

## Higher Education in Northern Australia – the Impact of the Minerals Boom

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### Abstract

Since 2002, one of the primary drivers of economic growth in Australia has been an export-driven minerals boom. The focus of this minerals boom has been increased mining and minerals processing activity in regional areas of Queensland, Western Australia and the Northern Territory, resulting in the value of mineral exports from these states doubling between 2004 and 2008. Despite the current economic slow down, the long-term growth prospects of countries such as China and India indicate that this mining-based growth is likely to continue and be a key factor in many regional economies within Australia for the foreseeable future.

However, the economic growth associated with the minerals boom has created several very real challenges for regional economies in Australia's north. The increased demand for labour associated with the minerals boom has caused a significant skills shortage in many areas of regional Australia. This is likely to become a serious long-term problem for many of these regional economies, as many areas of Western Australia, the Northern Territory and Queensland have also experienced declining university enrolments during this period, further compromising the ability of these regions to meet future labour needs of industry. Declining enrolments have also placed a considerable short-term strain on many of the universities servicing these regions, creating further challenges for regional sustainability.

This paper examines the impact of the minerals boom to date on the demand for higher education in northern Australia, and the sustainability of regional higher education providers in high economic growth environments. A range of datasets are used to examine changes in the demand for higher education amongst student groups within these regions, and the potential consequences for regional employers and long-term regional competitiveness. Finally, it identifies challenges facing higher education providers operating in such environments, and the policy implications of these challenges for governments.

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## Introduction

One of the great contradictions facing Australia in the 21st century is that while its population and service industries become increasingly concentrated in key urban areas such as Sydney and Melbourne, Australia's economy is becoming increasingly reliant upon economic activity in remote areas of regional Australia.

Australia's new "Minerals Boom" has been much discussed in the media and in contemporary economic analysis. The growth of minerals exports from Australia to the rapidly growing economies of China and India has been one of the most significant drivers of Australia's economic growth in the first decade of the 21st century, and appears certain to play a key role in Australia's economic future.

What is often overlooked in this analysis of Australia's minerals boom is how much of that boom can be attributed to activities in a limited number of key regional areas in Australia's north and the impact that the growth in mining activities has had on those regions. Historically these regions have comparatively low levels of human capital development and educational attainment, and the impact of the mining boom has been to further decrease enrolments in higher education from these regions. Given the importance of these regions to Australia's economic future, consideration of their future educational and human capital needs is warranted.

## Australia's North and the Minerals Boom

Since 2002, Australia has experienced a mining boom with significant growth in both the volume and the value of mineral exports (Minerals Council of Australia, 2008). By 2007–08, mineral exports represented 41% of Australia's total exports (up from 29% in 2000-01) (Australian Bureau of Agricultural and Resource Economics, 2009b), and were making a significant contribution to Australia's economic wealth. This growth puts Australia in an almost unique position, being one of the very few developed nations to have this level of reliance on mineral exports. Of the 30 members of the Organisation for Economic Cooperation and Development (OECD), only Norway, which derives just over 50% of its export revenue from oil and natural gas exports, now has a greater economic reliance on mineral exports than Australia (Statistics Norway, 2009).

The main driver of Australia's minerals boom has been massive growth in minerals extraction and export from Northern Australia. The value of mineral exports from the "mining states" of Queensland, Western Australia and the Northern Territory more than doubled between 2002 and 2008, significantly outstripping export growth in the remainder of Australia (Australian Bureau of Agricultural and Resource Economics, 2009b). Most of this growth could be attributed to mining and export activities in regional areas of Northern Australia, areas that are physically and geographically remote from major population centres in the mining states such as Brisbane and Perth. These relatively mining-intensive regions include the coal mining areas of Central Queensland; lead, zinc and copper extraction operations in north-western Queensland; offshore gas extraction and processing serviced via Darwin in the Northern Territory; and the gas and iron ore extraction regions of the Pilbara and surrounding areas in Western Australia.

The growth in the value of mining activity in these regions has been substantial. In Western Australia, the value of mining and petroleum production increased from A\$28.397 billion in 2004 (Department of Industry and Resources, 2004) to

A\$71.787 billion in 2008 (Department of Mines and Resources, 2009). Approximately 64% of the value of the onshore mining component of that total can be attributed to mining activity in the Pilbara, which also supports a substantial proportion of the state's offshore LNG extraction industry (Department of Mines and Resources, 2009). Queensland's coal industry experienced massive growth, with exports growing from A\$5.946 billion in 2003-04 (Office of Economic and Statistical Research, 2004) to \$30.221 billion in 2008-09 (Office of Economic and Statistical Research, 2009). More than 97% of those exports were produced in Central Queensland coal mines, or were exported through Central Queensland ports.

