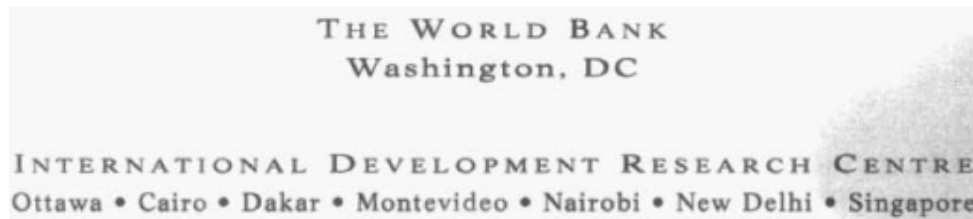


Large Mines and the Community

Socioeconomic and Environmental Effects in Latin America, Canada, and Spain

edited by Gary McMahon and Felix Remy



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Foreword

The costs and benefits of large-scale mining to local communities and the evolution of the relationship between mining companies and communities is a subject that has become important in countries spanning the globe. To date, however, it is also a subject on which there has been a dearth of comprehensive research. In a context in which this relationship is changing rapidly —albeit unevenly and unsystematically —the need to develop tools that will allow the assessment of the impact of different approaches to this relationship has become paramount.

To address this need, a project on large mines and the community was launched in three traditional Latin American mining countries —Bolivia, Chile, and Peru —where mining has been an important part of the economy for centuries. Given the relatively long and extensive mining history of the three countries, it is believed that these studies will provide important lessons to other countries in the region and around the globe. It was also decided to include studies from Canada and Spain so as to compare the experiences of developed and developing countries and to share lessons learned. The experience of Canada, with its well-established mining industry and involvement of aboriginal peoples that live in many of Canada's mining regions, has important parallels with the Latin American situation. The study of the Almadén mercury mine in Spain, the oldest active mine in the world, looks into a community profoundly affected for over 2 000 years by a mine that is now facing closure. The project was developed by in-country research teams and staff members of the Industry and Mining Division of the World Bank (now part of the Mining Department) and the International Development Research Centre (IDRC) of Canada. It was officially launched in Lima in June 1998 with financial support from IDRC, the World Bank, the Canadian International Development Agency (CIDA), and the Government of Spain. The country studies were undertaken by teams from the Universidad Católica (Bolivia), the Universidad de Chile (Chile), the Grupo de Análisis para el Desarrollo (Peru), Carleton University (Canada), and International Institutional Consulting (Spain), as well as by Graham Parsons, an independent consultant in Saskatchewan, Canada.

This book is the final result of these efforts. It contains an independent analysis of the various effects of large-scale mining on local communities, with three medium-scale mines included for contrast. The authors have explored the reasons for varying performances and lessons learned for future operations. The general message of the book is a hopeful one: the relationship between mining operations and local communities is undergoing a largely positive evolution, and there are very practical programs and policies that can be followed to increase the probability of such experiences. A more specific message of the book is that these are more likely to take place if the three major stakeholders —the local community (including such groups as civil society, local government, labour unions, and women's groups), the mining company, and the central (or state/provincial) government —work together in a trilateral framework toward ensuring long-term, sustainable benefits to the community, benefits that will not disappear when the mine eventually closes. It is our hope and belief that the studies contained in this book will play a key role in the development of best practices with respect to mining and the community, which can be used to guide the policy and actions of all stakeholders.

We would like to thank CIDA and the Government of Spain for their support for this project, Real Lavergne for his assistance in the development and monitoring of this project, Jean-Claude Lauzier for his contributions to the development of the project, and numerous participants in project workshops in Lima and Santiago.

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CHAPTER 1.

Key Observations and Recommendations: A Synthesis of Case Studies

Gary McMahon and Felix Remy

Introduction

This book presents six studies that investigate the impacts of medium-and large-scale mines on local communities. Each examines the economic, social (including health and education), cultural, and environmental effects of the mining operations on the communities. The studies' primary goal is to analyze the mining operations costs and benefits upon the surrounding vicinity from a multi-dimensional perspective. Strong emphasis is placed on the sustainability of any benefits received by the communities. Second, the authors explain the legal and consultative processes that often led to quite different results. Third, the authors identify the best or good practices from the perspectives of all stakeholders in the management of the development, extraction, and closure phases of a mining operation, paying particular attention to sustainable socioeconomic development.

Two factors have affected increased globalization of trade markets in recent years: The decline of the communist trading block and the increased environmental control in developed countries. One of the most notable results of this has been the marked increase in exploration and mineral development activities by local and multinational companies in developing and transition countries. Many countries that have recently begun the transition to a market economy (or moved away from a reliance on state intervention in the economy) see the development of the mining sector as vital for the reactivation of their economy. In particular, revenues from this sector are often the most important (and easiest to manage) source both of foreign exchange and fiscal revenues.

The capital-intensive nature of mining requires very large amounts of investment capital and, in most cases, considerable technological upgrading.¹

Consequently, many governments of countries with significant mining potential have changed their investment and mining codes to attract foreign investors.² The results of these actions have been impressive. Between 1990 and 1997, while global exploration investment went up 90 percent, it increased fourfold in Latin America. From another perspective, the share of exploration investment in other developing countries rose from 1990 to 1997, but by the year 2000 it returned to the 1990 level. However, Latin America increased its share by 123 percent (from 13 percent to 29 percent) from 1990 to 1997, and then maintained that share from 1997 to 2000, when exploration investment was sharply reduced worldwide.³

At the same time, with the recently diminished role of the state in the mining industry and a more active international community, expectations regarding the responsibility of mining

¹ In this document, the mining sector does not include oil and gas. Although much of the discussion also pertains to that sector, it is excluded from this project due to its distinctive characteristics.

² Most of this reform has taken place in Latin America although the momentum is beginning to spread to developing countries in other regions of the world.

