Monitoring social progress in mining zones—the case of Antofagasta and Tarapacá, Chile

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ABSTRACT

Chile is a mining country; the sector, in the last years, represented around 20% of the Chilean GDP and 34% of the world's copper production with 5.4 million of metric tonnes. The most important mining regions Tarapacá and Antofagasta represent 75% of the Chilean mining GDP and 25% of world copper production (COCHILCO, 2010). In the last two decades these mining regions grew in terms of production, foreign investment, world class projects, and have experienced very important economic and social transformations. Poverty has reduced to less than 7% of the population and GDP per capita has increased to over US$ 30 thousand per year (Banco Central de Chile, 2010).

However, despite these positive indicators, the story of the mining industry's contribution to economic and social progress is more complex. A deeper view is necessary to answer the more complex questions: what has the impact been in terms of quality of life and human development? And, given the world class (perhaps unparalleled) resource and the relatively small population, have enough positive benefits been generated by mining, particularly in comparison to the wealth generated by the industry?

This paper evaluates economic and social progress in Antofagasta and Tarapacá over the period of ten years (2000–2010). A pilot monitoring framework is developed based on five dimensions (socio-economic conditions, education, health, small and local communities, and institutional development). Three factors are analysed: the current state, the trend of progress and the performance against reference targets. Indicators are reported for each of these dimensions and evaluated in terms of the gaps between the current state and the reference target, given trends in progress.

The pilot monitoring framework reveals that both Antofagasta and Tarapacá show good progress on some social and economic indicators; however, when compared to trends and the performance toward reference goals, the level of progress is low and insufficient to demonstrate a comprehensive improvement in terms of quality of life and human development. The monitoring framework developed has the potential to be used to support evaluation of social investments and corporate community programmes and, in doing so, contribute to a participatory and informed dialogue about the contribution of the sector.

INTRODUCTION

This paper analyses the socioeconomic development of Tarapacá and Antofagasta, the main mining regions of Chile. In the past 20 years these regions have emerged as centres of mining development, with significant production linkages and progress in overcoming poverty and improving socioeconomic development. While focussed on Chile the analysis has broader implications for debates about mineral resource endowments and development, as well as natural resource governance. This is particularly so given claims that Chile provides a model for other resource endowed regions; that Chilean resources have been developed for broad societal benefit; and that Chile has avoided the so-called 'resource curse' (Maxwell, 2004; ICMM 2006).

Recent improvements in the terms of trade for a number of commodities, including copper, have resulted in a significant increase in the returns to the state in terms of taxation and royalties. Yet questions remain as to the level of returns and regional benefit given the scale of resource development in Chile (Newbold, 2003; Riesco et al, 2005).

Lagos (1997), Meller (2000) and Franks (2007) provide in depth analysis of the policy and historical context of copper development in Chile. Lagos and Blanco (2010) undertake an analysis of economic and social development in the region of Antofagasta concluding that further improvements in the region require a greater commitment to social development goals. In this paper we aim to build on this research to improve how socioeconomic information is analysed in relation to the impacts of mineral development on quality of life and human development. We develop a pilot monitoring framework based on five dimensions (socioeconomic conditions, education, health, small and local communities, and institutional development). Three factors are analysed: the current state, the trend of progress and performance against reference targets. Indicators are reported for each of these dimensions and evaluated in terms of the gaps between the current state and the reference level (target), given trends in progress.

The paper is divided into five parts. The first part shows contextual data for Chile and the mining regions under analysis (Tarapacá and Antofagasta). Part two critiques the traditional approach of reporting on social and economic development and argues for a new generation of questions that better account for stakeholder expectations and the responsibilities of companies. Part three presents a generic framework of socioeconomic indicators for tracking and monitoring socio-economic development in mining regions. Part four presents results for 15 selected indicators in Antofagasta and Tarapacá. Finally, the paper concludes with a discussion about the shared responsibilities of industry and government.

CHILE, TARAPACÁ AND ANTOFAGASTA

In recent decades, Chile has made significant progress in socioeconomic terms. The results stand out among the economies of Latin America and developing countries. In 2010 the country's GDP was over US$ 200 billion, with a GDP per capita around US$ 12 000 (current dollars; BANCO CENTRAL DE CHILE 2010). In the same year Chile was admitted into the OECD as a part of the continued strengthening of its democratic institutions.

Chile is a mining country; the sector in the last five years (based on current dollars) represented around 20% of the Chilean GDP, and is the principal supplier of copper worldwide with 5.4 million of metric tonnes equivalents to 34% of world copper production (COCHILCO, 2010). Chilean copper reserves account for 23% (USSG 2010) of worldwide copper reserves.

