Comparing Victoria's Genuine Progress with that of the Rest-of-Australia

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**Abstract**
While a range of exogenous and endogenous factors affect the standard of living of most Australians in a more-or-less uniform way, the different social and economic policies of each state government are likely to affect the levels of sustainable well-being experienced across the various states. With this in mind, a Genuine Progress Indicator (GPI) - a newly devised measure of sustainable well-being - is calculated for Victoria and the Rest-of-Australia (Australia minus Victoria) for the period 1986-2003. The GPI takes account of the various costs and benefits of economic activity in order to investigate the impact of a growing state or national economy on sustainable well-being.

By analysing the GPI results and the policies undertaken by the Victorian government, it is possible to determine what the state of Victoria is doing differently to the Rest-of-Australia that might be beneficial or detrimental to sustainable well-being. While our study reveals that Victoria is performing better than the Rest-of-Australia, it also highlights flaws in the policy-making process that have resulted in Victoria's Gross State Product (GSP) overstating its genuine progress.

**Keywords**
Australia, Victoria, sustainable well-being

This article is available in Journal of Economic and Social Policy: [http://epubs.scu.edu.au/jesp/vol10/iss2/7](http://epubs.scu.edu.au/jesp/vol10/iss2/7)
Introduction

Alternative measures to standard national accounts are becoming increasingly common in assessing human well-being within the literature. It is no longer justifiable to continue assuming Pigou's (1920) 'unverified probability' that growth in the economy equates to the growth in human well-being and, thus, an indication of genuine progress in action (Clarke & Islam 2004; Daly 1996; Lawn 2004; UNDP 1990). Indeed, this should hardly be considered controversial given that standard national accounts (such as per capita Gross Domestic Product (GDP)) were never intended to be measures of human well-being. Yet, from its inception, GDP has been assigned as a proxy measure of human well-being both within the economic literature and in public debate (Beckerman 1994; Hjate et al. 1977; World Bank 2001; Gylfasson 1999). Such an approach implicitly assumes that human well-being and economic activity are either the same concept or, at the very least, closely related. However, this approach fails to consider a number of important economic costs and non-welfaristic impacts on human well-being associated with a growing economy.

Human well-being is enhanced by a growing economy through increased consumption and access to various public and private services. However, economic growth can also result in pollution, increased social dislocation and breakdown, and the loss of natural resources necessary to sustain future levels of human well-being. Unfortunately, such costs are not fully considered when aggregate national accounting identities are estimated. As such, GDP fails to adequately reflect what is happening to human well-being, especially sustainable well-being (Dowrick & Quiggin 1998).

It is, however, possible to adjust standard national accounting estimates to overcome their limitations. The Genuine Progress Indicator (GPI) is one such example. The GPI is a monetary-based index that has been designed to ascertain the impact of a growing economy on sustainable well-being. Economic growth has a number of impacts, both positive and negative, that are not properly accounted for within standard national account measures. The GPI is comprised of a large number of individual benefit and cost items that account for these wide-ranging impacts of economic growth, including social and environmental benefits and costs as well as those of the traditional economic variety. Therefore, whilst the GPI embraces some national accounting values, its full calculation depends on a number of other values that normally escape market valuation.
Within this paper, the sustainable well-being of Victoria and the Rest-of-Australia is compared by estimating two GPIs for the period 1986-2003. While a range of exogenous and endogenous factors affect the standard of living of most Australians in a relatively uniform way, the different social and economic policies of each state government are likely to affect the levels of sustainable well-being experienced across the various states. By comparing the GPI for Victoria and the Rest-of-Australia it is possible to analyse what Victoria is doing differently to the Rest-of-Australia that might be beneficial or detrimental to sustainable well-being.

To achieve its aims, this paper is set out as follows: This section has introduced the paper. Section 2 introduces the GPI while the results are analysed in Section 3. Section 4 briefly discusses the policy implications flowing from these results, before the paper is concluded in Section 5.

**Introducing the GPI**

The GPI was developed largely in response to the dominance of GDP per capita (and other standard national account measures) within the literature and public debate (Daly 1996). Whilst not without faults (Neumayer 1999), the GPI is a theoretically valid approach that provides clear and transparent insights into the sustainable well-being implications of a growing state or national economy (Lawn 2003).