³ Exploration investment generally leads to project investment of a much greater amount, although there is no clear relationship and the amounts are spread over a number of years.

companies in the protection of the environment and their relationship with local communities have changed. It is now generally accepted that the potential detrimental effects that mining can have on fragile ecosystems and local communities should be prioritized. While it is generally true that large international mining companies are better environmental citizens than smaller, domestically owned mines, a number of negative incidents has drawn widespread interest in and criticism of their practices. On the one hand, local and international environmental groups have become increasingly involved in mining disputes. On the other hand, local communities have become increasingly concerned that they shoulder

all of the negative impacts of mining but receive few of the benefits, especially as capital-intensive, large mining operations only generate a fraction of the jobs that they did a generation or two ago.

The emphasis this analysis places on the development of the local community is relatively new in terms of economic research on mining. Traditionally, most research has focused on the macroeconomic effects, determining the benefit (or lack thereof) to the mining sector's impact on the national economy. Often the discussion has been centered on the natural resource curse or the related Dutch disease. On the contrary, there is little analytical research on the microeconomic or regional effects that focus on socio-cultural and, especially, environmental effects. In contrast, the studies in this book are primarily concerned with whether or not large mining operations can produce net sustainable benefits to local communities, and, if so, whether there are policies or processes that can increase positive and reduce negative impacts. In order to determine the net benefits, it was necessary to analyze all relevant impacts—economic, social, cultural, health, and environmental. The key issues addressed in each of these areas are discussed in this introductory chapter.

Three of the six studies cover mines located in developing countries. They cover a total of seven mines in Bolivia, Chile, and Peru and each study follows similar methodologies, addressing the issues described above. The other three studies are on mines located in developed countries, each of which was selected to provide further illumination to the results of the Latin American studies and provide additional lessons for all developing and transition countries involved in large-scale natural resource extraction. Chapter 5 examines community and regional development in the area of the Almadén mercury mine in Spain, the oldest continuously operating mine in the world with at least 2000 years of operation. Chapter 6 examines the history of mine-community relations in Canada, using a number of mini-case studies. Finally, chapter 7 looks at the community effects of the uranium industry in northern Saskatchewan, a part of Canada mostly populated by aboriginal peoples.⁴

This chapter summarizes the main conclusions of the studies, culminating in a synopsis of lessons learned, conclusions, and recommendations.

Key issues

It was noted in the introduction that the researchers investigated the economic, social, cultural, environmental, and health impacts of medium-and large-scale mining operations on local communities. The key issues that they addressed in each area are outlined here.

⁴ Native peoples in Canada are customarily referred to as aboriginal peoples while in Latin America they are called indigenous. We use both terminologies in this book depending on the context.

Economic issues

The opening of a large mine has economic consequences at the national, state or provincial, and local levels. Large mines create employment directly in both the construction and operating phases, indirectly through input demand, and even more indirectly through the so-called multiplier effects of the demands for goods and services by their employees. Large mines also provide foreign exchange earnings and tax revenues. Although the level of the tax burden, including indirect taxes, remains an important issue, many countries have reduced taxation levels and eased repatriation requirements in order to attract foreign investment. But

in some countries obsolete fiscal regulations have been applied, depriving the host country of a fair share of any benefits. At the same time, many countries have been decentralizing tax and expenditure systems.

These observations have many implications.

1. Spin-off economic benefits. Who is it that benefits from the direct, indirect, and multiplier effects of the opening of a large mine? Are there provisions for local and indigenous communities? Are there any commitments "to buy locally"? Will there be any attempt to train local residents for skilled or semi-skilled positions? Will informal or small-scale mines be displaced by the proposed new operation?
2. Income benefits. What will be the general effect on wages and incomes in the local area? Is it likely that the prices of some basic goods will increase dramatically, causing hardship to those community members not receiving benefits from the new economic conditions? In sum, the income distribution effects of the opening of a new mine are likely to be substantial and have potentially serious effects.
3. Taxation. The division of taxes and royalties among different levels of governments is an important factor in determining the geographic and end-use distribution of the benefits and costs of the mine. The influx of new migrants puts great strains on the existing social and economic infrastructure. It is essential that some mechanism exists to ensure an orderly expansion of activities and provision of services.

Environmental issues

There does not seem to be any hard evidence that large international mining companies seek pollution havens in which to conduct their operations. With some exceptions, they use the same technology in developing countries that they do in their home countries, and they often supersede the local environmental standards. However, there have been a number of large incidents in recent years which mining critics eagerly point out. In this study, primarily through discussions with the various stakeholders, the researchers made an assessment of the general environmental performance of the mining operations and their general compliance to national and international processes and standards.

Social and cultural issues

It is not just economic implications that pose a concern. There are equally grave social and cultural repercussions to opening a new mine, particularly when indigenous populations are affected. For instance, an influx of new workers may lead to social problems due to a lack of adequate housing and infrastructure, growth of bars and prostitution, easier access to the area due to road development, and deficient educational and medical facilities. Moreover, workers from other regions of the country or abroad usually bring different lifestyles and patterns of behaviour and arouse local resentments. Usually, the average "imported" worker will be wealthier than the local population: this may magnify their importance in the eyes of some local residents, especially the young.

The uneven distribution of benefits and costs from the mine may also upset existing social hierarchies and have dramatic cultural consequences. On the other hand, if managed properly, the increased employment, wealth and commerce caused by the mine opening can lead to a cultural revival, especially in a depressed area. Of particular concern is the case where the cultural adaptation of indigenous and non-indigenous local communities may be quite different. While the latter may not find their cultural base threatened by the large mine and welcome its employment opportunities, the indigenous peoples may believe that they and

their culture will be overwhelmed by the arrival of large number of workers and their families.

Similar to economic benefits and costs, the distribution of social benefits and costs is likely to be unequal, particularly if there are indigenous populations. In the past, companies often acted as a surrogate government, providing infrastructure, schools and medical care. While in recent years this may continue to be true for the company's employees, it is less and less true for the community at large. Therefore, local governments need to be empowered and financed to provide such services. An important part of the analysis in this project was to analyze the implicit distributional effects of the provision of government and company services. The related impact on poverty reduction was also a focus of the project.

Health issues

The health impacts of the opening of a large mine are an important factor from the environmental, social, and cultural perspectives. The pure economics of a large mine opening can also have significant health impacts if it leads to higher incomes and tax dollars spent locally on health-care provision, including better medical facilities. Nevertheless, the potential negative health impacts associated with mining generally receive most of the attention.

