

LESSONS FROM THE SOCIAL AND ECONOMIC IMPACTS OF THE MINING BOOM IN THE BOWEN BASIN 2004 - 2006

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ABSTRACT: The coal industry boom in Central Queensland's Bowen Basin has generated a number of positive economic and social impacts including increased employment, income and expenditure levels. The spike in international demand for coal since 2003 has resulted in an overlapping occurrence of an unprecedented number of new mine developments, expansion of existing mines, exploration activity and the construction of infrastructure to service the mining industry. However, positive economic impacts on smaller communities servicing the region have been limited by the use of non-resident workers, the impacts of 'Dutch Disease' on other industries and resources, and shortages in housing and infrastructure. The concerns are that local communities may be shouldering many of the costs of accommodating new developments while the benefits flow more broadly to regional and state centres. Lessons from the resource boom suggest that greater attention needs to be paid to housing supply, labour supply, information flows, project approvals, and the integration and interdependence of planning issues.

1. INTRODUCTION

The coal industry in Australia has been one of the key performers in the mining boom that was stimulated by increased global demands for commodities from 2004. The Bowen Basin region in central Queensland is the premier coal producing region of Australia, and the commodity boom has stimulated a substantial increase in production and investment. Key activities have included increased production at existing mines, the development and planning of new projects, increased infrastructure, particularly for railways and wharves, and the development of associated service industries (NRM 2006). This increase in

mining activities has generated a number of positive economic and social impacts, including increases in employment, income, new infrastructure and regional spending.

In principle, economic activity and growth can foster improvements in social conditions in a number of ways. These include the direct creation of jobs, with corresponding flows of income and wealth accumulation. Economic growth may also allow more resources to be used for social services such as health, education and welfare, both through private and public spending in turn increasing community liveability and lifestyle factors. As a result of spending on wages, infrastructure and operating costs, mines can provide direct injections of economic stimulus into regional areas, and help to maintain regional employment and population growth (Fargher et al. 2003).

However, rapid growth in a single industry can also create offsetting economic and social consequences. For example 'Dutch Disease' is a commonly referenced issue and refers to the situation where rapid growth in one industry drives up the cost of labour and other factors of production (Corden and Neary 1982, Corden 1984). This increases the costs for all industries through drawing on the same labour pool, transport infrastructure, and other factor inputs. Additional and related problems such as shortages in housing and labour markets and bottlenecks in the provision of infrastructure may also emerge. Where increased pressure on housing stock drives up housing and rental prices it may become more difficult for people on lower incomes to find affordable housing, reducing further the pool of affordable labour available to other industries. The end result is that uneven growth patterns may generate net economic impacts that are lower than the initial stimulus provided by the key growth industry.

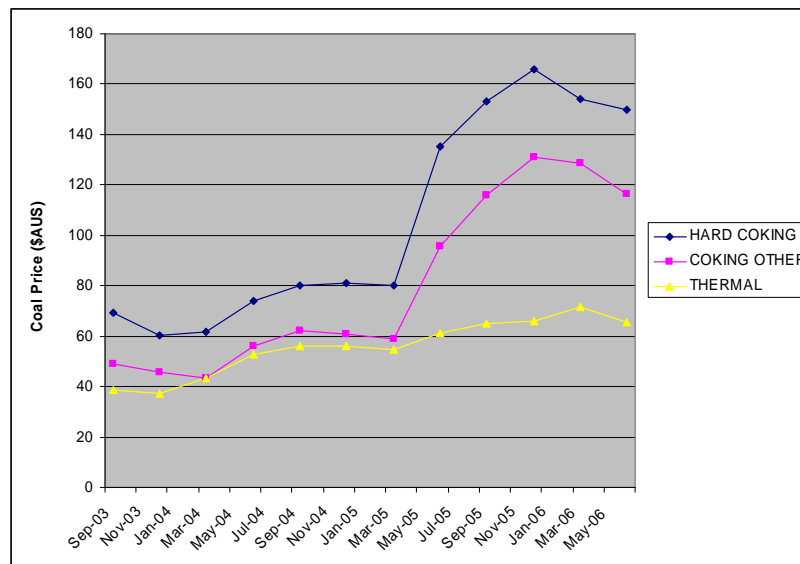
While policy makers and industry are generally appreciative of the potential for structural implements and bottlenecks to reduce economic growth, it is often difficult to address these issues in a real world setting. Governments often try to avoid future bottlenecks by engaging in forward planning and regional or integrated planning. However, where the results of planning exercises lead to rigid strategies and time frames it can be difficult to adjust to unexpected changes. As well, changing business, social and demographic patterns mean that appropriate responses in one period may not map very well to a different cycle of economic growth. Together, these possibilities raise a number of key issues, including; the extent to which local and regional communities actually are gaining maximum benefit from the mining boom; the capacity of some social groups and government, industry and communities to coordinate their different roles in order to capture such benefits; and the possibility that building an undiversified 'quarry economy' will ultimately prove unsustainable because the boom and bust cycles associated with mineral industries are ultimately damaging for the economy (Mercer and Marden 2006).

In this paper, the impacts of the coal mining boom on the Bowen Basin region are examined. The focus of the research is on two key stages: the identification of impacts and the development of strategies for policy makers that would help to address those impacts. The research is based on an overview of available literature and statistics, as well as the outcomes of a workshop dealing

with social and economic impacts from mining in the Bowen Basin. The paper is structured as follows. An overview of the coal industry and the Bowen Basin is provided in the next two sections, followed by an analysis of some of the impacts of higher growth on the region in section four. Strategies to deal with growth pressures are examined in section five, and some conclusions are provided in the final section.