Each of these mining-intensive regions is internationally significant in its own right as a mining powerhouse. Central Queensland's coal exports now total more than half of the world's seaborne trade in coking coal (Department of Mines and Energy, 2007). Iron ore exports from the Pilbara represent 16% of the world's total production of iron ore (Geoscience Australia, 2009).

In terms of future growth, the relative importance of the northern mining regions to Australia's mining industry and to Australia's economy as a whole can be gauged by examining projects currently under construction in Australia. As of October 2009, approximately 88% of all new investment in mineral and energy extraction in Australia – more than \$A92 billion – was being committed to projects located in the northern mining regions (Australian Bureau of Agricultural and Resource Economics, 2009b). In addition to this, all of the major mineral and energy processing projects currently under development in Australia are located in or draw on the resources of the northern mining regions (Australian Bureau of Agricultural and Resource Economics, 2009b).

These figures highlight not only the importance of these regions to Australia's economy, but also hint at how different these regions are from the mainstream Australian economy and how the mining boom has impacted regional economies. Despite the importance of this boom to the Australian economy, in 2006 only 1.17% of the Australian workforce was directly employed in the mining industry (Australian Bureau of Statistics, 2006). In mining intensive regions however, this proportion can be significantly higher. In the Pilbara, approximately 29% of the region's workforce was directly employed in the mining industry while in Northwest Queensland just under 20% of the workforce was directly employed in the mining industry during the same period (Australian Bureau of Statistics, 2006). In Central Queensland between 2001 and 2006, employment in the mining industry in the Mackay region grew by more than 80%, which in turn generated further growth in other key industries. Employment in the construction industry, necessary for constructing new mine sites, new infrastructure and new housing for the expanding workforce, grew by 64% in Mackay in the same period (Australian Bureau of Statistics, 2001, 2006). Growth in housing prices in the Central Queensland region meant that regional centres such as Rockhampton, Mackay and Bundaberg were all ranked in the 50 least affordable locations in the world for housing (Demographia, 2009) – an outcome that ranked some regional Queensland locations as being less affordable than London or New York. The experience of these mining regions during the peak of the minerals boom can therefore be said to be very different from mainstream metropolitan Australia, with mining having a very large and direct impact on their local economies.

## ***Mining and Higher Education in Regional Areas – The Theory***

The development of the education and skills-base of a region – or in economic terms, the development of its human capital base – is regarded as a critical factor in the long-term prospects for economic growth and development of that region. Studies of the relationships between education and levels of economic development by a number of authors at a regional and global level have shown a strong positive relationship between the development and strength of a region's human capital base and its level of economic growth and development (Reynolds et al., 2000). While various theories relating to economic development may differ in terms of the specific role that education and human capital development play in promoting economic growth and development (Oser & Brue, 1998), few dispute the importance of human capital development within an economy or the role of education in facilitating human capital development (Oser & Brue, 1998).

A considerable body of literature exists highlighting the difficulties that regional areas have in developing and retaining human capital. Within Australia, several studies have highlighted significant differences in enrolment and retention patterns between students from metropolitan and regional backgrounds, with regional students being less likely to enrol in higher education programs and, once enrolled, being less likely to complete such programs (DEEWR, 2010). Numerous theories have been put forward as to the reasons for these differences, with traditional explanations focusing on more limited access to higher education in regional areas as being a significant; however, more recent studies suggest socio-economic issues and differences between regional and metropolitan employment patterns being more significant (DEEWR, 2010). Internationally, Van de Meer (1996) notes a significant trend amongst new graduates to move from regional areas to metropolitan areas upon the completion of their degree programs. Longer term studies (Bynner et al., 2003) in the United Kingdom also show a tendency over time for degree qualified individuals to move from regional areas to metropolitan areas.

In terms of the impact of mining activity on higher education, Gylfason (2001) specifically examines the impact of mining activity on education in mineral-rich economies. Gylfason argues that minerals-based economies create a work force with relatively low skill levels, and offer little incentive for individuals to invest in their education or other forms of human capital development. From an economic perspective, this creates a real risk for the regional economy when shifts in the business cycle or structural changes in the economy occur – the relatively low levels of human capital development often mean that the region's economy is less able to adapt to such changes when they occur. Auty (1993) also notes the propensity of mining activity to “crowd out” other forms of activity in mineral-rich economies. In the context of education, he notes that the demand for resources (such as labour) to support mining activity frequently leads to mining companies absorbing surplus resources that would otherwise be used in other sectors of the economy (such as education). This again has the potential to impact higher education enrolments as the high salaries offered by many mining firms attract potential students into employment opportunities rather than continuing on with their studies.