The most direct health concerns are occupational health and safety issues. Large mining companies have become quite conscientious in this area, although care must be taken that special local circumstances are given adequate due.

There are also important types of health impacts via the environmental nexus. First, there are the effects due to flow contamination. Such pollutants can lead to increased morbidity via direct consumption or via effects on the quality or quantity of crops contaminated by polluted irrigation water or air. Second, environmental disasters can have similar effects and, if involving toxic substances such as cyanide, could result in death. Third, the long-term effects of pollution stocks can have serious morbidity and mortality impacts, especially if they include the slow leak of toxic substances and heavy metals into the environment.

Even if the production processes of a new mine are completely clean, there is still likely to be a significant health impact due to social effects. On the positive side, the company may act as a surrogate government and provide health facilities that previously did not exist. On the other hand, in-migration may bring in new diseases or, just as importantly, result in the spread of diseases related with prostitution, such as venereal diseases and AIDS. In general, the more isolated or "virgin" is the territory into which the mining operation is entering, the greater is the socially related health impact.

Legal and consultative issues

Just as important as what took place is why it took place. Of particular importance are the regulatory framework in effect at the time of project development, coupled with the consultative processes followed in the negotiations leading to the opening of the mine, as well as mediation methods for any conflicts which later develop. Final outcomes significantly depend on the clarity and specificity of fiscal and environmental regulations and standards, as well as who is involved in the negotiations and the "rules of the game." Moreover, the mining companies themselves may have codes of conduct for dealing with environmental issues and local populations. Nongovernmental organizations (NGOs) can also play an important role in the negotiations, especially with regards to environmental and indigenous issues, where they may be better informed than public authorities.

The outcomes of negotiations will also be greatly influenced by the existing legal framework. Of particular importance are these five factors.

1. The rights of local and indigenous communities with respect to natural resources, land claims and general land invasion;
2. The legal position with respect to mining in national parks and the effects on biodiversity;
3. The general state of judicial systems and law enforcement, particularly with respect to the ability of local and indigenous groups to demand effective representation;
4. General environmental legislation, especially with regards to individual or class action litigation and the existence of "ecological" crimes; and
5. The legal responsibilities of mining companies with respect to local and indigenous communities and environmental protection in general.

The mining operations

The six studies analyzed in this book cover thirteen mines or mining regions, including Inti Raymi and Puquio Norte in Bolivia; Escondida, Candelaria, and Fachinal in Chile; Yanacocha and Antamina in Peru; Almadén in Spain; Cameco in northern Saskatchewan; and Voisey Bay, Diavik, Sussex, and Sudbury Basin in Canada.

Inti Raymi, Bolivia: This large-scale gold mine is only 42 km from Oruro, a medium-sized city located at an important crossroads in the altiplano of Bolivia. The region has a long history of mining. The immediate area of the mine is characterized by very low productivity agriculture and high levels of out-migration. The mine began production in the 1980s, and there was a major increase in capacity in the early 1990s. During the 1990s, Inti Raymi was by far the most important mine in Bolivia and a major contributor to exports and regional GDP, but its reserves are now quite low.⁵

Puquio Norte, Bolivia: This medium-scale gold mine is located in the Bolivian lowlands about 180 km east of Santa Cruz de la Sierra. The mine is very close to San Ramon, a town of about 6 000 people located at an important crossroads. The economy of the area is based on agriculture and commercial activities; mining is not traditional. Population growth is very high in the region. Puquio Norte was commissioned in 1997 with reserves for about seven years. While significant locally, it is not an important mine from the national or regional point of view.

Escondida, Chile: This very large copper mine is 300 km from the medium-sized city of Antofagasta. The region is a dry desert with a long mining history with other important operating mines. Escondida started production in December 1990. It has reserves for over 50 years and is a major contributor to Chilean exports, fiscal revenues, and regional GDP.

⁵ Until recently the mine was expected to close within three years but recent discoveries may extend its life to ten years or more. However, this new lease on life is quite dependent on the development of a bioxidization process that would make exploitation of the new reserves economically feasible.

Candelaria, Chile: This large copper mine is located 20 km south of Copiapó, a medium-sized town, in the coast of the Chilean 3rd region. As in the case of Escondida, the mine is located in a dry desert and the region has a long mining history. It has reserves for 34 years. Candelaria is an operation with significant impact in the regional economy.

Fachinal, Chile: This medium-scale gold mine is in a semi-wilderness area, about 25 km from the small town of Chile Chico. Tourism is the most important local activity and job opportunities are scarce; mining is not a traditional activity in the area. Fachinal was commissioned in 1996 and presently has reserves for about eight years. While significant locally, it is not important from a national point of view.

Yanacocha, Peru: This very large gold mine is located 45 km from Cajamarca, a medium-sized city. The economy of the area is based on agriculture and domestic tourism; mining is not a traditional activity. The region is one with high levels of poverty and lack of basic needs. Yanacocha first began production in 1993 and has expanded several times since. It is a very low-cost producer with reserves for at least 15 years, and is an important contributor to exports, fiscal revenues, and regional GDP.

Antamina, Peru: This very large-scale copper mine is under construction and should be in production by late 2001. It is located in a very poor highland area of Peru dominated by small towns and low productivity farming. Antamina has reserves for at least 40 years. It is projected to be a very important contributor to Peruvian exports, fiscal revenues, and regional GDP.

Almadén, Spain: The state-owned mercury mine at Almadén has been in operation for over 2 000 years and perhaps much longer. Historically, the region has been very dependent on the mine as a source of employment and income. Other activities in the lightly populated region are farming and rustic tourism. Due to the decline in the demand for mercury caused by environmental concerns, the mine is currently operating at low levels of production. During its history the Almadén mine has been an extremely important source of export and fiscal revenues for Spain although this is no longer the case.

Cameco, Northern Saskatchewan, Canada: Cameco, the world's largest uranium mining company, has four uranium mines in operation in northern Saskatchewan. It was formed when provincial and federal state-owned companies were merged and privatized in 1988. The mines are all located in remote, cold climate sites, in a region heavily dominated by aboriginal peoples living in poor conditions. Cameco is a very important employer in northern Saskatchewan as well as a significant generator of fiscal revenue for the entire province. In the 1990s between 40 to 50 percent of its employees were aboriginal peoples.

