

**Proposal and/or Scoping Paper on**  
**Analysing the Socio-Economic Impact of Mining Activities in Bowen and Surat Basin Regions- A Time-Series and Cross Sectional Analysis with a Longitudinal Perspective**

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## **1.0 Background**

Queensland is a world-ranked producer of energy, especially coal and metallic mineral resources like bauxite, copper, silver, lead and zinc. Its mining industry is among the most efficient and technologically advanced in the world. The Queensland economy is regional and decentralized, and the mining industry provides the foundation of many of the regional clusters of economic and social activities within the state. Two such regional clusters with substantial mining activities are the Bowen and Surat Basin regions which are the premier coal producing regions of Australia. The Bowen Basin covers an area of approximately 60,000 km<sup>2</sup> in Central Queensland stretching from Collinville in the north to Theodore in the south. The Basin hosts more than 40 operational mines and produces over 100 million tonnes of black coal annually (Qld 2008). The Surat Basin covers a large area of 122,655 km<sup>2</sup> in Southern Queensland including local government areas of Toowoomba, Western Downs and Maranoa, with strong linkages through Banana to Gladstone. Until 2008, Queensland's major coal production of around 150 M tonnes per annum was concentrated in the northern Bowen Basin. However, presently the Surat Basin plays an increasing role in the economic development path of Queensland because of its large resources of open-cut thermal coal and coal seam gas (CSG). Cumulative CSG production from Surat and Bowen basins from 2000 (when commercial production began) to June 2007 was about 646 pet joules (PJ) (11.7 Mt). Annual production for 2007-08 was 150 PJ (2.7 Mt). Production in the Surat Basin, nevertheless, is set to increase over the coming years with a focus on export coal, coal seam gas and electricity from coal.

It is well known that large scale mining activities in communities have substantial socio-economic impacts (Rolfe and Miles 2007; Brereton, Moran et al. 2008; DIP 2008; Mayes 2008). Positive impacts range from increased local income and employment to infrastructure development, while negative consequences range from housing related problems to health issues. There have been an impressive body of reports, presentations and academic papers written on identifying the impacts arising from mining operations. However, a comprehensive study is yet to be performed in the Australian context. Concrete empirical analyses employing modern quantitative research techniques is needed to estimate the magnitudes of such impacts and their possible long term forecasts. Hence, this research is going to scientifically verify, estimate, forecast, and compare the overall socio-economic impacts of mining developments in these regions by implementing recent developments in time series and cross sectional analyses techniques. This study is going to be the first one which would analyse all the aspects of possible impacts from both quantitative and qualitative perspectives. Furthermore, this is going to be the first study to compare the experiences of both of the regions. Hence, the policy implications provided from such a comprehensive study would be more accurate and appropriate for greater sustainability of mining communities. On the basis of the comprehensive impact analyses, this study would further make major policy recommendations to restore and develop sustainable mining communities across Australia.

## 2.0 Impact of Mining Activities-Some Relevant Studies

Previous literature on the implications of mining activities reveals both positive and negative consequences. In one hand, Fargher et al.(2003) argue that, 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. On the other hand, Corden (1984) and Corden and Neary (1982) introduce the notion of ‘Dutch Disease’ which refers to the situation where rapid growth in one industry drives up the cost of labour and other factors of production. Hence, rapid growth in one sector like mining can also create offsetting economic and social consequences. For example, recently Saab and Ayoub (2008) show that worker remittances, foreign grants and oil revenues are the main factors behind the Dutch Syndrome in countries like Egypt, Jordan, Lebanon and Syria.

In addition to the above mentioned implications, there are several studies undertaken to ascertain the impacts of mining activities in different regions of Australia which are in order. Mayes (2008) investigates the impact of mining activities on the Ravensthorpe Hopetoun District in the south-east corner of Western Australia. He suggests that the positive impacts of mining activities are increased local employment, infrastructure upgrades, and social vibrancy by introduction of more families and youth in the locality. Negative impacts include insufficient housing, social change, and community division and a sense of powerlessness within the community. The Hunter Valley of New South Wales also has a long history of mining including coal. Connor and Albrecht’s (2004) study on the Hunter Valley finds that, due to the mining activities employment has increased which lead to community benefits and businesses have expanded in the region. In contrast, adverse consequences like vegetation and bio diversity loss, deterioration of physical and psychological health, environmental degradations like increase of dust, noise, and vibration have also been experienced.

There is literature that has found an association between increased or more severe respiratory diseases in those living adjacent to mining developments, however a causal relationship is yet to be found (Lewis and Hensley. et al 1998; Lewis and Toneguzzi et al. 1995). Despite this lack of causal relationship, environment issues continue to be a source of concern in the Hunter Valley (Brereton and Moran et at. 2008, Brereton and Moffatt 2005; Dalton 2003).

