

## Mining and Sustainable Communities – a Western Australian Perspective

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### Introduction

The exploitation of minerals and energy has been closely associated with the growth and development of the world economy throughout its recorded history. Different periods have been characterised by materials names - e.g. stone, copper, bronze, iron, coal. The use of these materials as a principal ingredient of tools or power for the period concerned brought great improvement in terms of human well-being as measured by population growth and other indicators.

Minerals and energy are finite in supply. Because of this, they have – with other non-renewable resources – attracted predictions that their prices will rise, from many economic theorists over the past two centuries. Interestingly enough, this has not occurred. The prices of minerals have generally exhibited a downward tendency over the past one hundred years with major breakthroughs in technology in discovery, mineral processing and mining, as well as recycling, ensuring that mineral supply has kept pace with, and increased more rapidly than, increases in demand (see for example Sullivan, Sznoppek and Wagner 1998 and Myers and Barnett 1985 on this point).

Many mines generate considerable amounts of economic rent - a payment in excess of the price of supply when there is market equilibrium. This is, in effect, a super normal profit, which the owners of well-endowed mines receive during production. Governments typically seek to appropriate some or all of this economic rent by the imposition of

royalties on production and taxation of income.

The beneficiaries of the economic rent from minerals may choose to consume it immediately. Alternatively they may seek to invest it in productive assets, which will sustain or even increase economic and social welfare, and maintain or improve environmental quality when the mine life is over. Typically they may consume some and invest some of the economic rent. If they carry out this process in a way that increases future incomes, and maintains or enhances the cultural integrity of affected populations and environmental quality, minerals will have been a blessing.

Intuitively it seems that minerals have historically been a blessing in countries such as the United States (gold, coal, oil and copper), England (coal), Germany (coal), Canada (gold, oil and gas, nickel and other base metals), Australia (gold, coal, iron ore, base metals, oil and gas) - helping their national products to grow strongly and boosting their populations during different phases of economic development. When minerals have been exhausted, their citizens have been able to move on to other industries and occupations to maintain and enhance the living standards provided initially by the mineral windfall. More recently a group of authors such as Auty and Gelb have argued that minerals have been a curse for many developing nations. Sachs and Warner (1995) have provided some empirical support for this position.

This paper outlines the impacts of minerals and energy exploitation on the fortunes and sustainability of nearby communities and regions. Its focus is particularly on mining in developed

nations. The second section contains a brief review of a hierarchy of regions, cities and towns which have developed as a result of nearby mineral wealth. This is followed by some thoughts on the life cycle of mining towns, focusing particularly on Western Australia. It leads in the fourth section to some discussion of the relevance of the current emphasis of mining companies and the community more generally on sustainable development policies. In the concluding section, I offer some thoughts on the position of Western Australian mining towns in fifty years time.

### Regions, Cities and Towns That Owe Their Fortunes to Minerals and Energy

At a regional (state or provincial) level, minerals and energy have either driven major initial or subsequent growth in the prosperity of California, Texas, Oklahoma, Nevada, Alberta, the Transvaal (now Gauteng), Chile's Second region, and probably every Australian state. In *The Rush that Never Ended*, Geoffrey Blainey (1994) provides an excellent historical account of the impacts of minerals and energy discovery and exploitation on Australian economic development.

Many major cities also owe much of their current prosperity to an initial or ongoing association with the minerals and energy sector. Included in this group are Houston, Dallas, Denver and San Francisco in the United States, Toronto, Calgary and Vancouver in Canada, Lima and Santiago in South America, Johannesburg in South Africa, and Melbourne and Perth in Australia.

A group of prominent regional cities have depended more directly on mining for some or all of their

history. These include places such as Newcastle in England (coal), Sudbury in Canada (nickel), Kimberley in South Africa (diamonds), Belo Horizonte in Brazil (iron ore) and Antofagasta in Chile (copper). The list in regional Australia seems even longer. Newcastle and Wollongong (both coal), Bathurst, Ballarat, Bendigo (all gold), Kalgoorlie (gold and nickel), Broken Hill and Mount Isa (base metals), Sale (oil and gas), Collie (coal), Port Hedland and Whyalla (iron ore), and Karratha (iron ore, oil and gas) all owe either their establishment or part of their subsequent prosperity to minerals or energy and then there are smaller mining towns.

