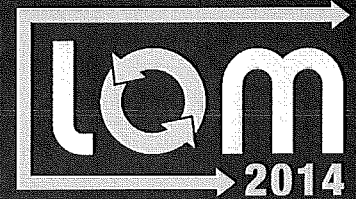


Life-of-Mine 2014

**Delivering sustainable legacies through
integrated Life-of-Mine Planning**

16–18 July 2014 | Brisbane, Australia



Proceedings

Proceedings Sponsor



Co-hosted by

Ausimm
THE MINERALS INSTITUTE

SMICMLR
Centre for Mined Land
Rehabilitation

Mine Life Cycle Planning – Creating Lasting Value for Communities

I Buitrago¹ and S Robertson²

ABSTRACT

Mine life cycle planning and enduring value are taking centre stage to meet corporate goals and deliver socio-economic outcomes for communities over the life of a mine. There is a general agreement in the literature about mining-induced effects on locals adjacent to mining operations and subsequent closure. In response, international regulatory bodies, through the implementation of global agendas, encourage exploration and mining companies to embrace the concept of corporate social responsibility. This concept is designed to provide sustainable outcomes and maintain a social license to operate over the life of a mine. This paper proposes a practical application of the sustainable livelihood approach as a tool for international planning. With this approach as the governing framework, this paper proposes an innovative tool for mine life cycle planning. Based on the findings, this paper discusses the socio-economic impacts of mining and mine closure. It also argues that transferring some of the benefits from mining to create lasting value for communities needs to be considered at the initial stages of planning for the mine and the community. Findings also indicate that conditions such as a strong local government, good governance arrangements, relevant capacity-building for sustainable livelihoods and a diversified economy are important to transferring some of the benefits from mining to create lasting value for communities. The paper is based on a mixed research technique for data analysis and a case study methodology. The case studies were conducted in Australia and Colombia.

INTRODUCTION

There has been an increasing emphasis on planning for social sustainability during the mine life cycle. The old form of regulatory planning by state agencies is being replaced by more inclusionary practices. Civil society and private actors such as exploration and mining corporations more often engage in joint efforts to help mining-impacted communities achieve their sustainable development (SD) aspirations. 'Such inclusionary processes are considered particularly vital under the rubrics of sustainable livelihood approach, adapted by the international funding agencies, for ensuring that developmental outcomes meet the needs of the local communities' (Buitrago and Chatterji, 2013, p 1). Newer demands are being placed on state agencies, non-state and market actors in forging sustainable communities and creating lasting value for locals adjacent to mining projects. However, stakeholders' contributions in planning sustainable communities and livelihoods in resource regions are under investigated. Hence, this paper compares and contrasts mine life cycle planning in two case study areas. It also displays the role of stakeholders in creating lasting value for communities in resource regions of Australia and Colombia. The town of Leigh Creek, Australia and Risaralda, Colombia will be used as case study locations. These two study sites are a subset of broader case studies being undertaken in Australia and Colombia. Based on a mixed methodological technique and supported by the case study method, this paper provides a comparative analysis of both regions, displaying existing debates surrounding these important issues.

1. PhD Candidate, Sustainable Minerals Institute and School of Geography, Planning and Environmental Management, The University of Queensland, St Lucia Qld 4072. Email: i.buitrago@uq.edu.au

2. PhD Candidate, CRC Remote Economic Participation and University of New England Business School, University of New England, Armidale NSW 2531. Email: srobert9@myune.edu.au

This paper also discusses the socio-economic impacts of mining during the mine life cycle. Based on a practical application of the Sustainable Livelihood Framework (SL), this paper also argues that creating lasting value for communities needs to be considered by all stakeholders (state and non-state actors) at the initial stages of planning for the mine and the community. Findings also indicate that helping communities to achieve their development aspirations has to do with having contextual and good governance approaches in place. Factors like a strong local government, good governance arrangements, active community and government engagement, community capacity-building for sustainable livelihoods and a diversified economy are important to creating lasting value for communities. In addition, it highlights the need for greater involvement of mining and exploration companies to carry out developmental works at the local level based on bottom-up approaches for social responsibility.

This paper is organised into the following sections: 'Literature review' is a literature review about mine life cycle planning, lasting value and the sustainable livelihood approach. 'Methodology' presents the methodological approach that supports this research. 'Discussion' displays a practical application of the SL to compare both case study areas. This section also aims to contrast the role of stakeholders in planning sustainable communities in the regions concerned. 'Conclusion' includes a summary and highlights factors that need to be taken into account for mine life cycle planning and creating lasting value for communities.

LITERATURE REVIEW

Mine life cycle planning

Mine life cycle planning is the term given to the planning process involved in the development of a potential mineral extraction operation, preferably from the commencement of the exploration stage. To a degree, the efficiency of a mining operation is determined at the planning stage. Poor planning can generate economic and socio-economic damage to the operating company and neighbouring communities (Kaplunov, 1999; Bhattacharya, 2007). Inadequate planning may also have global negative consequences for the mining company through difficulties in attracting finance, insurance and revocation or failure to gain a social licence to develop the mine (Webb, 2012). As highlighted by Bhattacharya (2007), mine life cycle planning does not just involve the development of the ore deposits; it must also take into consideration the wider macroeconomic and socio-economic implications of the mine.

