

MINING DEVELOPMENTS AND SOCIAL IMPACTS ON COMMUNITIES: BOWEN BASIN CASE STUDIES

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Abstract

Mining activities in Australia tend to be cyclical, with boom and bust times impacting upon associated communities. However, little information exists to classify key impacts or to identify how they vary across mining service towns. In this paper, qualitative social impact assessment techniques have been used to independently assess post-development impacts of mining on six communities in the Bowen Basin in Queensland, following the boom in coal prices between 2003 and 2008. The communities are similar in that they all have at least one mine in the vicinity and have more male than female residents but they differ in town histories, and the size plus growth rate of both their permanent and temporary populations. While the mining boom has been generating social and economic impacts, the pattern of the impacts appears to vary across communities depending on the size of the impact, community structure and history, and the extent to which a non-resident workforce is involved.

Keywords

Bowen Basin, Coal mining, Social impact assessment

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Introduction

In contrast with the economic stagnation and depopulation that bedevil many non-metropolitan industries and communities, the mining and minerals processing sector in Australia has, until recently, enjoyed several years of rising prices and rapid growth. In just two years from 2003–04 to 2005–06 average export prices for Australian coal more than doubled from \$53.63 to \$125.16 per tonne; the total value of coal exports increased from \$7.2 billion to \$17.9 billion; and the number of employees increased from 13,192 to 18,687 (QDME, 2008). Over the same period, the contribution of coal to Queensland's total exports by value jumped from 29.5% to 41% (OESR, 2007). These price rises have generated substantial growth in coal mining, with subsequent impacts on employment, business activity and populations in local and regional mining communities (Rolfe, Miles, Lockie, & Ivanova, 2007).

Despite the substantial economic benefits of this activity, questions are also raised about its social and ecological consequences and the

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success, or otherwise, of legislative instruments to regulate development such as requirements for environmental impact assessments. While this paper cannot address all such questions, it can contribute to our understanding of social impacts and how these are experienced across a number of communities within the same region; including towns that are exposed to a number of mining developments.

Social impact assessment (SIA) studies are most commonly conducted prior to the approval of large projects in order to predict and mitigate major social issues (Dale, Chapman & McDonald, 1997). As such, such studies are rarely able to offer either comparative analysis of multiple communities exposed to mine development or, alternatively, of the cumulative impacts on individual towns of multiple mine developments (Solomon, Katz & Lovel, 2007). The single project focus of most SIA studies makes it difficult for policy makers to draw more general conclusions about how communities might be impacted upon during fluctuations in commodity cycles when there are broad scale changes in the level of employment and activity, including contributions from specific project developments.

This paper reports research about the broader scale impacts of mining changes on regional communities. It includes a review of four SIA studies of six towns in Central Queensland's Bowen Basin that were undertaken outside legislative provisions for pre-development assessment. All townships were located in proximity to between one and 14 operational mines. Ex post studies of this kind, while comparatively rare, are of particular value in informing predictive SIAs and other assessment and planning processes. They also, we would argue, make a useful contribution to our understandings of regional development and community dynamics in non-metropolitan areas more generally. Before presenting the results of this research, a review is presented of a number of studies that were initiated during Australia's last mining boom during the 1960s and 70s and which, similarly, sought to extend understanding beyond the minimum provisions of existing environmental impact assessment legislation.

Background

The mining boom of the 1960s and 1970s saw a major shift in the focus of mining investment and employment from the more densely settled states of New South Wales and Victoria to comparatively isolated parts of Queensland and Western Australia (Maude & Hugo, 1992). The remoteness of many new mine sites promoted the development of company built and operated towns to house the growing workforces. Such towns represented unique 'social laboratories' and attracted considerable research attention. However, while much research effort was focussed on extremely isolated purpose-built towns in the Pilbara region of Western Australia, more towns were actually under construction in Queensland's less remote Bowen Basin (Parker, 1988). Despite government and company policies that favoured the construction of single company towns even when existing towns were located in close proximity to new mines (Parker, 1988), a mixed pattern of development emerged that included the expansion of established agricultural service centres and mining towns alongside the construction of purpose-built towns (Maude & Hugo, 1992).

The purpose-built mining towns were characterised by low representation of Indigenous people. This was because of industrial relations policies which tended to favour employment of workers with past mining backgrounds and fewer opportunities for Indigenous people to get the required training and job opportunities. These factors meant that many mining communities have developed with little participation or involvement from Indigenous people, even when mining was located on land that had high levels of cultural significance for these groups. FIFO projects also excluded most Aboriginal communities from potential involvement (Newton & Robinson, 1987) because pick-up points were situated outside Aboriginal communities.

Purpose built towns were further characterised by inter-related problems including high population turnover, with most people only planning to stay four to five years; demographic imbalance, with men outnumbering women and 25–35 year olds predominating; limited services and amenities; and limited opportunities for economic and

demographic diversification (see Brealey & Newton, 1978; Newton & Robinson, 1987; Sharma, 1983). Even the establishment of small businesses in company towns was dependant on companies' willingness to sub-lease land and provide services. As a consequence, residents experienced a diminished quality of life and sense of impermanence (Robinson & Newton, 1988). Miners and their partners suffered more psychological stress than country town people due to social isolation, especially from relatives; boredom; climate; the transient nature of the towns and their atypical populations; alcohol abuse; and unsatisfied sexual need (Cotterell, 1984; Pilgrim, 1988). The focus on physical infrastructure and recreational services within mining towns left them under-serviced in terms of the human services needed to deal with such issues (CHHSS, 1999). In established towns that were expanded to accommodate mine workers, the capacity of unskilled and semi-skilled miners to earn more money and occupy better and cheaper housing than skilled and professional workers often fuelled resentment and conflict (Brealey & Newton, 1978; Newton & Robinson, 1987).