The most important mining regions in Chile are Tarapacá and Antofagasta. Both regions represent 75% of the Chilean mining GDP and 25% of world copper production (BANCO CENTRAL OF CHILE 2010). In the last two decades the regions grew in terms of production, foreign investment and new world class projects. They have experienced very important economic and social transformations, particularly in comparison to non-mining regions in Chile and others zones in Latin America. A good example of these changes is poverty reduction which between 1990 and 2009 declined from 35% to less than 7% of the population (National Poverty Line; CASEN, 2010) and GDP per capita, which grew to over US$ 30 thousand per year.

According to these traditional figures both regions offer a relatively positive scenario for analysis. To date the mining assets invested represent around US$ 25 billion; in the last two decades foreign investment materialised was over US$ 15 billion; and the contribution to state income toped 25% (considering direct and indirect effects; data based on current dollar and own research). Resource development is undertaken by a mix of both Chilean state owned companies such as CODELCO, and international mineral houses, including BHP Billiton, Angloamerican, Xstrata, Freeport-McMoRan and Barrick Gold (Consejo Minero de Chile, 2010; COCHILCO 2010).

A NEW GENERATION OF QUESTIONS

Addressing issues related to the effects of mining on human, social and economic development is, however, not straightforward for both of the regions under analysis (and for other mining regions). This is in part due to the fact that social groups and society in general have been subject to significant change in terms of composition and complexity, as well as the effect of broader societal transformations, such as the return to democracy; but also because the headline indicators mask underlying trends.

In the past 20 or 30 years mining impacts have mostly been reported in relation to production, investment, and direct effects on the economy (what we could call Type I questions). In recent years, following the conceptual evolution of human development concepts, the questions have evolved to consider: what are the effects of mining activities on health, education, quality of life and human development? And what is the magnitude and longevity of these effects? These types of questions we could call Type II questions. Their aim is to explore what has happened within communities as a result of resource development and there is a growing body of research on Type II questions with reference to Latin American mining regions (Aroca 2000; Parra 2006; Parra 2008; Larde, Chaparro & Parra 2008; Parra 2009; Lagos 2009; Lagos and Blanco, 2010; Parra 2010).

However, given the scale of resource development, the disproportionate nature of who experiences such developments, and growing community and government expectations even Type II questions may be inadequate as indicators of economic and social development. Societal expectations appear to show a similar trajectory to commodity prices – while actual economic and social development outcomes are not as closely linked. Social groups are thus quite logically asking: Is social progress and societal benefit from mining proportionate to the private benefits enjoyed by resource developers? These different questions we could name Type III.

The case of Tarapacá and Antofagasta are clear examples in this regard. The regions can demonstrate many statistical records on production and mining investment (Type I questions). It is also possible to prove the existence of a positive (though of course partial) correlation between mining activity and poverty reduction, and some causal mechanisms to explain the link (Type II

questions), however, when we start to ask: how much should poverty have reduced considering the magnitude of the wealth generated and the extent of the resource? Or how many years of resource development would be needed to achieve a satisfactory level of social condition (without poverty)? The answers are more complicated.

These new types of questions have huge relevancy for resource companies and society in general given the substantial increase in terms of trade and the "mining boom" being experienced in regions as far and wide as Africa, Australia, Canada, Finland and Latin America. The steady rise in corporate earnings, sales, profit margins and net profits, are viewed by some stakeholders as lost opportunities for improvements in local and regional development. Questions are being asked about the level of taxation and royalties, whether development is better achieved by state owned entities and whether there is a need for a new social contract. Such questions demand more from our analysis than the simple demonstration of net benefit.

At the community level in the areas of influence of mining projects, these questions are posed with reference to socio-economic demands, and in relation to the delivery of these demands through community relations programmes, local procurement and supplier policies, locally located employment and small business opportunities and more broadly the role of mining companies in the local society. Today, communities and interest groups are not only measuring benefit by considering company community development initiatives, they are instead thinking about what are the real changes needed to produce a significant improvement in terms of human development and how might company programmes contribute to broader community level and government planning to coordinate and leverage activities.

The answers to these questions are of course not only the remit of the mining industry. As such a participative process of analysis, assessment and development is required. In the following section we offer a pilot monitoring framework that begins to articulate answers to the three types of questions presented above.