For the purposes of this paper, I confine my attention to Western Australia. Taking a cultural heritage focus, Moore (1998) recently provided a useful survey of current (see Figure 1) and former towns. A brief summary, using his three-part sub-state regional classification (Northern, Goldfields and South-West) appears in Table 1. The list contains

- three regional centres (Kalgoorlie-Boulder, Port Hedland and Karratha);
- six towns classified as sub-regional centres;
- four company towns;
- twenty-seven small towns;
- eighteen notable former mining towns; and
- 114 other gazetted mining towns.

Seven former company towns, five of which have closed, appear in the table. While Moore includes Perth, Bunbury and Geraldton in his classification because of their role as mining processing centres or ports, I have not included them here. Esperance might also be included in a wider discussion because of its role as a port shipping nickel and iron ore.

Figure 1 Current Western Australian Mining Towns

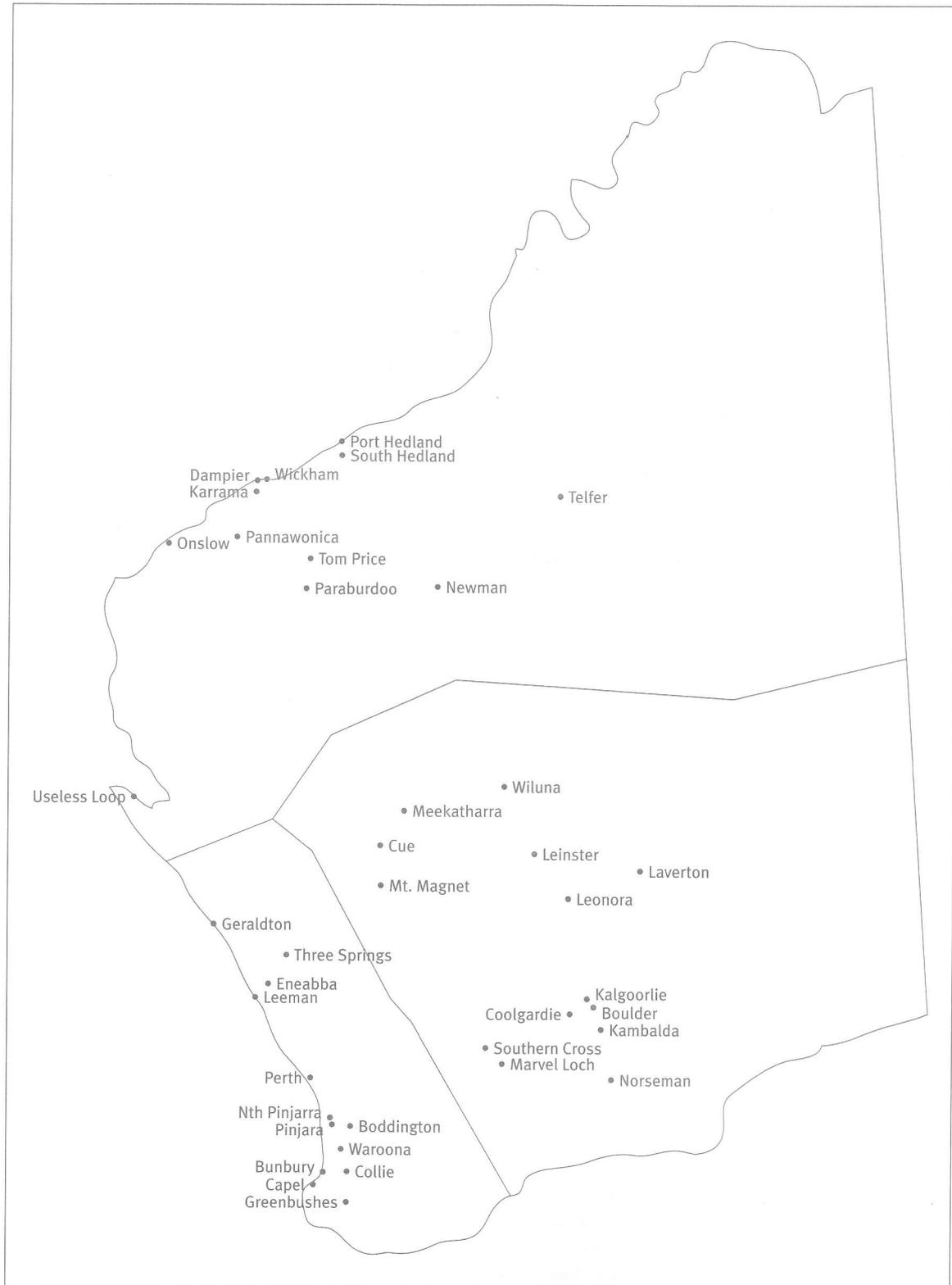


Table 1 Present Mining Towns in Western Australia - a Brief Summary

	Northern	Goldfields	South-West
Regional centres	Karratha Port Hedland	Kalgoorlie- Boulder	
Sub-regional centres	Newman #	Southern Cross Leonora Meekatharra	Collie Pinjarra
Company towns	Pannawonica Paraburdoo Tom Price	Leinster	
Small towns	Dampier Halls Creek Onslow Marble Bar Nullagine Roebourne Useless Loop Wickham	Cue Coolgardie Kambalda # Laverton Marvel Loch Menzies Mount Magnet Norseman Sandstone Wiluna	Boddington Capel Donnybrook Eneabba Greenbushes Northampton Ravensthorpe Three Springs Waroona Yalgoo
Notable former mining towns	Goldsworthy # Koolan Island # Shay Gap # Telfer # Wittenoom #	Big Bell Broad Arrow Bullfinch Bulong Day Dawn Ora Banda Kookynie Kanowna Koolyanobbing Paddington Westonia Widgiemooltha	
Number of other gazetted former mining towns	3	99	12

# Former company town

\* No longer mining town

Source: Moore 1998

## Western Australia's Mineral-Driven Prosperity and the Life Cycles of Mining Towns

The above list of mining towns reflects both the historical and continuing importance of the minerals and energy sector to the economic fortunes of WA since European settlement. When Lieutenant James Stirling and his colleagues established the Swan River Colony in 1829, they saw its future being based on agricultural