Despite these problems, it is important to point out that mining towns were not the wildly dysfunctional communities of the popular imagination but – as reflected by their conventional suburban designs – surprisingly ordered and tranquil (Sharma, 1983). Debate over mining towns shifted in the mid-1980s to economically and politically feasible models for their management. The limitation that isolation placed on opportunities for economic diversification raised issues about the optimum level of social infrastructure, housing, sewage etc, and who should pay for and provide it. While companies initially saw the provision of social infrastructure as essential to attract workers and minimise industrial disputes (Parker, 1988), by the mid-1980s, falling mineral prices and changes to the tax regime that increased the cost of providing workers with non-salary benefits reduced their willingness to invest in company towns and to shoulder responsibility (and criticism) for their management (CHHSS, 1999; Pilgrim, 1988).

This reluctance translated into two key trends: a preference among companies for the 'normalisation'

of existing mining towns and the adoption of various forms of fly-in/fly-out (FIFO), operation for new mining developments. 'Normalisation', or the handing over of town administration to government, raised a series of concerns and points of conflict: fear that existing and future facilities would be downgraded; fear that the transfer of town running costs from mining companies would impose a burden on taxpayers; fear that companies would reduce employment levels in towns with extremely limited alternative employment opportunities; and fear that normalisation might be used to justify the extraction of higher royalties from the mining companies and discourage future investment (Pilgrim, 1988). The cautious attitude of most local and state governments to normalisation was fuelled by what were perceived to be lower than expected levels of economic benefit from mining. Multiplier effects in remote towns were much smaller than anticipated as most mine-related jobs were created off-site in major urban centres and regions, much consumer spending took place in the larger centres, and there were limited possibilities for diversification of the town economies (Maude & Hugo, 1992). Local governments were usually not allowed to rate the mining companies (levy land taxes), resulting in an increasing dependence on handouts from state governments (Newton & Robinson, 1987). FIFO, or commuter, workforce arrangements which encouraged employees to stay in temporary accommodation while on shift while maintaining a permanent residence elsewhere were seen to magnify these problems.

The more recent mining boom has accelerated the trends away from the traditional patterns of mining towns (Ivanova et al., 2007; Lockie et al., 2009; Rolfe et al., 2007). There is an increased trend towards block shift work patterns and a non-resident workforce, coupled with increased mobility and more lifestyle drivers shifting or cycling people out of mining communities (Rolfe et al., 2007). There is also more reliance on work camps rather than permanent housing development, and high levels of population mobility. These factors are causing population to concentrate in regional hubs and larger mining towns, where services tend to be focused (Rolfe et al., 2007).

Study site

The Bowen Basin is a long-settled agricultural region in Central Queensland extending from Collinsville in the north to Theodore in the south. Black coal projects commenced in the mid-1960s and today account for about 85% of Queensland coal production, most of which is exported. The Basin is serviced by 22 small communities with a combined population of around 50,000 people (ABS, 2006). While some communities were originally purpose-built mining towns, others were predominantly agricultural towns or regional service communities that have expanded to service the coal industry. The larger regional centres of Rockhampton, Mackay, Gladstone and Bowen along the coast also act as bases for the mining industry and for many employees and service companies.

The importance of mining to regional economies has risen alongside increases in both employment and income levels within the industry. Average weekly earnings in the mining sector are higher than in any other Australian industry at \$1,962.00/week (all employees, total earnings); almost quadruple the weekly earnings in both retail trade and hospitality (ABS, 2008). Figure 1 and Table 1 below, give an overview of the location, population and economy of the six communities included in this study:

Blackwater, Springsure, Rolleston, Nebo, Coppabella and Moranbah. Blackwater and Moranbah, which are mining towns, Springsure and Rolleston are agricultural service towns with a recent arrival of mine workers, Nebo was always an agricultural service town but is becoming more and more a mining town, and Coppabella is a railway town with a recent significant increase in mine workers. Data are included on non-resident workers who live in each area for extended periods when on-shift but have a permanent place of residence elsewhere. Many non-resident workers live while on-shift in non-private dwellings such as single persons quarters (SPQs), hotel/motel accommodation, caravan parks and share houses (PIFU, 2007). Of these, SPQs, in the form of work camps, provide most accommodation for non-resident workers. SPQs/work camps are situated either in the residential area of the town (Blackwater), in the industrial part of the town (Moranbah and Nebo), at the mine-site (between Springsure and Rolleston), or, as in the case of Coppabella, adjacent to but slightly separated from the town. The non-resident:resident ratio (see Table 1) is 0–18:82–100 for Blackwater, Moranbah, Springsure and Rolleston but much higher for Nebo (68.2:31.8) and Coppabella (57.0:43.0).