In the context of Australia's northern mining areas, these theoretical paradigms present a number of challenges to the long-term sustainability of both the northern mining regions and Australia's mining industry. With most of Australia's mining activity focused in regional areas, previous studies indicate that retaining degree-

qualified graduates in regional areas is likely to present a major challenge to both regional and industry leaders. The challenge in this respect is not limited to mining companies recruiting and retaining tertiary qualified employees for mining production and processing roles, but also extends to government, business and other organisations providing teachers, nurses, accountants and other degree-qualified employees necessary for sustaining regional communities. In addition to the difficulties that previous studies have found with retaining degree qualified graduates in regional areas post-graduation, Gylfason (2001) notes the decreased willingness for individuals in mineral-rich economies to invest in their own education. As a result, regional communities and Australia's mining industry face the possibility of a decreasing pool of graduates from regional institutions and increasing difficulties in retaining these graduates in regional locations.

### ***Mining and Higher Education in Regional Areas – The Northern Australia Experience***

Historically, the key mining regions of Northern Australia have relatively low levels of higher education attainment compared to the Australian average. Census data collected in the 2001 Census – immediately prior to the 2002 start date for the minerals boom recognised by the Australian Minerals Council – all of the key northern mining regions had a significantly lower proportion of their population who had completed a bachelor degree qualification than the Australian average.

**Table 1. Percentage of Population who has completed a Bachelor Degree or Higher**

	<b>2001</b>
<b>Pilbara</b>	8.96%
<b>Northern Territory</b>	9.07%
<b>Northwest Qld</b>	7.49%
<b>Mackay</b>	7.00%
<b>Fitzroy</b>	8.01%
<b>Australia</b>	12.92%

From Australian Bureau of Statistics, 2001 Census.

Following the commencement of the mining boom, new enrolments in higher education programs in the northern mining regions suffered substantial falls.

**Table 2. First Year University Enrolments 2004 – 2008 by Geographic Region of Applicant**

	2004	2005	2006	2007	2008	2009
<b>Fitzroy – Central Queensland</b>	1231	1181	1097	1036	1096	933
<b>Mackay – Central Queensland</b>	868	720	727	732	769	662
<b>Western Australia</b>	13725	14268	13332	12991	12479	14086
<b>Northern Territory*</b>	NA	NA	1345	1550	1249	1280

\*Data for Northern Territory refers to applications, rather than enrolments.

From QTAC Statistical Reports 2003-2004 to 2008-2009, Tertiary Institutions Service Centre Applications and Offer Statistics – Admission Period 2003/2004 to 2008/2009, and South Australian Tertiary Admissions Centre Statistics 2005/06 to 2009/09

In the case of Western Australia, the extent of growth in the mining industry and the “fly-in, fly-out” nature of mining operations in the Pilbara (meaning workers in the Pilbara could live anywhere in the state and fly-in, fly-out of that region for work purposes, rather than being focused in a single regional location) saw a decrease in domestic enrolments throughout the state during the period from 2004 to 2008. The recovery in enrolments for 2009 may be attributable to the economic slowdown resulting from the Global Financial Crisis and the decrease in employment opportunities associated with that change (Tertiary Institutions Service Centre, 2009). The Northern Territory also saw a state-wide decrease in enrolments, with a small recovery in 2009. In Queensland, key coal-mining regions in Central Queensland saw substantial falls in higher education enrolments through the period of the minerals boom, despite a state-wide increase in enrolments over the period in question. The fact that Central Queensland’s mining activities rely less on fly-in, fly-out labour and instead draw more heavily on the labour force of the regions they operate in may be one factor in accounting for the differences among the various regions’ enrolment patterns.

Not only did fewer students choose to enrol in higher education programs, but institutions also found themselves facing increasing difficulties in retaining those students. The table below shows the worst outcomes in Australia from the 2009 Learning and Teaching Performance Fund with respect to student retention across all four Discipline Areas considered by the fund. Highlighted are the regional Queensland institutions, together with the West Australian and Northern Territory-based institutions most likely to be affected by the Minerals Boom.