Meehan (2012) suggests that mine life cycle planning has four stages: exploration, project development, operations and mine closure. If the exploration stage confirms that there is a mineral deposit that can be mined economically, the project development stage begins. The exploration and project development stages often overlap (Meehan, 2012). The concept of generating lasting or enduring value from mining should be considered at the project development stage. For example, Franks (2012) suggests that a plan should aim for outcomes that enhance the post-resource futures of the region surrounding the mine project. Furthermore, there is now awareness amongst natural resource companies of the requirement to 'develop a comprehensive plan to work together with the communities that are the most critical stakeholders and engage these stakeholders in sustainable community development' (Nakagawa, Bahr and Levy, 2013, p 498) and in creating lasting value.

Lasting value

Creating lasting or enduring value for communities from mining is the concept of providing a 'lasting or persistent benefit to groups of people and entities who have a stake in this economic activity' (Davies, Maru and May 2012, p 2). The concept of enduring community value from mining builds upon the concept of SD. Hodge (2004) considered that the success of a mining activity should be judged on its contribution to the well-being of the associated communities and the environment. Thus, by the end of the mine life cycle the affected communities should be more viable, durable and equitable than they were before mining commenced (Davies, Maru and May, 2012). Veiga, Scoble and McAllister (2001, p 192) defined a sustainable mining community as being 'one that could realise a net benefit from the introduction of mining that lasts through the closure of the mine and beyond'.

Veiga, Scoble and McAllister (2001), Hodge (2004) and Davies, Maru and May's (2012) definitions of a sustainable community are similar to the definition of a sustainable livelihood as part of the SL.

A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: A livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets and provides sustainable livelihood opportunities for the next generation; and which contributes to other livelihoods at the local and global levels in the short and long terms (Chambers and Conway, 1992, p 7).

The terms 'lasting value', 'enduring value' and 'sustainable communities' are considered synonymous and are used interchangeably in the literature and match with Chambers and Conway's definition of a sustainable livelihood. Tuck, Lowe and McRae-William (2005), following Veiga, Scoble and McAllister (2001), suggested three prerequisites for a sustainable community:

1. ecological sustainability
2. economic vitality
3. social equity.

They suggest that the challenge for mining companies in planning for a development is to ensure that the prerequisites are achieved ensuring that: environmental impacts pose no unacceptable risks, communications between the company and communities are transparent and effective and the community perceives that they will gain a net benefit from the development. These conditions are interrelated and each requires consideration and planning by mining companies, governments and residents. They are all critical factors in the development of lasting value and sustainable mining-related communities.

Sustainable livelihood approach

Concepts like SD and sustainable livelihoods have taken centre stage in the present day development literature. The notion of SD owes its origins to environmental activists in the 19th century (Dresner, 2008). However, in the contemporary era, SD is seen as a broad term that encompasses a wide range of social, economic, environmental and political elements. Global organisations such as the World Bank and the United Nations have embraced the Brundtland Commission's definition of SD, which states that it is 'meet(ing) the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission on Environment and Development, 1987, p 31). This definition is based on an anthropocentric perspective that places humans at the centre, downplaying other components that are equally important to achieve sustainability, like the environment itself. This SD approach has also made room for a proliferation of global and local agendas pertinent to development, such as Agenda 21, Local Agenda 21 and SD approaches like the triple bottom line, the five capitals approach and the Sustainable Livelihood Approach (Freeman, 1996).

Approaches that follow the triple bottom line model posit economic, environmental and social spheres as the core elements to formulate strategies to achieve SD. This model has been applied to examine the social and environmental impact of industrial activities like mining. It is argued (Jenkins and Yakovleva, 2006; Labonne, 1999) that there is still a gap between the triple bottom line principles and concrete corporate actions to bring these principles into practice. The five capitals approach examines SD in light of five forms of capital: natural, human, social, economic and physical. The premise of the five capital approach is that for long-term sustainability the extraction of natural resources or natural capital needs to compensate communities by improving or increasing other forms of capital (Porritt, 2007). However, the application of the five capitals approach has been criticised given the marginal contributions derived from the application of this approach to local community issues (Brereton and Pattenden, 2007).

In nations like Colombia, the application of the five capitals approach faces serious difficulties. Empirical research in Colombia shows that communities have not been adequately compensated for natural resource extraction (Cardenas, 2011). Hence, there is a need to examine this issue broadly. Aspects like the context in which communities are embedded, governance dynamics, community assets, strategies and possibilities for development need to be examined holistically. Given the SL holistic perspective to address development matters, this framework is considered to be the most suitable approach within which to frame these cases.

Following the anthropocentric approach to SD, the SL was conceived as a way of thinking about the objectives, scope and priority of development (Carney, 2003; Rakodi and Lloyd-Jones, 2002). In 1998, the British Government's Department for International Development (DFID) adopted the SL as an approach to assessing and evaluating developmental projects funded by it. Since then, several other international organisations, like the United Nations Development Programme and the non-governmental organisation CARE, have also adopted the SL to undertake their projects (Carney, 2003). Hence, this paper proposes a practical application of the SL to examine the mining industry's contribution in creating lasting value for communities.