A number of GPI studies have now been undertaken for a wide range of countries (see, for instance, Diefenbacher 1994; Moffatt & Wilson 1994; Rosenberg & Oegema 1995; Jackson & Stymme 1996; Jackson et al. 1997; Stockhammer et al. 1997; Guenno & Tiezzi 1998; Castaneda 1999; Hamilton 1999; Lawn & Sanders 1999; Lawn 2000a; Clarke 2004). Only on two occasions has a GPI been calculated at the state or provincial level (Costanza et al. 2004; Anielski 2001). However, a comparison between a state and the remainder of the nation has not been previously undertaken. Thus, the analysis conducted in this paper is rather unique.

The individual items used to construct both the Victorian and Rest-of-Australia GPIs are listed in Table 1. The table also describes the valuation method used in the calculation of each item and whether the item contributes positively or negatively to sustainable well-being. A full description of how
these separate estimations were made and the data sources used can be found in Lawn and Clarke (2005).

Essentially the items used to calculate the GPI are based on the need to include economic and social benefits (such as consumption, services provided by consumer durables, welfare generated by publicly-provided service capital, and the value of household and volunteer labour); economic and social costs (such as the cost of unemployment, the cost of crime and family breakdown, and the cost of foreign debt); and environmental costs (such as the cost of various forms of resource depletion, the cost of various forms of pollution, and the cost of long-term environmental damage). A Distribution Index and Ecosystem Health Index are also incorporated into the GPI to account for the change in the distribution of income and impact of ecosystem damage.

Table 1: Items and the Valuation Methods used to Calculate the GPI

<table>
<thead>
<tr>
<th>Item</th>
<th>Welfare Contribution</th>
<th>Method of Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumption Expenditure (CON)</td>
<td>positive</td>
<td>Adjusted for all cigarettes and tobacco, and half of alcohol expenditure. Also adjusted for part expenditure (consider defensive) of rent, health, government final expenditure, food, electricity, vehicle operating costs, transportation, communication, hotel, cafes and restaurants, and insurance and other financial services</td>
</tr>
<tr>
<td>Expenditure on consumer durables (ECD)</td>
<td>negative</td>
<td>Sum of private expenditure on clothing, footwear, furnishings, household equipment, and vehicle purchases</td>
</tr>
<tr>
<td>Service from consumer durables (SCD)</td>
<td>positive</td>
<td>Depreciation value of existing consumer durables (depreciation rate of stock assumed to be 10 percent per annum)</td>
</tr>
<tr>
<td>Adjusted consumption</td>
<td></td>
<td>Timing adjustment of consumption benefits</td>
</tr>
<tr>
<td>Distribution Index (DI)</td>
<td>positive or negative</td>
<td>Change in income distribution over the study period (1986 = 100.0)</td>
</tr>
<tr>
<td>Adjusted consumption (weighted) (**)</td>
<td></td>
<td>Adjusted CON weighted by the DI</td>
</tr>
<tr>
<td>Welfare generated by publicly-provided service capital (**)</td>
<td>positive</td>
<td>Assumed to equal 75 percent of public sector consumption of fixed capital</td>
</tr>
<tr>
<td>Value of non-paid household labour (**)</td>