2. OVERVIEW OF THE COAL INDUSTRY IN QUEENSLAND

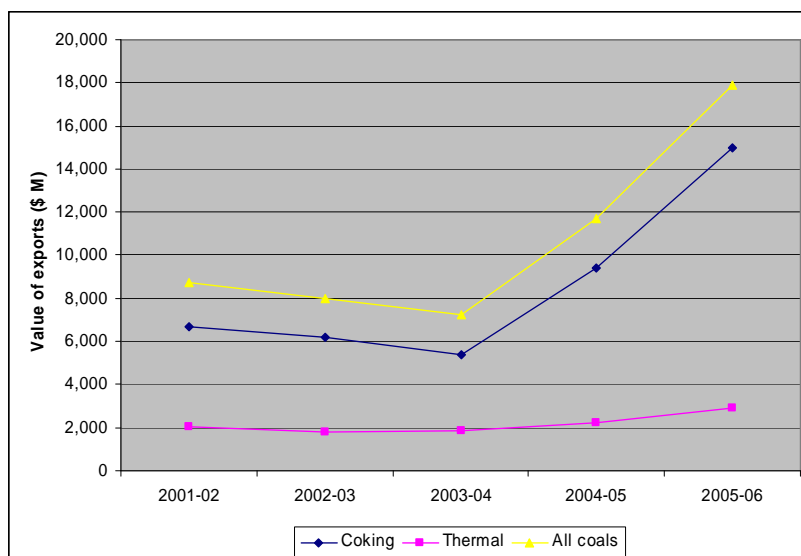
The mining industry is a key part of the economy in Queensland, accounting for over 10 percent of the Gross State Product (ACIL Consulting 2002). In many inland regions of Australia, the relative influence of agriculture is declining, and mining and petroleum production is the major contributor to economic wealth (Fargher et al. 2003). The contribution is enhanced by higher levels of salary payments to mining employees and higher levels of spending on operating, exploration and capital items. Coal production is a major part of the mining industry in Queensland, accounting for 40 percent of the state's merchandise exports by value in the year to August 2006, compared to 30.2 percent two years previously (OESR 2006a). In 2004 a sharp rise in international demand, partly attributed to the growth in the Chinese economy, created increases in Australian coal prices (Figure 1).



Source: Compiled from data from NRM (2006)

Figure 1. Free-on-board Coal Prices 2003-2006 \$A

The increase in coal prices was largely responsible for increases in the value of coal exports from 2004 (Figure 2), although increases in production levels was also a contributing factor. In the 12 months to August 2006, Queensland exported \$14.5 billion in coal exports (OESR 2006a). The increases in price and profitability have stimulated further expansion of the industry and employment levels. Growth in industry output has occurred steadily since the early 1980s, with the production of saleable coal rising by 69 percent from 95Mt in 1994 to 160Mt in 2004 (Figure 3). Open cut mines were responsible for most of the increase in production, but the greatest rate of increase occurred in underground mines.



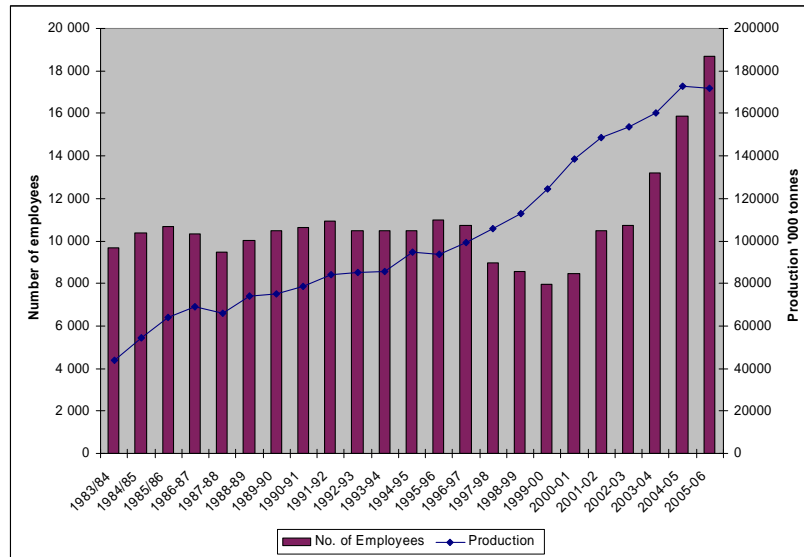
Source: Compiled from data from NRM (2006)

Figure 2. Value of Coal Exports 2001/2 to 2005/6

Employment levels in the coal industry have tended to fluctuate (Figure 3). A reform period during the late 1990s reduced the impact of union demarcation disputes on work practices, introduced contract labour at a number of mines, and changed a number of work patterns, including moves towards longer shift patterns. This reduced employment levels in the industry from the mid 1990s through to 2000. Between 1999/2000 and 2005/6, direct employment grew by 134 percent, while flow-on employment to contractors and suppliers also increased.

The productivity in terms of saleable output per employee has varied substantially since 1994 (Figure 4). The lowest productivity over the ten year period from 1994/5 to 2004/5 in the coal mining industry was in 1995/6, when it

was 8,709 tonnes per employee. The highest productivity occurred in 2000/1, with 16,579 tonnes per employee. Most of the productivity increases can be attributed to factors such as increased mechanisation and technical efficiency, and changed workforce practices. The decline in productivity since 2000/1 may reflect the development of less accessible reserves that were previously uneconomic to mine as well as changes in workforce composition.



Source: Compiled from data from NRM (2006).