**Table 3. 2008 Student Retention Adjusted for Institutional Student Profile  
Highlighting Regional Queensland Institutional Performance**

	<b>Science, Computing, Engineering, Architecture and Agriculture</b>	<b>Business, Economics and Law</b>	<b>Humanities, Arts and Education</b>	<b>Health</b>
<b>Lowest Retention Outcome in Australia</b>	Australian Catholic University	University of the Sunshine Coast	Central Queensland University	Central Queensland University
<b>2nd Lowest Retention Outcome</b>	University of the Sunshine Coast	James Cook University	James Cook University	James Cook University
<b>3<sup>rd</sup> Lowest Retention Outcome</b>	Victoria University	Central Queensland University	Charles Darwin University	Murdoch University
<b>4<sup>th</sup> Lowest Retention Outcome</b>	Central Queensland University	University of Ballarat	University of the Sunshine Coast	Southern Cross University
<b>5<sup>th</sup> Lowest Retention Outcome</b>	James Cook University	Murdoch University	Griffith University	University of Southern Queensland

From Department of Education, Employment and Workplace Relations, 2009

Northern Australian institutions such as CQUniversity and James Cook University experienced consistently poor outcomes in all discipline areas. Other institutions affected by the mining boom, such as Charles Darwin University, the University of the Sunshine Coast and Murdoch University, also experienced poor performance in specific areas. These high levels of attrition are significant in that factors beyond the institutions' control, such as regional economic and employment outcomes, have been key drivers of institutional attrition and retention. Most analysis of attrition and retention to date has treated retention and attrition as being an outcome of institutional performance, and government policy has been to reward institutions for achieving low rates of student attrition. The irony of this situation is that many of the regional universities most affected by the mining boom are being disadvantaged not only by high levels of attrition being generated by regional economic growth, but also by government policy that incorrectly attributes this attrition to being a factor of institutional performance. This not only financially disadvantages institutions for being influenced by these external drivers, but also places an onus of responsibility and blame on institutions for being influenced by factors largely beyond their control.

## **Regional Universities, Regional Challenges and National Priorities**

The net impact of this change in enrolment patterns is that fewer students from Australia's key mining regions chose to enrol in higher education programs during the course of the minerals boom. In Western Australia and the Northern Territory, this fall in enrolments seems to have abated with the recent economic slowdown;

however, in other mining areas such as Central Queensland the downward trend appears to be continuing. Several regional universities affected by the mining boom also appear to have experienced particular challenges in terms of student retention when compared to other Australian universities. While a variety of region and institution specific factors make it difficult to compare the experiences of all institutions that have been affected to varying degrees by the mining boom, it does appear that many regional institutions that should have been positioning themselves to capitalise on the emerging opportunities in their regions have actually been disadvantaged by the strength of the economic growth in their local areas and the opportunities that this growth has presented to their potential students.

Decreasing new enrolments and higher attrition generally result in lower student enrolment and a decrease in graduate numbers. Several regional universities affected by the mining boom have experienced significant decreases in enrolments as a result of these trends. James Cook University saw its domestic enrolments fall from 8851.7 Equivalent Full-Time Students Units (EFTSU) in 2004 to 8264 EFTSU in 2008 (CQUniversity, 2010). Metropolitan universities in cities like Perth that are highly reliant on the mining industry have also been impacted by these trends – Edith Cowan University in Western Australia saw its domestic enrolments fall from 13101.37 EFTSU to 11474.05 EFTSU over the same period (CQUniversity, 2010).

While this has obvious impacts on institutional viability, it also creates issues for these institutions' regional communities as lower enrolments inevitably result in fewer graduates to meet the growing needs of their regional workforce. Between 2006 and 2009, the combined impact of several years of low enrolments and high attrition saw the number of graduates from Central Queensland University's Bachelor of Learning Management (Primary) program fall from 190 to 99 (CQUniversity, 2010). The number of domestic graduates from the University's Bachelor of Information Technology program fell from 44 to 25 during the same period, and even graduations from programs directly linked to the mining industry such as Engineering fell from 51 to 39 students (CQUniversity, 2010).

