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Reaching economic and social prosperity – a need to collaborate with communities through commodity cycles to post-closure

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Abstract

This paper begins by describing key case studies that illuminate how specific mining communities in British Columbia (BC) have fared over a variety of mine closure circumstances. Investigations that have identified parameters important in the characterisation of BC mining community health, well-being, and sustainability, and have provided evidence that collaborative mine closure planning is essential for BC mining communities to reach economic and social prosperity are also highlighted. This paper concludes by detailing formal and informal means that can establish collaborative planning with the objective of linking mining corporations with the future sustainable development of its "community" beyond the life of a mine.

1 Introduction

Today, it is estimated that over 115 communities are associated with mineral development in Canada (Natural Resources Canada, 2010). Mining communities in general can differ in geography, cultural, and political, environmental and social contexts (Veiga et al., 2001). Mining communities in Canada can include those that are purposefully built to support mineral development, communities located in proximity to a mineral development property, Aboriginal communities, and communities that are associated with fly-in fly-out operations (Veiga et al., 2001). They can range in size from a city (such as Sudbury, Ontario) to a small rural/remote town (such as Daniel's Harbour, Newfoundland) (Neil et al., 1992; Veiga et al., 2001). It is not uncommon for one mine to be associated with multiple communities, and to have a varied relationship with them (Veiga et al., 2001).

Many Canadian mining communities are situated in rural and remote regions (Canadian Institute for Health Information, 2006; Randall and Ironside, 1996), are economically reliant on this industry (Neil et al., 1992; McAllister et al., 1999), and are perceived to benefit from mining activities (Mining Association of Canada, 2009). Examples of benefits could include direct employment, ancillary economic activity, the development or enhancement of infrastructure and/or transportation corridors, and water and power supply (Veiga et al., 2001). In the western Canadian province of British Columbia (BC), operating mines have provided billions of dollars' worth of investment, over 25,000 jobs, and provided high salaries and benefits to communities and their residents across the province. In addition, over C$1 million in funding has been allocated to rural and First Nations communities for mining education and skills training (Ministry of Energy, Mines and Petroleum Resources, 2007).

While there is no doubt mining brings an economic boost to these locales during the operation of a mine, little research has investigated how Canadian mining communities have fared over time in terms of their social and economic fabric, or if economic prosperity has coincided with social prosperity with both sustaining beyond the mine life. This paper aims to address these research gaps within the context of BC, and is comprised of three main sections. The first section of this paper highlights four case studies that describe how BC mining communities have fared over a variety of closure circumstances, the second section brings attention to recent research findings associated with the sustainability of mining communities in BC calling for the need for early closure planning, and the final section of this paper highlights processes available to the mining industry to establish such planning to address sustainability with communities in Canada.

2 Methodology

The case studies have been developed through a literature review using academic, government, non-governmental organisation, corporate, and community sources. The cases also include a collection of community-level data from British Columbia Statistics Canada Census collections. Specific attention focussed on the type and life of the mine, the reason for closure, how the community was impacted during closure, and how the associated community is faring today. In addition, this paper presents a synthesis of findings stemming from two major research studies to provide additional insight into the impacts mine closure and changing economic conditions can have on the social and economic prosperity, and sustainability of mining communities in BC: The BC Mining and Community Health Project (Shandro et al., 2010; Shandro, 2011; Shandro et al., 2011a; Shandro et al., 2011b; Shandro et al., 2011c), and; and the Integrated Study of the Social Dimensions of Rural Health project that initiated the New Emerging Team for the Health in Rural and Northern BC (NETHRN-BC) (Nelson et al., 2010; Ostry, 2009; Ostry et al., 2009a; Ostry et al., 2009b; Ostry et al., 2010; see http://nethrnbc.uvic.ca/ for a complete list of projects and publications).

3 Mining community case studies

3.1 Granisle, BC

Granisle is a remote community located in north-western BC on Babine Lake. It was incorporated on June 29, 1971 to support copper mining at two open pit mines on the nearby MacDonald Island: The Granisle Copper Mine, and the Bell Copper Mine. The Granisle Copper Mine operated from 1962 and closed due to low metal prices in 1982. Over this period, The Granisle Mine produced over two million ounces of silver, over 200 thousand ounces of gold, 472 million pounds of copper, and almost 15 thousand pounds of molybdenum (BC Geological Survey, 2009). The Bell Copper Mine operated from 1972 to 1992, recovered one million ounces of silver, over 400 thousand ounces of gold and 672 million pounds of copper. The Bell Mine was reportedly closed due to depleted ore reserves (BC Geological Survey, 1991).