Figure 3. Queensland Coal Production and the Number of Employees, 1994-2004

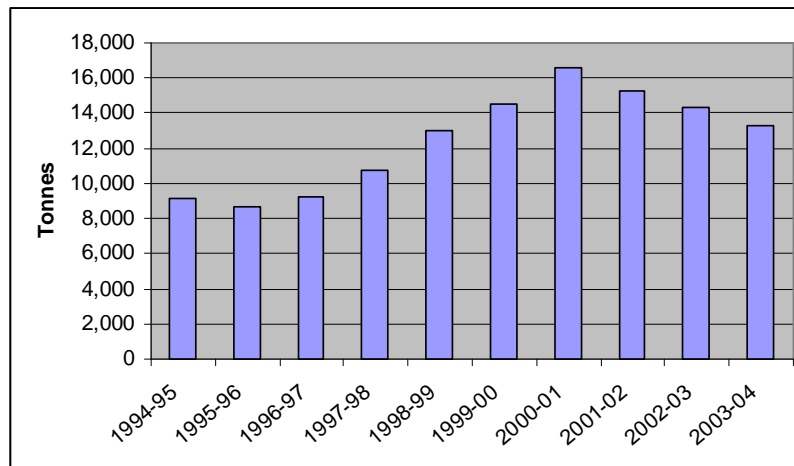
3. THE BOWEN BASIN REGION

The Bowen Basin in central Queensland produces about 85% of the coal in Queensland, with most of it being exported through ports at Gladstone, Mackay and Bowen. The Bowen Basin extends from Collinsville in the north to Moura in the south (Figure 5). Mining activities tend to be carried out by larger scale firms, with 43 coal mines operating in Queensland during 2004–5. Of these, 33 were open-cut mines and 10 were underground (NRM 2006).

The Queensland Government has predicted that there will be a growth rate of 7% per annum in the coal industry from 2005 – 2010¹. Increases in production since 2000/1 (Figure 3) have largely come from expansion of existing mines as shown by increases in employee numbers (NRM 2006). There was little change

¹ Press release by the then Minister responsible for Mining, Tony McGrady 23/11/04.

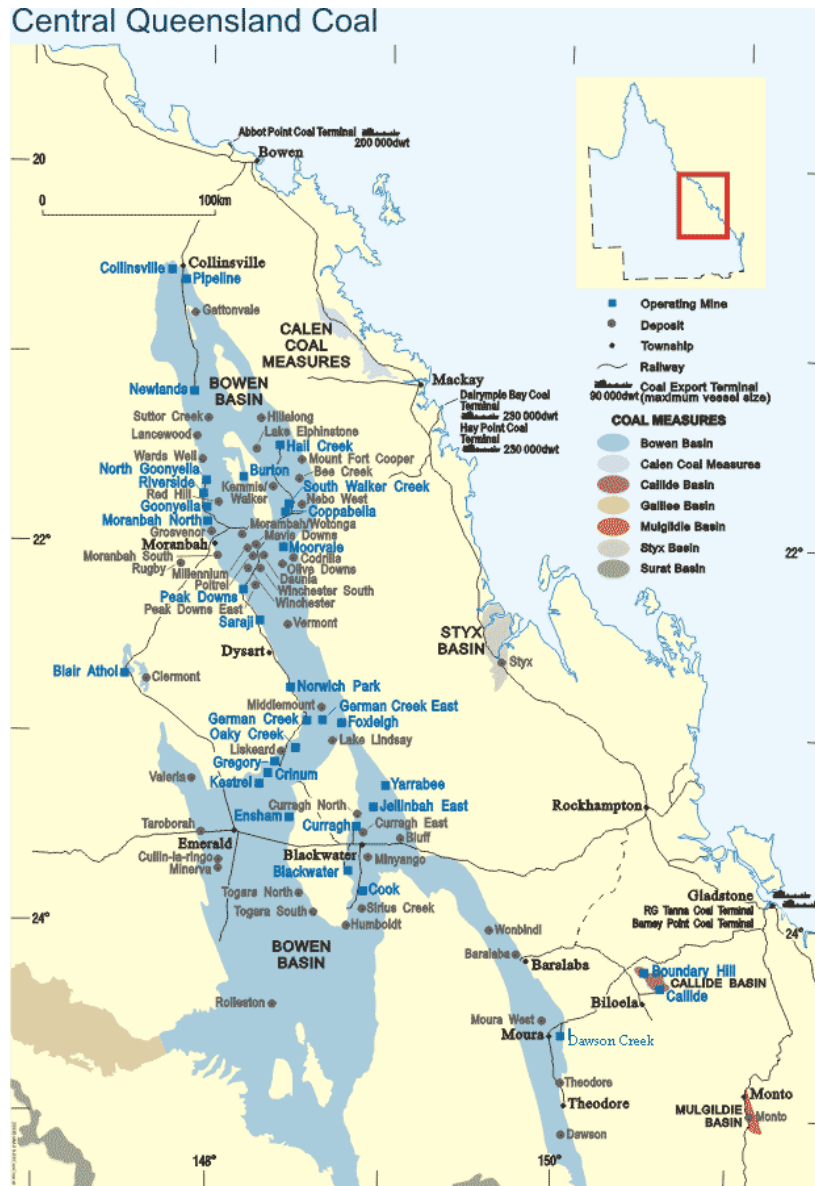
in the number of operating mines in the Bowen Basin from 2000/1 (34 mines) to 2004/5 (37 mines), but there are a number of current and potential developments across the Bowen Basin as producers respond to the increased demand for coal. NRM (2006) identify that a further 25 mines (21 in the Bowen Basin) were under development or active consideration by 2006. OESR (2006a) report two black coal projects worth \$685 million were completed in the second half of 2006, with a further \$10 billion of projects under construction or consideration. Projects under development in 2006 were expected to increase coal production capacity in the state by about 45 million tons a year by 2008, an increase of approximately 26 percent over 2005/6 (OESR 2006a). The developments are increasing the number of building and construction employees in the region, as well as increasing demands for a range of materials and services.



Source: Compiled from data from NRM (2006).

Figure 4. Total Saleable Output per Employee, Queensland 1994-2004

Exploration activities have also expanded. Expenditure on exploration increased from \$60.6 million in 2003/4 to \$88.1 million in 2004/5 (NRM 2006). Coal related infrastructure has also had to be expanded to cater for increased volumes of coal production. Key areas of infrastructure development include increases in port capacity at Bowen, Mackay and Gladstone, expansion and upgrading of the coal rail network, increases in rolling stock for the rail network, and improvements in water infrastructure. Several billion dollars in expenditure is planned by the Queensland Government for the Central Queensland region by 2010 to upgrade infrastructure (NRM 2006).