METHODOLOGY

Based on the SL as the conceptual framework, this paper deals with diverse and multiple sets of data requiring the application of the case study method. The case studies allow for detailed and comprehensive information to be collected about a more focused issue. The collected data comes from different groups of interest: private companies, governments and civil society and individual actors. Data was collected through surveys, semi-structure interviews, literature review and policy and stakeholder analysis techniques. A total of 25 semi-structure interviews and focus groups were conducted in Risaralda, Colombia. A preliminary stakeholder and policy analysis was undertaken before conducting fieldwork to examine the context in which communities were embedded. A baseline stakeholder analysis was undertaken during fieldwork to identify key actors, their roles and responsibilities. Data was collected between 2012 and 2013 in Risaralda, Colombia.

In November 2013, a preliminary survey was undertaken in Leigh Creek, Australia and surrounding communities to assess the level of interaction with and use of services that respondents have in the region. Surveys were completed either online via Survey Monkey or through a paper version supplied with a return paid envelope to the researcher. Paper surveys were distributed via local progress associations (which act as community advisory groups to the local government authority) and/or the local post office/general store in the community. The local post office/general store distributed the surveys and information sheets via the postal system to members of the community or had the surveys available for collection at the store. This enabled the distribution of the survey to all members of the surrounding communities including pastoral properties. In two of the communities, the progress association was used to distribute the surveys or information sheets to members of the progress association and other community members. For another community, the surveys were available for distribution at the community's annual general meeting. Follow-up conversations were had with the executive of the progress association and the post office/general store owners in December 2014 to further promote the survey and encourage participation. Flyers promoting the survey were also distributed to the community via noticeboards, the progress association and information in the community newsletter. Of the 28 initial respondents, six were residents of Leigh Creek and 22 were from the surrounding area ('hinterlands'). The returned paper-based surveys were manually entered by the researcher into the online survey via Survey Monkey to enable data analysis.

DISCUSSION

A revised version of the DFID's SL has been adopted to map the proposed paper and deliver stakeholders with planning tools for social sustainability. Following Rakodi and Lloyd-Jones (2002, p 9), the SL includes five components of analysis:

1. vulnerability context
2. policies, institutions and processes
3. livelihood assets
4. livelihood strategies
5. livelihood outcomes (see Figure 1).

An examination of the context helps identify factors impacting on community livelihoods. These contextual factors have implications for governance dynamics, understood as the set of policies, institutions and processes for social sustainability. Both the context and governance dynamics impact on communities' assets and their possibilities to become sustainable over time. A combination of livelihood assets and livelihood strategies results in sustainable outcomes for communities. This