<td>positive</td>
<td>Valued using the net opportunity cost method</td>
</tr>
<tr>
<td>Value of volunteer labour (**)</td>
<td>positive</td>
<td>Valued using the net opportunity cost method</td>
</tr>
<tr>
<td>Item</td>
<td>Welfare Contribution</td>
<td>Method of Valuation</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cost of unemployment, underemployment, and labour under-utilisation (**)</td>
<td>negative</td>
<td>Multiply the CU8 number of under-utilised labour by the estimated cost per unemployed person</td>
</tr>
<tr>
<td>Cost of crime (**)</td>
<td>negative</td>
<td>Multiply various crime indexes by the estimated cost of each crime category</td>
</tr>
<tr>
<td>Cost of family breakdown (**)</td>
<td>negative</td>
<td>Multiply the approximate number of dysfunctional families (based on divorce numbers) by the estimated cost per family breakdown</td>
</tr>
<tr>
<td>Change in foreign debt position (**)</td>
<td>positive or negative</td>
<td>Equal to the change in net foreign liabilities from one financial year to the next</td>
</tr>
<tr>
<td>Cost of non-renewable resource depletion (*)</td>
<td>negative</td>
<td>Using the El Serafy (1989) ‘user cost’ formula to determine the amount to set aside to sustain a flow of income equal to that generated by the exhausted resource</td>
</tr>
<tr>
<td>Cost of lost agricultural land (*)</td>
<td>negative</td>
<td>Amount required to compensate citizens for the cumulative impact of past and present agricultural practices</td>
</tr>
<tr>
<td>Cost of irrigation water use (*)</td>
<td>negative</td>
<td>Amount required to compensate citizens for the cumulative impact of excessive irrigation water use</td>
</tr>
<tr>
<td>Cost of timber depletion (*)</td>
<td>negative</td>
<td>Using the El Serafy (1989) formula to determine the cost in circumstances where the rate of timber extraction exceeds the rate of timber regeneration and plantation establishment</td>
</tr>
<tr>
<td>Cost of air pollution (*)</td>
<td>negative</td>
<td>Weight the estimated 1992 cost of air pollution by an air pollution index</td>
</tr>
<tr>
<td>Cost of urban waste-water pollution (*)</td>
<td>negative</td>
<td>Weight the estimated 1994 cost of urban waste-water pollution by a waste-water pollution technology index</td>
</tr>
<tr>
<td>Cost of long-term environmental damage (*)</td>
<td>negative</td>
<td>Amount required to compensate citizens for the long-term environmental impact of energy consumption</td>
</tr>
<tr>
<td>Lost natural capital services (LNCS)</td>
<td></td>
<td>Sum of (*) items. The LNCS sub-total reflects the cost of sacrificing some of the source, sink, and life-support services provided by natural capital</td>
</tr>
<tr>
<td>Ecosystem Health Index (EHI)</td>
<td>positive or negative</td>
<td>Based on the change in remnant vegetation over the study period</td>
</tr>
<tr>
<td>Weighted LNCS (**)</td>
<td></td>
<td>Lost natural capital services (LNCS) weighted by the EHI</td>
</tr>
<tr>
<td>Genuine Progress Indicator (GPI)</td>
<td></td>
<td>Sum of (**) items (beginning with Adjusted CON (weighted))</td>
</tr>
<tr>
<td>Population</td>
<td></td>
<td>Population of study region</td>
</tr>
<tr>
<td>Per capita GPI</td>
<td></td>
<td>GPI ÷ population</td>
</tr>
</tbody>
</table>
Comparing the GPI of Victoria and the Rest-of-Australia