Several government and consultancy reports, numerous newspaper articles and few academic papers have endeavoured to identify the socio-economic impacts of mining activities in the Bowen and Surat Basin regions of Queensland. Most of these studies are exploratory in nature. They employ literature surveys; structured, semi-structured and unstructured surveys; focus group discussions and observation techniques. In a recent paper focussing on creating a strategic response to the negative issues of the Bowen Basin, Miles and Kinnear (2008) unpack several detrimental aspects of mining activities. Based on a desk top review, the report indentifies negative socio-economic implications like, labour shortages, infrastructure-services-housing problems, climate change, and planning barriers. Based on observations of the mining developments in Surat Basin, DTRDI (2008) predicts that communities in this region will be socio-economically pressured. More than 12,500 full-time equivalent positions are expected to be created by 2030, population is predicted to be increased by up to 40 percent, and the community infrastructure required to increase by one third, all indicate a significant impact in what is a comparatively sparsely populated rural area.

In a scoping study on Surat Basin, CSIRO Sustainable Ecosystems (2008) suggests that like the Bowen Basin, in addition to the economic benefits, the Surat Basin region is also subject to unintentional and socially undesirable effects due to socio-economic transformation. After conducting a listening tour across six ‘coal dependent and affected’ communities, Friends of the Earth (2009) identifies concerns about access to services. This report further reveals

concerns regarding environmental pollution, landscape degradation, health, housing, cost of living, agricultural variability, climate change, etc. In an Environmental Impacts Statement, Parsons Brinckerhoff Australia Pty Ltd.(2008) report some of the concerns of Surat Basin region communities like, impacts of water and air quality, housing, road safety, loss of families, lifestyle, crime, social divide, change to social activities, move from farming to mining, etc. The statement further indentifies some of the benefits of mining in this region. The benefits include more and better services, business opportunities, economic growth, more jobs, etc.

Rolfe and Miles (2007) and Rolfe, Ivanova, and Lockie (2006) introduce the concept of uneven spatial manifestations of mining development in Bowen region. These papers demonstrate how the local communities of Bowen Basin are concerned that they are shouldering many of the costs of accommodating new developments while the benefits flow more broadly to regional and state centres. Ivanova, Rolfe, and Lockie (2005) further indicate that the scale of coal mining growth has introduced numerous new social issues for regional and local economic development including employment and skill shortages, a shortage of affordable housing, social inequalities and lack of appropriate infrastructure and services.

In summary, despite the diverse purposes and perspectives of the selection of papers discussed, there are issues that arise consistently in regard to the perceived positive and negative impacts of mining activities. Some of the typical benefits are: increased overall and/or mining income and employment, growth/business development, improved infrastructure and services, and the social benefits that an increased population can bring. The typical negative impacts are: decrease in non-mining activities like agricultural income and/or productivity, infrastructure and service pressures, pressure in housing though unavailability and housing price increase, changed social dynamics, biodiversity loss, water and land quality degradation (example, coal seam gas water), and health impacts.

Previous studies in this field have mainly been exploratory, involved in identifying and/or guessing the above mentioned consequences. However, none of the previous research employs quantitative and/or econometric studies to ascertain and forecast the exact magnitude of such impacts. This type of impact estimation and forecasting would, nevertheless, make significant contribution in devising policies for developing a sustainable mining and economic community. Furthermore, a comprehensive study covering all the above mentioned aspects with the application of both quantitative and qualitative methodologies, *i.e.* a comprehensive impact study is nonexistent for Australian mining communities. Furthermore, previous studies concerning these two regions analyses them separately. However, a study comparing the socio-economic impacts experienced by these two regions is warranted. Comprehensive lessons learned report by comparing the impacts in these two regions would sharpen and develop future strategies for greater sustainability of these regions. The proposed study would, therefore, attempt to fill these gaps by performing a comprehensive study on these two regions which would assist long term sustainability of mining communities of Australia, especially the concerned regions. This study would also help the Australian Centre for Sustainable Business and Development (ACSBD) to position itself as the centre for research excellence in socio-economic impact studies in the mining industries of Australia.

### **3.0 Broad Objectives:**

The key objectives of the proposed study are:

- (a) Identifying the socio-economic impacts of mining activities in Bowen and Surat basin regions;
- (b) Comparing the socio-economic implications between the regions;

- (c) Devising possible policies for developing and restoring greater sustainable mining communities across Australia, especially in these two regions.

#### 4.0 Analytical Framework:

The proposed study would make significant policy recommendations in developing sustainable mining communities across Australia based on identifying socio-economic impact of mining activities in Bowen and Surat Basin region. A combination of both qualitative and quantitative research techniques would be implemented for this purpose (see Figure 1).