Voisey Bay, Labrador, Canada: This very large-scale nickel deposit is located in a remote area of northern Canada mostly inhabited by aboriginal peoples. Construction is currently delayed due to stalled negotiations between the owner, International Nickel Company, and the Government of Newfoundland. When in operation the mine is expected to employ about 1 400 people on a fly-in, fly-out basis. About 25 percent of the jobs are to go to local Innu and Inuit peoples. The mine is expected to generate \$296 million in annual income in Labrador and \$1 billion annually for the entire province of Newfoundland.

Diavik Mine, Northwest Territories, Canada: This large-scale diamond mine in a very remote area of northern Canada is scheduled to open in 2003. The inhabitants of the region are mostly aboriginal. It is expected to provide 411 jobs, with employment of northerners to eventually be 100 percent. Agreements with the company also provide for significant purchases from northern businesses.

Sussex, New Brunswick, Canada: This medium-scale potash mine was built in the 1980s in a well-established area that is economically dependent on farming plus pulp and paper. Most of the 334 employees are from surrounding communities. About 50 percent of all expenditures by the company go directly to the local region.

Sudbury, Ontario, Canada: The Sudbury Basin contains very large nickel and copper mines. It is located at an important crossroads between both southern and northern as well as eastern and western Ontario. During the last century, Sudbury has evolved into a major mining and regional service center. Companies selling mine-related goods and services have access to 90 mines within a 500 kilometre radius. Moreover, many Government services have relocated to Sudbury. While at one time the Sudbury Basin was considered one of the world's major mining environmental disasters, it now is a global technological leader in high productivity and environmentally friendly technologies.

Latin America: costs and benefits of the mining operations

In this and the following section the results of the studies in Bolivia, Chile, and Peru are summarized. The analysis begins with the economic costs and benefits of mining to the local communities, progresses social and cultural impacts, and finally presents environmental effects. The processes that helped determine the results are examined in the section entitled "Lessons learned and recommendations." Gold and copper are the primary products of four and three of the mines, respectively. All the copper mines represent large-scale operations, though two of the gold mines are medium-scale operations.

Economic costs and benefits

As noted earlier, most previous research on the mining sector has focused on its macroeconomic effects. To put the operations in context, the contributions to fiscal and exports revenues are discussed here, but no analysis is made of the direct or indirect implications of these amounts. Here, the focus is on a number of key microeconomic variables concerning local communities. These include land acquisition, employment and salary levels, business creation and development, multiplier effects, infrastructure creation, contribution to local taxes, training and education for mine employment as well as effects on local prices, particularly basic commodities and housing.

Table 1 contains the available data on investment, production, export revenues, and fiscal revenues for the mines in this study. For the large-scale mines, the amounts of investment and production are generally very large. The Table shows that the large-scale mines in Latin America have generated substantial export revenues and, except for Inti Raymi, healthy fiscal revenues too. The medium-scale mines are not significant from a macroeconomic perspective.

In a number of cases, land acquisition was a very crucial economic and social issue. Although it can be seen in Table 2 that prices paid were generally far above pre-mine market values, the negotiations often were very difficult. Moreover, local people usually had a different conception of what a land acquisition contract is than the mining firm, and tried to reopen the contracts (often successfully) when new information came to light or circumstances changed. Contracts were never reopened on the grounds the company had originally been too generous.

Whenever disputes arose, the two most important points of contention were a lack of consistency in pricing coupled with lack of alternative sources of employment and income for the sellers of the land. Even though the landowners received a sum far beyond the present value of their holdings, it was often consumed or poorly invested, and later on the former peasant farmer had no source of income.

Table 1. Investments, production, export revenues, fiscal revenues.

Large-scale mines	Investment	Production	Export revenues(% of	Fiscal revenues(% of total
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			total exportrevenues)	fiscalrevenues)
Inti Raymi, Bolivia	\$200 million (1990-1994)	10 435 kg of gold (1998)	11% (1998)	\$4.2 million in 1998
Yanacocha, Peru	\$492 million (1993-1998)	41 300 kg of gold (1998)	\$250 million in 1998(4.6%)	\$164.4 million intotal from 1993- 1997(1.6%)
Antamina, Peru (projected annual)	\$2.296 billion (1998-2002)	250 000 mt ofcopper; 150 000 mt of zinc	\$950 million (10%-15%)	\$83 million per year(2.5%-3%)
Escondida, Chile	\$2.3 billion (1990-1998)	851 000 mt of copper in 1998	\$1.96 billion in 1998(8.9%)	\$253 million in 1996(1.92%)
Candelaria, Chile	\$902 million (1988-1997)	215 000 mt of copper in 1998	\$656 million in 1998(3%)	\$30 million (total from 1993-1996)
Diavik, Canada (projection)	\$850 million	N/A	N/A	\$4 million per year
Northern Saskatchewan, Canada	1986 US \$2.5 billion (1953-1998)	10 924 milliontonnes uranium(1998)	\$379 million (3.1%) (1998)	\$72 million (2.4%provincial ownsource revenues(1998))
Almadén, Spain	-	-	-	-
Medium-scale mines				
Puquio Norte, Bolivia	\$25 million (1993-1997)	861 kg of gold (1998)	0.8% (1998)	\$0.32 million in 1998
Fachinal, Chile	\$85 million (1994-1996)	1400 kg of goldand 78 000 kg ofsilver in 1998	\$30 million in 1998 (<<1%)	-
Sussex, Canada	-	770 000 tonnes ofpotash and 700 000 tonnes of rock salt per year	-	-

In order to overcome difficulties associated with pricing, it is important to be transparent in negotiations either with landowners, or with communities in the case of the ownership of common land. If different vendors perceive that others have received a better deal, not only will they try to reopen their contracts but ill feelings will be generated. Pricing becomes a particularly difficult challenge when land is bought over time. Yanacocha in Peru paid much larger amounts for land bought in the late 1990s versus the early 1990s, amounts that largely reflected changing market conditions caused by the renewed dynamism in the area due to the mining operation itself as well as the defeat of Sendero Luminoso. This led to a great deal of bitterness on the part of early sellers and brought social forces such as the Catholic Church on their side. In the end the early contracts were renegotiated and several side payments were renegotiated which included jobs and social programs. Antamina, perhaps learning from the

difficulties that Yanacocha had faced, bought almost all the land that it thought it might need at one time, paying the same amount for land of similar quality.