Despite a federal system of government in Australia, the various states and territories have retained some degree of control over economic and social activities. This ability to act independently can impact on sustainable well-being levels at the state level. It is useful therefore to examine the performance of Victoria vis-à-vis the Rest-of-Australia. A comparative analysis is potentially valuable in that a great deal can be learned about what Victoria is doing differently to the Rest-of-Australia that could be especially beneficial or detrimental to sustainable well-being.

It is necessary to note that 'Rest-of-Australia' implies Australia minus Victoria. As such, the comparative analysis conducted reveals nothing about Victoria's performance relative to another Australian state. Indeed, it is simultaneously possible for Victoria to be outperforming the Rest-of-Australia while another state is outperforming Victoria, or vice versa.

As Table 2 shows, the sustainable well-being of the average Victorian was higher than that of the average person living elsewhere in Australia over the entire study period. Furthermore, the difference between Victoria and the Rest-of-Australia increased over the study period. For example, while the difference in per capita GPI of Victoria and the Rest-of-Australia was $2,105 per person in 1986 ($18,839 for Victoria and $16,734 for the Rest-of-Australia), it had more than doubled by 2003 to $4,331 per person, $22,951 for Victoria and $18,620 for the Rest-of-Australia. Not surprisingly, the percentage rise in per capita GPI over the study period for Victoria was significantly higher than that of the Rest-of-Australia - 21.8 percent versus 11.3 percent.
Table 2: Comparison of Victoria's GPI pc and GSP pc to the Rest-of-Australia GPI pc and GDP pc, 1986-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Victoria GPI pc</th>
<th>Rest-of-Australia GPI pc</th>
<th>Victoria GSP pc / GDP pc</th>
<th>Rest-of-Australia GSP pc / GDP pc</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986</td>
<td>18839</td>
<td>16734</td>
<td>26743</td>
<td>26710</td>
</tr>
<tr>
<td>1987</td>
<td>20879</td>
<td>18730</td>
<td>27057</td>
<td>26898</td>
</tr>
<tr>
<td>1988</td>
<td>20732</td>
<td>18340</td>
<td>28158</td>
<td>27843</td>
</tr>
<tr>
<td>1989</td>
<td>19957</td>
<td>17545</td>
<td>28900</td>
<td>28441</td>
</tr>
<tr>
<td>1990</td>
<td>20293</td>
<td>17847</td>
<td>20086</td>
<td>28880</td>
</tr>
<tr>
<td>1991</td>
<td>20647</td>
<td>18393</td>
<td>29156</td>
<td>28667</td>
</tr>
<tr>
<td>1992</td>
<td>20535</td>
<td>18005</td>
<td>28242</td>
<td>28617</td>
</tr>
<tr>
<td>1993</td>
<td>20335</td>
<td>18396</td>
<td>29340</td>
<td>29256</td>
</tr>
<tr>
<td>1994</td>
<td>21845</td>
<td>19987</td>
<td>30269</td>
<td>30040</td>
</tr>
<tr>
<td>1995</td>
<td>21030</td>
<td>18462</td>
<td>31125</td>
<td>30950</td>
</tr>
<tr>
<td>1996</td>
<td>21950</td>
<td>19344</td>
<td>32205</td>
<td>31785</td>
</tr>
<tr>
<td>1997</td>
<td>21443</td>
<td>18640</td>
<td>32858</td>
<td>32669</td>
</tr>
<tr>
<td>1998</td>
<td>21862</td>
<td>18503</td>
<td>34179</td>
<td>33704</td>
</tr>
<tr>
<td>1999</td>
<td>23402</td>
<td>20216</td>
<td>36211</td>
<td>34885</td>
</tr>
<tr>
<td>2000</td>
<td>21677</td>
<td>18097</td>
<td>36957</td>
<td>35820</td>
</tr>
<tr>
<td>2001</td>
<td>22334</td>
<td>18593</td>
<td>37544</td>
<td>35952</td>
</tr>
<tr>
<td>2002</td>
<td>23157</td>
<td>19231</td>
<td>38512</td>
<td>36924</td>
</tr>
<tr>
<td>2003</td>
<td>22950</td>
<td>18620</td>
<td>39067</td>
<td>37525</td>
</tr>
</tbody>
</table>

It is interesting that the gap between the per capita GPI of Victoria and the Rest-of-Australia grew most intensely between 2000 and 2003. This is particularly obvious from Figure 1, which compares the index values of per capita GPI for Victoria and the Rest-of-Australia. Figure 1 shows that the per capita GPI of the Rest-of-Australia grew at a faster rate than it did for Victoria between 1986 and 1994 (16.0 percent for Victoria and 19.4 percent for the Rest-of-Australia). While the trend was subsequently reversed after 1994, the superior growth rate of Victoria's per capita GPI did not emerge until after 2000 when, quite clearly, the gap between the two indexed curves began to noticeably widen.
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It is also evident from Figure 1 that the trend movement in per capita GPI was much the same for both Victoria and the Rest-of-Australia. Only in 1993 and 1998 did the per capita GPI of Victoria and the Rest-of-Australia move in opposite directions. In many ways, this should be expected given that, firstly, many factors and government policies affecting Australia as a whole also affect Victoria. Second, the Victorian economy constitutes the second largest in Australia and consequently has a significant impact on the broader Australian economy.

Comparing the GPI Components of Victoria and the Rest-of-Australia

To determine why Victoria out-performed the Rest-of-Australia over the study period and, most particularly after 2000, it is necessary to compare the items that make up the per capita GPI of Victoria and the Rest-of-Australia. The focus of attention in this section is not on the aggregate values of the component items because the Victorian values are understandably dwarfed by those of the Rest-of-Australia. The focus is instead on the per capita values. In addition, we aim to direct our attention to the dominant items and/or items where a clear disparity exists between Victoria and the Rest-of-Australia.
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Consumption-related welfare

Figure 2 shows that the per capita weighted consumption of Victoria and the Rest-of-Australia differed minimally throughout the study period. Having said this, per capita weighted consumption was higher in Victoria between 1986 and 1993 but lower from 1994 onwards. This is a significant observation in that the contribution of consumption-related welfare to Victoria's sustainable well-being was less than that of the Rest-of-Australia after 1993 despite Victoria's per capita GPI being much higher. It suggests, even at this earlier stage, that most of Victoria's non-economic cost items were much lower than they were for the Rest-of-Australia.