The first recorded census population for Granisle was 1,210 in 1976, and peaked at 1,430 in 1981. Following the closure of the Granisle Copper Mine in 1982, Granisle lost almost 50% of its population (as captured by a decline in recorded population to 646 in the 1986 census window) (BC Statistics, 2007). The population rose to 803 in 1991, but decreased by 50% with the closure of the Bell Copper Mine (BC Statistics, 2007).

Today, the latest census population record (2006 census window) (BC Statistics, 2006) indicates the population of Granisle is 364. Demographically, the community is reflective of an aging population where 40.5% of the population are between 45 and 64 years of age. The community also has high unemployment rates; in 2006, the unemployment rate for both males and females 15 and over was 25%, approximately five times higher than the BC average (5.8 for males over 15, and 6.3 for females over 15). In terms of employment income, 24% of the total population with employment income worked full time for a full year, compared to the provincial average of 47%. No females with employment income in Granisle reported working full time for a full year. The average total employment income from all sources for males over 15 was C$ 25,342, and for females it was C$ 19,794.

Today Granisle's economic base is largely from retirement income, and tourist based operations. The area is heavily dependent on Babine Lake for fishing, boating, wild-life viewing and camping opportunities (Patriquin et al., 2005). Within close proximity to Granisle, there are two major exploration projects underway and one proposed mine development (the Morrison Mine) is currently under review by the BC Environmental Assessment Office (Grieve et al., 2010). The community of Granisle has expressed that the Morrison Mine offers a unique opportunity to revive this community. Today many of the residential buildings require upgrades and maintenance, a large proportion of Granisle's population is over the age of 45, there is reportedly a shortage of volunteers needed for fire and ambulance services (Village of Granisle, 2010); and important health and social services are lacking (Omenica Beetle Action Coalition, 2008). In a study initiated by Natural Resources Canada, Forest Park Service, on Community Sustainability in northern British Columbia, Granisle was found to have the most serious sustainability concerns. Granisle scored lower on sustainability assessments with considerable challenges noted in the domains of economic capital, economic vitality, human capital and human health, as compared to all other study communities that were similar in terms of geographic location and population (MacKendrick and Parkins, 2004). Specific

challenges identified include that local health care infrastructure is limited, and access to regional health infrastructure is poor. Granisle was also the only study community to have a mining past (MacKendrick and Parkins, 2004).

3.2 Tumbler Ridge, BC

Tumbler Ridge is to date the last community in BC to be built under the Instant Towns Policy to support coal mining and is located in north-eastern BC. Planning for Tumbler Ridge began in 1976, in conjunction with development applications for two open pit coal mines (the Bullmoose Mine and the Quinette Mine). The Bullmoose Mine operated continuously from 1983. Production resulted in the shipping of over 32 million tonnes of metallurgical coal overseas and the mine closed in 2003 due to ore exhaustion (BC Geological Survey, 2010). The Quintette Mine operated from the early 1980s and closed prematurely in 2000 due to low coal prices (Baker, 2002).

Incorporated in 1981, the development of Tumbler Ridge occurred through a partnership agreement between the provincial government and the two mining companies, where the provincial government contributed C$1 billion dollars (District of Tumbler Ridge, 2005) (at that time Denison Mines Inc. and the now Teck Resources Ltd. were the two mining companies operating in Tumbler Ridge. However, low coal prices in the 1990s allowed Teck Resources Ltd. to take over the Quintette Mine from Denison).

The first census for Tumbler Ridge was in 1986, at which time the population was 4,387. As little closure planning towards economic diversification had occurred between the mines and community (Shandro et al., 2010), few opportunities aside from mining (during operations and post-closure) were available. In 2001, coinciding with the closure of the Quintette Mine, the population plummeted to 1,851 (BC Statistics, 2007). A novel approach to sustain the community was made through an innovative housing sale where abandoned homes were listed and sold at well below assessed values (District of Tumbler Ridge, 2005). Many of the homes were purchased by retirees (District of Tumbler Ridge, 2005), which radically shifted the demographic composition of this community to an aging population.

Today, increased demand for metallurgical coal and interest in coal properties has precipitated a boom in mining activity in the Tumbler Ridge region. At present, there are four operating mines, three proposed mine developments and two major exploration projects (Grieve et al., 2010). It has also been speculated that the reopening of Quintette may occur in the future (Bains, 2011). In support of this boom, census data indicate that between 2001 and 2006 the population of Tumbler Ridge increased by over 30%. However, while unemployment rates in Tumbler Ridge for males (15+ age category) is low at 2.8%, for females (15+ age category) it is 8.5%, with an unemployment rate of 25% for women aged 15–24. In 2006, 34% of the population worked full time and full year (remained employed for a full year), and males (15+ age category) with employment income (annual, pre-tax) averaged C$ 39,843, with females (15+ age category) with employment income (annual, pre-tax) averaging C$ 16,660 (BC Statistics, 2010a).