Side payments, such as preferred employment, are one method to avoid or, if necessary, of overcoming the difficulties that arise when former landowners have spent the money they received for their land and have no other income sources. Another method that can be used in the case of the sale of community owned lands is to keep the funds in some sort of trust. In the case of Inti Raymi in Bolivia, one community (La Joya) included a representative from the mining company as part of a three-member board of trustees to help prevent both wasteful investments and corruption.

Table 2. Land acquisition.

Large-scale mines	Price range(per ha)/average price(per ha)/number of hectares	Previous market price (per ha)	Side payments	Savings and investment	General comments
Inti Raymi, Bolivia	\$300-\$1000/\$368/5746 ^a	\$30	Preferred employment for locals, including training; Constructed 135 houses at \$11 000/house for dislocated villagers	High percentage invested	Prices paid depended on quality of land and availability of alternative sites; artisanal miners given areas
Yanacocha, Peru	\$37-\$600/\$152/4069	\$44 (1992)	Rotating employment for land vendors	50% invested payment (other lands, houses, taxi)	Great variation in prices of similar quality land over time
Antamina, Peru	\$100-\$1000/\$480/7141	\$30	\$33 000 to 52 renters on mine site	Communities 100%; renters 80%; landowners (not known)	Negotiated common price all at once with prices only depending on quality of land
Escondida, Chile	Negligible(unoccupied desert)	Negligible	-	-	-
Candelaria, Chile	Negligible(unoccupied desert)	Negligible	-	-	-
Diavik, Canada	Negligible	Very low	Royalties to aboriginal groups, Local hiring policy with first priority to affected groups	-	Must negotiate impact and benefit agreements with aboriginal groups who

Northern Saskatchewan, Canada	Negligible	Very low	Employment performance monitoring Preferential local training and hiring policies Procurement contracts to local business New company development for Indian and community based business	-	own land Must negotiate impact and benefit agreements with local residents prior to development
Almadén, Spain	-	-	Preferred employment for locals	-	Miners have right to agriculture activities on mine property
Medium-scale mines					
Puquio Norte, Bolivia	N/A/7 200	Very low	None	Not relevant	All land bought from a foreigner; COMSUR allowed artisanal miners to stay with conditions
Fachinal, Chile	-	-	-	-	-
Sussex, Canada	-	-	-	-	-

^a Inti Raymi also paid \$22 222 per hectare for land adjacent to the local town site.

With the possible exception of some environmental externalities (discussed below), there were substantial benefits and few economic costs to the communities near the mining operations. Given the great technological advances in mining in the last 30 years (including the prevalence of labour-saving open-pit mining), direct employment in the Latin American mines has usually been small but not insignificant, except during the construction phase where it was substantial. Moreover, it has often been an important source of work for relocated peoples (usually peasant farmers).

As can be seen in Table 3, the indirect employment effects are often extremely important. Employment in sub-contracted firms or suppliers of mine-related goods and services is often equal to or much higher than mine employment—fourteen times as high in the case of Yanacocha. In turn, estimated non-mine related employment generated through multiplier effects is often much higher than direct or indirect mine employment —about 2.5 times as

high as the others combined in the case of Inti Raymi. In summary, for all of the large-scale mines, the total effects of the operations on local and regional employment can be substantial.

Table 3. Employment.

Large-scale mines	Direct employment	Indirect local mining employment (mine contractors and suppliers)	% of direct and indirect mining posts filled by local residents	Local non-mine employment generated by mine^a	Total mine related employment as share of total employment
Inti Raymi	716	246	65%	2 500	25% (60) *
Yanacocha	269	3 885	90%	6000	14.4% of county (provincial) 2.8% of department
Antamina (projected)	1 250 (4 000 during construction)	3 750	80%	4 000	
Escondida	2 000	6 200	>80%	5 200	9% of Region II
Candelaria	860	450	86%	1012	7% of Region III
Diavik (projected)	411	-	>70%	-	-
Northern Saskatchewan (1998)	1254	937	49%	1620	27%
Almadén (average over last 50 years)	1351	50	90%	-	-
Medium-scale mines					
Puquio Norte	118	Very small	30% (approx)	-	10% (25% of manual labour)
Fachinal	265	250	<30%	900	-
Sussex	345	615	>90%	-	-

*—The first figure includes Oruro; the bracketed figure is the 2 communities closest to the mine site (La Joya and Chuquiña)

^a This is the number of jobs generated due to the expenditure of contractors and suppliers on local inputs and the employees of the mining company, mine contractors, and mine suppliers in local markets (i.e. the "multiplier effect").

Outsourcing is critical for both the size and sustainability of the mining operations' economic impact. This point cannot be over-emphasized: it is perhaps the strongest result proven by these studies. In most cases, outsourcing increased over time and was the key source of entrepreneurial development. Moreover, the multiplier effects of the operation were much greater if there was substantial local outsourcing because of the bigger monetary injection and because employees of contractors usually spend more of their own money in the local

economy. While all of the larger mines worked actively to develop local contractors and suppliers, Escondida's program designed to assist local companies in quality control is the most noteworthy. This company's program has been so successful that many of its local contractors not only supply other firms in the region but are supplying mining companies in other regions of Chile.

While business creation to sell basic commodities or recreation to miners usually happened on its own, business creation for outsourcing began more readily and on a larger scale when the mining company played a proactive role. Yet, there is room here for governments to be more proactive and not just rely on company initiative. An interesting example of how not to proceed occurred in the case of the Fachinal gold mine in Chile. Many new shops opened to provide basic goods and recreation to the miners but the company made an agreement with a subsidized government supplier that was able to undercut most of these local operations. Moreover, the company opened a large canteen to provide recreation for the miners. Both of these developments have had significant negative effects on the local community and led to much bitterness towards the mine.