Source: www.bowenbasin.cqu.edu.au (Bowen Basin Area Map 2003)

Figure 5. Bowen Basin Area Map

The increases in employment and expenditure being generated by the coal mining boom will also impact on the communities of the region. The Bowen Basin region was serviced by 15 small communities with a combined population of 42,000 people in 2001 (ABS 2001). While some communities (e.g. Glenden, Moranbah) have been purpose-built to serve the mining industry, others (e.g. Springsure) are predominantly agricultural towns or regional service communities (e.g. Emerald) that have expanded to service the coal industry. Other key service centres are the larger communities of Rockhampton, Mackay, Gladstone and Bowen along the Queensland coast. These are developing as key bases for the mining industry and for many employees and service companies.

The importance of mining to regional economies is driven by both the increases in employment and the high incomes of employees in the mining sector. Average weekly earnings in the mining sector in Australia are higher than any other industry at \$1,424/week for a full-time employee in August 2001. Wage levels are approximately double weekly earnings in the retail trade and tourism industries (ACIL Consulting 2002). The high levels of income in the mining industry mean that flow-on expenditure levels are also high. Even though mining accounts for only 1 in every 14 jobs in Queensland, the industry accounts for significant job creation as income is spent in other industries (ACIL Consulting 2002). In terms of spending impacts on the Queensland economy, a job in mining is worth approximately two jobs in either the retail trade or tourism industries (ACIL Consulting 2002).

There have been changes in employment patterns within the coal industry over the past few years, with downstream impacts on social and demographic changes (Zheng et al. 2007). First, there has been increasing emphasis on the use of contractors to perform some or most of the mining operations since the changes in working arrangements in the late 1990s. This change has been driven by searches for efficiencies in production. Second, there is increased usage of variations on fly-in/fly-out operations, whereby mining companies no longer build mining towns or take full responsibility of employees outside of working hours. Third, there has been more adoption of 'block shift' patterns in which employees are typically involved in 12 hour shifts for a certain number of days, followed by several days of break. In many cases, employees are able to stay in work camps close to the mine site when involved in a 'block shift'.

One effect of the changes is that employees now have more choice about where they and their families are located. Many employees and their families now live in the larger more liveable centres or coastal cities. Some employees stay in company accommodation when they are completing a shift. PIFU (2006a) estimated that at June 2006, there were 10,763 non-resident workers in the nine key shires of the Bowen Basin, or an additional 14 percent of the Bowen Basin population moving in and out of the region for employment purposes. In the 1990s, there was an increased tendency for mining families to relocate to coastal areas leading to population declines in many of the smaller mining towns. For example, mining communities in the northern Bowen Basin experienced an overall loss of 1656 residents between 1991 and 1996, with most relocating to Mackay (Qld Govt. 2002). PIFU (2005) estimated that Livingston Shire (coastal

area) has grown by 7.38 percent or 1,691 people from 2001 to 2004, while the population of the Bauhinia Shire (former agricultural but now a growing mining shire) has declined by 0.53 percent (12 people) in the same period of time. These different demographic and employment patterns have meant that the recent coal boom has had very different regional impacts compared to earlier growth in the industry.

4. THE IMPACTS OF HIGHER GROWTH

Two of the key outcomes of the growth in the coal industry are the increases in employment and regional incomes. The boom in the mining industry has increased direct employment by more than 10,000 employees in the five years to 2005/6 (Figure 3), with additional employment through contractors and service industries. This is increasing the population of communities in the region. For example, the population of eleven key communities in the Bowen Basin was expected to increase by 17.6 percent from 32,897 in 2001 to 38,687 in 2006.² A further increase to 48,650 people was expected by 2021. These projected increases are at odds with the contracting population in many regional areas of Australia.

These changes have to be viewed in the context of other demographic influences on regional Queensland. There have been population losses in many regional areas as increased efficiencies in agriculture and service industries mean that fewer people are employed in those sectors. In many cases, the population movements are from rural areas and smaller towns to larger centres within regions. Better transport and communication facilities, increased emphasis on service industries and the increased scale of firms and enterprises are among some of the economic reasons larger centres have grown at the expense of smaller ones.

There are also a number of social reasons why there have been population movements to larger centres (Rolfe et al. 2005). These include better employment opportunities (especially for partners), better education and health services, increased recreation opportunities, and quality of lifestyle factors. Currently, there are a variety of employment patterns at the different mines across the Bowen Basin, ranging from the traditional company town close to the mine site option to the more recent fly-in/fly-out operations. This means that there is some opportunity for employees to “vote with their feet” by shifting to the mining operation that suits their personal preferences.

The coal mining boom is also contributing to increases in regional income. Rolfe et al. (2003) report average 2002 salary levels at one mine at \$123,550. By indexing to CPI increases and extrapolating across increased employment levels, an additional \$1.37 billion in salaries is estimated to flow from the upturn in direct employment alone. Most of this is expected to relate to employment positions in the Bowen Basin. The increased activity in mining will impact on local, regional and state economies in a number of ways, including:

² Information supplied by the Planning Information and Forecast Unit (PIFU) in the Queensland Department of Local Government, Planning, Sport and Recreation.

- The expenditure of mining companies on salaries for mining, development and exploration activities,
- The expenditure of mining companies on contractors and suppliers associated with mining, development and exploration activities,
- The expenditure of government and industry on infrastructure development,
- The flow-on effects of business expenditure back into other sectors of the economy,
- The flow-on effects of consumption expenditure back into other sectors of the economy.
- Increased dividends to investors in mining firms which are then used for the purchases of goods and services,
- Increased royalty payments and tax revenues to government.

The increases in employment and expenditure are helping to fuel the regional economy in central Queensland, but may have offsetting impacts in terms of labour market shortages, infrastructure bottlenecks and housing prices. These types of negative impacts of a boom in a resource sector became known as ‘Dutch Disease’ after rapid expansion in the natural gas sector in the Netherlands in the 1960s caused a decline in the manufacturing sector.³ The economic concepts underlying Dutch Disease have been more rigorously defined and explained by Corden and Neary (1982) and Corden (1984).

