australian population stresses the importance of caring for the environment. The Australian Conservation Foundation has not conducted or commissioned specific research into the question of Australian population and environment;<sup>60</sup> however, it appears to agree with the business lobby that a larger Australian population *is* possible, provided environmental constraints can be overcome. The major differences between these camps seem to be the degree of optimism and the degree to which these views are based upon science rather than assertion and hope.

For example, the president of the Australian Population Institute, Mr Bert Dennis, in a speech given to the Department of Immigration and Multicultural and Indigenous Affairs conference,<sup>61</sup> said 'I advocate a higher population and I am a vigorous advocate for the environment, but I am also a vigorous exponent of best environmental practice.'

Dennis described how, in his own life and with his own company, he tries to be an environmental trendsetter (eg, by improving the energy rating of new housing settlements). He also referred to evidence suggesting that, as average income increases, environmental impact tends to reduce.<sup>62</sup> However, in this and similar presentations by the Institute, there is little evidence to suggest understanding of, or advocacy to correct, the *structural* impediments that drive a high per capita environmental impact in Australia. For example, references to the principles of ecological economics,<sup>63</sup> were absent, not only in this speech but also, as far as I can tell, on the Institute's website.

Another prominent supporter of the Institute is Mr Richard Pratt, who calls for an Australian population of 50 million by 2050. Pratt envisages a 'democratic, secure, prosperous, fair and pluralist Australia' (Daniel, 2002). The increased inequality in Australia in recent decades is likely to be a factor in the widespread rejection of large-scale emigration to Australia by low-skilled workers. As with their professed concern over the environment, the Institute's credibility would be enhanced by articulating policies designed to lead to lower Australian inequality.

## **11. Conclusion**

### **11.1 Summary**

This short report is an overview of recent and current global and Australian research concerning population and environment. Sections 2 to 5 reviewed some of the literature concerning the concepts of human carrying capacity and optimal population. Though these concepts are contentious, and, in some cases, are suggested as having zero utility, I argue that they remain the most useful and best explored ways to consider human population and the environment. The term 'human carrying capacity' was discussed in detail, and though I agree that the term is problematic, I suggest that its usefulness could be enhanced by the addition of several qualifiers, including 'reserve', 'marginal' and 'sustainable'. These terms are defined in the glossary. Optimal population and the desirability of migrants was introduced and discussed in sections 3 and 4.

Sections 6 to 8 considered this theory in the Australian context, examining the history and recent research into Australian population, the environment and carrying capacity. Sections 9 and 10 gave a brief review of the views of two different lobby groups.

### **11.2 Findings**

This report finds that comparatively little sophisticated research exists on population and environment as a distinct subject. Instead, it seems that most work traditionally has been undertaken by specialists such as demographers, environmental scientists and political scientists. More interaction between these disciplines appears desirable.

It was also argued that the major parties in this debate propose different scenarios, based more on political than scientific reasons. Unfortunately, the Australian

Population Institute appears to be particularly influenced by a partisan view of the scientific literature, unlikely to withstand peer review. Their overall message would be more credible if they and the business lobby that they represent accept that an increased population *will* inevitably lead to further environmental damage, but that this may be an acceptable trade-off for other benefits, such as to the economy and to future security.

On the other hand, the case of demographers and especially economists who make this argument would be strengthened if they could frankly discuss potential economic and security risks that could impinge upon Australia if the regional population continues to increase, while simultaneously eroding its resource base. Recent instability in Central Asia and the rise of organised systems of transporting asylum seekers has already incurred very substantial financial and other costs in Australia, strengthening fears that future costs will be even higher. Australians have a right to control their borders. However, neither the government nor orthodox economists appear to have seriously considered whether preventive actions to do so (by promoting stability in our region and by better advancing the cause of sustainable development) might provide more cost-effective utilisation of limited funds.

Both the business lobby and environmental scientists agree that Australia's per capita environmental impact can be reduced by better technology and organisation. The development of environmentally-friendly sunrise industries could reduce the ecological footprint of the average Australian and lead to a wealth of export opportunities, especially to Asia.

Of course, even if the average Australian ecological footprint can be substantially reduced, a larger population will mean that the Australian contribution to global environmental change, especially from greenhouse emissions, is likely to continue to rise, but it would do so at a slower rate. The world has for several decades been practising a global experiment with its life-support systems, which has been characterised as 'environmental brinkmanship' (Butler 2000a).