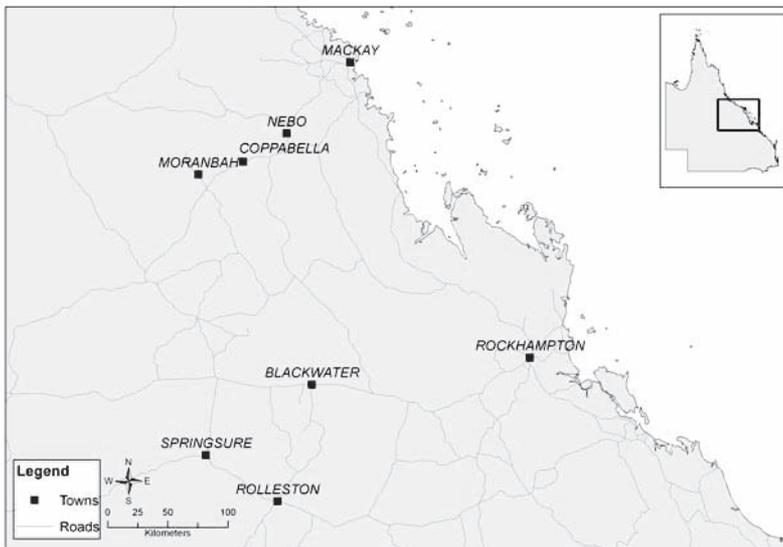


Figure 1: Case study communities. Source: Central Queensland University 2007

Table 1: Description of case study communities

	Blackwater	Moranbah	Nebo	Springsure	Rolleston	Coppabella
History	'Whistle stop' on railway line transformed into mining town during 1980s	Purpose-built mining town constructed in 1971	Agricultural service town and local government hub transformed into mining town	Agricultural service town with recent arrival of mine workers	Agricultural service town with recent arrival of mine workers	Purpose-built residential town for Queensland Rail employees in 1970 with recent increase in mine workers
No. permanent residents 1996*	5,931	6,508	unknown	666	unknown	unknown
No. permanent residents 2001**	4,913	6,124	238	770	unknown	unknown
No. permanent residents 2006***	5,031	7,133	282	829	217	unknown
Growth rate permanent residents 2001–2006	+2.4%	+16.5%	+18.5%	+7.7%	unknown	unknown
Est. no. permanent residents 2007****	5,465	7,822	323	909	unknown	538
No. non-resident workers 2007****	963	1,717	693	62	< 4	712
Non-resident: resident ratio 2007	15.0:85.0	18.0:82.0	68.2:31.8	6.4:93.6	Close to 0.0:100.0	57.0:43.0
Projected permanent resident population 2021*****	5,760	11,750	790	1,500	unknown	unknown
Male:female ratio 2001**	55.3:44.7	55.8:44.2	55.5:44.5	52.3:47.7	unknown	unknown

Table 1: *Continued*

	Blackwater	Moranbah	Nebo	Springsure	Rolleston	Coppabella
Male:female ratio 2006***	55.4:44.6	55.2:44.8	57.4:42.6	52.5:47.5	55.8:44.2	unknown
Largest employer***	Coal mining	Coal mining	Local government administration	Local government administration	Sheep/beef cattle/grain farming	Queensland Rail
Second largest employer***	School education	School education	Coal mining	Coal mining	School education	Coal mining
No. coal mines within 50 km	6	14	8	1	1	12

*Source: ABS (1996); **Source: ABS (2001); ***Source: ABS (2006); ****Source: PIFU (2007); *****Source: DLGPSR (2007).

Methodology

Social Impact Assessment is concerned with all issues that affect people, directly or indirectly, as a consequence of development or other planned interventions (Vanclay, 2003). These include impacts related to measurable processes of social change, e.g. Demographics, and impacts related to people’s perceptions and experience of change (Joyce & MacFarlane, 2001). As stated above, SIA is most commonly used prior to the commencement of large projects in order to predict and mitigate the consequences of those projects. According to the US Principles and Guidelines for SIA (Burdge et al., 1995), the principal method to achieve this is comparative; that is, ex post studies of the actual impacts of planned interventions implemented elsewhere, together with demographic trends and other statistical data, are used to extrapolate what might happen in the particular community of interest (for reviews of approaches to SIA see Lockie, 2001; Vanclay, 2006). Ex post assessments of the kind reported in this paper are thus essential to the reliability and usefulness of predictive assessments carried out in relation to other mining projects.

As can be seen in Table 2, for the four case studies reported in this paper, primary data were collected through the surveying and/or interviewing of businesses, households, key informants and work camp residents over an 18 month period. 14–24 key

informants were interviewed in each of the case studies; they were chosen from a cross-section of stakeholders within each community and interviewed face-to-face following a semi-structured format. Snowball sampling (a method of non-probability sampling, see De Vaus, 1991) was used with informants asked to nominate other individuals and groups they thought ought to be involved. A slightly different protocol was followed in the case of Indigenous groups. For each study, Traditional Owner groups with recognised Native Title claims over lands affected by mining were contacted and asked to nominate an appropriate spokesperson or spokespersons; that is, someone with authority to speak on behalf of ‘country’. The interviews with the stakeholders sought to gain information about attitudes towards mines, values, interests and aspirations in relation to positive and negative social, economic and environmental past, current and future impacts of the mines on self and others in the community, and perceived solutions to the issues. This was a goal in itself and at the same time the researchers sought to feed the issues into the development of the quantitative surveys. Surveys were conducted with mine workers, businesses and residents to compare perceptions of the social and environmental impacts of coal mining and to identify socio-demographic characteristics. All surveys were based on random samples of target populations: 122–319 residents,

Table 2: Details of data collection

		Blackwater	Springsure/ Rolleston	Moranbah	Nebo/ Coppabella
Data collection period		October 2005	November 2005	September 2006 –March 2007	September 2006 –March 2007
Data collection techniques		Semi-structured interviews with key informants Household survey	Semi-structured interviews with key informants Household survey	Semi-structured interviews with key informants Household survey Business survey Work camp survey	Semi-structured interviews with key informants Household survey Business survey Work camp survey
Number of interviews/ surveys returned	Key informants	15	17	24	14
	Households	207	195	319	122
	Businesses			47	11
	Work camp			70	69