The impacts of Dutch Disease occur in two main ways, through microeconomic and macroeconomic impacts. At the microeconomic level, a resources boom can have direct and indirect impacts on other industries (usually manufacturing and agriculture) by increasing the price of labour and other resources. Indirect impacts are often larger, because the additional revenues generated by a resources boom can create a spending effect that increases demand in a region and flows through to higher labour and price levels. The macroeconomic effects occur when the increasing revenues generated through a resources boom generate an appreciation in the exchange rate, affecting the returns for export industries and the costs for importing ones. For an affected economic sector, Dutch Disease can simultaneously increase costs and reduce export income and the availability of skilled labour.

Economic performance is enhanced when countries or regions can specialise in industries where they have a competitive advantage, so the process of moving economic resources (including labour) from less productive industries to more productive ones is a normal part of economic growth (Malecki 1997, Coombs 2001, Beer et al 2003). The factors that distinguish Dutch Disease from the more standard phases of economic growth is where the speed or fluctuations in a resources boom amplifies the decline in other sectors in the short term beyond what is economically desirable (Corden 1984). This can occur when a decline in alternative industries during a resource boom is not easily reversed when the boom tapers off. There are two main options to reduce the potential for Dutch Disease (Corden 1984). The first is to quarantine some of the boom revenues

³ The term ‘Dutch Disease’ was popularised following an article in the Economist magazine in the November 26 1977 edition.

offshore so as to minimise impacts on exchange rates and reduce the spending surge. The second is to address some of the issues that limit the competitiveness of affected industries. Where some level of Dutch Disease is unavoidable, governments may have a role in helping affected sectors to transition to new levels of performance.

Dutch Disease can also extend to social impacts in two main ways. The first is through the impacts of rising prices for factors such as housing. Increased costs can flow through to less advantaged members of the community without them sharing the benefits of higher incomes. In communities where housing rental costs increase, the net effect may be very strong incentives to relocate. The second broad impact type is where the Dutch Disease impacts on alternate industries cause job losses, involuntary relocations and other impacts. However, at a regional level these potential social impacts have to be balanced against the social benefits of a commodity boom, including the consequences of increased income and employment. Commodity booms and Dutch Disease can generate both winners and losers in terms of economic and social consequences, and it may not be easy to distinguish the contributing impacts. Some examples of this are shown in the following case study.

5. THE IMPACTS OF THE RESOURCE BOOM ON BOWEN BASIN COMMUNITIES

The material for this case study was principally collected from a workshop conducted in a central Bowen Basin community, Emerald, in May 2006. The workshop setting was one of the best ways of collecting detail on impacts because there are limited official statistics available (because of the small size of the communities involved) and many statistics are not available in a timely manner. A number of key industry, government and community representatives were invited to participate in the workshop⁴, and attendance was open and advertised to members of the community. After a number of invited papers⁵, an open session was used to identify the key issues that the different stakeholders were facing in dealing with the resource boom. There were also a number of initiatives proposed about how to address the different issues, coordination difficulties and impacts of the resource boom.

The issues identified by workshop participants can be categorised into key groups as follows.

5.1 Housing shortages and high rental prices

The most dominant impacts identified in the workshops were housing shortages and the flow-on effects of the resulting high rent levels. The increased workforce, particularly those associated with contractors, exceeded available

⁴ The workshop was organised by Central Queensland University, with support from the Australian Coal Association Research Program (ACARP) and the Queensland Department of Communities.

⁵ The program and forum papers are available for download at <http://www.bowenbasin.cqu.edu.au/events/research.html>.

housing levels in most towns. There have been reports of rents in key centres such as Emerald and Moranbah being as high as \$700 and \$900 per week respectively for a four bedroom house. OESR (2006b) reported that the cost of housing in Moranbah in May 2006 was 95.5 percent more expensive than Brisbane, reflecting the high demands and short supply. Many accommodation establishments were booked out several months in advance, and examples of 'hot-bedding'⁶ were reported in some towns⁶. The high rental levels made it uneconomic for people to work in low income jobs. For example it was reported in some mining towns that unless apprentices lived at home or were supported by employers or government, their income levels were actually lower than the amount they would have to pay in rental accommodation.

In previous mining upturns, mining companies tended to provide housing for employees. However, following the reform process of the late 1990s the trend was to make housing a private responsibility. As well, a much higher proportion of workforce responsibilities now fell on subcontractors. While many mining companies still provided work camp accommodation, they did not cater for all employees or those of subcontractors. The resulting demands for private housing have not immediately been met by local housing markets. There appear to be several reasons including:

- Limited availability and release of land in some communities,
- Limited availability of building contractors (and housing for them),
- Caution of investors,
- Constraints in infrastructure provision in some communities, and
- Constraints and delays in planning and approvals processes.

Evidence for increases in housing land development for two of the regional centres, Mackay and Emerald, are shown in Figures 6 and 7. These show that residential land values have effectively tripled from 2001 to 2006, accompanied by increases in both lot production and dwelling approvals.

However, the pattern of building development varies between communities (Figure 8). In the smaller communities, the level of building development relative to their share of the Queensland population in 2005 tended to be below the state average. In contrast, the level of building development relative to population in the regional mining hubs of Emerald and Mackay is above the state average. Rockhampton, with more limited exposure to the mining industry, has had much lower levels of building activity. The data confirms that building activity did not meet the large increases in demand that were driven by the mining boom.