While this economic boom in mining activity has no doubt provided some much needed stability for now to this northern community, it is accompanied by challenges at the community level. Housing is in high demand. Rental properties are coveted and homes once purchased when the Quintette Mine closed for approximately C$ 25,000 are now selling for C$ 199,000 (District of Tumbler Ridge, 2009). While this scenario may be good for owners wishing to sell, most of these homes were purchased by individuals looking to retire in Tumbler Ridge and this cost fluctuation has potential to drive an important diverse portion of the population away (as residents face an increase in property taxes). In addition, despite the arrival of retirees, the openings of new mines, or the resurgence in population, there has yet to be any additional support for health and social services in Tumbler Ridge (District of Tumbler Ridge, 2008; Shandro et al., 2011a). Local health care providers are stretched thin and persistently lobbying the provincial government for extra and much boost in support to provide excellence in care to the boom in mine employees and their families, all while commitments made to community health by mine proponents during the Environmental Impact Assessment (EIA) phase remain unfulfilled (Shandro et al., 2011a). Additional challenges for this remote community also include an absence of public transportation options (although within the community there is a volunteer shuttle available to those requiring health services not available within the municipality). In addition, pregnant women must travel over one hour (weather permitting) by vehicle to deliver their children at the hospital in Dawson Creek, approximately 100 km away (Shandro et

al., 2010a; Shandro et al., 2011), and mental health and addictions services are reportedly overwhelmed (Shandro et al., 2011).

3.3 Stewart, BC

Stewart is a community with a long history of mining. This north-western BC community has been exposed to a variety of closure circumstances including closure due to ore exhaustion and closure due to low metal prices; the region is also scattered with abandoned mines.

Established as a small settlement in 1902, the community rapidly boomed to 10,000 by 1906 with people in search of gold. The town rapidly developed and hosted a main street lined with shops, four steam ships per week, four newspapers, hotels and many different businesses and services. This booming economy was short lived; mining prospects did not transpire and with failure to establish rail service in the area, the population reportedly dropped "overnight" to 17 during the first World War (District of Stewart, 2011).

This did not halt exploration though and led to the development and operation of notable early mines such as the Premier Gold and Silver Mine and the Granduc Copper Mine. The Premier Mine produced continuously from 1918 to 1953, and closed after several interruptions in 1967. The mine reopened for a short period of time between 1989 and 1996. Over the entire period Premier produced over two million ounces of gold and 41 million ounces of silver (Baker, 2002). The Granduc Copper Mine operated from 1971 to 1978 and from 1980 to 1983, requiring construction of the impressive 18 km long tunnel to access the orebody. Over this period, Granduc produced over 400 million pounds of copper (BC Geological Survey, 2011).

In 1931 the first census record indicated a population of 610. The population of Stewart peaked at 1,456 in 1986 with the reopening of Premier and Granduc, but the closure of Granduc prompted a decline in population to 858 as recorded in the 1991 census. Another decrease in population by approximately 50% was recorded in the 1996 census coinciding with the second closure of the Premier Mine (BC Statistics, 2007).

The latest census record (2006) indicates a population for Stewart of 496 people (BC Statistics, 2010b). According to census data, unemployment only affects males in Stewart, with the overall male unemployment rate being 11.4%. Males between the ages of 15 and 24 have a 100% unemployment rate (this age cohort makes up 6% of the total population of Stewart) and 52% of the population worked full time, full year. The average employment income (annual, pre-tax) was C$ 41,349 for males 15 years and older, and for females over 15 it was C$ 23,405 (BC Statistics, 2010b).

Today the town of Stewart has no open mines within its vicinity. That said, there are over 20 major exploration projects within a fly-in fly-out range, and five proposed mine developments (Grieve et al., 2010). At present, Stewart's only elementary school is scheduled for closure (Stewart and Hyder International Chamber of Commerce, 2011) which is also reflective of a 'greying' community with the only population growth record in the region being those aged 65 to 79. In 2001, over 50% of the working population was aged over 45. This is of great concern as the Local Health Authority has reported no long term or extended care beds, independent living accommodations or complex care beds required for an aging population (Hanlon and Halseth, 2005).

3.4 Kimberley, BC

Kimberley, located in south-eastern BC, began development in conjunction with development of the Sullivan Mine in 1892. While the Sullivan Mine began operations in 1909, Kimberley was not officially incorporated until March 1944. The Sullivan Mine operated both as open pit and underground operations and produced eight million tonnes of zinc, over eight million tonnes of lead, and 280 ounces of silver. Over the 91 years of operation, it employed on average 1,000 people at a time (Parker, 2002). At the end of 2001, the Sullivan Mine was closed after 92 years in operation.