While scientists and policy-makers do not know where the threshold points lie that separate a tolerable from an intolerable environment, it is true that the Australian contribution to this experiment is comparatively small, even though high on a per capita basis. From an environmental position, Australia should reduce its per capita ecological footprint. But unless Australia also engages in regional environmental leadership, even an absolute reduction in the Australian ecological footprint will have little impact on total environmental change.

A larger Australian population, *combined* with the adoption of a leadership role in developing sustainable technologies and economic systems, might be more environmentally beneficial than either the current head-in-the-sand approach or the one that stresses environmental parsimony. Such policies could lead Australia to be seen as a more hospitable regional player and, in the worst case, would provide a stronger economic and military basis should regional instability markedly increase.

The recent decision by Australia not to ratify the Kyoto Protocol and to run down the Australian Greenhouse Office (Miller, 2002) demonstrates how far Australian policy-makers have to go. It is clear that some common elements exist between the major players in this debate. More co-operation between these groups could yet see the emergence of the policies suggested above.



## 12. Glossary

**Boserupian principle:** the proposition that the human carrying capacity can be increased, *within limits*, by additional inputs, including, at least sometimes, an expanded human population.

**Human carrying capacity:** the capacity of a human population, in conjunction with its environment to supply a given living standard. HCC can be analysed as a function of human capital, social capital, natural capital, financial capital and fixed capital (infrastructure) (McMichael and Butler, submitted). HCC can be local, regional or global. Some elements of HCC may originate from other populations. When HCC elements are traded or otherwise exchanged, HCC is modified. In some cases, HCC may be increased in each region (eg, exchanging oil for grain between regions with a surplus in oil and grain). In other cases, the HCC of one area may be disproportionately increased at the expense of another (eg, the transferring of a PhD graduate from Zimbabwe to the US). Global HCC can be influenced by these transfers if they result in reduced global social capital, thus increasing the risk of capital-destroying conflict.

**Human capital:** the skills of an individual which are useful to increase carrying capacity. While many of these skills may be directly related to the production of goods (eg, farming or engineering knowledge) some service-related talents, such as the ability to entertain, may also increase carrying capacity, for example by enhancing the productive ability of others.

**Marginal human carrying capacity:** the additional human carrying capacity supplied (or subtracted) by an additional person. MCC depends on the capital brought (or subtracted) by a marginal (additional) individual. For example, a migrant may bring useful skills, or be a net drain on carrying capacity (nevertheless, in areas with abundant spare carrying capacity, such individuals may still be welcomed).

**Natural capital:** the environmental assets of an area, such as ecosystems (including soil), water, oil and mineral reserves, local climate and the frequency of natural disasters, such as earthquakes.

**Optimal population:** from an anthropocentric view, this can be defined as the human population size associated with an average marginal carrying capacity of one. That is, optimal population is where the net lifetime contribution to HCC of an additional (marginal) individual approximates the extraction from HCC of such an individual. Some populations may elect for affluence instead of a higher population. Such populations could still consider this optimal.

**Reserve human carrying capacity:** the extent to which a population is able to access distant or future carrying capacity, even if at the expense of other human populations. Reserve carrying capacity can be current or future.

**Social capital:** the cohesiveness of a population, measured by indicators such as the degree of trust and social interactions. In general, there is a direct correlation between social capital and social cohesion. Maximum social capital may not maximise HCC, because such societies may be more closed to outside influences, and less interested in innovation. Simplistic uses of this concept are also problematic. For example, the cohesion of the Nazis in Germany in the 1930s clearly contributed to that country's economic revival and growing military power. In turn this strength was used to try to appropriate additional HCC (not only 'lebensraum', or living space, but oil from the

Stalingrad region of Russia). However, the social cohesion of the Nazis did not extend to Germany's Jewish, gypsy and disabled populations. The social capital of the Nazis was not used to increase the HCC of these minority populations. In situations where per capita access to natural capital is very low (such as for the Palestinian refugees) social cohesion may be an important means of increasing HCC. However, beyond limits, a reduction in natural capital may itself reduce social capital.

**Sustainable human carrying capacity:** HCC which is sustained. That is, HCC which endures indefinitely. Sustainable HCC can be analysed at any scale, including locally, regionally and globally. It is increasingly sensible to analyse global HCC, given the complexity of trade, cultural, terrorist and military interconnections that link the global population.