development. But with the emerging fortunes of mining after 1840 in the Australian colonies, Western Australia became very much an economic backwater. This continued until the major gold rushes in the 1890s which transformed the colony's (state's) economy. The population more than tripled in a decade and the success of the gold industry established foundations for the development of a more broadly-based state economy which grew impressively during the first half of the twentieth century. Importantly as well, the new mining towns played an important role in establishing a viable

sub-state regional and rural community. Additionally they underpinned the growing prosperity and metropolitan dominance of Perth. Discoveries of several other minerals boosted the fortunes of the mineral sector after 1960. These included world-class deposits of iron ore in the Pilbara, bauxite and mineral sands in the South-West, and nickel in the Goldfields. There were also major finds of oil and gas on the North West shelf and diamonds in the Kimberley. Languishing for three or four decades after World War II, the gold industry finally emerged again strongly after 1980. It benefitted particularly from major technological change in mineral processing, mining methods and mineral exploration.

During the gold rushes and soon after, minerals accounted for more than twenty per cent of the state's gross product and more than three-quarters of its exports. This situation returned after 1960 and has continued since that time. Notably as well, the minerals and energy sector brought economic growth rates in WA consistently above the national average, and a movement of per capita GDP from around 85 per cent of the national average in 1960 to more than 100 per cent of the national average since 1980.

Minerals are fixed in supply. They often occur in remote locations, where climatic conditions are harsh. As a result, when mineral deposits become exhausted some communities decline dramatically and even disappear.

Yet so-called 'bonanza' deposits in remote locations lead to the establishment of large towns, which attract major infrastructure development. This includes investment in facilities such as railways to the nearest port, good connecting roads from other established centres, long-term electricity and water supply, airports, telephone, radio, television and other communications, professional town planning, substantial public buildings and high quality recreational facilities. These developments provide the basis for potential diversification of the economy as the mineral endowment becomes exhausted.