![Figure 2: Weighted Consumption pc of Victoria and Rest-of-Australia](http://epubs.scu.edu.au/jesp/vol10/iss2/7)

Distribution Index (DI)

One of the items used in the calculation of the GPI is a Distribution Index (DI). The DI is used to weight personal consumption expenditure on the assumption that, if per capita consumption was to remain unchanged from one year to the next but the rich got richer and the poor got poorer (ie, the proportion of all consumption by the rich increased), the per capita welfare
The contribution of consumption would decline. This assumption is based on the premise that the marginal welfare contribution of consumption expenditure to the rich is less than what it is for the poor. Thus, changes in the distribution of income over time need to be incorporated into a measure of sustainable well-being.

Our DI is constructed on the basis that a fall in the ratio of the median annual income to per capita GDP or GSP represents a growing gap between the income of the rich and the poor. How do we rationalise this? If the ratio of the median annual income to per capita GDP or GSP is declining, it means the latter is rising faster than the former. This can only occur if the distribution of income is becoming increasingly skewed towards the higher income level - that is, the rich are getting richer.

We have constructed our DI by setting the ratio of the median annual income to per capita GDP or GSP so it has an index value of 100.0 in the first year of the study period (ie, 1986 = 100.0). As the ratio rises/falls over the study period, the DI correspondingly increases/decreases. A rise in the DI signifies a growing disparity between the income of the rich and the poor, while a fall in the DI signifies a more equal distribution of income.

The Distribution Indexes (DI) of both Victoria and the Rest-of-Australia differed little over the study period (see Figure 3). However, between 1992 and 1996, the distribution of income in Victoria changed from being slightly more equal to marginally more unequal than the Rest-of-Australia. The disparity between the two indexes continued in favour of the Rest-of-Australia through to 2003. While the difference in the distribution of income was not enough to explain the variation in the performances of Victoria and the Rest-of-Australia, Figure 3 indicates that reducing the widening gap between the rich and the poor would have relatively more impact on Victoria’s sustainable well-being than the Rest-of-Australia’s.
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Cost of unemployment, underemployment, and labour underutilisation

Of the three social cost items which make up the GPI, a disparity between Victoria and the Rest-of-Australia most obviously exists in the case of the cost of unemployment, underemployment, and labour underutilisation. The per capita cost of unemployment (broadly defined) was much lower in Victoria than the Rest-of-Australia between 1986 and 1992, but was higher during the period from 1993 to 1999 (Figure 4). Following 1999, the per capita cost of unemployment in Victoria fell despite it rising slightly in the Rest-of-Australia. Overall, the per capita cost of unemployment improved by around $600 per person in Victoria relative to the Rest-of-Australia between 1994 and 2003. This is a notable relative gain that undoubtedly contributed to the widening of the gap between the per capita GPI of Victoria and that of the Rest-of-Australia.
One of the main reasons for Victoria's superior relative performance in terms of the cost of unemployment was its ability to create full-time jobs instead of increasing the growth in part-time and casual employment. Therefore, while Victoria has not escaped the scourge of employment casualisation that has sharply increased the cost of underemployment, it has managed to limit its growth relative to a number of other states.

**Cost of non-renewable resource depletion**

The difference between Victoria and the Rest-of-Australia was greatest in relation to the various environmental cost items (Figure 5). The per capita cost of non-renewable resource depletion was much lower in Victoria than it was for the Rest-of-Australia. Furthermore, after a general rise in the per capita cost of non-renewable resource depletion for both Victoria and the Rest-of-Australia between 1987 and 1993, the per capita cost for Victoria steeply declined in all but the year 2000. Conversely, the per capita cost of non-renewable resource depletion for the Rest-of-Australia rose sharply for most years between 1993 and 2003.
Again, this is a significant welfare-influencing difference that demonstrates Victoria's reduced reliance on the proceeds of mining to finance its consumption of goods and services. It also suggests that Victoria is better able to operate within its biophysical means by generating a significantly larger proportion of genuine money income from value-adding activities compared to the states of Western Australia and Queensland and, to a lesser extent, New South Wales and South Australia.

**Cost of lost agricultural land**

The per capita cost of lost agricultural land was much less for Victoria than the Rest-of-Australia (see Figure 6). The difference in the per capita cost of lost agricultural land between Victoria and the Rest-of-Australia varied from around $2,600 per person in 1986 to around $2,400 per person by 2003. In view of the magnitude of this disparity, the lower per capita cost of lost agricultural land in Victoria was yet another strong factor underlying the variance between Victoria's per capita GPI and that of the Rest-of-Australia. It also points to Victoria not having to rely as heavily on the depletion of a natural capital asset to finance its consumption endeavours.