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## **14. Appendices**

### **14.1 Main activities undertaken to prepare this report**

#### **7 November 2001**

Attended book launch; United Nations Population Fund (UNFPA); State of the World Population 2001; Parliament House, Sydney; meetings with Dianne Proctor (Australian Reproductive Health Alliance) and Jenny Goldie (Sustainable Population Australia)

#### **8 February 2002**

Telephone discussion with Dianne Proctor, CEO, Australian Reproductive Health Alliance

Meeting with Professor Jack Caldwell, Australian National University, Canberra

#### **12 February 2002**

Meeting with Dr Warwick Neville, Australian Catholic Bishops Conference, Canberra

#### **13 February 2002**

Meeting with Dr Barney Foran, CSIRO, Canberra



**14 February 2002**

Meeting with Professor Peter McDonald, Australian National University, Canberra

**18 February 2002**

Meeting with Rev (Dr) Ann Wansbrough, UnitingCare NSW, Sydney

**25 February 2002**

Attended Population Summit, Regent Theatre, Melbourne

**26 February 2002**

Correspondence with Professor Bob Douglas, Australia 21, Australian National University, Canberra

**2 March 2002**

Meeting with Senator Bob Brown, leader Australian Greens.

Correspondence with Professor Tim Flannery (South Australian Museum), Associate Professor Stephanie Fahey (University of Sydney), Professor Bob Wasson (Australian National University), Dr Kevin McCracken (Macquarie University, Sydney), Dr Alan Jones (Australian Museum), Anna Reynolds (Climate Action Network Australia), Professor John Last (Uni Ottawa), Professor David Shearman (Society of Doctors for the Environment, Australia)

**27 March 2002**

Meeting with Professor Jamie Kirkpatrick, Department of Environmental Studies, University of Tasmania, Hobart

Meeting with the Hon. Duncan Kerr, Australian Labor Party, Hobart

Meeting with Ms Jo Flanagan, Anglicare, Hobart

**7-8 May 2002**

Attended conference, 'Migration – benefiting Australia', Department of Immigration and Indigenous Affairs, Sydney

**9-10 May 2002**

Attended conference, 'Australian migration and ethnic relations in a period of changing international relations', Multicultural Research Centre and Australian Migration Research Network, University of Sydney

**5-6 July 2003**

Participated in symposium and workshop, 'Population change in Asia and the Pacific. Implications for development policy', Australian National Museum, Canberra

**14.2 Groups contacted in the preparation of this report**

Anglicare

Australia 21

Australian Academy of Science

Australian Academy of Technological Sciences and Engineering

Australian Catholic Bishops Conference

Australian Conservation Foundation

Australian Greens

Australian Labor Party

Australian Population Institute

Australian Reproductive Health Alliance  
Caritas Australia  
Climate Action Network  
CSIRO  
Doctors for the Environment Australia  
Family Planning Australia  
Liberal Party of Australia  
Medical Association for the Prevention of War  
National Party  
Nature and Society Forum  
Public Health Association  
Sustainable Population Australia  
Uniting Church in Australia

### **14.3 The Population Summit, Melbourne, 25 February 2002**

This well-organised and highly publicised meeting was organised and supported by a number of businesses, organisations and individuals, including the Australian Population Institute, Boral, *The Age* newspaper and the Victorian government. It was opened by Mr Steve Bracks, the Victorian Premier, and overseen by Mr Steve Vizard. The summit was divided into five main sessions, each lasting an hour with four or five speakers. These were (in chronological order) economics, environment, humanitarian, demography and international relations. In addition, three parallel sessions were held in the afternoon (media and public perception, culture, and youth perspectives). Speakers at lunch included prominent businessman Mr Richard Pratt, the Leader of the Opposition Mr Simon Crean, and a representative of Mr Philip Ruddock, the Minister for Immigration. Two former Australian prime ministers were also involved; Bob Hawke spoke in the international relations session, while a written paper from Malcolm Fraser was available.

The summit, which had no admission fee, attracted several hundred delegates. Most were invited, but interested individuals were admitted if they expressed sufficient interest. A substantial number of students attended and a separate youth session was held.

My impressions are that the conference was organised by individuals and organisations with a strong wish to increase the Australian population above the trajectory projected by natural fertility and current levels of immigration. The conference organisers deserve credit for the opportunity given to speakers who questioned, or even opposed this approach. Many speakers argued powerfully in support of a larger population. Their main arguments are:

- Population growth is desirable for economic growth. Australia risks economic marginalisation, cultural and technological stagnation, and, ultimately, capital flight, if its population doesn't grow at a rate higher than the current baseline (which would see a population of about 24 million by 2050).
- Higher population and economic growth is desirable for military protection.
- Environmental constraints are exaggerated and in any case soluble by technology.