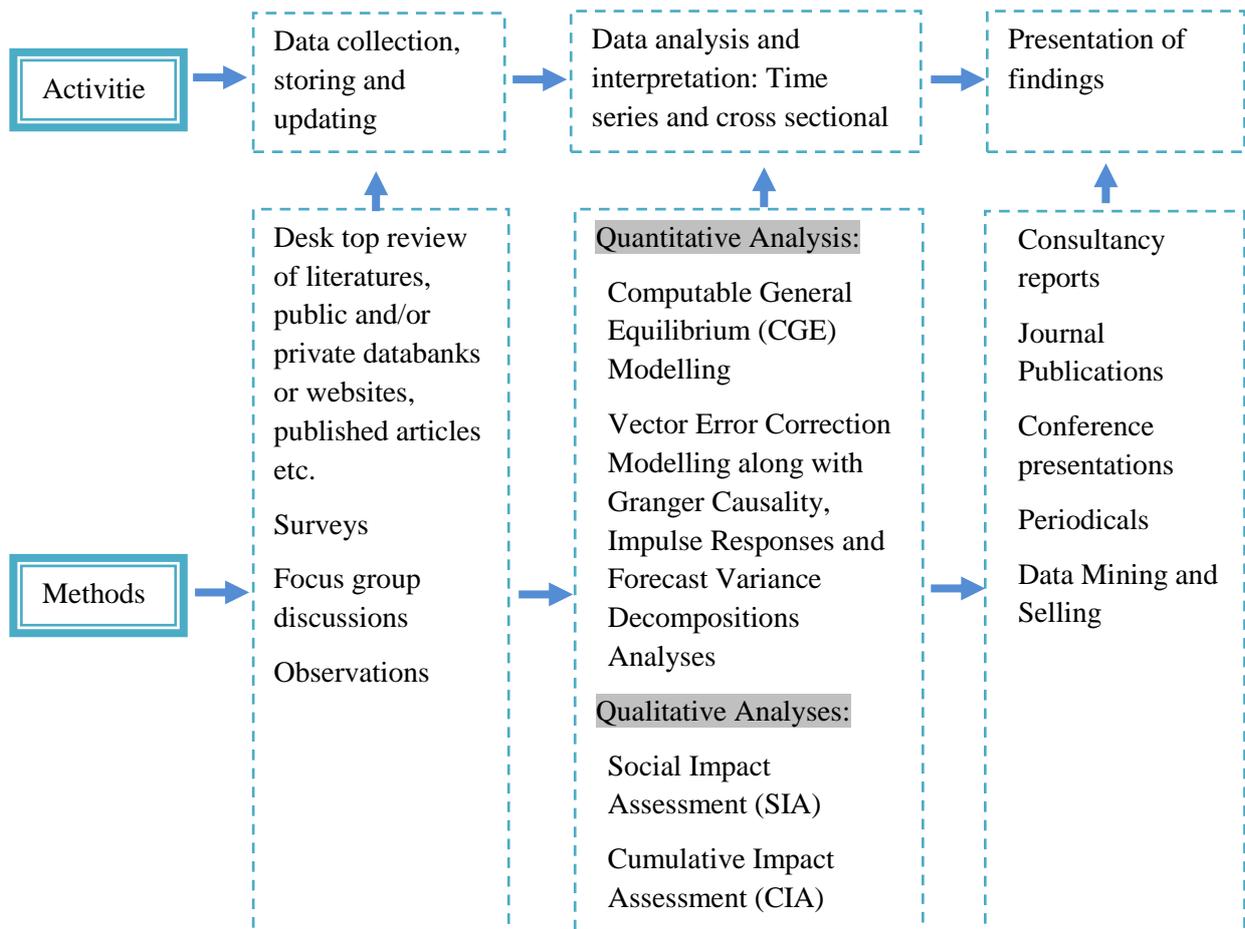


Figure 1: Activities to be performed and methods to be implemented

As presented in the diagram above, all the possible methods of data collection would be employed to collect accurate, appropriate and timely data of mining, socio-economic and environmental indicators. Some of the relevant indicators are offered in Appendix 1.

After collecting the above mentioned data on mining, economic, social, and environmental indicators, this study would perform extensive quantitative and qualitative analyses with the sophisticated modern techniques available. As far as quantitative analyses is concerned both time series and cross sectional methods like, Computable General Equilibrium (CGE) Model, Vector Error Correction Model (VECM) would be employed to devise accurate policy implications for long term sustainability of these regions. Social Impact Assessment (SIA) and Cumulative Impact Assessment (CIA) will be undertaken to perform qualitative assessment. On the basis of both quantitative and qualitative impact analyses the proposed study would furnish possible recommendations for greater sustainability of these regions and future mining communities. It is worth to be mentioned here that the researcher(s) would

handle all the issues related to the validity and reliability of research data and techniques in all the steps of this study: from research design to devising policy implications.