11–47 businesses and 69–70 work camp residents were surveyed in each of the 4 case studies. Data were collected either by phone, email, or using a traditional pen and paper instrument. The household surveys collected data regarding length of residency; residential location preferences and factors that drive location choice; whether rising accommodation costs were seen as a positive or negative impact; views and preferences on work camp development versus permanent housing; attitudes towards some environmental issues; the percentage of income spent locally versus elsewhere; perceptions about the standard of facilities, services and community infrastructure; and views on the potential development for the community. The business surveys sought to gain information about the percentage of business custom from the mines; recruitment strategies; staff, turnover and profit figures; the proportion of business expenses that are sourced from the local area; and views and preferences on work camp development versus permanent housing. The work camp surveys were about expenditure patterns; residential location choices and plans; demands for different types of housing; and the demands for different types of services and infrastructure. Full interview and survey data can be found in the

following research reports: *Socio-economic impact assessment and community engagement to reduce conflict over mine operations research reports 1–11* (CQUniversity, 2005/2006); *Economic and social impacts of the Coppabella and Moorvale mines research reports 1–5* (CQUniversity, 2007a); and *Impacts of the coal mining expansion on Moranbah and associated community research reports 1–7* (CQUniversity, 2007b).

Findings

This section will discuss positive impacts of the mines; demographic change; demand for and cost of access to accommodation; business and employment opportunities and constraints; atypical work schedules; environment and amenity; and Aboriginal cultural heritage.

There were significant impacts, both positive and negative, reported for the mining industry on all towns. The relatively high incomes, for example, of people working in the mining industry and of business people servicing the mines were seen to generate positive impacts on all towns. As one informant (a contractor active in many community and volunteer organisations) said:

The coal mines have created so much employment and activity in town. There isn't as many local people, so they

look for contractors more and more for other jobs; there isn't one business in town that isn't going ahead with the extra people. Huge opportunities for expansion ... some don't seem to be too enthusiastic but others seem to be getting right behind it ... there are three electricians in town; one works in the mine, so the other two get more work from private citizens. Everybody gets an advantage from the mines, either directly or indirectly.

Other positive impacts were identified by respondents as: population growth and diversification in communities; increased financial support in towns; developers, land and house owners benefiting from substantial increases in values; education of the communities (e.g. popular open days at mine sites); improved service levels in town (e.g. a mining company bringing out a physiotherapist); improvements in infrastructure such as roads and communications; mining companies and contractors lending out equipment to councils and communities; town development through the building or renovation of houses by the mining companies or their employees; and various landholders benefiting by having been able to access water from pipelines established by mining companies, entering into agreements (e.g. leaseback) with mining companies that purchased their properties, and mining companies were seen as receptive towards requests for grazing on mining leases not directly impacted by mining. Most Moranbah and all Nebo/Coppabella business survey respondents indicated that the coal mining companies had had a mostly positive impact on their business. The mining industry accounted for 80% of business custom of the latter respondents.

Overall, most stakeholders were positive about mining (in general) in the area and the benefits they believed it brought. Despite this, the emphasis in this paper is on the negative impacts which were more complex in nature. It is also important to keep in mind that people who were unhappy with the impacts of mining and moved out of the area do not have a voice in these studies. Additionally, some of the stakeholders may have been reluctant to emphasise what they saw as negative impacts. Whether justified or not, one of the stakeholders (a farmer's wife) believed that:

The mines are here to stay anyway; if you complain, the companies might decide to stop funding community projects

and then you have not only the negative impacts but no positive impacts as well.

Negative impacts are described in the following paragraphs, and summarised in Table 3.

Demographic change

There was some population turnover identified by key informants in the rural communities of Springsure and Nebo, partly attributed to concerns about culture changes with increased mining employment. However, the permanent population was growing in all towns except Coppabella where non-railway workers could not access permanent housing. This population growth was predicted to continue at least until 2021 (DLGPSR, 2007) (see Table 1). As with demographic change associated with the previous mining boom, this population growth was associated with an atypical demographic structure in several important ways. First, the permanent population base was supplemented by a substantial population of itinerant workers based in temporary accommodation while on shift (see Table 1). This was most dramatic in Nebo and Coppabella where temporary residents outnumbered permanent residents and least evident in Springsure and Rolleston where there were no work camps. Second, while it was expected that that temporary population of itinerant workers would be predominantly male, the permanent population of all towns except Moranbah was also increasingly male dominated. Third, there were some indications of high population turnover as well as growth.

Each of these three trends was related, at least in part, to limited availability of permanent housing and associated inflation in the purchase and rental cost of that housing (see below). Work camp surveys indicated that 11% of Moranbah and 12% of Nebo work camp residents were interested in moving permanently to these towns. While that leaves a much larger group who would prefer to maintain their permanent residence elsewhere, it remained the case that accommodating these workers and their families would lead to significant population growth, particularly in Nebo. Failure to provide adequate housing for prospective permanent residents locked these communities into two socially negative feedback cycles, as became clear

Table 3: Impact summary

Issue/Town	Blackwater	Springsure	Rolleston	Moranbah	Nebo	Coppabella
Accommodation in short supply and expensive	x	x	x	x	x	x
High turnover and/or dwindling school enrolments	x			x	x	x
Staff shortages	x	x	x	x	x	
Itinerants spend little money	x					
Locals spend little money					x	
Clubs/organisations under pressure	x	x	x	x	x	x
Itinerants cause visual and crime impacts and impacts on the social fabric and identity of the community	x	x	x	x	x	x
Shift work/equal time rosters/ itinerant lifestyle cause physical, mental and social health issues	x	x	x	x	x	x
Increase in traffic density and (potential) motor vehicle accidents	x	x	x	x	x	x
Mines cause coal dust, noise and power shortage	x			x	x	x
Mines cause water shortage				x	x	
Lack of shops, basic health facilities and community spirit	x				x	x
Permanent population outweighed by itinerants					x	x

from the interviews. On the one hand, an increasing proportion of the permanent housing stock was actually taken up by itinerant workers who preferred to enter share housing arrangements than to live in work camps. As rental costs increased, it was correspondingly difficult for anyone not sharing with several others to access such housing. On the other hand, the ability of these towns to generate the critical mass of permanent residents necessary to underwrite human services and other facilities was

further undermined, in turn making them less desirable to permanent residents.