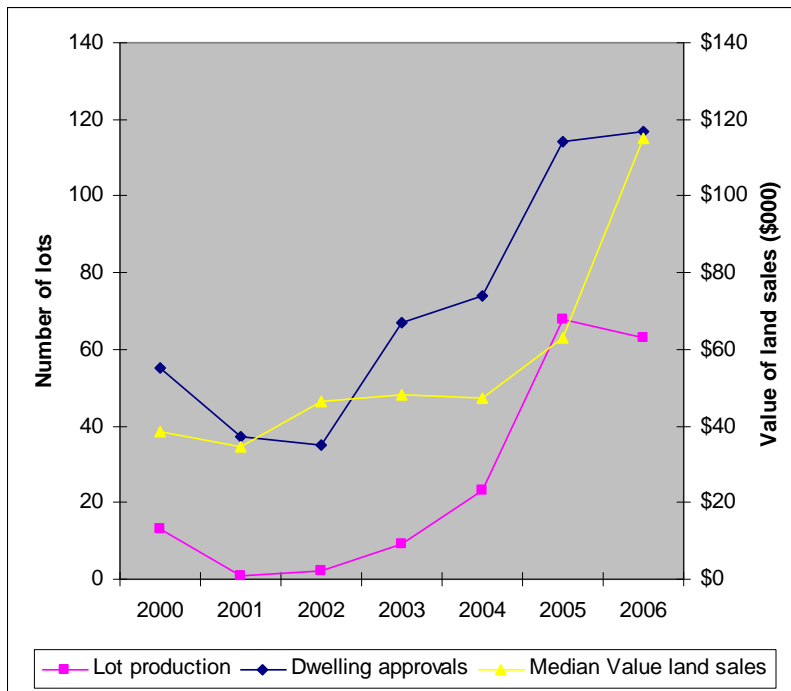
5.2 Skill shortages

A second key area of shortage were skills shortages, particularly in trades areas, as workers with skills transferred across to the mining and associated construction industry. The intersection of the current boom in the mining industry and the demographic shift away from regional areas is creating acute

⁶ Hot-bedding occurs when rooms are let to two different people on alternate shifts so that the room is occupied for up to 12 hours by each tenant.

shortages of skilled labour in some areas (Miles et al. 2006). Reasons for this also include:

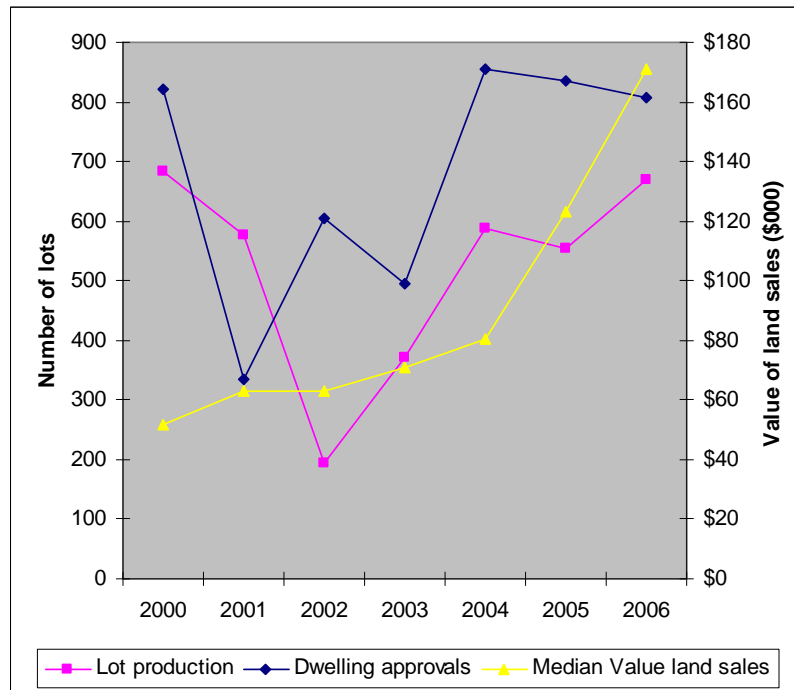
- a limited pool of specialist skills,
- limited training opportunities and/or graduates in some fields (eg mining engineering), and
- difficulties in attracting skilled employees to move to regional areas.



Source: Compiled from data obtained from PIFU (2006b)

Figure 6. Residential Land Development, Emerald, 2000-2006

Local service businesses, rural industries and local government were identified as key sectors that had been affected by the skills shortage. There was evidence that local businesses found it very difficult to employ new staff, and unless accommodation was provided, it was extremely difficult to recruit people from outside the local area or region. In many cases, employees with good skills were sourced from outside the local area or region, only to have them shift shortly afterwards to higher paid employment in the mining or mining service sector.



Source: Compiled from data obtained from PIFU (2006b)

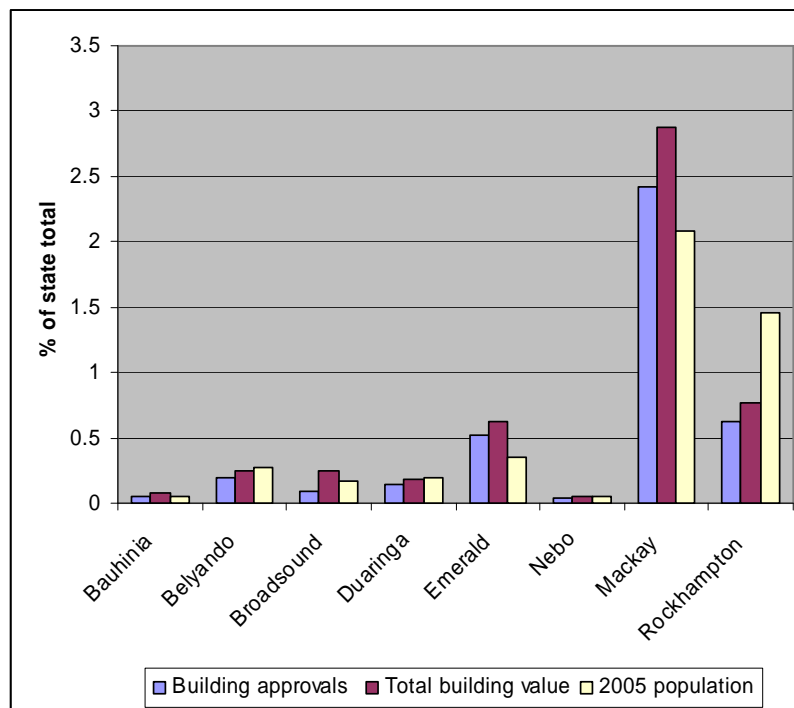
Figure 7. Residential Land Development, Mackay, 2000-2006

In addition the attraction and retention of qualified professionals in the service sector has also been shown to be a major concern. Areas commonly reported as *of concern* include the medical and allied health services, educational services including school, tertiary and vocational training and most other community support service sectors. Shortages were commonly reported in the skilled trade areas such as plumbers, builders and electricians. The major cause of the difficulties in the attraction and retention these professionals were associated with liveability and lifestyle factors (Miles et al. 2006).