### 5.0 Project Concepts and Scopes:

A number of short-term and long-term projects can be designed to achieve the broader objectives outlined in section 3. These include:

- a) Analysing the social, economic and business sustainability of the mining activities in Surat Basin: Lessons learned from Bowen developments
- b) Developing socio-economic and demographic profile of local communities based on their perception about and involvement in mining activities in the regions;
- c) Identifying the economic and social feasibility of coal seam gas water treatment plants;
- d) Analysing the skill requirements of mining industries: Identifying gaps and proposals for academic and vocational supports from university level;
- e) Investigating the existence of probable Dutch Disease phenomena within the regions;
- f) Identifying the impacts of mining activities on economic, social and environmental performances and sustainability;
- g) Investigating the impact of mining activities on health (physical and mental) and safety of the communities;
- h) Impact of mining activities on agriculture and food processing units: An economic cost-benefit analysis of the overall economic performance of the regions;
- i) Impact of mining on cost of living in the mining regions;
- j) Analysing the economic and infrastructure contributions of the mining industries in the region;
- k) Identifying the environmental and ecological impact of mining and designing a future sustainability map for the region and so forth;

Hence, this proposed project would be able to make a wide range of academic and applied contribution by performing substantial work in systems environment consisting of several projects from different areas as presented in Figure 2.



Figure 2: The systems approach and scopes of the overall project performance.

## **6.0 Significance of the Study:**

The proposed research carries both academic and practical significance. Firstly, this is going to be the first study which would analyse all the aspects of possible impacts from both quantitative and qualitative perspectives. Secondly, this is going to be the first study to compare the experiences of both of the regions. Hence, the policy implications provided from such a comprehensive study would be more accurate and appropriate for greater sustainability of mining communities. Thirdly, this study would act as a primary step toward developing a centre for excellence in sustainable mining community research for the first time in Australia. And fourthly, this would be the first research to perform a comprehensive study undertaking a wide range of qualitative and quantitative methods involving a large number of socio-economic and environmental indicators.

## **7.0 Future Directions:**

In the process of performing this study, the Centre would eventually position itself as a place of research excellence in sustainable mining community development space. Some of the basic services this Centre would be able to continuously provide through launching this research are: one, developing and updating a data warehouse for the mining communities across Queensland which would ultimately lead to introducing a complete database of the whole Australian mining industry; two, performing quality academic research and consultancy papers related to mining activities and its impact on socio-economic and environmental indicators; three, publishing regular mining community updates. Hence, this study would be a preliminary step to develop this Centre as an organization like International Energy Agency in Queensland and ultimately in Australian perspective.

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## Appendix 1: Some Relevant Indicators

### ***Mining:***

Aggregate and disaggregate mining output, income and employment;  
Total and regional Coal Seam Gas (CSG) ground water production;  
Cost of groundwater treatments;  
Cost, salary package and pricing (for both future and options contracts) of the mining products;  
Mining labour profile: number in different skill level available and required, regional and non-regional (including intra-state, inter-state and international), *etc.*

### ***Economic:***

Aggregate and disaggregate total and per capita income in sectors like agriculture, food processing, *etc.*;  
Total and sector wise employment and wage rate in sectors like agriculture, food processing, *etc.*;  
Number and size of business service organizations within the region and number of new licenses;  
Number and sizes of Regional and non-regional business suppliers to mining;  
Number of job vacancies and types of skills required in different sectors, specially mining, Agriculture and food processing industries;  
Number of houses available, new houses listed and their market prices;  
Price levels of commodities and industrial products [*i.e.*, consumer and producer price index (*i.e.* CPI and PPI)]  
Average household income and expenditure;  
Price of rural land;  
Population, both locals and settlers.

### ***Social:***

Aggregate and disaggregate infrastructure investment;  
Number of primary, secondary, tertiary and vocational school enrolments;  
Number and types of skills available;  
Number and types of recreational facilities, clubs, organizations, *etc.*;  
Number of patients with mining activity related health issues like pneumoconiosis (black lung), asthma, *etc.*;  
Number of coal mining related deaths;  
Number of road accidents, specially related to mining activities;  
Number of patients with depression or psychological illness;  
Number of work place and environment related illness and accidents.

### ***Environmental:***

Monthly level of rainfall;  
Temperature data;  
Vegetation or plantation data;  
Data related to soil profile;  
Wildlife and habitat related data;

Air quality data;  
Land use data.