These cycles can be illustrated with reference to school enrolments. According to key informants, total student numbers in Nebo had not changed over the preceding three years despite population growth (the highest growth rate in permanent residents of the communities studied), while schools in Moranbah were experiencing slightly increasing numbers. Blackwater and Coppabella schools experienced a

downturn as families were replaced by ‘single’ men. High student turnover was evident in Nebo (with students coming and going, without changing the total number of students), Moranbah, Blackwater and Coppabella, especially at junior levels, as mine workers took advantage of high labour demand to move to better jobs or more personally desirable locations. One of the teachers explained:

All year there’s been new children in the classes; I’m teaching three classes and all year there’s been children coming and going. One went to Singleton; the father had a good job at the mines there and the whole family moved with him. Others moved to Mackay while dad stays here, two little girls have arrived at the end of the last term. My grandson is in Grade 1 and he had three teachers in one year, not quite normal. Whether they come with their husbands to work in the mines? I don’t think you would find that in cities, to have three teachers in one year.

In those two towns with low populations of mine workers, Springsure and Rolleston, no problems were evident with student loss or turnover (see Table 3).

Demand for and cost of access to accommodation

An inadequate supply of permanent accommodation in all towns (see Table 3) contributed to rapidly rising rental and purchase prices. Median weekly rents in 2008 ranged from \$220 in Rolleston to \$680 in Moranbah (see Table 4). This compared with a median weekly rent of \$340 in Brisbane, the nearest capital city. Importantly, the rate of growth in median

rents for all towns where data were available was considerably higher than in Brisbane; ranging from 160% in Springsure to 394% in Moranbah compared with only 100% in Brisbane.

While rising accommodation costs could be seen to benefit existing home owners, whether owner occupiers or landlords), less than a third of residents saw rising house prices as a positive impact. Conversely, about 85% of Springsure/Rolleston and 94% of Moranbah householders indicated that affordable housing and rentals would encourage them or other families to stay longer in the area. Rising accommodation costs were seen to generate several negative impacts including: financial hardship for low income earners and one-income families; reports of workers camping or sleeping in their cars as even temporary accommodation facilities filled up; difficulties attracting or retaining employees in businesses unable to compete with the wages paid by mines; and an acceleration of the trends noted above to increasingly atypical demographic structures and high population turnover. According to one woman who worked in emergency accommodation:

It’s getting harder and harder for people who don’t work for the mines to be able to afford to live here; rents starting at \$500 a week ... People [working in the] local supermarket, local businesses, can’t afford those types of rents. Even guys working for the mines, if they are the sole provider for the family, even for them it gets difficult if they pay \$500–600 per week rent out of take-home pay ... Some guys have families elsewhere and they pay \$165 per

Table 4: Median weekly rents (any dwelling type, any number of bedrooms)

Median weekly rents	1998	2003	2008	Growth rate 1998–2008
Moranbah	137.8	235	680	+393.5%
Nebo	117.5	220	450	+283.0%
Rolleston	80	85*	220*	+175.0%*
Blackwater	145	140	380	+162.1%
Springsure	100	137.5	260	+160.0%
Coppabella	unknown	unknown	unknown	unknown
Brisbane	170	220	340	+100%

*(Partly) based on fewer than 5 bonds lodged

Source: Residential Tenancies Authority, personal communication, October 2007 and January 2009.

week if they're lucky enough that a mine subsidises a room in a camp, but they've still got their petrol and rent where their family is living and still have to support that family.

High building costs and the reluctance of banks to mortgage properties in relatively isolated locations dependent on mines with finite operational lifespans constrained the ability of private entrepreneurs to meet demand for low-cost housing and promoted inflation in the cost of existing housing stock. A colleague of the accommodation worker quoted above argued that:

Mining has encouraged people to buy \$300–400,000 homes in a town where maybe in five years time [those houses will] not be worth anything.

Most local stakeholders believed that state government ought to provide low-cost housing for families, the general local workforce and low-income earners, while mining companies ought to provide housing for their workers. Local government was seen to have a key role through the provision of affordable land for permanent housing and for small businesses to build (homes) without restrictions. Work camps were generally seen as a practical way to deal with the short-term need for accommodation, and with fluctuations in employment levels, but as less desirable in the long-term than permanent housing, even where this housing was shared by groups of otherwise itinerant workers. The only partial exception to this view was expressed by businesses in Nebo who believed that the local government should relax restrictions on the development of work camps in that town. Paradoxically though, the majority of the non-resident workforce who were interviewed or surveyed preferred to commute to the area, and would not move to the mining towns, even if more housing became available.

Business and employment opportunities and constraints

Opportunities for non-mining businesses and services were constrained in all towns by difficulties attracting and retaining staff (see Table 3). As one interviewee in Blackwater said:

The hairdresser can't get people to work there, so you have to make appointments in advance. You have the population

base here but a lack of workers. It's hard to attract people on lower wages; the mines pay much more, so once young people are allowed to drive they work on the trucks in the mines. And I lost people to the council; they also pay more.