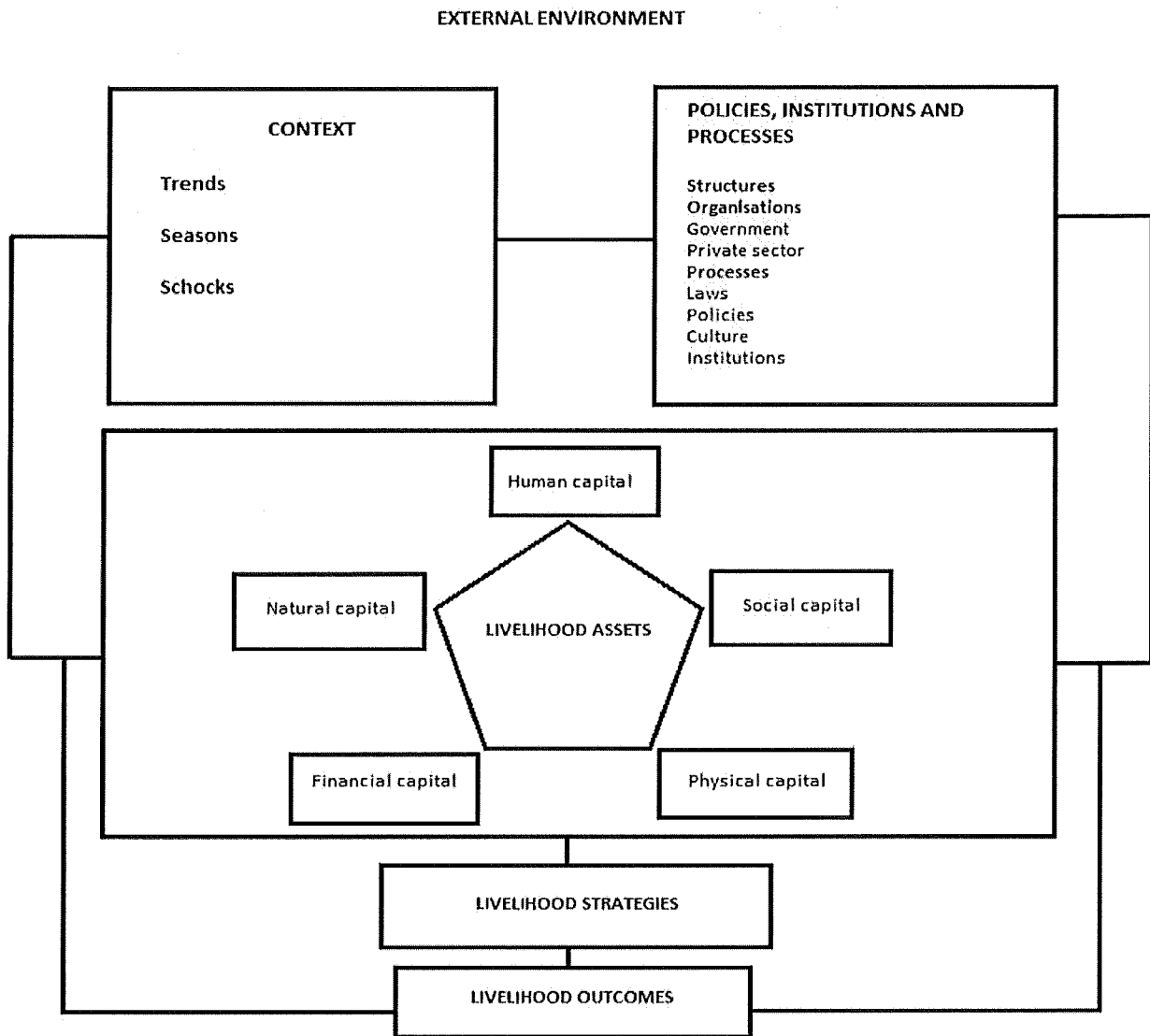


FIG 1 – Sustainable Livelihood Framework (after Rakodi and Lloyd-Jones, 2002, p 9).

paper focuses on the first three SL components. These elements have been applied to examine the existing situation in the case study areas. A description of each component and a practical application is provided in this section.

Context – Sustainable Livelihood Framework application

Following Rakodi and Lloyd-Jones (2002), the SL context component accounts for the environment in which communities are immersed. Hence, this subsection provides an overview of the contextual factors (socio-economic, demographic, ecological, etc) that impact on locals and determine their possibilities to forge sustainable communities. This section also constitutes a description of both the Australia and Colombia case study areas.

Context – Leigh Creek, Australia

In May 1978, the South Australian Minister for Planning proposed to the Cabinet that Leigh Creek South should be an 'open' town rather than a 'closed' or 'company' town. The proposal highlighted the benefits of an open town, including the potential for tourism and other private development, the provision for the diversification of job opportunities, a possible reduction in duplication of services, a more efficient use of housing and town facilities and the importance of developing a service centre in the region (State Records of South Australia, 1978a). Families moved to the new community from 1980 until 1983, when the old community was closed (Klaassen, 1997).

In response to the concerns of unions and Leigh Creek residents, a South Australian Government committee, the Leigh Creek Fact Finding Committee, was formed. In June 1978, the committee visited Leigh Creek to take submissions from community members (State Records of South Australia, 1978b). The overwhelming opinion expressed to the committee was that the town should remain closed to outsiders and only people who worked or provided support services for the Electricity Trust of South Australia (ETSA) should be allowed to live in the town (Klaassen, 1997).

The fact finding committee recommended that the Electricity Trust of South Australia (ETSA) remain the management authority for the new Leigh Creek South. However, allotments be made available by lease from ETSA to enable business opportunities and to enable people to retire in the town. The committee further recommended that not more than two 'welfare' houses be developed per year in the town. This confirmed the Government's previous decision that the new Leigh Creek South be an open township. However, the committee highlighted the very strong union and community resistance to the concept of welfare housing in the new town and the potential for industrial action if the welfare housing option proceeded (State Records of South Australia, 1978c). It is unclear when or even if the 1978 Government policy changed so that Leigh Creek would remain a closed community. As subsequent development plans refer to Leigh Creek being a country or 'normal' township and recommend that the general population should be able to reside in Leigh Creek.

Leigh Creek coalfield was privatised in 2000 and is currently leased and operated by Alinta Energy. Under the lease agreement Alinta Energy is also responsible for the maintenance of the town of Leigh Creek, with the exception of the government buildings such as the hospital, police station and school. While Leigh Creek has a longer mining history than Risaralda, both cases provide an interesting comparative analysis on planning for sustainable communities and creating lasting value for locals. This examination will be highlighted in the following sections.

Context – Risaralda, Colombia

Colombia is located on the northern peninsula of South America and has undergone an escalating growth in mining during the last three decades. Colombia is the main producer of coal in Latin America and the 12th largest producer in the world (Idarraga, 2010). The mining boom is not particular to a specific region. Hence, there are major implications for communities across the country. Mining is expanding all over Colombia. However, for the purpose of this paper, Risaralda constitutes the case study area, where South African, Canadian and domestic mining and exploration companies operate. Risaralda is a region located in the Colombian Andes mountain range. The Risaralda province hosts the Quinchia municipality. The latter is also part of the Marmato mining district. Interviews were conducted in Quinchia, where Canadian and domestic exploration and mining companies undertake projects.

Mining and exploration projects operated in Risaralda impact on local communities in both urban and non-urban areas. According to the last census register in 2005 (DANE, 2005), Risaralda had a population of 859 666. Out of this population, 665 104 people inhabited urban areas whereas 194 562 were located in semi-urban and rural areas. Of the population, 51.3 per cent were female and 48.7 per cent male. Statistics also show that Risaralda hosted 230 532 households in urban and non-urban areas.

Risaralda does not have as long a mining history as Leigh Creek. However, the recent development of mining and exploration projects has positioned this activity as one of the main economic activities in the region. Metals production in Risaralda represented 6.71 per cent of Colombia's total production in 2005 (UPME, 2014). Informal mining in Risaralda also provides a livelihood for some community members. Exploration projects currently undertaken by Canadian companies occupy large areas of land that hosts important reserves of gold. Informal miners who previously worked in this area are involved in ongoing negotiations with the Canadian company to explore possibilities of relocation and opportunities for their livelihood transformations. A group of informal miners have obtained a concession to keep mining the land where the Canadian company operates. Informal mining is undergoing a licencing process in which international companies are actively participating. This process focuses on employment generation for informal miners and community members at the large-scale mining industry. This approach is likely to have a strong impact on community livelihoods. Contextual factors in both case study areas determine the current situation of both research locations.