These falls in graduate numbers create significant pressures for the sustainability of both the mining industry and the broader economic and social fabric of Northern Australia's mining regions. Not only is the rapidly growing mining industry less able to rely on local graduates to staff its rapidly expanding workforce, but regional economies are less able to meet their own on-going needs in key services industries such as nursing and education. The alternative of offering post-graduation financial incentives to attract graduates from other areas to work in regional areas is becoming increasingly expensive. Salary data available via the Graduate Destination Survey (Graduate Careers Council of Australia, 2002) at the start of the Minerals Boom indicated that at that stage, the pure salary cost of attracting graduates from outside regional Queensland to Central Queensland was approximately \$2000 per graduate per annum. Difficulties in attracting graduates to regional areas have seen that cost differential increase. By 2010, Queensland Health was offering financial and other incentives of up to \$25,000 per annum to attract registered nurses to remote locations in Queensland, and subsidised or free accommodation to attract staff to many regional locations (Queensland Health, 2010). Any further falls in the number of students graduating from regional universities will run the risk of further increasing the salary and other costs of basic service provision in regional areas, and represents a significant risk to the competitiveness and sustainability of businesses and organisations operating in regional areas.

## The Future

While the recent Global Financial Crisis has detracted attention from the latest achievements of Australia's mining industry, the current indicators are that Australia's minerals boom will continue, and that the focus of this boom will remain in Northern Australia. More than A\$92 billion of new mining projects will begin operations in Northern Australia in the next five years. These projects not only include massive expansions of current industries, such as the A\$43 billion Barrow Island Liquid Natural Gas project in the Pilbara (ABARE, 2009c), but also the introduction of new industries into Northern Australia's Mining regions. The largest Liquid Natural Gas contract in Australia's history was recently signed for the extraction, processing and export of Coal Seam Gas from Central Queensland's coal regions (Australian Broadcasting Corporation, 2010). This is a staggering achievement for a region that less than five years ago had no commercial-scale Liquid Natural Gas extraction, processing or export capacity, and is in addition to a planned doubling of the coal exports from that region over the next ten years. The value of such projects and their contribution to the growth of the Australian economy is immense.

Regional universities will play a key role in supporting this on-going growth. Higher education in northern Australia is directly served by only three regionally-based Universities that are physically located in Northern Australia – CQUniversity in Central Queensland, Charles Darwin University in the Northern Territory, and James Cook University of North Queensland in North Queensland. All of these institutions have faced significant enrolment and financial pressures as a consequence of the minerals boom which to varying degrees has diminished their capacity to serve the needs of their regional communities and the booming minerals industry.

At a regional level, this creates significant issues when it is considered that the areas of Northern Australia most affected by this diminished capacity are the very regions expected to be the powerhouses of Australia's economic growth in coming years. Graduates will be required not only for technical roles in developing and managing mining projects and related infrastructure, but also to fill key roles in the health, education and service industries that play an integral role in supporting mining projects and communities. Ensuring the sustainability of Australia's mining industry entails not only meeting the human capital needs of the mining industry itself, but also ensuring that the social and community needs of regional communities are adequately addressed. ,

At a national level, this creates significant challenges in trying to apply the current government's drive to increase the number of university graduates (Gillard, 2009) at a regional level. The experience of the mining intensive regions during the minerals boom has been that high rates of employment and salary growth resulted in a significant downturn in higher education enrolments from within those regions. Any return to these boom conditions is likely to result in further pressures being placed upon these regions' higher education enrolments and completions. Such an outcome would certainly make it difficult to achieve a consistent, nation-wide increase in higher education enrolments and completions, or for mining intensive regions to improve their current education levels to levels comparable to Australian norms. The discussion around how to achieve this goal have to date mainly focused on supply-side issues – how to generate the additional places required to achieve the government's enrolment and completion targets – and on how to improve access to higher education for students from low socio-economic backgrounds

(DEEWR, 2010). The idea that potential students may not wish to take advantage of those opportunities and may instead prefer to continue to take advantage of very well paid but relatively unskilled positions in the mining industry has not been addressed. How to motivate potential students to enrol in and complete tertiary programs that involve a considerable investment in time, money and opportunity cost when extremely well paid alternatives exist requiring very limited formal training or study will be a key issue if the government's strategy is to be successful at a regional level in Northern Australia.

As such, the few regional higher education providers in Australia's north will play a key role in ensuring the sustainability of Australia's mining industry – the industry that is expected to drive Australia's economic growth in coming years. However, if these providers are to play such a decisive role in Australia's economic future, there needs to be recognition of the regional-specific issues and challenges facing these institutions. The rapid economic change and employment growth generated by the mining industry and the impact that these changes have had on institutional enrolments represent the most significant of those challenges. Dealing with these challenges at a regional level in Northern Australia will not only be a key issue for the regions involved, but also for the future of Australia's economy as a whole.

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