Disappointment was also expressed, in Nebo especially, about the lower than expected level of economic stimulus from mining as limited expenditure by non-resident workers and limited development of service and non-mining businesses restricted the capture and multiplier effect of mining revenues. Located approximately one hour drive from the coastal city of Mackay, even permanent residents of Nebo spent more than 70% of their income in Mackay as the community survey in Nebo revealed.

Despite these constraints, economic development in non-mining industries was still underway. In fact, most businesses reported that while recruitment was becoming more difficult they had managed nevertheless to employ successful recruitment strategies. These strategies included offering employment conditions similar to those offered by mines, employing locals, and employing overseas workers. The average business in Nebo and Coppabella had 18% more staff, 41% more turnover and made 16% more profit in 2006 than in 2004, while the average Moranbah business increased staff numbers by 38%, turnover by 57% and profit by 26% over the same period.

Atypical work schedules

Key to the development of long-distance commuting by mine workforces was the introduction of equal time rosters based on 12 hour shifts, day and night, organised in blocks followed by an extended period off. Typical patterns include four days on and four days off, or seven on and seven off. These arrangements allow mine workers to maintain permanent residences in larger centres where they and their families have better access to employment, schooling, health care, recreation, housing and other services. If such workers did not commute to the mine site, it is likely that it would be their families instead who would be forced to travel in order to access such opportunities. By locating their permanent residence in a large centre and commuting to the mine site, mine employees and their families are also less vulnerable to mine closures

or changes in employer that would result in forced relocation from single-enterprise mining towns (Newton & Robinson, 1987; Robinson & Newton, 1988). Another advantage of FIFO is that towns may over the medium to long-term gain a benefit from less pronounced boom and bust cycles.

Equal time rosters and long-distance commuting were, however, extremely unpopular with non-mining residents and other key informants. These groups associated current shiftwork practices with a decline of community organisations, lack of integration within the community, criminal and antisocial behaviour, unhealthy work practices, family stresses and breakdowns, substance abuse, and an increase in motor vehicle accidents.

Despite population growth, sporting and recreational clubs and other community and volunteer associations were under pressure in all communities (see Table 3) due to reduced numbers of members and leaders. Participation in community organisations and other voluntary activities is extremely constrained by the atypical work schedules used across the mining industry. During shift blocks, extended work days mitigate against employees engaging in any activities aside from working, eating and sleeping. Time off, while extended, does not follow the weekly and monthly patterns around which community associations organise their activity. And, of course, for an increasing number of mine employees that time off is spent outside the immediate area while, for their families, no time at all is spent in the direct environment. Thus, the atypical demographic structure promoted by shiftwork and commuting reduces not only the viability of government or private sector provision of human services as discussed above, it reduces also the viability of the volunteer organisations that frequently step in to provide these services in rural and remote communities. In Nebo, for example, several informants commented on difficulties recruiting volunteers for the State Emergency Services (SES) while, at the same time, the growing population of itinerant workers was generating more road traffic, more accidents (see below) and, therefore, more demand on SES volunteers.

Lack of interaction and integration between permanent and temporary residents contributed

to an 'us and them' attitude and a belief among permanent residents that itinerant workers were responsible for a range of additional social problems. Long-term residents of Nebo and Coppabella, for example, felt pushed aside by itinerant mine workers and resented the idea that their towns would become known as mining towns (see Newton & Robinson, 1987). Residents and key informants in all the towns believed that temporary residents were responsible for a disproportionate share of criminal and antisocial behaviour ranging from general noisiness and messiness to drug use and trafficking, alcohol abuse, dangerous driving, sexual assault, property damage and theft. While fear of crime is itself a significant negative social impact, there is some additional evidence that supports residents in their belief. Specifically, offences against the person (especially sexual assault) rated higher in Nebo and Belyando Shire (this includes Coppabella and Moranbah) than in Queensland as a whole and increased from 36 incidents per 100,000 people in 2000/01 to 299 incidents per 100,000 people in 2002/03. In 2002/03, Duarina Shire (this includes Blackwater) had higher rates of offences against the person (which had increased from 121 to 173 incidents per 100,000 people between 2000/01 and 2002/03) and other offences (increased from 305 to 430/100,000 over the same period; especially good order offences) than Queensland as a whole. In 2002/03, Emerald, Bauhinia (Rolleston and Springsure) and Peak Downs shires had lower rates of offences against persons (although these rates increased from 100 in 1998/99 to 168 in 2002/03 per 100,000 persons) than Queensland as a whole, but a significantly higher rate of other offences (especially good order offences) although these decreased from 763 in 2000/01 to 723 in 2002/03 per 100,000 (OESR, 2002, 2004).

Informants were not solely concerned about the impacts of shiftwork practices on local communities. Some were also concerned about the impacts of shiftwork practices and FIFO arrangements on miners and their families. These included: a lack of extended family and other support networks; monotonous work; obesity; depression; family breakdown; alcohol and substance abuse; family violence; and financial difficulties associated with

housing costs, poor understanding of the real cost of car leasing arrangements, and indebtedness. Some also believed that locals did not give mine workers a chance to integrate.