Additionally, the context has implications for the governance environment. In other words, it shapes stakeholders' relationships in planning for sustainable communities.

Governance – Sustainable Livelihood Framework application

Governments' and communities' roles are key to examining the governance environment in both case study areas. Planning for social sustainability is not only the mining or exploration company's responsibility. Both cases show that local governments are determinant to create lasting value for communities and achieve social sustainability aspirations (Buitrago and Chatterji, 2013). Community engagement is also pivotal to deliver sustainable outcomes for communities (Buitrago, 2013). The 1978 decision to have Leigh Creek remain a closed community provides a strong example where short-term aims or even the self interest of the residents at the time outweighed the longer term sustainability of the community. The recent change in shift cycle potentially falls within this category as well in that it has lowered the number of residential workers and families, which impacts on the population level that is required to maintain education and medical services. Instead, the Risaralda case characterises by active community engagement. Locals are committed to help stakeholders (governments and companies) achieve the community's SD aspirations.

The change in shift cycle at Leigh Creek occurred in September 2012, when Alinta Energy altered the shift cycle from a four-day-on, four-day-off cycle to a seven-day-on, seven-day-off cycle. The change in cycle was designed to increase the productivity and profitability of the mine, with one week devoted to production and the other to maintenance and overburden removal. The unintended consequence of this change has been the slow move from a resident workforce to a drive-in, drive-out workforce.

At face value, the change in roster was enacted without consideration of the impact on the community of Leigh Creek. However, the change may well increase the lifespan of the mine, thus enabling time for planning to be undertaken to ensure that Leigh Creek will have a future post the cessation of mining at the coalfield. As noted from the survey, there is a negative view in the surrounding communities about the viability of Leigh Creek into the future and the ability to access services currently available in the town. At present, there is no documentary evidence that the South Australian Government has undertaken any planning for the impacts on the communities once the Leigh Creek coalfield has ceased operations.

On the other hand, the Risaralda case highlights the key role of the Government in creating lasting legacies for locals. With the escalation of mining operations, stakeholders in Risaralda have attempted to maximise social benefits in the mining boom. Governments, the private sector and civil society have joined in an effort to develop an approach to development that tackles key community issues. Multi-stakeholder collaboration processes for delivering lasting value to communities are characterised by active government engagement. Mining is part of Risaralda's cultural and political/economic spheres; however, the recent escalation of mining operations undertaken mainly by international companies has not prevented communities from forging alternative livelihoods and benefiting from existing governance arrangements for long-term social sustainability.

Risaralda's government authorities agree that mining is essential to meet regional competitiveness standards and achieve SD goals. Therefore, regional government authorities have allowed mining and exploration companies to undertake operations. However, companies are accountable for meeting acceptable social responsible requirements and have a strong commitment to regional development from the early stages of mining operations. In addition, the government is committed to providing communities with relevant initiatives that allow them to meet SD aspirations:

We are working with other stakeholders to provide communities with education so they can build knowledge to work at a mine and get involved in potential mining projects ... We also want to educate people to help us oversee companies' performance while operating in the region (Local government representative, interview, 24 November 2013).

Government authorities agree that there is a need to up-skill communities in mining and operational effectiveness in mining practices. Nevertheless, policy frameworks also highlight the importance of developing community capacity in other sectors different from mining but relevant for the local economy. This approach has the potential for driving local development and contributing to Risaralda's competitiveness standards in the long-term:

We do not want mining-dependent communities. Instead, we need to develop sustainable supply chains and entrepreneurship amongst community members. People usually think competitiveness is an overnight process. This is a false expectation. It is a long-term commitment that will allow us to forge more sustainable communities (Senior government representative from Risaralda, interview, October 2012).

The Risaralda case not only highlights the key role of the government and community engagement in a governance scenario, but also the importance of building community capacity and enhancing local assets. Strengthening livelihood assets is pivotal to diversify the local economy and create lasting value in the regions concerned.

Livelihood assets – Sustainable Livelihood Framework application

One of the core components of SL is the notion of livelihood (DFID, 1999), which is also relevant in this paper. Both the context and the governance environment have implications for communities' assets. Hence, this section examines livelihood assets of communities adjacent to mining and exploration projects in both case study areas. It suggests how enhancing livelihood assets leads to economic diversification and therefore to social sustainability in the case study locations.

The initial survey data collected in Leigh Creek highlights the level of interaction and dependence that communities in surrounding areas have on the town for a range of goods and services. A sustainable community framework suggests that the level of interaction and dependency on Leigh Creek by surrounding communities would allow the town to be viable as a service centre upon cessation of the operation of the Leigh Creek coalmine. However, Leigh Creek is in a very remote area. The population within an accessible distance of Leigh Creek at the 2011 census was 700 usual residents and 353 dwellings (ABS, 2012). Leigh Creek had a usual place of residence count of 505 and 315 dwellings at the 2011 census (ABS, 2013). These residents are required to work a minimum of 20 hours per week for the mine or services in the town or be a family member of a worker.