5.3 Information flows

A third key area of concern that was identified were poor information flows about new developments. There was very little advance warning about planning for new developments until the mining companies had made decisions to proceed. While mining companies might negotiate with key state government departments, the concerns about commercial information meant that other departments and local government responsible for services and infrastructure

provision were not aware of developments until late in the cycle. Similar issues appeared to affect housing markets, where private investors and developers were initially reluctant to meet new demands in case the mining boom was short lived. At the same time, mining companies were investing billions of dollars in new development in expectations of longer term increases in mineral demand. The expectations and information sets of different sectors in the economy appeared to be mismatched.



Source: Compiled from data sourced from OESR (2006c)

Figure 8. Building Activity in Select Bowen Basin and Regional Centres, 2005

5.4 Longer term planning and infrastructure development.

The Bowen Basin region is covered by two regional plans, being the Central Queensland: A New Millennium (CQANM) plan and the Mackay Whitsunday Area Management (WHAM) plan. These had been drafted in the late 1990s in a period of declining mining workforce numbers and provided little guidance about appropriate development strategies in a boom period. The speed and intensity of the boom placed considerable pressure on government authorities

and local government to provide appropriate services and infrastructure and to perform the appropriate checks and approvals. This meant that the focus was often on meeting immediate demands with little ability to plan more strategically or to upgrade previous planning mechanisms.

There was also little evidence that the planning mechanisms were sophisticated enough to deal with the new workforce patterns where large numbers of the workforce were non-resident in the local communities. These were workers who tended to live in regional areas, and stayed in temporary accommodation during the period of their work-shift block. Some of the implications of these more flexible methods of labour supply were:

- Many direct impacts of increased employment were attributed directly to regional centres,
- Mining communities had to cater for large numbers of temporary workers who were not full-time residents,
- A specialised set of infrastructure and services were required in mining communities, and
- There were increased traffic flows and concerns about the effects of fatigue on traffic safety.

5.5 The Environmental Impact Statement (EIS) as an Approvals Process

A key issue that was flagged by participants in the workshop was that the Environmental Impact Statement process used to plan and approve major new projects in Queensland (Thomas 2001, England 2001) was not comprehensive enough and does not deal with the cumulative effects experienced in the boom period. In Queensland, the project proponent has to prepare an EIS and submit it for agency approval and public comment as part of the approvals process. Several of the issues that were raised were:

- The EIS process was focused on single projects, and may not adequately account for the cumulative impacts of several projects being developed simultaneously,
- The EIS process only applied to new projects, and mines undergoing expansions or changes in operations did not have to assess their social and economic impacts on communities, and
- After initial approvals had been gained, there was little formal requirement for follow-up assessments of the impacts of mining and changes in operations on communities (establishment, operation and closure phases).

5.6 Responsibilities for funding

There was some confusion about who is responsible and should fund new services and infrastructure needed as a result of major developments. Some of the tensions identified arose because local government is called on to provide essential infrastructure to cater for increased populations, but often have little prior information, a limited funding base, and little guarantee that the population base will remain in the future. At the same time, the EIS process is focused on the responsibilities of project proponents, but does not extend to identifying the roles and needs for government involvement to deliver associated services. A

key need identified in the planning process is to both specify what are the services and infrastructure required from both private and public providers and to specify as well as possible which parties might be responsible for organisation and funding.

6. CONCLUSIONS

The resource boom in the coal industry is having a number of positive economic and social impacts on the Bowen Basin region. The scale of development is having major impacts on the regional and state economy, through the impacts and stimulus of the direct and the indirect spending and employment multipliers. In fact, a notable feature of this mining boom is the extent to which the economic stimulus has transferred to regional and state levels as compared to the smaller mining towns in the Bowen Basin. This has been driven by two key organisational and demographic trends. First, the move to more flexible work operations and the pattern of shift work blocks has meant that large numbers of mining employees base themselves at the coastal and urban centres and travel out to the mining communities for shift work blocks. Increases in workforce requirements have been largely catered for by the construction of work-camps rather than the construction of new housing. Second, a greater reliance on contractors and mining supply industries has stimulated growth in the mining support sector, which has tended to be based in larger communities and strategic centres fulfilling the role of service hubs. Both of these trends have meant that a large proportion of the direct and indirect economic impacts of the boom have bypassed the smaller local economies and focused immediately on the larger regional centres.

While the mining boom has been generally positive for the Bowen Basin and Central Queensland region, there have been some offsetting economic and social impacts. Some elements of 'Dutch Disease' can be identified where competition for employees and resources has had negative spill-over effects on other industries and resources. The most serious impacts have occurred through housing markets in smaller communities, where the higher rents and unavailability of housing have made it difficult for people on lower incomes to continue living in towns, and have made it harder for other industries to attract new workers. There have also been concerns over planning and coordination issues, about the way that the impacts of new developments are assessed, and about how responsibility for how new infrastructure is funded and developed. The concerns are that local communities may be shouldering many of the costs of accommodating new developments while the benefits flow more broadly to regional and state centres.