As shown in Table 4, with the exception of Puquio Norte in Bolivia, salaries for miners and contractors are much higher than general local levels in the cases where data exists. As noted in the discussion on employment, the local monetary injection is much larger than the salaries to the mine employees, and this amount is increased through the multiplier effects. The last column of Table 4 contains the estimated multipliers for the various mines. These vary widely and largely depend on the ability of the local community and region to take advantage of the opportunities offered by the mining operation. The multiplier associated with Escondida is extremely high given the development of an increasingly sophisticated network of mining contractors and suppliers in the Antofagasta area.

Table 4. Salaries and wages.

Large-scale mines	Average monthly salary (non-management)	Mine salaries relative to local salaries	Average monthly salary for employees of mine contractors	Mine contractor salaries relative to local salaries	Annual monetary injection to local economy (mine employees and contractors)	Estimated multiplier
Int;Raymi(1997)	\$678	450% higher	\$350.	250% higher	\$9.3 million	2.79
Yanacocha (1997)	\$1 155	300%	\$700	180%	\$21.7 million	2.53
Antamina (projection)	\$1 000	200%	-	-	\$29.8 million	1.42
Escondida	\$1 800	254%	-	-	\$279.6 million	5.7
Candelaria	\$1 300	233%	-	-	\$39 million	1.76
Diavik (projection)	\$3 750	Much lower	-	-	\$40 million	-
Northern Saskatchewan , Canada (1998)	\$3 700	440% for north; 674% northern Indian;	\$2 700	330% for north; 490% for northern Indian;	\$64.7 million (wages and salaries only)	2.4

		240% provincia l average		175% provincia l average		
Almadén, Spain	\$500	125%	\$500	125%	\$8.4 million	-
(average over last 50 years in constant 1998\$)						
Medium-scale mines						
Puquio Norte (1998)	\$290	Same	-	-	-	N/A (proabl y very low)
Fachinal Sussex	\$764	157%	-	-	\$7.6 million	1.76
	-	-	-	-	\$34 million	-

In theory, infrastructure creation can be one of the most important benefits of a mining operation as it encourages development of other economic opportunities. However, as can be seen in Table 5, in the Latin American studies this was generally not the case as most of the mines are not far from existing roads. The exceptions are Escondida—which is in the middle of a desert, so opening up the route did not provide many other opportunities—and Antamina. In the case of Antamina, a mine still under development, it is expected that the building of a paved road to the coast will have a very strong positive impact on local development, especially in agriculture and tourism. In most cases, the most important expenditures on infrastructure were for construction of or upgrading local roads, schools, and hospitals. An interesting exception occurred in the case of Puquio Norte in Bolivia, where the company and local community combined funds to build a gas pipeline to the mine that was larger than necessary to meet the company's needs. The extra capacity was used to provide electricity to the local rural population.

If properly channeled to the region, local taxes can be an extremely important benefit of the mine, as was the case with Inti Raymi in recent years. In Peru substantial taxes from a mining operation also should go to the local and regional levels but it is unclear if they actually have, as the case of Yanacocha illustrates. In general, the fiscal systems in the three countries are quite centralized, suggesting that this is an important area for some type of reform in order to bring more sustained benefits to the local community. However, funding by foundations established by the mining companies substitute for local taxation to some degree.

Table 5. Infrastructure and local taxes.

Large-scale mines	Roads and ports	Power	Hospitals, schools, and other	Local taxes
Inti Raymi	Minor roads	Generating station for mine not suitable for rural areas	High quality local schools in rural and urban areas; high quality rural health center	10% of department budget (1998)
Yanacocha	Built and upgraded local roads; assisted in maintenance of road to coast	None	High quality school; rural water and sanitation	\$7 million per year (1993- 1997) ^a

Antamina	Major upgrading of road to coast and Lima (in progress); secondary roads upgraded	None	projects Technical and secondary schools (built by community with land payments)	\$16.6 million per year once in production
Escondida	Port of Coloso (only for company use); road to mine; local roads in port area	High voltage power line	International school; water tanks	\$2.2 million (1997)
Candelaria	Port at Punta Padrones (only for company use), 22 kms of road	-	Sports complex; created primary and secondary school	-
Diavik (projection)	-	-	-	\$1.2 million per year
Northern Saskatchewan, Canada	Significant road expansion, including a connected network	High voltage power lines with local access	Recreational facilities; health care facilities; water and sewage	1995 US \$42.4 million (1985-1996)
Almadén, Spain	Worse than national standards	At national standards	High school; university; hospitals; sports complex; much higher than national standards	Negligible
Medium-scale mines				
Puquio Norte	Insignificant	Electricity for rural areas	None	Negligible (paid to Santa Cruz department)
Fachinal	Road improvements (25 kms)	-	-	-
Sussex	-	-	-	\$6 million per year to provincial government

^a This is the approximate regional contribution to regional taxes based on the legal percentage of taxes that are supposed to go to the regions, although it is not certain that they actually are redistributed.

^b This amount only includes royalty payments. An unknown amount of corporate income tax would also be paid.

Training and education for mine employment was significant for all of the mines except Puquio Norte and Fachinal. The most interesting example of such training occurred at Escondida, where significant emphasis was placed on upgrading attitudes towards work.

Finally, fears that the mining operations would result in large price increases were mostly unjustified in Escondida, Candelaria and Inti Raymi. But there were some problems in Yanacocha, Puquio Norte and Fachinal, primarily concerning rents and real estate values.

Social and cultural externalities

Discussions of the social and cultural externalities of large natural resource projects usually focus on the negative impacts, such as increases in crime and prostitution, cultural conflicts with indigenous peoples or local communities in general, the upsetting of existing social hierarchies, and the creation of envy between those who benefit from the project and those who do not. However, the studies in this book also illustrate that there can be positive spin-offs also, especially in the areas of health, training, education, and the creation of social capital; that is, capacity for local governance, homogeneity of the community, as well as communication links with and within the community. In the absence of well-endowed local governments, foundations set up by the mining companies play a very important role in structuring, coordinating and funding the activities that make such positive externalities possible.