Motor vehicle densities and accidents were reported by informants to have increased in all towns and surrounding districts. While improvements to a number of roads may have mitigated some of the additional accident risk associated with rising traffic densities, this was offset, it was believed, by increased travel times, fatigue, speeding, wide/heavy loads, and damage to road surfaces by increased traffic loads. The management of fatigue associated with working 12 hour shifts and with commuting either side of each shift block was identified by virtually all mining companies as a significant health and safety issue, and there were proactive programs in place, educating/training workers, for example. However, there was less emphasis on the underlying cause of fatigue (i.e. shifts). According to informants, the shortage of affordable accommodation in the mining towns and the fact that not all mining companies provided buses for their employees further reduced the effectiveness of fatigue management plans. The practical difficulties faced by mine employees in managing fatigue were reiterated by a stakeholder:

My husband had to start work at 6:00. He had to leave Mackay at 3:00 to make sure he got here. If he had three days off he'd spend the first day winding down, then the second day semi-human and the third day he's winding up again to go to work and not able to relax and go to sleep properly so had only 2–3 hours sleep before getting up and on the road.

Thirteen percent of workers in Di Milia's and Bowden's research (2007) reported falling asleep (anything between once and more than four times) while driving to their day shift and no less than 23% while driving home (similar for day and night shift) in the previous 12 months, which resulted in running off the road/shoulder, braking for no reason and/or crossing the middle line, all of which could have resulted in fatalities.

Environment and amenity

Mining activity was increasing around each of the towns reviewed in this study, but there were

differences in the perception of environmental, health and amenity impacts from coal mining between the people of the rural towns (Springsure and Rolleston), and the people of the mining-focus towns (Blackwater, Nebo, Coppabella and Moranbah). Only a minority of key informants from Springsure mentioned noise and dust from trucks and trains. No informants from Rolleston complained about these or other nuisances. Informants from the other towns raised both these and additional issues such as power shortages, vibration, and a range of water related issues including over-extraction of groundwater, interruption of animal and household water supplies, and disruption of overland flows (see Table 3). Some were particularly concerned about the impacts of these issues on farmers and graziers. The visibility to residents of noise and dust pollution contributed to a proactive approach among mining companies to pre-empting and dealing with complaints through monitoring, complaint registers, newsletters etc, but informants were still concerned about noise from trains interrupting telephone conversations, and coal dust (from blasts, coal trains/trucks and stock piles) soiling house interiors and increasing asthma cases. Participants commented that:

There's an increase in mines with unwashed coals; if the wind is south, my house gets a lot of coal dust. [And] noise of trains; I can't talk on the phone when they get past (health worker living in Bluff, 20 km from Blackwater).

The only thing that annoys me; if they do a blast you get covered in coal dust. [She said that she had cleaned her house a day earlier and it was clearly covered in dust as there had been a blast after that]... Luckily my daughter grew out of asthma; otherwise she would be in big trouble... Young lad next door has a lot of allergy problems with his eyes. Seems to be mainly since a lack of water; the coal gets shit-dry. If you pass a coal train; they have a big cloud of air-born coal dust when you drive past them or when they come into town (wife of QR-driver and long-term Coppabella resident).

Asthma is always been up; don't know about other towns but a very high rate of asthma here. I don't know what's the cause. I have it now, never had it for years, but I got it 10

years ago. My daughter nearly died from an asthma attack. She was 23–24 years old, never had asthma. 10 people that I know personally that died of asthma attacks. This [plan to develop mines closer to town] will only make that rate higher (Moranbah business person).

The amenity of the towns themselves were impacted upon more by the social and economic landscape of the urban environment; a landscape that was often as affected by development decisions taken decades previously as by the most recent mining boom. Interviews with community representatives and household surveys suggested, for example, that the still predominantly rural towns of Springsure and Rolleston, and the purpose-built mining town of Moranbah, were more attractive to permanent residents than were Nebo, Coppabella and Blackwater, all towns that had been established for other purposes only to be expanded dramatically in response to mining development. Springsure and Rolleston had a strong sense of community spirit and access, in Springsure, to relatively good health facilities. Even though Moranbah and Blackwater were similar in some respects, both mining towns of approximately the same size, Moranbah had more shops and services. Attention to landscaping and planning at the time of establishment led Sharma (1983) to describe Moranbah as ‘outback suburbia’. One of the key informants to this study said ‘Moranbah is like a mini-city’. Blackwater, by contrast, had developed in more haphazard fashion since the 1960s resulting, according to Sharma (1983, p. 158), in ‘a somewhat bleak looking result’. The town still lacked a clear centre or identity and had limited shops and services.

The fact that the permanent population was by far outweighed by transient residents in Coppabella and Nebo impacted dramatically on residents’ sense of community. The sight of work camps housing close to a thousand workers each both reinforced this sense of being ‘taken over’ and was a significant negative impact on visual amenity in its own right.

Aboriginal cultural heritage

The impacts of mining on Aboriginal people pertain both to legal rights as Native Title claimants and to cultural heritage. Native Title confers property rights that allow for the maintenance of traditional

law and culture to the extent claimed and to the extent cognisant with the tenure and use of that land. Only claimant groups or determined holders possess Native Title rights. Other groups have no legal mandate to speak for country. As a form of property right, Native Title provides a legal basis for the involvement of Aboriginal groups in planning processes above and beyond that of other interest groups (e.g. voluntary conservation groups). Further, while the existing Aboriginal populations of the towns and local government areas included in these studies was low (an outcome of people either being forced from the area during European colonisation or moving voluntarily as a result of limited employment opportunities), Native Title rights extend to include Traditional Owners who are not necessarily resident.

Cultural heritage is not a simple subset of Native Title and may continue to exist where Native Title rights have been circumscribed or extinguished. Further, Aboriginal cultural heritage is not necessarily restricted to artefacts, archaeological sites and other material relics and may include the spiritual and environmental integrity of the landscape itself (Godwin, 2001). Maintaining access to country is fundamental to Indigenous cultural heritage management. Mining necessarily entails a substantial negative impact on Aboriginal cultural heritage through the disturbance of large areas of country. However, the implications of this impact must be assessed in context of previous dispossession and dispersal.