The lack of diversification of employment opportunities and the inability to reside in the town unless in employment within the mine or the community jeopardises the town's future. The concern for the viability of Leigh Creek post mining is reflected in the responses from survey participants to the question 'The future of this community is bleak unless the population begins to grow'. 54.55 per cent (n = 18) either strongly agreed or agreed with the statement. Only 12.12 per cent (n = 4) respondents either strongly disagreed or disagreed with this statement, with the remaining 33.33 per cent (n = 11) respondents feeling neutral. A similar negative sentiment was expressed to the question 'Leigh Creek has a future as a community without mining', with 60.61 per cent (n = 20) respondents strongly disagreeing or disagreeing with this statement. Only 18.18 per cent (n = 6) agreed with the question. Of note is that of the six respondents living in Leigh Creek, none agreed with the statement.

In response to the question 'In your opinion what would be required to ensure that Leigh Creek was to remain a viable community into the future', 17 participants responded with themes highlighting that there needed to be alternative industry, the ability to own property in the community or the relaxation of residence rules (see Table 1). These responses are in line with the literature that recommends that for a community to be sustainable it needs to have diversified industry and be an open community (Clemenson, 1992; Haney and Shkaratan, 2003; O'Faircheallaigh, 1992; Veiga, Scoble and McAllister, 2001).

Another example generating lasting value from mining in the case study area comes from the Andamantha Tribal Lands Association (ATLA). ATLA as an organisation has taken the policy that funds granted under native title land use agreements with mining companies are invested in purchasing pastoral leases, tourism ventures and the mining companies themselves (personal communication, T Coultard, September 2013). This has enabled the organisation to derive ongoing income for their members into the post-mining future. It should be noted, however, that ATLA does not receive any payments from the Leigh Creek coalfield.

Risaralda differs substantially from the Leigh Creek case. The main difference is that Risaralda does not rely on mining as much as Leigh Creek does. At the local level, Risaralda's economy is more diversified. Coffee production and the trading of goods and services are the main economic sectors. Economic diversification has had positive implications for community livelihoods. The most evident

TABLE 1

Leigh Creek survey responses to the question 'In your opinion what would be required to ensure that Leigh Creek was to remain a viable community into the future?'

In your opinion what would be required to ensure that Leigh Creek was to remain a viable community into the future?
Hospital, schools, shop, post office, doctor, continues.
Hospital, schools, shop, post office, doctor, continues.
Hospital, schools, shop, post office, doctor, continues.
Hospital, shop, dr, school, continues.
Allow non-mine workers to live in the town. Encourage retirees to stay or move into town. Encourage other alternative industries in the area.
Hospital, school, shop, post office, doctor.
Open the township up 2 the public so some of us can go and live there.
Mining to continue.
Make town open to anyone not only mine workers and offsets like teachers, nurses, police.
A rangeland University. Selling land house block size in the town. Residents can own their own home. Good public transport, bus and air.
Business that it not reliant on mine, eg tourism. Health service is trying to incorporate more aged care.
Alternative industry development. Level of service provision to remain the same or increase. Increase in population. Possible for retirees to remain in town.
Better public transport links to Pt Augusta and Adelaide.
Shifts change and keeps the money in the town.
More industries, more personal owned business. If they let people get houses even if you didn't have 20 hrs of work.
Stop selling prime pastoral country to greenies.
New industry.
Another mining venture opening up – continuation of Leigh Creek.
Unless there are other employment opportunities not linked to the Alinta coalfield it won't be able to continue. The rules for accessing housing are also a barrier. The town is already reduced to a size where it is becoming unattractive for families to move into – sporting, shops, size of school and the shift structure (7 days off is too many for some people). People also have to leave when they retire as can't keep the housing.
If the mine closed the town would require an amount of government assistance to support the infrastructure currently in place for travellers and local community.
DIDO has drastically altered the make up of the community – causing it to fall below a viable population to support a number of enterprises. It is highly unlikely that the town will increase in size given that Alinta energy sees the town as a substantial \$ cost. When the company is again sold the future for the town may look very bleak indeed.
More people choosing to live residentially as to DIDO or FIFO. Government support for medical services and education.
More entertainment. Sporting matches from around the district. Shopping centre to be open all day on Saturday. No sale of alcohol at christmas pageant.
Jobs and people increased in size.
Incorporate the use of the town for fly in fly out as a drop in location for other mines should the mine close down.
Tourism opportunity. Open town.
Ability for independent parties to contribute to the community.
Open the township up to everyone.
Leigh Creek becomes an Aboriginal owned town.
Hospital and shops remain as they are, and alternatives for housing sought if mine closes.

finding is that it has helped enhance the community's assets to better cope with mining-induced impacts. This has been possible due to bottom-up corporate social responsibility (CSR) agendas.

CSR agendas are community oriented, contributing to meeting community aspirations. Risaralda's state and local governments have pushed companies towards a more bottom-up and community-oriented agenda to enhance the community's assets and livelihood options. This scenario has been beneficial for local communities as they have been compensated for natural resource extraction:

Companies operating in the region have embarked on social investment ... one of the companies has helped us increase our productivity by providing us some financial assistance, capacity-building and some machinery to grow our local business (Community leader, interview, 18 October 2012).

Community organisations for coffee, blackberries, jewellery production and trade have been able to further develop livelihood options more attuned to their life's plans and intended to last after the mine's closure.