The first census for the population of Kimberley was conducted in 1951 and recorded a population of 5,933. Since then, the population has not changed dramatically. While it peaked at just over 7,000 in 1981, it has remained stable within the 6,000 people range (BC Statistics, 2007). While the population slightly decreased between the census windows that captured the closure (1996 and 2001), the loss in mining jobs did not coincide with a large impact to community population. This can likely be attributed to community

sustainability planning taken on in partnership between the now Teck Resources Ltd. and the city of Kimberley (Mining Association of Canada, 2001; Parker, 2002).

During the early days of the operation, it was recognised that Teck had a paternalistic approach towards the community and was renowned for social programmes and support for employees and families. In 1968, Kimberley strode towards independence with an urban renewal project seeking to bring economic diversity to the community. It has been described in a report written by the Government of Canada, that the relationship between Teck and the community of Kimberley evolved over three phases: 1) a shift in economic power occurred as the community became diversified; 2) this process influenced a shift in community dependency on the company to a more independent stance; and 3) a shift in corporate views also occurred to take a more collaborative approach. These shifts in community independence and corporate behaviours brought attention to an important topic: life in Kimberley after the mine. As a result of collaborative planning, Teck supported and continues to support the development of recreational facilities including the local ski resort, and golf course, hiking trails etc. A committee was also established to address environmental concerns. While closure of the mine brought a loss of C$ 2 million in annual taxes to Kimberley (Government of Canada, 2004), Kimberley's successes due to partnerships with government and community leaders (Government of Canada, 2004) transformed the once single industry town into a four seasons world class tourist destination known as the Bavarian City in the Rockies (Parker, 2002).

The last recorded census population was 6,139 in 2006. Unemployment rates are low, males at 5.8% and females at 6.3% and 38% of the population worked full time year round (16% of those individuals were women). Average employment income (pre-tax; in C$) for males 15+ was C$ 30,956, and for women it was C$ 17,451 (BC Statistics, 2010c).

4 Bridging community health and sustainability post closure

4.1 Research studies

Review of recently completed research projects within BC adds depth and context to the above case studies. These projects, the Integrated Study of the Social Dimensions of Rural Health project funded by Canadian Institutes of Health Research (CIHR), and the Mining and Community Health Project funded by CIHR and the Social Sciences and Humanities Research Council of Canada (full reference list given in Section 2), focused in part on the impacts mining and other resource sectors have on rural and northern community health and sustainability in BC. Conducted through a merged social determinant of health/sustainable development framework (Figure 1.) based upon the assumption that sustainable communities are healthy, the investigations have demonstrated a clear link between rapidly changing community economic conditions and poor community health and sustainability outcomes.

The purpose of the Integrated Study of the Social Dimensions of Rural Health project was to develop and enhance research capacity in the social determinants of rural and northern health in BC through the formation of the New Emerging Team for Health in Rural and Northern British Columbia (NETHRN-BC). The goal of the NETHRN-BC project was to bring together the critical population health, social scientific research, and health services research expertise necessary to better understand the social determinants of the health of rural and northern populations in BC. A part of this research programme concentrated on two main research questions in relation to rural and remote health in BC: 1) what are the determinants of social capital in rural and northern communities in BC and how do these differ from urban communities, and; 2) what are the key social determinants of health that are important to the health status of northern, rural and remote British Columbians? The many projects funded by NETHRN-BC were mainly epidemiological (quantitative) in their methodology although some projects also used qualitative methods. Major findings, especially in terms of being able to better direct preventive public health policy in rural and remote regions, relate to the demonstration that community economic conditions are a critical component in the health of rural and remote communities. Several of the studies demonstrate a clear link between adverse economic and social conditions and adverse health outcomes and point to ways to mitigate these adverse outcomes (Nelson et al., 2010; Ostry et al., 2010, 2009; Ostry, 2009a, 2009b).

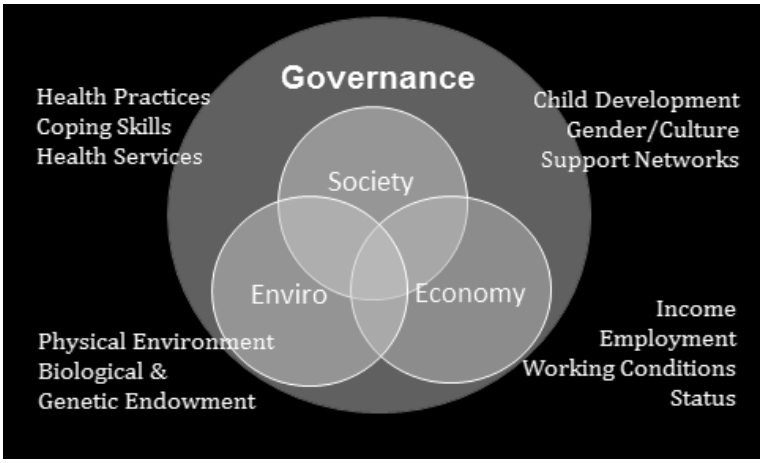

Figure 1 The merged social determinants of health/sustainable development framework (adapted from Shandro, 2011) overlaps the pillars of sustainable development (society, economy, and environment) with the determinants of health (factors that influence human health as identified by Health Canada and the World Health Organization). This framework also identifies the fundamental role that governance (at the legislative, regulatory, and corporate level) plays in influencing the pillars of sustainable development. To achieve sustainability at the community-level, the consideration of human health determinants is critical