Two broad factors were identified as potential impediments to successful communication and negotiation between Traditional Owners and mine operators over Native Title and cultural heritage. The first was the belief among Native Title claimants that despite their unique status and property rights they negotiated from a very low power base, creating a temptation among mining companies to make no more concessions than were necessary to secure agreement and allow mining to proceed. One Indigenous informant argued that when a:

town [is] full of coal miners, the first thing they say: ‘there’s a black fellow looking for cultural heritage’. They don’t understand that we just want to protect our lands. We have no real stopping power because the State Government will

say it's done. You just come to the table and take what you can. But most [people] think we're here solely to try to stop production, which is totally wrong; all we want is that our cultural heritage is either saved or put somewhere where our children can see it, for teaching purposes.

The second impediment to communication and negotiation was the sheer size and complexity of mining companies. Some mining companies helped to resolve this by appointing a designated contact person. However, this person was seldom Indigenous and Traditional Owners themselves were still expected to participate on a voluntary basis with little financial support or training. Exacerbating this issue was the structure of many mining ventures, in which one company operated as project manager and others were subcontracted to undertake mining and other activities. While Traditional Owner groups negotiated with the project manager on matters related to cultural heritage management, they were required to deal with contractors on issues such as employment and training; a priority area for many Traditional Owner groups. The willingness and capacity of contractors to work with Indigenous people was perceived to vary. Despite some success stories, other training and employment opportunities were not realised:

When we negotiated with [the mine], they [contractor] offered us 20 positions for Traditional Owners. They put the boys through three weeks of TAFE; first aid, bobcat, fork-lifting, got them skilled up. And ended up with only two people on-site. [The contractor] didn't give the other 18 guys the job in the end. Good gesture from them, just to get the next lot of clearing to that country. [Another contractor] is doing the same now.

Some mine operators were seen to go well beyond the minimum necessary to meet their legal obligations to Aboriginal people. Cultural heritage management, in particular, provided opportunities for capacity building and business development with enterprises established to identify and manage cultural heritage, playing a crucial role in ensuring Aboriginal control of cultural heritage. Playing an active role in cultural heritage management also provided access for Aboriginal people to traditional lands. While the very nature of mining may be seen to infringe the cultural integrity of the landscape and attracted considerable criticism from Traditional

Owners, the reality of prior exclusion due to agricultural land use meant that many also saw mining as a net gain due to the potential for access to sites for cultural heritage management, access following mine closure, and access for those Indigenous people who had left their traditional country. Concerns were raised, however, about the sustainability of cultural heritage enterprises given the spatially specific nature of their work and thus dependence on continued mine development. Further, with the exception of cultural heritage enterprises, there was very little evidence in any of the towns of partnerships between mines and Traditional Owners that had resulted in the development of viable Indigenous businesses.

Conclusions

Just as the mining towns of the 1970s were not the wildly dysfunctional frontier towns of the popular imagination, neither were these at the beginning of the 21st century. However, significant impacts of new mining developments from the recent boom were imposed on Bowen Basin communities, some of which raise important questions for planning and decision-making. These impacts are summarised in Table 3. The increased reliance on a non-resident workforce and the increased mobility of local residents has meant that an increasing proportion of the economic stimulus from mining is flowing out of the mining towns into the regional centres (Rolfe et al., 2007). Housing shortages and price spikes have also limited the potential for flow-on economic development and created pressures on non-mining businesses and socio-economic groups. The increased use of non-resident workforces brought additional problems of fatigue, family isolation and community fragmentation.

The number of coal mines close to a town, and the extent of the non-resident workforce, appear to be key factors determining the extent of social impacts. The two rural service towns, Springsure and Rolleston, each had only one mine in their proximity and did not have a growing temporary population. Mine employees located in these towns were regarded as locals. Springsure and Rolleston experienced fewer environmental impacts, traffic accidents, and turnover in school enrolments than did the other towns. Coppabella and Nebo, on the other hand, illustrate

that while the impacts on existing residents are potentially most acute in towns where the itinerant population comes to outnumber the permanent population; such towns may, in the process, become even more attractive to temporary residents. Community spirit and/or identity issues were also associated with the loss of women and families from Coppabella and Blackwater; the lack of a clear town centre in Blackwater; and the largely unplanned expansion of Nebo, Coppabella and Blackwater, all towns established for other purposes, in response to mining development. By contrast, the deliberate attempt to plan Moranbah so as to feel like an established community back in the 1970s appeared to have had lasting benefits in terms of the ability of the town to generate a sense of community and to attract service industries and permanent residents. Whether or not Blackwater deserved its reputation as 'bleak' and 'uncentred' (of course, there are many residents and local government officials who would dispute this!), the perception that this was the case continued to render it a less desirable location by potential residents.

The ability of towns to attract and retain permanent residents serves as a useful proxy indicator of the number and magnitude of social, economic and environmental impacts associated with mining. However, it does not tell us a great deal, by itself, about the likely capacity of those same communities to deal with future downturns in the mining industry as experienced through the 1980s and 90s. The demographic structure of most towns was increasingly dominated by 'single' men with limited education or training. With the exception of Coppabella, 'normalisation' has ensured that irrespective of whether these towns were established as company towns or not, most housing is now in private ownership. Any reduction in mine-related employment, some indications of which were beginning to appear in early 2009 in response to the global financial crisis, will very likely leave behind essentially unskilled workers with limited mobility. While some towns may experience less economic and social disruption than others, none have been able to use the current mining boom to leverage other economic development opportunities that might provide additional insurance against welfare dependence.

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