Based on this assessment, one might argue that a positive relationship exists between the long-term viability of mining towns and the size of their

mineral endowment. Relatively small discoveries might lead to a minimal town infrastructure, which then fades away. Historically, population levels in a remote mining town with a small to medium-size deposit would follow a path such as *OAB* in Figure 2. A recent development which is affecting the fortunes of such mining settlements has been the strong emergence of 'long distance commuting' or 'fly-in, fly-out (FIFO)' work patterns. Less support by Federal and State governments for active, non-metropolitan regional development policy has encouraged mining companies to use mining camps rather than develop new towns. Authors such as Storey (2001a, 2001b) provide an interesting review of the economic, social and policy implications of FIFO work patterns for the Western Australian minerals and energy sector. With FIFO mining there have been no new mining settlements in Western Australia since 1980. This is reflected in a movement along the path *OCB* on the horizontal axis (Figure 2). The data in Table 2 reflect the strong continuing growth in the mining FIFO workforce in the past decade.

Larger discoveries have traditionally led to the establishment of more permanent settlements which may become sustainable by moving themselves into other industries when the lode runs out. The previous establishment of a viable physical and human capital base, together with innovative local entrepreneurship enables this to happen when the natural resource base disappears. Such a scenario appears in Figure 3. Historically a town such as Ballarat or Bendigo may have followed a population path as outlined by the line *OAB* in Figure 3. Conversely with the emergence of FIFO work patterns, large mineral discoveries are today more likely to lead to a population time path such as that shown by *OCD* (Figure 3).

**Table 2** Changing Residence Patterns of the Mineral Sector Workforce in Western Australia, 1989/99-1999/2000

	1989/1999	1999/2000
<i>Estimated Number of Workers</i>		
Resident	29,506	26,172
FIFO	7,021	11,986
Total	36,527	38,158