The Mining and Community Health Project aimed to investigate the demographic, economic, and health fabric of BC mining communities using a multi-method approach. The first component was a quantitative study funded by the Canadian Institute of Health Research. This study monitored 15 BC mining communities over a decade marked by an economic downturn (1991–2001) using community-level socio-demographic and economic indicators from Statistics Canada data collections, and health indicators associated with stress mediated pathways (community level rates of cardiovascular disease and mental disorders). Findings from this study identified that mining communities in British Columbia are particularly vulnerable in terms of their sustainability and health. While these communities were shown to accrue economic benefits while a mine was in operation, upon closure many of these communities lost a significant proportion of their population because of the resulting lack of economic options and, higher rates of acute cardiovascular disease and mental disorders were observed in communities following mine closure (Shandro, 2011; Shandro et al., 2009, 2011b, 2011c).

The second component of the Mining and Community Health Project was a qualitative study that focussed on the experiences of health and social service providers with respect to the mining boom-bust cycle in northern coal mining community in BC. This study interviewed health and social service providers in the study community. Interview data indicated that there was a need for more mental health and addictions services and that there was a need to collaborate with health service providers to ensure a mining community has adequate health and social services for mine employees and their families, and to improve the retention of health and social service staff within the community by reducing burnout (Shandro et al., 2011a, 2011c). This study also highlighted deficiencies in the EIA process (the primary method used to approve a mineral development project and mitigate potential negative effects in Canada) as commitments made by mine proponents to community health have yet to be realised. The study also illuminated key community health issues associated with mine closure including: mental health and addictions; family stress, and; strains to the sustainability of community health services (Shandro et al., 2011a).

The Mining and Community Health Project was also supplemented by an "End of Grant" Knowledge Translation award from CIHR, which allowed the sharing of research findings with key mining/health stakeholders in the pilot community, Tumbler Ridge, BC. A main recommendation stemming from this process was that collaborative community sustainability planning between communities, industry, and the health and social service sector may help mitigate negative mining-induced health impacts (Shandro et al., 2010a, 2010b, 2011c). This type of planning is generally not initiated in mining communities and represents

a novel approach towards the prevention and mitigation of mining associated impacts at the community level. Stemming from this work, additional funds have been garnered by the research team through the National Sciences and Engineering Research Council of Canada discovery grant programme to develop a framework for collaborative integrated mine planning in BC, and a CIHR Knowledge Translation grant to address the inclusion of the social determinants of health within the EIA process.

5 Towards prosperous and sustainable mining communities

Examination of the four case studies along with newly completed research projects clearly demonstrates the need to address mining community sustainability during mine closure planning. However, a common debate is present today with respect to the sustainability of mining communities. It is questioned whether single industry based mining communities truly viable: are such communities meant to be sustainable post mining? Industry leaders are taking a proactive approach towards addressing this debate. As examples, the International Council on Mining and Metals has recently produced a Planning for Integrated Mine Closure Toolkit, to "promote a more disciplined approach to integrated closure planning and to increase the uniformity of good practices across the sector" (International Council on Mining and Metals, 2009a) with aims of "achieving post-closure status that leaves behind an enduring positive legacy in the community" (International Council on Mining and Metals, 2009b). While the 2007 International Finance Corporation Stakeholder Engagement guidance document is a generalised document for all industries (not mining specifically), it does recognise that closure can result in loss of employment, decline in economic activity (especially the case for rural and remote regions), the discontinuance of community services, and community dislocation; and that planning for closure should occur far in advance to mitigate and manage potential risks, and realise economic benefits (International Finance Corporation, 2007). These approaches are laudable, and provide evidence of a shift in corporate policies away from paternalistic relations with mining communities. As the mining industry approaches this paradigm shift, it is important to bring attention to processes in BC and elsewhere in Canada that exist at the community level that corporations should be aware of as they begin to collaborate with communities towards closure planning.