To address these issues, a number of areas of attention have been suggested by stakeholders for consideration by government, industry and communities. These provide an indication of the key issues that need to be addressed in the continued development of the Bowen Basin. At a broader level, they also identify a more generic set of issues that are likely to emerge in many resource boom situations. The key recommendations to consider in the context of the Bowen Basin are as follows:

- Mechanisms are needed to improve the supply of housing, perhaps by stimulating land availability, private investment and building activity.
- Greater attention needs to be paid to improving the supply of labour, providing appropriate training and education mechanisms, and addressing any impediments to labour mobility.
- Mechanisms are needed that would improve information flows between industry, state government and local government about new developments.
- Better and more flexible planning is needed to cater for new developments and demographic changes and to provide additional services and infrastructure in regional hubs.
- A planned approach to improve the liveability and lifestyle amenity of the more remote service hubs to attract and retain a skilled works force and associated support services.
- The EIS process needs to be adjusted to:
 - account for the cumulative impacts of multiple projects,
 - account for operational changes during the life of projects,
 - revise projections about impacts at regular times through a mining cycle, and
- The planning and approval process needs to move beyond the focus on project proponents to more of a joint process with government that identifies responsibilities and funding for infrastructure and service requirements associated with new projects.

As government agencies, mining companies and communities struggle to catch up with the infrastructure requirements and other implications of the current boom it is difficult to consider anything other than the short-term imperative of managing growth and removing bottlenecks as effectively as possible. However, if there is an over-riding lesson to be learned from this boom it is the need to devote resources to planning at a number of levels for a variety of future industry expansion and decline scenarios. In the same way that major regional planning exercises in the late 1990s failed to consider the possibility of a mining boom, the majority of EISs and other planning activities continue to ignore matters of mine downsizing or closure. The cyclical nature of commodity markets and a volatile political environment for fossil fuels both suggest that the mining industry of the Bowen Basin will inevitably, at some point, contract. It may also be considered somewhat inevitable that technological development and changes in workforce management will generate, in time, their own demographic and economic impacts. Consideration must be given now to how the benefits of the boom will be captured and invested to build desirable futures for the communities of Central Queensland.

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REFERENCES

- Australian Bureau of Statistics (ABS) (2001) *2001 Census Data*. Australian Government: Canberra.
- ACIL Consulting (2002) *Queensland's mining industries: creating wealth for the community, the state and the nation*. Unpublished report for the Queensland Department of Natural Resources and Mines: Brisbane.
- Beer, A., Maude, A. and Pritchard, B. (2003) *Developing Australia's Regions: Theory and Practice*. University of New South Wales Press: Sydney.
- Coombs, G. (ed.) (2001) *Essays on Regional Economic Development*, South Australian Centre for Economic Studies, Adelaide and Flinders Universities: Adelaide.
- Corden, W.M. (1984) Boom sector and Dutch Disease economics: Survey and consolidation. *Oxford Economic Papers*, 36, p.362.
- Corden, W.M. and Neary, J.P. (1982) Booming sector and de-industrialisation in a small open economy. *The Economic Journal*, 92, pp. 829-831.
- England, P. (2001) *Integrated Planning in Queensland*. Federation Press: Sydney.
- Fargher, J.D., Howard, B.M., Burnside, D.G. and Andrew, M.H. (2003) The economy of Australia's rangelands – myth or mystery? *The Rangeland Journal*, 25(2), pp. 140-156.
- Malecki, E.J. (1997) *Technology and Economic Development: The Dynamics of local, regional and national competitiveness. 2nd Ed.* Addison Wesley Longman: Harlow: Essex.
- Mercer, D. and Marden, P. (2006) Ecologically sustainable development in a 'Quarry' economy: One step forward, two steps back. *Geographical Research*, 44(2), pp. 183-203.
- Miles, R., Marshall, C., Rolfe, J. and Noonan, S. (2006) The attraction and retention of professionals to regional areas, *Australasian Journal of Regional Science*, 12(2), pp.129-152.
- Natural Resources and Mines (NRM) (2006) *Queensland Mining and Petroleum 2005: Exploration, Operations and Developments*. Queensland Government: Brisbane.
- Natural Resources and Mines (NRM) (2005) *Queensland Coal Industry 10 Year Summary*. Queensland Government, Natural Resources and Mines: Brisbane.
- Office of Economic and Social Research (OESR) (2006a) *Queensland Economic Review*. Office of the Government Statistician: Brisbane.
- Office of Economic and Social Research (OESR) (2006b) *Index of Retail Prices in Queensland Regional Centres*. Office of the Government Statistician: Brisbane.

- Office of Economic and Social Research (OESR) (2006c) *Queensland Regional Profiles*. Office of the Government Statistician: Brisbane.
- Planning Information and Forecasting Unit (PIFU) (2006a) *Full-Time Equivalent population estimates for nine Local Government Areas in the Bowen Basin, June 2006*. Queensland Government, Department of Local Government, Planning, Sport and Recreation: Brisbane.
- Planning Information and Forecasting Unit (PIFU) (2006b) *Total Residential Land Activity Fact Sheet (various)*. Queensland Government, Department of Local Government, Planning, Sport and Recreation: Brisbane.
- Planning Information and Forecasting Unit (PIFU) (2005) *Population growth – Highlights and Trends, Central Queensland A New Millennium Region 2000*. Queensland Government, Department of Local Government, Planning, Sport and Recreation: Brisbane.
- Queensland Government (2002) *Building Positive Futures for Bowen Basin Mining Communities*. Report prepared by the Interdepartmental Organising Committee for the Positive Futures in Mining Communities Forum, Brisbane.
- Rolfe, J.C., Lockie, S. and Franettovich, M. (2003) *Economic and Social Impacts of the Coppabella Mine on the Nebo Shire and the Mackay Region*. Centre for Social Science Research, Central Queensland University: Rockhampton.
- Rolfe, J., Hyland, P., Ivanova, G. and Street, D. (2005) *Regional Economic Impact Assessment: Factors Influencing Workforce Mobility to Regional Mining Towns, Socio-Economic Impact Assessment and Community Engagement to Reduce Conflict over Mine Operations*. Research Report Number 5, Centre for Social Science Research, Central Queensland University: Rockhampton.
- Thomas, I. (2001) *Environment Impact Assessment: Theory and Practice*. Federation Press: Sydney.
- Zheng, C., DiMilia, L., Rolfe, J. and Bretherton, P. (2007) Strategic People Management of Coal Mining Firms in Central Queensland. *Management Research News*, 30, pp. 302–311.