PILOT MONITORING FRAMEWORK

The pilot monitoring framework developed here is based on five dimensions (socioeconomic conditions, education, health, small and local communities, and institutional development) and the analysis of three factors: the current state, the trend of progress and the performance against reference targets. Indicators are reported for each of these dimensions and evaluated in terms of the gaps between the current state and the reference level (target), given trends in progress. If the gap is huge, then the assessment of the development is low. If the current data is very close to the reference level the human development is evaluated as high. Of course, the evaluation of development (high, medium and low) is a qualitative measure that needs a participative process of evaluation that includes perspectives from companies, stakeholders and local authorities (Table 1).

For the analysis of trends in progress and gap we use time as a measure (years) to provide a comparative unit across all indicators. For the reference level of progress, we use other countries with the same GDP per capita or an “inspirational” target, for example: < 1% of poverty; 14 years of average schooling. Finally, a separate analysis is necessary for local and small communities, because a number of indicators are not efficient in communities with a low population or with special conditions.

Furthermore, due to the importance of comparing progress and development globally we adopt the concept of human development as advocated by various United Nations initiatives (UNDP 2010). For example, in the dimension of education it is important to know the progress in terms of the improvement in skills, quality, results, as well as research, to understand how mining activities contribute over the long-term.

Table 1 Factors analysed within the pilot monitoring framework

	Factors of Analysis			**Evaluation**	
Dimensions	Current data	Trend of progress	Reference Level of Progress (or Target)	Gap (Years)	Development (High, Medium, Basic)
1 Social and economic conditions					
2 Education					
3 Health					
4 local and small communities					
5 Institutional development					

ANALYSIS IN TARAPACÁ AND ANTOFAGASTA

The results reported here reveal that both mining regions demonstrate a relatively high level of progress in the dimension of social and economic conditions; however progress in a number of other dimensions is relatively low (see Table 2).

Education: LOW

The indicators in the educational dimension were evaluated as low due to the huge gap between the current data and the reference level.

Using education results as an example (Educational Ministry of Chile quality of education test - SIMCE; MINEDUC 2010) the pilot monitoring framework shows that if the annual trend of change for the results of the SIMCE test continues (based on the period 2000-2009), the regions will achieve the "aspirational" target only within the next 55 years. The aspirational target adopted in this case represents a performance of around 70% of the best result.

Another indicator analysed is enrolment within Masters and PhD level degrees in local universities. The current enrolment is around 570 people per year in local universities, but using a comparative measure based on enrolment per GDP, the regions should have a higher enrolment of around 2.100 people per year. Based on the trend of progress the gap is around 76 years.

Health: LOW (Hospital Beds)

In 2010 the number of hospital beds (in public and private sector) was around 1.942 units or 22.2 hospital beds per 10 000 people (MINSAL 2010). The figure has remained relatively stable since at least 1990–96 and with a target set of 3500 hospital beds (40 hospital beds per 10 000 people) (countries with a similar GDP per capita) this represents a gap of around 200 years.

Local and Small Communities: LOW

While both regions demonstrated high social and economic conditions in average terms, the social conditions for small communities are far from at an optimum level. Alto Hospicio, Tocopilla, and Colchane are examples of this reality, with poverty levels up to 50%. Poverty in these communities is similar or worse in comparison to other communities in non-mining regions of Chile. Other indicators like SIMCE test scores for Mejillones or Sierra Gorda, follow the same tendency, with satisfactory results only achieved in the next seven or eight decades.

Institutional development: LOW

For the analysis of institutional development we used an indicator percentage of GDP of public expenditure. In developed countries public expenditure is between 21% and 25% of GDP, with public expenditure for countries like Chile around 18%–21% of GDP. In Tarapacá and Antofagasta, however, public expenditure represents around 5% of GDP. This situation is a likely reason for the poor indicators of health and education, or the unsatisfactory conditions of local and small communities. Such a situation is a paradox given the level of economic resources generated from the region.