For already established Canadian municipalities, there are two community sustainability planning initiatives: a municipalities' Official Community Plan (OCP), and the Smart Planning for Communities Initiative (SPCI, formerly known as the Integrated Sustainability Community Plan). The OCP, under the BC *Local Government Act* section 875, aims to provide a long term vision for a community. The OCP generally includes specific objectives and policies that act to guide decisions on land use management and planning and should include policies related to the health and well-being of the municipality. Local governments are encouraged to merge the OCP with other types of planning initiatives (BC Ministry of Community, Sport, and Cultural Development, 2011a).

The SPCI is a process that assists communities to envision and plan for the long term well-being of their community. It is a framework that is founded on the guiding principle of Sustainable Development in that it aims to guide community planning in order to meeting current needs, while ensuring the needs of future generations can also be met (BC Ministry of Community, Sport, and Cultural Development, 2011b). The BC Government is currently providing funding for municipalities to undertake such planning through a federal gas tax agreement (BC Ministry of Community, Sport, and Cultural Development, 2011b).

Sustainable development also represents the guiding principle for the comprehensive community plan, a resource for First Nations communities in Canada developed in British Columbia. This type of planning initiative takes a holistic approach, is community based, enables First Nations communities to establish and meet future goals and aspirations, and provides a mechanism for linkage with other community plans and/or initiatives (Indian and Northern Affairs Canada, 2006).

While these processes do not generally take into consideration mining related factors, they do provide a means for a mining corporation to contribute to the planning process without starting a new community sustainability plan. Specifically, engaging in these planning initiatives prior to opening, bringing attention to mining related indicators (ideally within the merged determinants of health and sustainable development framework), setting goals and objectives that incorporate mining related impacts during the life cycle of the mine including closure, and tracking success over time will undoubtedly lead to positive outcomes for both communities and mining corporations. The case studies of Granisle, Stewart and Tumbler Ridge all identify

communities open to industry. However, these communities are in need of housing upgrades and assistance with respect to the availability of health and social services in order for mining companies to be able to recruit, house and retain employees and their families. While in the best of circumstances, mines close due to ore exhaustion, the reality is that mining is linked strongly with commodity cycles and the feasibility of ore extraction. As technology advances, it could be that a project is suspended for a year, or 20 in the case of the Quintette Mine in Tumbler Ridge. Constructive closure planning that incorporates the sustainability of an associated community may eliminate the need to reinvest in these types of community issues time and time again as the life cycle of a mine re-emerges.

6 Conclusion

This paper has examined how four BC mining communities have fared post mine closure. Examination of these cases identify that the only community to have received the benefits of collaborative closure planning from a mining corporation has been successful at achieving economic and social prosperity and sustainability beyond mining. Research studies into the health and well-being of rural, resource and mining communities have significantly enhanced our understanding of how the cyclical nature of mining and other resource sectors have impacted communities in BC over time. These studies have also demonstrated that economic fortunes attributed to mining developments do not necessarily translate into sustained economic and social prosperity for associated communities during operations and post-closure. Research has also shown that it is essential, prior to the opening of a mine, to build partnerships between community, industry, and government stakeholders (especially through collaborative sustainability planning processes) to both maximise and sustain potential economic and social benefits to communities post mining. In BC, and elsewhere in Canada, there are mechanisms at the community level to initiate these types of collaborations and research is currently underway by this team to identify appropriate mining community-level indicators targeting sustained social and economic prosperity.

References

Bains, M. (2011) Company investigates reopening of coal mine near Tumbler Ridge. Northeast News. Available online at: http://www.northeastnews.ca/index.php?option=com_content&view=article&id=827:company-investigates-reopening-of-coal-mine-near-tumbler-ridge&catid=10:news&Itemid=12.

Baker, D. (2002) Mining in Northern British Columbia. Western Geography, 12, pp. 1–22.

BC Geological Survey (1991) MINFILE Number: 093M001; Bell. Ministry of Energy, Mines and Petroleum Resources.

BC Geological Survey (2009) MINFILE Number: 093L146; Granisle. Ministry of Energy, Mines and Petroleum Resources.

BC Geological Survey (2010) MINFILE Number: 093P 001; Bullmoose. Ministry of Energy, Mines and Petroleum Resources.

BC Geological Survey (2011) MINFILE Number 104B021; Granduc. Ministry of Energy, Mines and Petroleum Resources.

BC Ministry of Community, Sport, and Cultural Development (2011a) Official Community Plans. Available online at: http://www.cscd.gov.bc.ca/lgd/planning/official_community_plans.htm.

BC Ministry of Community, Sport, and Cultural Development (2011b) Smart Planning for Communities Initiative. Available online at: http://www.cscd.gov.bc.ca/lgd/intergov_relations/smart_planning.htm.

BC Statistics (2006) Census profile for Granisle. Available online at: http://datafind.gov.bc.ca/query.html?qt=Granisle&submit=+Search+&style=bcstats&qp=%3CANY%3E+url%3Awww.bcstats.gov.bc.ca%2F.

