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Original article

## Drilling into community perceptions of coal seam gas in Roma, Australia

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### ABSTRACT

Coal seam gas (CSG) extraction and its conversion into liquefied natural gas (LNG) for overseas export is a recent phenomenon in Australia. These activities have, not surprisingly, attracted significant attention because of their perceived impacts on the environment and communities. However, community and stakeholder perceptions of these impacts, particularly for local development, have gone virtually unexamined in the literature. This paper aims to bridge this gap by exploring local perceptions of CSG extraction in a rural Australian community. In doing so, the research determines the efficacy of using social representation theory (SRT) and social exchange theory (SET) to assess community perceptions of mining-induced change. Findings reveal that the community perceives CSG extraction to provide positive economic impacts but is concerned about its ability to facilitate long-term economic growth and development. Long-term residents considered regional development to be targeted towards satisfying the needs of mining companies and 'new' migrants to the region. A lack of information about the impacts of CSG extraction has led to heightened apprehension among long-term residents.

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### 1. Introduction

Australia is considerably rich in natural resources and consequently has a lengthy and well documented history of mining (Blainey, 1993; Eklund, 2012; Minifie et al., 2013). As one of the world's largest mining countries (Pellegrino and Lodhia, 2012), mining activity and successive booms have long been the driver of economic development and societal change within Australia (Lawrence and Davies, 2011; Mercer et al., 2014), particularly in regional areas (Eklund, 2015; Tomaney, 2010). The most recent mining boom has been no exception, delivering significant economic and societal change (Mercer et al., 2014; Petrova and Marinova, 2014).

A key driver of this recent mining boom has been the development of several projects aimed at extracting coal seam gas (CSG) and converting it to liquefied natural gas (LNG) for exportation to key international markets (Trigger et al., 2014). CSG is a naturally occurring methane gas found in coal seams. Extraction of CSG gas can involve the process of fracking to stimulate and accelerate the flow of coal seam gas. Despite procedural variances to CSG extraction and the criticism around

the process of fracking, CSG is regarded as a valuable key transition fuel (Connolly and Orsmond, 2011; Nghiem et al., 2011). Demand for CSG is high and forecast to increase, though this is arguable (Chen and Randall, 2013), as it is viewed as a viable and abundant alternative fuel source to coal (Lin et al., 2010). All the same current demand has seen substantial growth in CSG exploration and extraction in Australia, particularly in regional Queensland (Nghiem et al., 2011).

The impacts and community perceptions of traditional forms of mining, such as coal and oil, have been well documented in a number of studies (Kitula, 2006; Tiwary, 2001; Garvin et al., 2009; Hossain et al., 2013). Additionally, the diverse economic, social and environmental impacts of mining are also well-established (Kitula, 2006). Some of these impacts include infrastructure development (Lockie et al., 2009), employment and business opportunities (Buultjens et al., 2010; Rolfe et al., 2007), environmental degradation (Dudka and Adriano, 1997), and a lack of community cohesion (Petkova et al., 2009), among others. Mining has also impacted on policy, with policy implications and reform being central to mining changes and development (Banks, 2011).

Although the impacts of more traditional forms of mining have been established, CSG extraction is a relatively recent phenomenon in Australia. There are an increasing amount of studies exploring the impacts of CSG mining (Fleming and Measham, 2015; Hossain et al., 2013). Nevertheless, the impacts are not well understood,

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with perceptions of affected communities an area that warrants further inquiry (Barrett et al., 2013; Hamawand et al., 2013; Lloyd et al., 2013). Consequently, the purpose of this research is to explore community perceptions of the impact of CSG extraction in Roma; a small rural town in South-West Queensland, Australia.

This research applies core concepts from social exchange theory and social representation theory to create a lens to view community perceptions of CSG mining in Roma. Developing an understanding of community perceptions of the impacts of CSG extraction has practical implications for policy and planning. For instance it can ensure the development of sustainable economies and resilient regions, where the impacts of CSG mining do not dictate community development or interfere with maintaining a diverse economy (Davoudi et al., 2012; McLennan et al., 2015). This research also increases the conceptual understanding of CSG extraction which can provide the foundation for future management practices designed to enhance the positive aspects of CSG extraction, but also to mitigate the potential for negative impacts.

## 2. Literature review

Change induced by economic activity is well-established within the literature, commonly discussed at the macro, meso and micro levels (Bec et al., 2015). These changes are commonly expressed through impact studies with a number of economic sectors becoming the focus, including mining (Kitula, 2006), tourism (Mathieson and Wall, 1982), forestry (Maeto and Sato, 2004) and manufacturing (Holl, 2004). According to Kitula (2006), mining has become a focus of change studies as the industry tends to have a noticeable impact on the environment, economy and/or social systems. Literature in this area is extensive, with the impacts of mining well documented (Gilberthorpe and Papyrakis, 2015; McDonald et al., 2012).