Table 2 Pilot Monitoring Framework: Tarapacá & Antofagasta

		Factors of Analysis			Evaluation	
Dimensions		Current Data (b)	Annual Trend of Progress (2000-2009)	Target	Gap (Years)	Quality of Life (High, Medium, Basic)
1	Social and economic conditions					
	Poverty (%)	7%	0,35%	1%	17	MEDIUM
	Inequality (% poorest quintile)	6%	0,3%	8%	7	HIGH
	Salary ratio Female/Male	0,55	0,04	0,9	9	HIGH
2	Education					
	Result of SIMCE Test (points)	240-250	1	300	55	LOW
	PhD & Masters (annual enrolment)	570	20	2.100	76	LOW
	Average Schooling	11,0	0,15	14,0	20	LOW
3	Health					
	Total Hospital Beds & per 10.000 people	1,942 (22,2)	10	3,500 (40)	210	LOW
	Infant Mortality (per 1000)	8-9	0,5	3-4	10	HIGH
4	Local and small communities					
	Alto Hospicio Poverty (%)	22%	0,35%	5%	48	LOW
	Tocopilla Poverty (%)	11,7%	0,35%	5%	20	LOW
	Colchane Poverty (%)	50%	0,35%	5%	120	LOW
	SIMCE Mejillones	216	1	300	84	LOW
	SIMCE Sierra Gorda	227	1	300	73	LOW
5	Institutional development					
	Public Expenditure (US$)	1.200	100	4.500	30	LOW
	Public Expenditure (% GDP)	5%		15%	30	LOW

CASEN (2000, 2002, 2004, 2006, 2009); MINEDUC (2010); MINSAL (2010), INE (2010), BANCO CENTRAL DE CHILE (2010)

RESPONSIBILITIES

There is a view held within some parts of the minerals industry that social and human development issues in mining regions should predominantly, or exclusively, fall under the responsibility of government? Why should mining companies develop social monitoring frameworks and be responsible for indicators such as the results in tests of education quality, the annual enrolment in PhD programmes or the number of hospital beds per capita?—isn't that what royalties and taxes are paid for?

Corporate social responsibility advocates (and some industry representative organisations) have countered that efforts to improve social and economic development in mining regions make good business sense; that they enhance company reputation; ensure the quality of life and attraction/retention of employees; provide a supply of skilled workers; help win the support of crucial stakeholders; and balance the adverse impacts of mining (see for example ICMM 2005). These pragmatic arguments, which are often the business case behind corporate programmes to deliver benefit, are compelling for the Type I and II questions outline above, but often fall short of making the case for the Type III questions of delivering public (and local) benefit that is proportionate to private benefit and the scale of resource development. What is needed is more than a business case for corporate responsibility, but an articulation of a business case for industry-wide responsibility.

There are at least two reasons why industry should be in a position to demonstrate a proportionate level of benefit. First, the legacy of past and current development plays a very big role in shaping the future social licence to operate. In regions such as Chile, endowed with a very large proportion of a relatively essential resource there is a compelling case for a long-term view. Chile has faced this issue before in the period between the 1950s and 1970s where the lack of demonstrable benefit by multinational copper mining companies led to a withdrawal of the social licence and increased state control of copper extraction. Indeed this is one of the reasons why Escondida, one of the first multinational copper operations to invest in Chile following the nationalisation of the industry, decided not to accelerate the depreciation of its capital as well as establish a community development foundation.

The second argument forwarded here is that for the mining industry to accept responsibility for the improvements in social and human development, such as accepting a measure of responsibility for poverty reduction in Tarapacá and Antofagasta, the industry must also accept a measure of responsibility for the shortcomings. That is, responsibility is global—one must take the bad with the good. In a context where production is large and rapidly expanding, the business risks of development in Chile are in decline, returns on investment are healthy, and the historic level of taxation and royalties provided to government in Chile is modest (particularly in comparison to the return from state owned entities) industry must share the responsibility with governments for regional social and economic development outcomes.

CONCLUSION

In this paper we have evaluated economic and social progress in Antofagasta and Tarapacá, Chile in the period 2000—2010. A pilot monitoring framework is developed that reveals that both regions demonstrate a relatively high level of progress in social and economic conditions but a low level of development when we take into consideration what should be expected given the scale of development and revenues generated, and the time it would take to meet reasonable reference levels.

Indicators of education, health, small communities and institutional development were evaluated as low level of development, because they show a huge gap between the current data and reference

level. The indicator of quality of education (SIMCE test) shows a gap of 55 years (in relation to an inspirational target); the indicator of hospital beds a gap of around two hundred years; the indicators for small localities like Tocopilla or Colchane show similar or worse poverty than any other community in non-mining regions of Chile; and the indicator of public expenditure in Tarapacá and Antofagasta is around 5% of GDP, and likely reason for the poor indicators of health, education, and the unsatisfactory conditions of local and small communities. Finally, the pilot monitoring framework developed here has the potential to be used to support evaluation of social investments and corporate community programmes and, in doing so, contribute to a participative and informed dialogue about the contribution of the sector and the growing demands of stakeholders.

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