I thought there were several key omissions:

- Inadequate exploration of the reasons for the *de facto* opposition to a substantial increase in the Australian population, evidenced by both Australian public opinion and the policies of both main political parties.
- Lack of an ecological economic contribution.
- The acute awareness of the political and economic vulnerability of Australia was not complemented by a similar appreciation of the ecological vulnerability of the populations in Australia's region.

These weaknesses were perhaps inevitable given the time constraints. The first may reflect the growing divisions apparent within Australia. The debate and tensions concerning the Australian population and (less explicitly) environment are at least as old as white settlement, though of fluctuating intensity. However, perhaps for the first time in this history, there is a significant divergence between elite and public opinion.

The coincidence of the timing of the population summit and my commission, while fortuitous, is not extraordinary – each reflects the current resurgence of interest in the population and environment debate, not only in Australia, but globally.

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## Endnotes

<sup>1</sup> World Development Reports and World Development Indicators CD ROM.

<sup>2</sup> These issues must have been considered by Australia's indigenous population, who not only utilised various forms of population limitation, but who also rejected the population-increasing technology of agriculture, used in New Guinea.

<sup>3</sup> 'Development' is another contentious term. I define it as the process by which human societies become better able to provide sustainably for the needs and legitimate aspirations of their populations. It is often simply used as a synonym for expansion, which, I argue, is often *unsustainable*.

<sup>4</sup> By threshold I mean substantial differences, not predicted by incremental increase. Thresholds are common in nature. Examples include the change in the state of water at freezing and boiling points, and the change between the last day of peace and the first day of war. Sayings such as 'the last straw' and the 'weakest link' suggest an ancient understanding of this concept.

<sup>5</sup> Thanks to Ian Lowe for this pithy definition.

<sup>6</sup> Boserup's work is important because it is sometimes cited as evidence that Malthusian principles do not apply (Ruttan, 1990; Caldwell, 1998). However, in 1982, Boserup wrote: 'He [Schultz] overlooks that there may be *different* reasons for poverty in sparsely and in densely populated countries, in each case related to population density--in the latter because of the unfavourable man-land ratio, in the former because of high costs of investment in and operation of rural infrastructure where population is sparse' (Boserup, 1982). The 'Boserupian principle' is defined in the glossary.

<sup>7</sup> For this report, 'human carrying capacity' is defined as the capacity of a human population, in conjunction with its environment, to supply a given living standard. See glossary for a fuller definition and discussion.

<sup>8</sup> Another reason for this taboo probably lies in its racist and eugenic applications, including by the Third Reich. Cohen (1995a: note 16) also attributes the failure of demographers since WWII to consider human carrying capacity in part as arising from some spectacularly unsuccessful predictions of projected global population made between the wars.

<sup>9</sup> See glossary for a formal definition.

<sup>10</sup> Cohen (1995a: 341) does allude to the growth in human inequality and increased racial mixing and friction, but this theme is not developed. However, Hung Liang-Chi, known as the 'Chinese Malthus' (1744-1809) made this point (Silberman, 1960).

<sup>11</sup> Though the quantity of aquaculture has continued to rise, substantial quantities of wild fish are used as fishfeed in aquaculture (Naylor *et al.*, 2000). Avoiding this double-counting shows a plateauing in

the total quantity of fish available to the consumer, and, because population continues to increase, the per capita availability of fish is now declining.

<sup>12</sup> To reduce the number of hungry people by half by no later than 2015.

<sup>13</sup> See glossary.

<sup>14</sup> The current interglacial period, of about 10,000 years duration. The Holocene roughly coincides with the development of agriculture, and, some think, may have been a key factor causing this transition, at least in the Middle East (Wright, 1968; Lev-Yaden *et al.*, 2000).

<sup>15</sup> This proposal was recently restated in *The Economist* (Anonymous, 1998). Former US President, George Bush snr, has also paraphrased this position, stating that 'every human being represents hands to work, and not just another mouth to feed' (cited in Cohen, 1995a). In Australia, Hewett (2002) recently questioned any relationship between population growth and environmental pressure, and even asserted 'the lack of population pressure in Australia has only increased the domestic environmental problems because it has reduced the economic and political impetus to find smarter technological solutions'. See also Sachs, 2002.