BC Statistics (2007) British Columbia Census Municipal Census Populations, 1921–2006. Available online at: http://www.bcstats.gov.bc.ca/data/pop/pop/mun/Mun1921_2006.asp.

BC Statistics (2010a) 2006 Census profile for Tumbler Ridge, DM. Available online at: http://datafind.gov.bc.ca/query.html?qt=Tumbler+Ridge&charset=utf8&style=bcstats&qp=%3CANY%3E+url%3Awww.bcstats.gov.bc.ca%2F&col=qlinks&col=blogs&col=bcgovt&col=govdaily.

BC Statistics (2010b) 2006 Census profile for Stewart. Available online at: http://datafind.gov.bc.ca/query.html?qt=Stewart&charset=utf8&style=bcstats&qp=%3CANY%3E+url%3Awww.bcstats.gov.bc.ca%2F&col=bcgovt&col=blogs&col=govdaily&col=qlinks

BC Statistics (2010c) 2006 Census profile for Kimberley. Available online at: http://datafind.gov.bc.ca/query.html?qt=Kimberley&submit=+Search+&style=bcstats&qp=%3CANY%3E+url%3Awww.bcstats.gov.bc.ca%2F.

Canadian Institute for Health Information (2006) How Healthy are Rural Canadians? An Assessment of their Health Status and Health Determinants. Ottawa: Canadian Institute for Health Information.

District of Stewart (2011) History of Stewart, Available online at: http://www.districtofstewart.com/about/history_Stewart.htm.

District of Tumbler Ridge (2005) Official Community Plan, Bylaw #498, 2005, May 2005, Available online at: http://www.tumblerridge.ca/DevelopmentandPlanning/OfficialCommunityPlan/tabid/112/Default.aspx.

District of Tumbler Ridge (2008) Seniors and special needs strategic plan, November 2008, Available online at: http://www.tumblerridge.ca/TownHall/CommitteesTaskForces/SeniorsNeedsTaskForce/tabid/159/Default.aspx.

District of Tumbler Ridge (2009) Community Profile – An Introduction to Tumbler Ridge, Economic Development Office, July 2009.

Government of Canada (2004) CSR Case Study: Teck Cominco, Building a culture of responsibility. Available online at: http://www.commdev.org/files/1078_file_tc_e.pdf.

Grieve, D., Madu, B., Northcote, B., Wojdak, P., Fredericks, J., Merideth-Jones, S. and Desjardins, P. (2010) Operating mines and selected major exploration projects in British Columbia. British Columbia Government, Available online at: http://www.empr.gov.bc.ca/mining/geoscience/publicationscatalogue/openfiles/2011/pages/2011-1.aspx.

Hanlon, N. and Halseth, G. (2005) The greying of resource communities in northern British Columbia: implications for health care delivery in already underserviced areas. The Canadian Geographer, 49(1), pp. 1–24.

ICMM (2009a) International Council on Mining and Metals. Planning for Integrated Mine Closure: Toolkit, p. 6. Available online at: www.icmm.com/document/310.

ICMM (2009b) International Council on Mining and Metals. Planning for Integrated Mine Closure: Toolkit, p. 8. Available online at: www.icmm.com/document/310.

Indian and Northern Affairs Canada (2006) CCP Handbook: Comprehensive Community Planning for First Nations in BC. Available online at: http://www.ainc-inac.gc.ca/ai/scr/bc/proser/fna/ccp/ccphb/pub/ccphb-eng.asp.

International Finance Corporation (2007) Stakeholder Engagement: A good practice handbook for companies doing business in emerging markets. Available online at: http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/p_StakeholderEngagement_Full/$FILE/IFC_StakeholderEngagement.pdf.

MacKendrick, N. and Parkins, J.R. (2004) Indicators of Community Sustainability for the Morice and Lakes IFPA Region. Natural Resources Canada, Edmonton, AB.

McAllister, M.L., Scoble, M. and Veiga, M. (1999) Sustainability and the Canadian mining industry at home and abroad. CIM Bulletin, 92(1033), pp. 85–92.

Mining Association of Canada (2001) Sullivan Roundtable: The Role of Industry Associations, Speech by Gordon Peeling, President and Chief Executive Officer, Mining Association of Canada, November 6, 2001. Available online at: http://www.mining.ca/www/media_lib/MAC_Documents/Speeches/English/kimberley.pdf.

Mining Association of Canada (2009) A report on the state of the Canadian mining industry: Facts & Figures 2009. Available online at: http://www.mining.ca/www/media_lib/MAC_Documents/Publications/2009/2009_F_and_F_English.pdf.