Source: Department of Minerals and Energy various dates

Figure 2 Small Mineral Deposits and the Size of Mining Towns

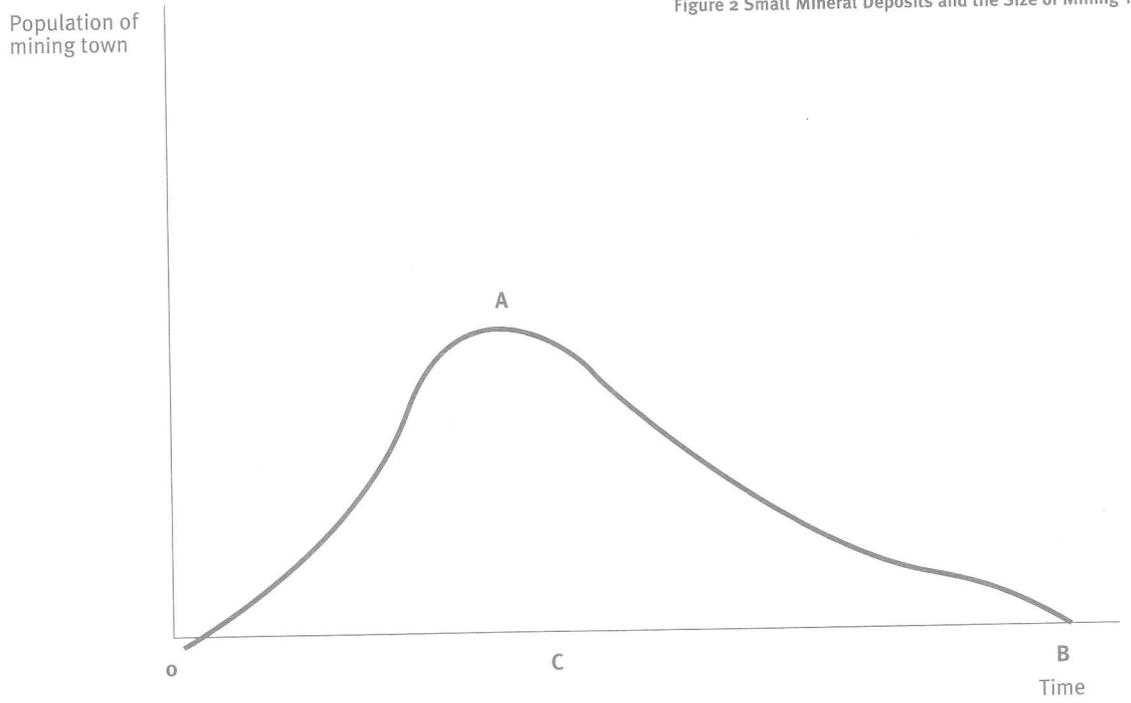
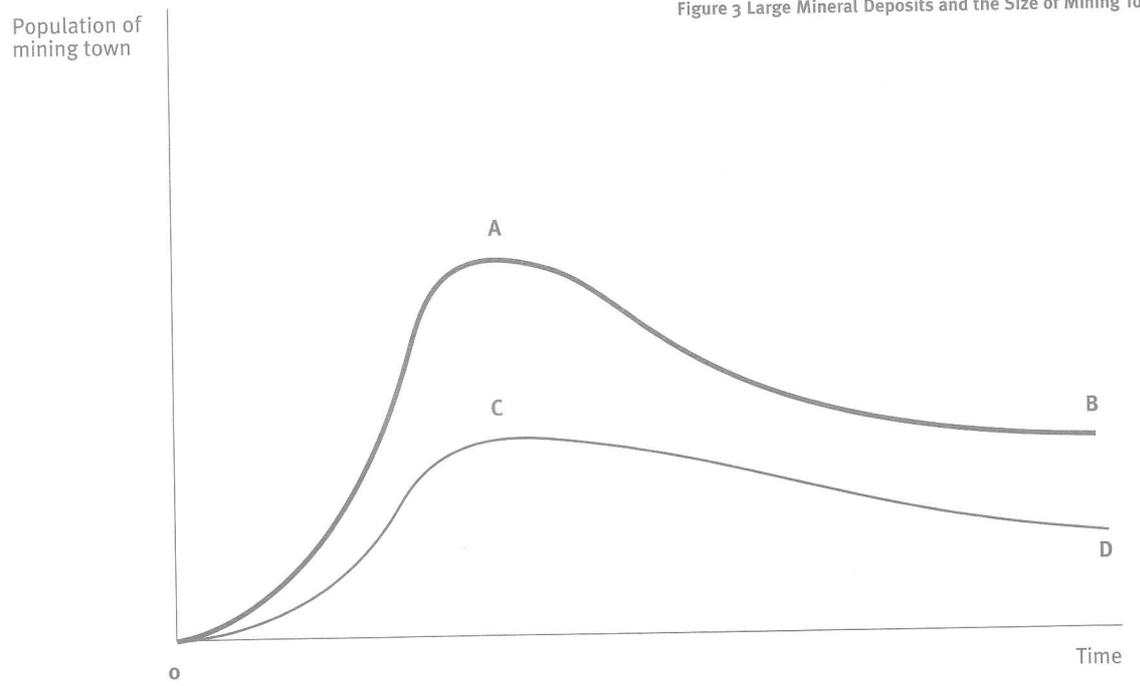


Figure 3 Large Mineral Deposits and the Size of Mining Towns



Remoteness and climate are also important factors which influence the economic fortunes of mining towns. Distance from a major population centre will typically be inversely related to the economic size of a mining town. Climatic extremes also have a negative impact on the development of new mining centres, and both of these factors influence other forms of economic development.

Two other factors have also recently become important: environmental and cultural sensitivities. If new mines or oil wells have the potential to pollute a nearby national park, river or lake their chances of approval are greatly reduced.

Environmental issues have become much more important during the past two decades. Local populations have also become much more politically influential than they were previously. Native Title issues have emerged strongly all over the world. The effect of the Mabo judgement by the Australian High Court in 1991 has been significant for the mineral industry in economic, political and cultural ways.

In the light of the above discussion a specification as follows seems useful in speculating about the size of mining towns.