**Figure 5:** Cost of Non-renewable Resource Depletion for Victoria and Rest-of-Australia
Although a greater proportion of agricultural activities in Victoria are of the more intensive varieties (ie, there is only a very small percentage of pastoral ventures in Victoria), a number of factors contribute to Victoria's smaller per capita cost. They include: (a) the much smaller area of land being used in Victoria for agricultural purposes; (b) the higher general fertility of Victoria's agricultural land; (c) the relative abundance of remnant vegetation in most agricultural districts (eg, compared to the Yorke Peninsula and Lower-North farming districts of South Australia and the grain-growing regions east of the city of Perth); and (d) Victoria's more reliable rainfall which reduces the exposure of agricultural land to erosion-generating conditions. The adoption of more sustainable land management practices and the confinement of human activity to land already significantly modified by agricultural industries is therefore necessary if Victoria is to minimise its cost of land degradation and maintain its edge over the Rest-of-Australia.

Cost of excessive irrigation water use

Given Victoria's heavy reliance on irrigation water, particularly from the highly stressed Murray-Darling Basin, it is expected that Victoria's per capita
cost of excessive irrigation water use to be much higher than the Rest-of-
Australia. Although the difference in the per capita cost of excessive irrigation
water use between Victoria and the Rest-of-Australia increased between 1986
and 1999, the gap closed slightly over the last four years of the study period
(see Figure 7). From the beginning of the study period to the end, the disparity
rose from around $100 to $190 per person. The disparity peaked at around
$200 per person in 1999.

![Cost of Excessive Irrigation Water Use for Victoria and Rest-of-Australia](image)

**Figure 7:** Cost of Excessive Irrigation Water Use for Victoria and Rest-of-Australia

The magnitude of the disparity should not be singled out as the major reason
for the difference between the per capita GPI of Victoria and the Rest-of-
Australia, but there is little doubt that a bridging of the gap between the per
capita costs would strengthen the relative position of Victoria. If nothing else,
Figure 8 indicates that Victoria should seek to improve its use and allocation
of Australia’s inland water resources.

**Cost of long-term environmental damage**

The per capita cost of long-term environmental damage for Victoria and the
Rest-of-Australia shows that Victoria's per capita cost of long-term
environmental damage was much the same as it was for the Rest-of-Australia in 1986 (see Figure 8). However, beyond 1986, the per capita cost for Victoria increased at a much greater rate than the Rest-of-Australia. Indeed, it was approximately $350 per person or 10 percent higher in Victoria by 2003. The growing gap can be largely attributed to Victoria's rapidly rising per capita energy consumption. The disconcerting aspect of Figure 8 is the apparent reduced capacity on the part of Victoria to quell its energy consumption and, more importantly, its failure to find better and cleaner ways of using energy. Increased energy efficiency and the transition towards renewable energy sources clearly requires greater policy emphasis if Victoria is to reduce its per capita energy consumption and bridge the cost gap between itself and the Rest-of-Australia.

Figure 8: Cost of Long-term Environmental Damage for Victoria and Rest-of-Australia

_Ecosystem Health Index (EHI)_

While it is a relatively simple exercise to estimate the cost of sacrificed source and sink functions of natural capital, it is exceedingly more difficult to estimate the various costs associated with losing some of the life-support services provided by critical ecosystems. To assist in this regard, we have
chosen to weight the cost of lost natural capital services in line with changes in the health of critical ecosystems.

The rationale for adopting this approach is simple. The impact of many resource extractive and pollutive activities is not confined to the damage inflicted on the natural environment's source and sink functions. Damage also extends to ecosystem degradation. A good example is strip mining, a resource-extraction practice requiring the initial removal of terrestrial fauna and flora. Another is agriculture. Again, an activity first requiring the clearance of native vegetation.

With this in mind, an Ecosystem Health Index (EHI) is constructed on the premise that remnant vegetation loss constitutes the 'greatest threat to biodiversity' and, therefore, to ecosystem functioning (Biodiversity Unit, 1995). A base index value of 100.0 is assigned to the first year of the study period (ie, 1986 = 100.0) and is adjusted in line with the annual changes in the area of relatively undisturbed land. As the area of relatively undisturbed land declines/increases over the study period, the EHI correspondingly falls/rises (note: an increase in relatively undisturbed land can occur if the rate of disturbance is exceeded by the rate of regrowth). For obvious reasons, a fall in the EHI signifies a worsening state of ecosystem health.