Ministry of Energy, Mines, and Petroleum Resources (2007) Mining benefits everyone: Sustaining rural communities through jobs and economy. Available online at: http://www.gov.bc.ca/empr/down/mining_factsheet_07.pdf.

Natural Resources Canada (2010) Social and Community Issues Related to Mining. NRCAN, Ottawa, ON Available Online at: http://www.nrcan.gc.ca/mms-smm/high-poin/20100326b-eng.htm.

Neil, C., Tykkylainen, T. and Bradbury, J. (1992) Coping with Closure: an international comparison of mine town experiences. Routledge, London.

Nelson, J., Scoble, M. and Ostry, A. (2010) Sustainable socio-economic development in mining communities: north-central British Columbia perspectives. International Journal of Mining, Reclamation and the Environment, 24(2): pp. 163–179.

Omineca Beetle Action Coalition (2008) Community Social Services and Support Strategy. Available online at: http://www.ominecacoalition.ca/Strategies/SocialSupports/StrategyDocs.html.

Ostry, A. (2009a) The mortality gap between urban and rural Canadians: a gendered analysis. Rural and Remote Health. 9: 1286 (Online). Available at: http://www.rrh.org.au/articles/showarticlenew.asp?ArticleID=1286.

Ostry, A. (2009b) The impact of the recession on the health of rural citizens in British Columbia, Canada. Journal of Remote and Rural Health. 9:1265 (Online). Available at: www.rrh.org.au/publishedarticles/article_print_1265.pdf.

Ostry, A., Maggi, S., Hershler, R., Chen, L., Loule, A. and Hertzman, C. (2009). Differences in non-work injury and accidents among sawmill workers in rural compared to urban British Columbia, Canada. BMC Public Health. 9, 432 p.

Ostry, A., Shandro, J.A. and Davis, E.J. (2010) Forest Sector Restructuring and the Health, Social Fabric and Sustainability of Rural and Northern Communities in British Columbia, Accepted with revisions by Society and Natural Resources, March 22, 2010. Manuscript # USNR-2010-0053.

Parker (2002) The Sullivan Roundtable: Lessons in sustainability one year later. World Bank Workshop, May 2002. http://www.mining.ca/www/media_lib/MAC_Documents/Presentations/English/parker.pdf.

Patriquin, M., Heckbert, S., Nickerson, C., Spense, M. and White, B. (2005) Regional economic implications of the mountain pine beetle infestation in the Northern Interior Forest Region of British Columbia. Natural Resources Canada, Canadian Forest Service. Available online at: http://dsp-psd.pwgsc.gc.ca/Collection/Fo143-3-2005-3E.pdf.

Randall, J.E. and Ironside, R.G. (1996) Communities on the edge: An economic geography of resource-dependent communities in Canada. The Canadian Geographer, 40(1), pp. 17–35.

Shandro, J. (2011) The demographic, economic and health fabric of mining communities in British Columbia, Canada. PhD Dissertation for the degree in Mining Engineering, UBC. Available online at: http://hdl.handle.net/2429/32016.

Shandro, J., Koehoorn, M. and Scoble, M. (2010) Bridging Mining Community Health and Sustainability. In Knowledge to Action: An end of grant knowledge translation case book, pp. 21–24. Canadian Institute of Health Research, Ottawa, ON.

Shandro, J., Koehoorn, M. Scoble, M. and Hurrel, C. (2009) Mining and Community Health: A British Columbia Based Research Project Summary Report. October, 2009. Available online at: http://www.spph.ubc.ca/sites/healthcare/files/1258418522196.pdf.

Shandro, J.A., Koehoorn, M., Scoble, M., Ostry, A., Veiga, M.M. and Gibson, N. (2011b). The well-being and sustainability of mining communities in British Columbia. Submitted to CIM Journal, 26 May 2011.

Shandro, J.A., Scoble, M., Ostry, A. and Koehoorn, M. (2011c) Health research studies in British Columbia mining communities. Proceedings of the 5th International Conference on Sustainable Development in the Minerals Industry, pp. 429–443.

Shandro, J.A., Veiga, M.M., Shoveller, J., Scoble, M. and Koehoorn, M. (2011a) Perspectives on community health issues and the mining boom-bust cycle. Resources Policy, doi:10.1016/j.resourpol.2011.01.004.

Stewart and Hyder International Chamber of Commerce (2011) Community Services. Available online at: http://www.stewart-hyder.com/community.html.

Veiga, M., Scoble, M. and McAllister, M.L. (2001) Mining with communities. Natural Resources Forum, 25, pp. 191–202.

Village of Granisle (2010) Response to the BC Environmental Assessment Office Re: Pacific Booker Minerals Environmental Assessment Certificate review. Available online at: http://a100.gov.bc.ca/appsdata/epic/html/deploy/epic_project_doc_list_224_r_loc.html.