<sup>16</sup> At the most extreme, convicts and 'potato Irish' both of whom were important in the European history of Australia.

<sup>17</sup> Not only natural resources, but human, social, built, financial and cultural.

<sup>18</sup> Such as situations of ecological or technological release.

<sup>19</sup> That is, to non-ecological economists – economists who regard the natural economy as a subset of the human economy, who deny the proximity of natural limits, and who claim that for practical purposes, natural capital can be substituted by built and manufactured capital (Daly, 1996; Brown, 2001).

<sup>20</sup> That is, previous writers who have warned of impending limits to the global population have underestimated the ability to increase human carrying capacity. To some, their warnings appear erroneous, to others premature.

<sup>21</sup> These authors also cite the National Population Inquiry report, *Population and Australia* (1975), as being similarly sceptical of this concept.

<sup>22</sup> I have argued that science is not value free. No doubt, both scientific and ethical cases could have been made to maintain the post-WWII population at fewer than 10 million (eg, by according a higher value to native species and the rights of Aboriginal populations). Such arguments would have been difficult to support from an anthropocentric, utilitarian perspective, given the overwhelming consensus that a larger population was needed. Yet 'optimum' cannot simply mean the majority view, though at times there will be agreement with it. Optimal needs qualification – optimal for whom? An optimal temperature for growing bananas is different to that for growing apricots. In this report, optimal is intended to apply to the *whole* Australian population. Well-known environmental scientist Tim Flannery has also recently called for a wide-ranging enquiry into this issue (AM, 24.1.02, <http://www.abc.net.au/am/s464277.htm>).

<sup>23</sup> There are additional temporal complications, of course. That is, the optimal figure now is probably not the optimal figure in the future or past. As well, comparatively unchangeable factors, such as demographic momentum (McDonald and Kippen, 1999) and technological and social 'riverbeds' (Bossel, 1998) limit future population sizes.

<sup>24</sup> The debate between poles of this theory can also be analysed as between extreme optimists and pessimists, including Malthus and his predecessor Condorcet, the French marquis whose work *Sketch for a Historical Picture of the Progress of the Human Mind* was published in 1795, a year after the author's death in prison. This book predicted a tenth stage of perfection of the human condition, still to come (Condorcet, 1995; Puntis and Kirpalani, 1998; Ross, 1998; McMichael and Butler, submitted).

<sup>25</sup> That is, enough to more than compensate for his or her relative.

<sup>26</sup> However, this fluctuated, being especially low during the economic recession of the 1890s and the Great Depression.

<sup>27</sup> Substantial populations of people with German origin had long settled in Australia, as had Chinese. The Chinese – if in numbers thought 'controllable' by the authorities – were tolerated; after all, they performed many vital economic functions, such as market gardening, that clearly added to human

carrying capacity. The population of Germans in the Barossa Valley also clearly added to its local carrying capacity; as well, in the 19<sup>th</sup> century, close links existed between the British and German elites.

<sup>28</sup> It can be argued that a transaction cost is imposed on the economy by non-English speaking immigrants. Conversely, the addition of different cultures may invigorate the dominant culture. More persuasively, the arrival of a large numbers of immigrants with education levels far lower than the Australian average could impose a significant transaction cost in the form of education.

<sup>29</sup> An increasing number of skilled migrants are receiving post-graduate education in Australia; however, at least their primary and secondary education has been obtained offshore.

<sup>30</sup> A trade off exists between youth and experience.

<sup>31</sup> That is, with a marked excess of elderly. This will occur if the Australian total fertility rate persists at its current – or lower – level (about 1.6) and if net migration is about zero.

<sup>32</sup> Though these authors explicitly deny the existence of an optimum population, these considerations clearly indicate a belief that some populations and age structures are preferable to others.

<sup>33</sup> As stated, this suggests both an extremely simplistic interpretation of Asians, as well as a kind of reverse racism, whereby Asians appear to be more materialistic than other people.

<sup>34</sup> This is a subtly different interpretation to that of McDonald and Kippen (1999).

<sup>35</sup> Including several who are prominent in the Australian Population Institute.

<sup>36</sup> Such countries are likely to be perceived as underpopulated.

<sup>37</sup> Income inequality has increased but expenditure inequality may not have.

<sup>38</sup> Many visa over-stayers are probably disproportionately young (and healthy), from high income countries, where they will eventually return.