As it turns out, one of the considerable strengths of the Victorian performance over that of the Rest-of-Australia is in relation to the EHI. Figure 9 shows that the Victorian EHI did not fall at anywhere near the same rate as the EHI of the Rest-of-Australia. There are two main reasons for this: 1) Victoria's rate of native vegetation clearance was very low over the entire study period; and 2) the rate of native vegetation clearance in Queensland and, to some degree, New South Wales was recklessly excessive.
Should Victoria maintain its low rate of vegetation clearance, or better still, confine clearance to significantly disturbed areas and allow for periodic regrowth, it should all but cease the decline of its EHI. In turn, Victoria would position itself in a very strong position relative to the Rest-of-Australia.

Apart from the broadening disparity in the respective EHIs, Victoria's lower per capita cost of non-renewable resource depletion and lost agricultural land were major contributing factors behind the superior environmental performance of Victoria. However, should Victoria be able to reduce its cost of long-term environmental damage and excessive irrigation water use through greater energy and water efficiency, it would be well on the way to further strengthening its relative position. Moreover, it would greatly assist in further increasing the gap between the sustainable well-being of the average Victorian and that of the average person living elsewhere in Australia.

**Policy Implications**

By comparing the trend movement of per capita GPI with the physical growth rate of the economy, it is possible to determine if economic growth has been translated into improvements in sustainable well-being. In the mid to late-
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In the 1980s, the higher rate of growth of the Victorian economy narrowed the gap between the per capita GPI of Victoria and that of the Rest-of-Australia. The gap, however, widened during the period from 1993 to 1998 when the Victorian economy grew at a much lower rate than the economy of the Rest-of-Australia. Finally, from 1999 to the end of the study period, the very high rates of growth of both economies in 2000 and 2003 caused the per capita GPI of Victoria and the Rest-of-Australia to decline.

Overall, the message appears to be very clear. A lower rate of growth is beneficial to sustainable well-being and is a relationship that could be intensified if more was done in both Victoria and Australia generally to narrow the gap between the rich and the poor; increase resource use efficiency; encourage better rather than more production; and endeavour to keep renewable natural capital stocks and critical ecosystems intact.

As discussed, the primary purpose of constructing the GPI was an alternative measure of well-being to GDP to highlight the full impact of a growing economy on sustainable well-being. It is important that some discussion is given around the policy implications that follow from this consideration (Clarke 2004, forthcoming). Yet public policies are not made in a political vacuum and policies that may be of great value to a nation's citizens cannot always be implemented immediately or at all because of institutional failings, misgivings held by the majority of the population, and concerns that some people could be adversely affected. However, despite these 'political' constraints, the following policy implications are produced outside this constraint.

**Taxation**

Tax revenues can be maintained (or even increased) by shifting the tax burden away from incomes, profits and labour and moving it to resource depletion and pollution using throughput taxation (or tradable depletion and pollution permits) (O'Riordan 1997; Roodman 1998; Lawn 2000). Throughput taxes are collected on resource throughput per unit of economic activity (Daly 1996; Lawn 2004). By reducing tax on income and profits, business is encouraged to seek higher value-adding production operations as well as qualitatively improve the stock of human-made capital. Reductions of tax on labour will reduce unemployment through lowering labour costs. The imposition of these depletion and pollution taxes therefore assists to increase the efficiency of this resource use which, in turn, reduces the pressure per unit of economic activity on the natural environment. Reforming tax in this manner rewards those
engaged in welfare-enhancing activities over those whose activities actually reduce well-being.

Land

The value of agricultural land lies in its propagating properties. If overused, the properties reduce and can eventually disappear. Sustainable farming practices remove this risk. Farmers directly benefit from the sustainable use of their agricultural land. Yet governments can practically assist farmers by assuming some of the financial costs associated with sustainable land use practices. We argue that sustainability is a public good and thus requires government intervention. The first major component of a sustainable land use policy is the use of subsidies and substantial tax rebates to assist farmers to adopt sustainable land use practices. The second policy component is the levying of penalties on farmers who fail to fulfil their stewardship responsibility. Importantly, a similar approach could also be applied in the case of the forestry, mining, and irrigation industries. While many would query the possible high cost of this restructuring process, we are confident that it amounts to much less than the eventual social and environmental cost of failing to adopt a proactive stance.