However, it can be suggested that economic diversification in Risaralda occurs for two reasons. On the one hand, Risaralda does not have a long-term mining history as Leigh Creek does. In this case, lessons need to be learned from the Leigh Creek research location. On the other hand, it has to do with companies' broader understanding of the need to enhance livelihood assets, which is not the case in Leigh Creek due to the community being viewed as only a place of residence for the workforce. In Risaralda, the companies' social responsibility managers, as well as other senior decision-makers within mining and exploration companies, are former local government representatives and community leaders. This has helped the community to easily engage with the company and express their concerns and demands, resulting in effective and more accurate planning approaches for social sustainability and opportunities to forge sustainable livelihood options since the early stages of the mine life cycle.

CONCLUSIONS

Mining has led to changes at the community level over time. However, mining-induced changes differ in each case due to a long mining history, particularly in Leigh Creek. Findings show that remote Australian communities seem to be more dependent on mining. This scenario differs from Risaralda, where mining is a recent activity and mining impacts are not as severe as in Australia. This paper suggests that helping communities achieve their development aspirations has to do with having contextual and good governance approaches in place. Data analysis shows that active community engagement and a strong government role in planning for social sustainability are factors that have contributed to forging sustainable livelihoods in the regions concerned. Similarly, building community capacity and enhancing community assets can lead to economic diversification, delivering lasting outcomes for locals.

Lessons need to be learned from the Leigh Creek case so that Risaralda's communities can cope with livelihood transformations in the further stages of the life of a mine. Similarly, the Risaralda case displays interesting findings regarding the possibilities of developing accurate planning approaches for social sustainability at early stages of the mine life cycle. One of the most representative findings has to do with active community engagement. Communities in Risaralda case have played a strong role in the formulation of local development agendas, becoming active participants in achieving their development aspirations during the mine life cycle. This has also been possible due to good governance arrangements at the government level.

Governments are determinant in planning sustainable communities. State actors can help locals cope with livelihood transformations. The Risaralda case shows how community members, supported by government agents, can develop non-mining activities like agribusiness, jewellery, coffee production and agriculture. These actions have been implemented either as a response to community initiatives or as a result of effective government-corporation partnerships. In Leigh Creek, there has been limited action by state actors in supporting the development of non-mining activities. By remaining a closed community, development of alternative businesses has been impeded along with any potential expansion of the population. This has been compounded by the low population in the surrounding region affecting the viability of alternative service businesses being established in competition with the service business established in Leigh Creek to support the mine.

Companies play a key role in planning sustainable communities. Their contribution is usually translated into CSR agendas. These accountability mechanisms have been essential to shaping livelihood transformations in the research locations. Bottom-up or locally-driven social responsibility approaches implemented by all stakeholders involved in resource regions are key drivers for local development and sustainable livelihood aspirations. In addition, bottom-up approaches focused on enhancing a community's livelihood assets have the potential to become key drivers of development, diversify resource economies and create sustainable livelihood options for local communities. Existing approaches need to provide locals with alternative livelihood options that create lasting value for communities.

ACKNOWLEDGEMENTS

This paper is based on PhD research conducted at the University of Queensland, the Cooperative Research Centre for Remote Economic Participation (CRC-REP) and the University of New England Business School. The authors acknowledge their supervisors' contributions to this paper: Associate Professor John Minnery and Dr Terry Maybury at the University of Queensland; Dr. Boyd Blackwell at CRC-REP, University of New England; Associate Professor Neil Argent at the University of New England and Professor Fiona Haslam McKenzie, CRC-REP, Curtin University. Our gratitude is also due to the International Mining for Development Centre (IM4DC) for the grants conferred to undertake field research in Risaralda, Colombia.