Size of mining towns = f	size of mineral endowment, (+) time of discovery, (-) distance from major city, (-) distance from major regional centre, (-) distance from coast, (-) attractiveness of climate, (+) environmental sensitivity, (-) cultural sensitivity of local population, (-) regional development policy stance, (+)
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Eggert (2001) proposed a different, though related formulation to explain the location of mining activity. It is:

Mining activity = f	Mineral endowment, Access to and costs of other inputs, Access to and costs of transportation to market, Previous mining heritage
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In view of this discussion, it is an interesting issue to reflect on the populations of mining areas in Western Australia (Table 3). These rose dramatically during the 1890s and then declined until about 1960, before rising again during the new resources boom until 1980. They have been relatively stable over the past two decades, though in proportional terms they have been falling. This trend seems destined to continue.

Table 3 The Rural and Metropolitan Structure of Western Australia's Population, 1901-1999

Year	Metropolitan		Mining areas		Other Regional		Total	
	('000)	%	('000)	%	('000)	%	('000)	%
1901	67	36	60	32	59	32	186	100
1961	410	56	42	6	279	38	731	100
1971	642	61	54	5	350	33	1,046	100
1981	918	71	92	7	290	22	1,300	100
1991	1,192	73	91	6	357	21	1,640	100
1999	1,368	72	90	5	442	23	1,883	100

Source: Australian Bureau of Statistics

In his Atlas: *Mining Towns of Western Australia*, Moore (1998) identified 34 mining towns in Western Australia at the 1996 census. (This excludes major centres such as Perth, Geraldton and Bunbury.) As can be seen from Table 4, only three of these had populations greater than 10,000, and another five had populations between 2,900 and 9,999. The remainder had fewer than 2,000 residents.

Given the above discussion, it seems reasonable to consider the question 'Does it matter if mining is unsustainable in small regional area?'. Many people

would argue that it does not. Their argument might proceed along the lines that development and decline in mineral exploitation is part of the normal development process. While the disappearance of current small mining towns may be unfortunate, it has happened throughout history and should not therefore be a cause of overwhelming concern. The rise of FIFO mining has been useful because it has provided a way of avoiding the stresses and strains associated with the decline part of this process.

An associated question is 'When does it matter if a mining town or region sinks into decline?'. Presumably there must be some concern if a large well-established town moves rapidly into a decline phase (e.g. Kalgoorlie or Broken Hill). There should also be major concern if a region or state withers away after its mineral and energy deposits have been exhausted. Part of this concern will arise, of course because the returns from mineral exploitation will not have been suitably invested to ensure the longer-term sustainability of an economy.

Table 4 Estimated Populations of Western Australian Mining Towns, 1996

Kalgoorlie-Boulder	28,087
Port Hedland	12,846
Karratha	10,057
Collie/ Allanson	7,766
Newman	4,790
Tom Price	3,872
Kambalda	3,598
Pinjarra/N Pinjarra	2,903
Paraburdoo	1,980
Warooka	1,833
Wickham	1,649
Norseman	1,516
Leinster	1,440
Dampier	1,424
Meekatharra	1,270
Coolgardie	1,258
Capel	1,258
Southern Cross	1,147
Leonora	1,143
Boddington	1,043
Pannawonica	779
Mount Magnet	747
Laverton	644
Onslow	588
Marvel Loch	494
Three Springs	411
Greenbushes	403
Eneabba	389
Cue	374
Wiluna	262
Useless Loop	150

Source: Moore 1998

We have observed already that Western Australia's GDP per capita rose in the early 1960s from 85 per cent to more than 100 per cent of the national average. If, against the backdrop of a decline in its mineral industry, WA again generates only 85 per cent of national average income, questions should

be asked about the contribution of its minerals and energy sector to sustainable development. A similar range of questions can be applied with respect to the technical and social aspects of sustainability as they apply to mineral exploitation.

## Mining Towns, Mining Companies, Government and Sustainable Communities

Over the past fifteen years, there has been a major focus in policy discussion and academic debate on sustainable development. In view of their previously questionable record with environmental management, most mining companies have embraced the notion of sustainability and put in place policies to promote it. One manifestation of an emphasis on sustainable development can be seen widely in Web Pages and in other company literature including annual reports.