Ecosystems

Biodiversity is necessary to sustain the natural environment's life-supporting services. To ensure this, around 20 percent of a nation's land area should be preserved as habitat for wildlife conservation (Wilson 1992). Legislation similar to the Native Vegetation Clearance Act of South Australia (1990) is a central instrument in maintaining this biodiversity. Wholesale land clearance in South Australia has ceased since this law was passed. We would further argue that compensation be made available in instances of the potential loss of agricultural production to ally equity considerations. Again, the preservation of such biodiversity must be considered a public good thus requiring government investment.

Green Production

Both state and federal governments can play a significant role in the establishment and development of high-tech, resource-saving industries by taking a greater lead in the procurement of products containing recycled materials, and of plant, machinery, and equipment powered by renewable energy sources. The construction of low energy-using public buildings would also benefit significantly. Green procurement policies help to develop ready
markets for low environmental impact goods that allow emerging green industries to rapidly attain the critical mass and economies of scale required to compete against traditional industries.

**Employment**

Whilst the previous policy implications have focused on environmental determinants of well-being, this final policy implication directly addresses a significant social determinant of well-being. State and federal governments should restore full employment as the centrepiece of macroeconomic policy or at least give achieving full employment equal prominence to controlling inflation. Unemployment (and underemployment and labour underutilization) imposes significant welfare costs on society, resulting in inequities that can become structural in nature (Mitchell et al. 2003; Sen 1997). As unemployment is a severe example of inefficient resource use, every efficiency-concerned government should be disturbed by the enormous waste that it represents. Although there is little opportunity to consider how full employment can be restored in an economy where the growth rate has been slowed or perhaps brought to a halt (ie, the steady-state economy), we invite all readers to consider the work of the Centre of Full Employment and Equity (University of Newcastle, Australia) and the papers appearing in the International Journal of Environment, Workplace, and Employment.

We would also like to stress that an important underlying assumption to these policy recommendations is that any proposed policy that negatively impacts on a small percentage of the population warrants compensation in some form - perhaps in the form of a direct compensation payment or a community level project to offset localised impacts. In this way, the welfare of affected citizens can be maintained so as to allow beneficial policies to be introduced.

**Conclusion**

The sustainable well-being of the average Victorian was consistently higher than that of the average person living elsewhere in Australia. Beginning with a difference in per capita GPI of $2,105 per person in 1986, the disparity between Victoria and the Rest-of-Australia increased to $4,331 per person by 2003. The percentage rise in per capita GPI over the study period for Victoria was 21.8 percent but only 11.3 percent for the Rest-of-Australia. The gap between the per capita GPI of Victoria and the Rest-of-Australia grew most intensely between 2000 and 2003. Not unlike the Victorian situation,
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Continuing high growth rates of the Rest-of-Australian economy had a detrimental impact on sustainable well-being. Conversely, the per capita GPI of the Rest-of-Australia often increased during a year of low growth. The similar relationship between per capita GPI and the prevailing growth rate of the Victorian and Rest-of-Australian economies reaffirms the possibility that the sustainable well-being of the average Australian might have been higher in 2003 if the policy emphasis had been directed more towards distributional equity, resource use efficiency, and natural capital maintenance and less towards the unbridled growth in real GDP.

Major reasons for Victoria’s superior per capita GPI include: 1) Victoria’s lower per capita cost of non-renewable resource depletion, particularly after 1993; 2) Victoria’s significantly lower per capita cost of lost agricultural land; and 3) overall, Victoria’s much lower social and environmental costs - given the similar per capita consumption-related welfare of Victoria and the Rest-of-Australia throughout the study period. Finally, Victoria’s environmental performance was vastly superior as reflected by its considerably lower per capita cost of lost natural capital services. Minor factors underlying the difference between the per capita GPI of Victoria and the Rest-of-Australia were: 1) Victoria’s lower per capita cost of unemployment (broadly defined) in the latter years of the study period resulting from Victoria’s capacity to create a larger number of full-time jobs; and 2) Victoria’s higher Ecosystem Health Index (EHI) arising from its much smaller rate of native vegetation clearance over the study period. It should be noted however, that Victoria performed worse than the Rest-of-Australia in terms of excessive rates of irrigation water use, per capita energy consumption, and, to a lesser extent, air pollution.

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