<sup>39</sup> Australia and New Zealand were world leaders in establishing social security systems. I suggest that this not only reflected egalitarian social characteristics, but also an abundant per capita carrying capacity.

<sup>40</sup> This rate may have exceeded that of the present. Technological breakthroughs continue, but do recent improvements such as the internet really exceed that of the railway, electricity, the internal combustion engine, heavier-than-air flight, satellites, television, the Green revolution and so on? (Particularly since the current human population is so much larger than before.)

<sup>41</sup> However, in many European and some Asian countries populations will soon decline, increasing the supply of national and regional natural capital per capita.

<sup>42</sup> Discussion of these issues in terms of human carrying capacity and putative overpopulation remains rare. For example, a recent, lucid book about the collapse of numerous sub-Saharan states by the human rights author, Peter Schwab (2001) is entirely silent about this cause of African carnage and catastrophe. It may be argued that such authors deny the importance of exceeding carrying capacity limits because of a feared interpretation of 'victim-blaming', that is, attributing responsibility to Africans rather than to colonialism. However, Schwab is unrelenting in his criticism of a series of African despots, whose rapacity and bad governance have contributed so much to the downward spiral in many African nations. Is not the failure to provide education, health care and other factors that promote the demographic transition also a consequence of such poor governance? Schwab's failure to discuss this supports the contention that a taboo exists concerning such issues (King and Elliot, 1993, 1997). Also see Sachs, 2002.

<sup>43</sup> This does not mean that carrying capacity could not be increased in such countries, nor that the optimal population is constant. For example, a larger population could easily be supported in the Congo, were that population more co-operative and better skilled.

<sup>44</sup> Excluding the Amerindian and Afro-American communities.

<sup>45</sup> Though water is widely regarded as a critical limiting factor for the Australian population, the per capita water supply and use is high by international standards (Australian Water Resources Assessment, 2000,

[http://audit.ea.gov.au/ANRA/docs/summary\\_reports/water\\_resources/SR\\_09.html](http://audit.ea.gov.au/ANRA/docs/summary_reports/water_resources/SR_09.html)).

- <sup>46</sup> A recently formed group of eminent researchers and policy advisors, from universities, the CSIRO and business.
- <sup>47</sup> There is increasing evidence that there may be a slowed or even reversed brain drain from India, which now has policies to encourage the return of people of Indian descent, even if removed by several generations.
- <sup>48</sup> As discussed above – were the Boserup hypothesis correct, why would Europeans and other dominant populations have ever left home?
- <sup>49</sup> Despite this comparative caution this report is still at odds with *Population Futures* (Jones, 2001) which explicitly denies several of these direct links.
- <sup>50</sup> Less optimistic interpretations are also possible – it seems important however to see what response the Minister would have to these comments.
- <sup>51</sup> <http://www.atse.org.au/publications/policy/susdev.htm> (5.7.02).
- <sup>52</sup> Pollution to (1) land and groundwater; (2) coastal waters, rivers and lakes near major urban areas; and (3) urban air sheds.
- <sup>53</sup> Depletion of: (1) arable land stock; (2) natural habitats and ecosystems; (3) biodiversity; (4) the stratospheric ozone layer; and (5) mineral, energy and timber resources.
- <sup>54</sup> (1) Pollution of freshwater stocks near major urban areas; and (2) pollution from greenhouse gas emissions.
- <sup>55</sup> Alteration of river and lake systems near major urban areas.
- <sup>56</sup> Including by the establishment of marine reserves (Pauly *et al.*, 2002).
- <sup>57</sup> Japan has adopted, even if implicitly, a low population growth policy and has been very restrictive in its immigration policy. Its low population growth rate and its high proportion of aged persons may well be major causes of its current economic malaise. However, unlike Australia, Japan remains densely-populated, and seems to have sufficient economic power to make invasion unlikely in the near future.
- <sup>58</sup> Measured as a percentage of GNP.
- <sup>59</sup> For example, see Berg (2001) and Daniel (2002). Jones (2001) reports that business has sponsored substantial debate in *The Australian*.
- <sup>60</sup> Personal communication, Mr Michael Krockenberger, Director, Australian Conservation Foundation.
- <sup>61</sup> 'Migration – benefiting Australia', Sydney, May 7-8, 2002.
- <sup>62</sup> Commonly called the Environmental Kuznets Curve (Magnani, 2000).
- <sup>63</sup> For example, work done to incorporate environmental and social feedback to economic indicators, such as the Genuine Progress Indicator (Hamilton and Dennis, 2000).