An initial problem has been that definition of the concept of sustainable development has been remarkably 'slippery'. As such, it has attracted the attention of many scholars and a consensus about its real meaning is only now emerging. Over the past decade many proponents of sustainable development policies appear to have embraced the concept in a way that supports their own specific goals. These range from

- maximising environmental quality in the case of conservation groups,
- maximising profits (or market share) in the case of large and small private corporations, and
- maximising community welfare in accordance with a set of political value judgements in the case of governments of the day.

Eggert (2000) has perhaps produced the best recent statement about the broad meaning of sustainable development in the context of operation of the minerals industry. He emphasises the concepts of **economic sustainability**, **physical sustainability**, and **cultural and social sustainability** in his discussion. Any proper study of the relationship between mining and the sustainability of communities or regions should consider each of these elements.

Issues of the physical sustainability of ecosystems and the social and cultural sustainability of indigenous populations have been particularly prominent in recent national political debates in

countries such as Australia. Where they have intersected with the economic fortunes of the minerals and energy sector, many would argue that these issues have taken precedence. After the mid-1990s, however, another set of forces surged into play. There was a political revolt in rural and regional Australia against the continuing domination of metropolitan interests and the adverse effects of global economic forces. The rise and fall (?) of the One Nation political party and the election of independent members in both State and Federal parliaments has been a prominent reflection of this. Pritchard and McManus (2000) considered many of the important dimensions of this situation. The Coalition and Labor Parties have readdressed their regional development policies in response to this in perhaps the most serious way since the era of the Growth Centres programs of the Whitlam government of the 1970s.

The data in Table 3 provide a limited historical perspective of the fortunes of rural and regional Australia, albeit from a Western Australian perspective. Metropolitan dominance in Australia was a growing phenomenon for much of the twentieth century. The population shares of the five major cities in their respective states grew until about 1980. Since that time, the regions have in some respects held their position, though much of this has been because of growing populations in coastal towns and centres. Australia's inland population has either stagnated or fallen.

We have noted above that the resurgence of the mineral sector in Western Australia after 1960 led again to minerals and energy again generating around **20 per cent of Gross State Product** and **70 per cent of exports**. Yet during this period only between five and seven per cent of the population resided in mining areas. Even if the government again strongly applies regional development policies, these proportions seem unlikely to change in any significant way.

Given this background, and the primary focus to generate returns for their shareholders, it seems reasonable to assume that mining companies will promote issues of sustainability only in so far as they support these returns in the medium- to long-term. In this respect it will usually be in their interests to promote both environmental and socio-economic agendas during the operation of large mines. Following mine closure, a continuing association with any small region is unlikely to continue.

Many companies have policies, which formally reflect their commitment to such goals. Placer Dome (2001), for instance, states that

...sustainability means the exploration, design, construction, operation and closure of mines in a manner that respects and responds to the social, environmental and economic needs of present generations and anticipates those of future generations in the communities and countries where we work. We are committed to demonstrating that through this policy we can contribute to long-term improvements in quality of life while acting as stewards for the environment.

From the point of view of local communities, the role of mining companies should be seen to make strategic investments to ensure the ongoing sustainability of their economies and physical environments. These may be in areas such as educating local workforces, promoting the establishment of small and medium-size enterprises, and building community infrastructure (roads, railways, airports, hospitals, schools and housing). When their mines close, mining companies will move on and communities will be on their own.

## The Future of Western Australian Mining Towns

Mining towns rise and fall over time. We have seen one view of this in Table 1 with respect to Western Australia. Although mining has driven the fortunes of Western Australia for much of its period of European settlement, only five per cent of the state's population lived in mining towns at the turn of the new millennium. In the preceding 110 years, 172 towns had been formally established; by 1996, 132 of these no longer existed. Among the remainder only three had populations of more than 10,000 people. Many of the remaining small mining towns may also eventually disappear. This seems even more likely because of the rise of 'fly-in, fly-out' mining.