Discussions surrounding the impacts of mining have gradually shifted over time. Impact studies originated from science disciplines and have gradually been adopted within the social sciences. For example, early research into the impacts of mining focused on the physical health and safety issues of mining activity (Fisher, 1944; Moss, 1923), as well as the environmental impacts on air, water and ecosystems (Bjerklie and LaPerriere, 1985; Dougall, 1950; Lawrey, 1977). More recent studies have explored the link between the environmental impacts of mining and the subsequent health implications for the community and society more broadly (Smedley et al., 1996; Ballard and Banks, 2003; Sengupta, 1993). In particular, the work by Thorton (1996) presented the impacts and implications of mining at a local scale, as well as nationally and globally. Thorton's (1996) study identified that mining can have impacts across the triple bottom line (TBL), which includes the economy, society and the environment. This seminal work acknowledged the broader implications of mining for society as an inherently linked and complex system, and is critically important for developing appropriate strategies for development (Rogers and Ryan, 2001). This initial perspective provided by Thorton (1996) gained substantial attention in the social sciences and generated an abundance of literature on the implications of mining for adjacent communities (Gibson and Klinick, 2005; Jenkins, 2004; Labonne, 1999). Consequently, many of the impact assessments that occurred within local communities were predominantly associated with development, but were considered from a diverse range of geographical and mining contexts. For instance, Labonne (1999, pg. 315) highlighted the role mining plays within a community and the contribution it can make to community development, finding that the 'old school mining orthodoxy' is extinct, calling for mining companies to also embrace the social dimension.

Within discussions on the impacts of mining, there is a strong focus on the micro level change which results from mining activity. This change is often classified at the community level, where social, environmental and economic systems collide (Bec et al., 2015). As a result, exploring the community perceptions of mining induced change has become a popular theme in the literature. Community perceptions are also becoming a key focus of mining impact studies, as community members are increasingly having a greater role in development decision making (Prno and Slocombe, 2012). Subsequently, extant literature has drawn on a number of different disciplinary perspectives to assess community perceptions of mining. Research in this area is commonly found within geography (Kemp, 2010; Petkova et al., 2009), environmental science (Kitula, 2006), sociology (Lockie et al., 2009), psychology (Petkova et al., 2009) and economics (Garvin et al., 2009). All the same, at a community level, the TBL (economic, environmental and sociocultural) has been central to discussions on the development of mining, particularly in regional communities (Rogers and Ryan, 2001).

Despite studies considering the economic and social impact of mining (Ayree, 2001; Lockie et al., 2009), the majority of the research is focused on the impact of mining on the environment (Krook et al., 2012). Kemp (2010) argues that the continued environmental focus has been detrimental to discussions on the impacts to society and the economy, and that there is a need for a more social science research to build theory that can be utilised to inform management action that drives change. Consequently, TBL impact studies underpinned by the notion of sustainability have become increasingly popular (Hilson and Murck, 2000; Kitula, 2006; Veiga et al., 2001). For instance, Hilson (2002) demonstrated how the impact of mining on land use was in turn impacting the local economy, leading to the demise of other sectors, such as agriculture. This created conflict and contention stemming from environments and reduced community cohesion (Hilson, 2002).

Likewise, Ballard and Banks (2003) explored the issue of resource conflict within communities, extending the impacts of mining to have social, economic and institutional implications for the region. Although the study focused on conflict and governance, the impacts of mining were acknowledged as a loss of a local community identity, loss of community rights and challenges to political regimes, among others. Additionally, a reduction in regulatory practices has compromised community values, shifting the control and power to mining companies and institutions supporting their practices (Ballard and Banks, 2003).

Previous literature recognises that the impacts of mining are often spatially influenced, with differences by geographical context (Thorslund et al., 2012). Consequently, the research in this field tends to be case study research considering different contexts (Everingham et al., 2014; Walton et al., 2013). However, coal and heavy metal mining have predominantly been the focus throughout the studies (West et al., 1997). Dudka and Adriano (1997) attribute this focus to the heightened health and environmental affects the extraction of coal in particular produces. Additionally, the focus on these minerals in the literature is also a reflection of the prominence of these types of mining, their widespread availability across various continents, driven by increasing global demand for these resources (Connolly and Orsmond, 2010; Mudd, 2007, 2010).

On the other hand, coal seam gas (CSG) is a relatively new fuel source which is becoming increasingly popular as an alternative energy source (Hamawand et al., 2013). The rapid expansion is attributed largely to advances in technology (Wang et al., 2013). Due to the rapid development of CSG technology, processes and systems, there is limited independent, empirically validated, publically available information relating to the impacts of CSG extraction. Research that has emerged tends to explore the surface

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