It was noted earlier that the mining companies have played an important role in the development of health and educational infrastructure (Table 5). As can be seen in Table 6, the larger mines have also played a strong role in providing health facilities and programs and "non-mine" training and education. However, there appear to be economies of scale in the provision of such services, because the medium-scale mines do not provide them, nor any other social services of note, except to their own work force.

Table 6. Social programs.

Large-scale mines	Foundation	Health	Education	Training	Other
Inti Raymi	Yes	Several	Several	Mine; agriculture; business and community management; weaving; small business development	Social capital development
Yanacocha	Yes	Several	Large number	Agriculture	Forestation; food security program; social capital development
Antamina (planning stage)	No	-	-	Agriculture; small business development	-
Escondida	Yes	Cancer research; upgrade children's hospital; out-patient hospice	School upgrading; scholarships; international school	Technical mine training; micro-enterprise development; labour market insertion; apprenticeship	-

				program; quality training for local suppliers	
Candelaria	No	Various small projects	Funds primary and secondary school; funding to technical school; scholarships	Technical mine training, training in modern industrial practices, training for local suppliers	Funds "Environmental Brigades" in local schools
Diavik	No	-	-	Support business development	Socioeconomic monitoring agreement
Northern Saskatchewan	No	Several community health drug and alcohol treatment; healing lodges	Scholarships; awards; training program; northern college	Multi-party training program — \$7 million from 1993-1998, 50% of funding from industry; skills training; work placements	Regional development programs by government and industry; community effects environmental monitoring committees; community economic development committees
Almadén	No	Specific cares for mercury-related diseases	Elementary school with national standards	Artisanal jobs	-
Medium-scale mines					
Puquio Norte	No	None	Improvement of local school	None	-
Fachinal	No	-	-	Technical mine training for locals	-
Sussex	No	-	-	-	-

Some of the larger mines have set up "arm's length" foundations to provide these goods and services. The advantages of a foundation are that it can bring in money from other sources and it is independent of the mine operation. On the other hand, it may also be divorced from the strategic thinking of senior management and be one of the first areas cut during a downturn. All of the foundations place a strong emphasis on training to increase the skills necessary for sustainable community development, as well as health issues for women, and mothers in particular.

The mining companies, generally through their foundations, are involved in creating social capital. The Inti Raymi Foundation, for example, trains locals in the design and preparation of projects that they can present for funding, including organizational matters. The entrepreneurial development program of Escondida was noted in the last sub-section. However, the indirect creation of social capital is likely more important for the communities. They are learning how to organize, how to negotiate with both companies and central governments, and how to take advantage of the opportunities offered by the mining operations to pull themselves up by their own bootstraps.

In addition to the previously mentioned economic dimension of land acquisition, there are strong social and cultural ramifications. The largest effects were in the two Peruvian cases where traditional socioeconomic relations among pastoral peoples were disturbed and family groups were occasionally broken. Social relationships may have also been disturbed by the large amounts of money paid for land in the cases of Inti Raymi, Yanacocha, and Antamina.

Nevertheless, in none of these cases was there any significant upsetting of the social hierarchy, although there was often movement among the different levels. Of more importance was the envy created by the new economic opportunities and land payments. In particular, there was rivalry between those villages directly affected by the mine operation and those in the nearby region of the mine. In general, the majority of the direct economic benefits went to those directly affected by the mine, while the other areas were able to glean more from indirect benefits. In fact, one of the primary purposes of the foundations was to give a more widespread distribution of the benefits of the operation to the surrounding communities that were not directly affected by the mine operations. As previously noted, in one sense the foundations were doing what could be expected of tax dollars paid to the local and regional governments by the mining companies.

Many of the mines are located in areas with substantial indigenous peoples that are familiar with mining, so the mine operations were not a cultural shock to them. Perhaps the only exception was the lowland peoples of Bolivia near the Puquio Norte mine but nonetheless, these indigenous peoples are quite westernized, and there are few true "Amazonian" indigenous peoples in the area. The only problem that the lowland people had was with the customs and work habits of the influx of the highland indigenous peoples. In fact, cultural and social conflicts among in-migrating national workers and local workers were quite strong in two of the areas which possessed no tradition of mining, and hence no established work force with these skills. The Fachinal mine avoided this problem by filling most of its posts with workers from the region, who underwent an intensive training program offered by the company.

Prostitution and related diseases are the major social problem in most of the areas, although alcohol abuse was also noted. However, given the integration of most of the mineworkers with local communities, these problems were not very severe. They were most evident in Cajamarca (near Yanacocha), where residents have complained of the large increase of "sex" bars, and in Fachinal, where the community is very small.

Environmental externalities

When mining is the topic, the environment is never far behind. In the analysis of any potential mining operation, whether the benefits of the mine are greater than the environmental costs is often the first question asked. In these Latin American studies, one objective of the researchers was to analyze the environmental costs thoroughly; not by undertaking physical tests, but by investigating the damage caused by any ongoing environmental problem or major environmental accident. However, researchers found that it

was hard to separate fact from fantasy when it came to the environmental performance of the mining companies.

In none of the mines was there any obvious evidence of substantial environmental damage. All the mines made significant efforts to minimize environmental damage and when minor incidents occurred, the companies responded quickly. Nevertheless, in at least three cases—Inti Raymi, Puquio Norte, and Yanacocha—many parties have complained of substantial environmental damage. However, the researchers were never able to verify such damage; nor was there any evidence of substantial accusations made by the usually vociferous international environmental NGOs.⁶

It seems likely that the claims of environmental damage were due to a combination of two different forces. The first was poor communications with the communities and unsatisfactory efforts at public relations by the mining company, coupled with the regrettable historic environmental performance of mining companies in the three countries. Especially in the earlier years of operation, many mining companies were very secretive about their operations and did not do a proper job of explaining and demonstrating to the public that they were taking proper care of the environment. The second reason was that local politicians and community members in general used the environment as a political tool. They would create distrust towards the company on environmental concerns in order to extract larger concessions from it on other matters. This political motivation seems to have been particularly strong in the cases of Inti Raymi and Yanacocha.