Perth and many of the larger regional centres in the state have owed, and will continue to owe, their wellbeing to minerals and energy. In 1997, I visited the Head Offices of several major mining corporations in Toronto. The Public Relations Director of one of these companies pointed out to me that perhaps 250,000 people in the city owed their livelihood to mining. Yet it was unlikely that

this fact was widely realised. A similar situation applies in Perth, Bunbury, Geraldton and Albany in Western Australia. Teachers in public schools, nurses in suburban hospitals and young people serving hamburgers or pizzas at fast food franchises are probably unaware that they owe their livelihood to the wealth generated by the minerals and energy sector.

In 2051, it seems likely that the minerals and energy sector in Western Australia will have contracted. If recent history provides a guide, the economic geography of world mineral production will have shifted away from nations such as Australia and Canada to Africa, South America and the nations of the former Soviet Union.

Many smaller mining towns will have disappeared, following the fortunes of the 132 former mining towns in the state. It is also interesting to consider the fortunes of current major centres - Kalgoorlie-Boulder, Port Hedland and Karratha, together with some of the sub-regional centres listed in Table 1. Although remote and in the tropics, Port Hedland and Karratha, are both coastal communities. The arrival of downstream processing facilities and their proximity to Asia seems likely to enhance their longer-term economic and social viability.

The future in Kalgoorlie-Boulder must be in greater doubt. As an inland centre in an arid climatic zone, there must be considerable question about whether it can maintain its present population when mining activities subside. While the city is well endowed with physical, transportation and communications infrastructure, the recent experience of towns such as Broken Hill would seem to suggest that its population will decline and perhaps stabilise, following the path outlined in Figure 3 - see Maxwell (2001).

For residents and large and small mining towns in Western Australia, the times ahead will be challenging. Some towns will change and evolve, diversifying their economic bases and developing competitiveness in new industries when the lode runs out. Where this happens, much of the evolution will be due to the commitment of local community members who identify new opportunities and adapt to them.

## References

- Blainey, G. 1993, *The Rush That Never Ended: A History of Australian Mining Fourth edition*, Melbourne University Press, Melbourne.
- Department of Minerals and Energy various dates, *Western Australia Statistics Digest: Mineral and Petroleum Production*, Department of Minerals and Energy, Perth.
- Eggert, R. 2000, 'Sustainable Development in the Minerals Industry' in Otto, J. and Cordes, J. (eds) *Sustainable Development and the Future of Mineral Investment*, United Nations Environment Program, Paris.
- Eggert, R. 2001, *Mining and Economic Sustainability: National Economies and Local Communities*, Mining, Minerals and Sustainable Development Project, October.
- Maxwell, P. 2001, 'Considering the Future of Kalgoorlie Boulder: The Challenges Facing a Large Remote Mining Town', *Australasian Journal of Regional Studies*, vol. 7, no. 1, pp. 63-81.
- Moore, G. 1998, *Mining Towns of Western Australia*, Chamber of Minerals and Energy, Perth.
- Myers, J.G. and Barnett, H.J. 1985, 'Minerals and Economic Growth' in Vogely, W. (ed.) *Economics of the Mineral Industries*, AIME, New York.
- Placer Dome, 2001, Sustainability Policy, [www.placerdome.com/sustainability/index.asp](http://www.placerdome.com/sustainability/index.asp)
- Pritchard, B. and McManus, P. (eds), 2000, *Land of Discontent: The Dynamics of Change in Rural and Regional Australia*, University of New South Wales Press, Sydney.
- Sachs, J. and Warner, A. 1995, 'Natural resources and economic growth', Working Paper, Harvard Institute for International Development.
- Storey, K. 2001a, 'Fly-in/Fly-out and Fly-over: mining and regional development in Western Australia', *Australian Geographer*, vol.32, no. 2, pp. 133-148.
- Storey, K. 2001b, 'FIFO Mining in Australia: What do we really know about its social and economic impacts?', mimeo.
- Sullivan, D., Sznoppek, J. and Wagner, L. 1998, '20th century U.S. mineral prices decline in constant dollars', United States Geological Survey.