REFERENCES

- Australian Bureau of Statistics (ABS), 2012. 2011 Census of population and housing: mesh block counts, 2011 [online], Commonwealth of Australia, Canberra. Available from: <<http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2011.02011?OpenDocument>> [Accessed: 20 January 2014].
- Australian Bureau of Statistics (ABS), 2013. 2011 census community profiles: Leigh Creek (SA) – basic community profile [online], Commonwealth of Australia, Canberra. Available from: <http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/communityprofile/SSC40363?opendocument&navpos=230> [Accessed: 20 June 2013].
- Bhattacharya, J, 2007. *Principles of Mine Planning* (Allied Publishers: New Delhi).
- Brereton, D and Pattenden, C, 2007. Measuring what matters: monitoring the contribution of a new mining project to community sustainability, in *Proceedings 3rd International Conference on Sustainable Development Indicators in the Minerals Industry* (ed: Z Agioutantis) (Helotopos: Greece).
- Buitrago, I, 2013. Mining, capacity-building and social license: making the links, in *Proceedings 23rd World Mining Congress 2013* (Canadian Institute of Mining, Metallurgy and Petroleum: Montreal).
- Buitrago, I and Chatterji, T, 2013. Planning for mining regions: building local government's capacity in a multi-stakeholder collaboration scenario, in *Proceedings 49th ISOCARP Congress 2013* (ISOCARP: Hague).
- Cardenas, M, 2011. Población Guajira, pobreza, desarrollo Humano y oportunidades humanas para los Niños en La Guajira (Guajira's population, poverty, human development and opportunities for children in La Guajira) [online], Masters dissertation, Universidad Nacional de Colombia. Available from: <http://www.bdigital.unal.edu.co/3573/1/Tesis_Mauricio_Cardenas.pdf>.
- Carney, D, 2003. Sustainable livelihoods approaches [online]. Available from: <http://www.eldis.org/vfile/upload/1/document/0812/SLA_Progress.pdf> [Accessed: 25 March 2014].
- Chambers, R and Conway, G, 1992. *Sustainable Rural Livelihoods: Practical Concepts for the 21st Century* (Institute of Development Studies UK).
- Clemenson, H, 1992. Are single industry towns diversifying? A look at fishing, mining and wood-based communities, *Perspectives on Labour and Income*, 4:50–77.
- Davies, J, Maru, Y and May, T, 2012. Enduring community value from mining: conceptual framework, CRC-REP working paper CW007, Ninti One Limited, Alice Springs.
- Departamento Administrativo Nacional de Estadísticas (DANE) (Administrative Department for National Statistics), 2005. Perfil Risaralda (Risaralda profile).
- Department for International Development (DFID), 1999. Sustainable livelihoods guidance sheets (DFID: United Kingdom).
- Dresner, S, 2008. *Principles of Sustainability* (Earthscan: London).
- Franks, D, 2012. Social impact assessment of resource projects, in *Mining for Development: Guide to Australian Practice* (International Mining for Development Centre: Perth).
- Freeman, C, 1996. Local government and emerging models of participation in the local agenda 21 process, *Journal of Environmental Planning and Management*, 39(1):65–78.
- Haney, M and Shkaratan, M, 2003. Mine closure and its impact on the community: five years after mine closure in Romania, Russia and Ukraine, World Bank policy research working paper 3083, June 2003, World Bank, Washington DC.
- Hodge, R, 2004. Mining's seven questions to sustainability: from mitigating impacts to encouraging contribution, *Episodes*, 27:177–184.
- Idarraga, I, 2010. Conflictos Socio-ambientales por la Extracción Minera en Colombia: Casos de la Inversión Británica (Mining-induced socio-environmental conflict: case studies of the British investment), Censat Agua Viva, Bogota.
- Jenkins, H and Yakovleva, N, 2006. Corporate social responsibility in the mining industry: exploring trends in social and environmental disclosure, *Journal of Cleaner Production*, 14(3–4):271–284.
- Kaplunov, D R, 1999. Problems of planning theory for developing bowels with underground mining of ore deposits, *Journal of Mining Science*, 35:286–290.

- Klaassen, N, 1997. *Leigh Creek: an Oasis in the Desert* (Flinders Ranges Research: Eden Hills, South Australia).
- Labonne, B, 1999. The mining industry and the community: joining forces for sustainable social development, *Natural Resources Forum*, 23(4):315-322.
- Meehan, D, 2012. Lifecycle of a mine [online]. Available from: <<http://www.openbriefing.com/AsxDownload.aspx?pdfUrl=Report%2FComNews%2F20120531%2F01301864.pdf>> [Accessed: 14 December 2012].
- Nakagawa, M, Bahr, K and Levy, D, 2013. Scientific understanding of stakeholders' behavior in mining community, *Environment, Development and Sustainability*, 15:497-510.
- O'Faircheallaigh, C, 1992. Mine closures in remote regions: policy options and implications, in *Coping with Closure: an International Comparison of Mine Town Experiences* (ed: C Neil, M Tykkylainen and J Bradbury) (Routledge: London).
- Porritt, J, 2007. *Capitalism as if the World Matters* (Cromwell Press: Trowbridge).
- Rakodi, C and Lloyd-Jones, T, 2002. *Urban Livelihoods: A People Centre Approach to Reducing Poverty* (Earthscan Publications: London).
- State Records of South Australia, 1978a. GRS 2701/1/d 10/75 - 2/84 N167-N171, N167 Leigh Creek township (new) correspondence liaison internal the electricity trust of South Australia, letter from Minister for Planning to the Premier, 3 May 1978.
- State Records of South Australia, 1978b. GRS 2701/1/d 10/75 - 2/84 N167-N171, N167 Leigh Creek township (new) correspondence liaison internal the electricity trust of South Australia, Supplementary Development Plan - Leigh Creek South Community Involvement, notice from Manager Leigh Creek, 27 June 1978.
- State Records of South Australia, 1978c. GRS 501/11 1977-79, 297/77 relocation of the Leigh Creek township, Department of Housing and Urban Affairs, Report from Leigh Creek Fact Finding Committee to the Minister for Planning and Mines and Energy, Minister for Community Welfare, Minister for Transport and Local Government.
- Tuck, J, Lowe, J and McRae-Williams, P, 2005. Managing community relationship, reputation and sustaining competitive advantage: the case of mining towns, in *Proceedings Second Future of Australia's Country Towns Conference* (Centre for Sustainable Regional Communities: Bendigo).
- Unidad de Planeación Minero Estratégica (UPME) (Strategic Mining Planning Department), 2014. Distritos mineros: exportaciones e infraestructura (Mining provinces: exports and infrastructure) [online], 13 February, Bogota. Available from: <http://www.upme.gov.co/Docs/Distritos_Mineros.pdf>.
- Veiga, M, Scoble, M and McAllister, M L, 2001. Mining with communities, *Natural Resources Forum*, 25(3):191-202.
- Webb, K, 2012. Political risk insurance, CSR and the mining sector: an illustration of the regulatory effects of contracts, *International Journal of Law and Management*, 54:394-415.
- World Commission on Environment and Development, 1987. *Our Common Future*, report.