Latin America: negotiation and implementation processes

In order to conclude which of the processes and strategies followed can be considered as being "best practices," the case researchers analyzed the processes used and the linkages to end results that were actually achieved. Therefore, the following definitions and objectives were applied to each case study.

1. Processes: analyze strategies followed by stakeholders;
2. Trilateral relationships: study the formal and informal relationships between the mining company, community, and central government; and
3. Best practices: research the processes and policies that led to the best impacts.

In the relationship between the mining operation and the surrounding communities there are always at least three major players: the local (and regional) community, the central government, and the mining company. Ideally this results in a trilateral relationship in which representatives of the three main parties keep an ongoing, three-way dialogue in order to facilitate the design and implementation of a local as well as regional development plan. However, as the cases reviewed illustrate, the more usual case in the Latin American context is that the company negotiates with the central government and the local community (or government) separately. There is very little communication between government and the local community.

⁶ While the environmental performance of the seven Andean operations covered was satisfactory, some isolated, punctual incidents with little, if any, permanent impact, such as a mercury spill in Yanacocha in June 2000, were depicted as typical of the performance of the mines and as affecting the permanent impact of these operations on their neighboring communities.

These "two-sided triangles" typified all Latin American studies with the possible exception of the ongoing case of Antamina in Peru. In most cases, the central government has only played a major role by previously establishing a legal and fiscal regime, environmental regulations, and major infrastructure projects, and only later granting the mine a licence. In fact, as all

three countries have modern mining codes, most regulations are not negotiable. All mines must follow modern environmental laws, undertake environmental impact assessments, and are inspected by central government representatives. However, a pernicious effect of the weak communication between government and the local community (the incomplete side of the triangle) is that almost all fiscal revenues go to the central level, and that very few communities benefit from these resources. In Bolivia a royalty goes to the departmental level, which has benefited communities in the area of Inti Raymi but not those in the area of Puquio Norte, because the departmental capital is relatively far away. In Peru the "canon minero" —a type of royalty amounting to 20 percent of the income tax paid to the central government — should be returned to the region. However, only a minimal amount has in fact been disbursed to the local communities.

Given that these regulations were already in place, the initial concern of the companies dealt with land acquisition. There is very little in the mining laws of the three countries with respect to local economic benefits or social and cultural issues, a situation which pretty much left it to the initiative of the companies to define the quality of relationship they wanted with their neighboring communities. In such a context, the absence of a complete triangular dialogue becomes a serious shortcoming for the establishment of sustainable development. When mining operations were established, there was no formal relationship between the company and the local government (except for Antamina). In general, the local governments did not play a significant role when mining operations were established as companies dealt directly with landowners or community representatives. In recent years this is changing, however, and it is more common for local governments to represent the community interests.

Despite the lack of a formal relationship, by far the most important side of the "triangle" has been the link between the companies and the local communities. In all cases there have been significant interactions, both negative and positive, between the companies and different local community groups (municipal authorities, community based organizations, NGOs, church, universities, landowners). In most cases these relationships have become much more profound over the years, partly due to a natural evolution of the relationships. But this is also due to changing global perceptions of the role of mining companies with respect to their host communities, and to a better understanding by the mining companies of the values and aspirations of the local communities. For instance, in the case of land acquisition from indigenous populations, it has taken decades for the companies to understand that the closure that they interpreted as finalizing a transaction was interpreted by the other side as the initiation of a long-term relationship, and that consequently land prices had to take into account social considerations.

As a result of the above, the mines that were built most recently began with many of the community interactions that took several years to develop in other cases. Antamina, the most recent mine, has begun with an effort to build a "profound relationship" with the local communities. While part of this change is likely due to learning from experience, certainly a large part is due to increasing pressure on large mining companies by communities and other stakeholders, including international NGOs and the shareholders of the international mining companies. In the past, communities were often satisfied with the large number of jobs that accompanied a large mine operation. However, technological progress has greatly reduced the number of jobs, so communities want other things as compensation.

The achievement of sustainable development by the communities is or should be the dominant goal of the relationship between mining companies and the communities. Communities want support from the mine in the economic, social, cultural, and environmental areas when it is operating. But they also need to address these issues once the

mine closes. Accordingly, there has been a great emphasis on developing the human and social capital, as well as the physical infrastructure that will allow the community to continue to prosper after the mine closes. In this regard, outsourcing and the related development of new skills and businesses are seen as a crucial step in the evolution of the community.

For the most part, although the central governments in the three Andean countries maintain a close relationship with the companies, related to the implementation and monitoring of the mining, fiscal, environmental and labour policies and norms, these governments have abdicated their local community responsibilities to the companies. As noted, communities gain little from tax revenues generated by the mines and there is little formal pressure from the central governments on the companies to provide services to the communities. However, companies are often put in a position where they have to fill a void left by the central government. This has become particularly important in the last five years. As the role of the state in the mining sector has diminished and the international community has become more involved, it is now generally accepted that the welfare and development of those most affected by mining—the local communities—must be prioritized. As the local governments do not have access to the resources, companies are put in the position of having to provide social services and to participate in the process of design, coordination and funding of local development programs or face social unrest.

Over time, the participation of the mining companies in the local context of the three Andean countries has become much more sophisticated, as companies have moved from assistential type models, where the company primarily provides welfare types of services, to production oriented models based on fomenting new businesses linked to the mining operation to sustainable community development models. Each step has built on its predecessors rather than replaced them, and at each step there has been a large increase in the level of community participation in the decision and design process. This trend is consistent with the realization that sustainability can only be achieved when community members feel that they are partners in the decisions that affect their lives.

Clearly there is a large role for the central government to play with respect to community development, even if it is as simple as transferring more of the fiscal revenues generated by the mine to the local and regional governments. In this next section, the role of the central government in Canada and Spain in filling in the third side of the triangle of communication will be examined.

Case studies from developed countries: Spain and Canada

Although environmental concerns are mentioned briefly, the main thrust of these studies was on the evolution of the tripartite relationship between communities, companies, and central (or higher level) governments. The main result is that the three parties are learning from experience. There is a strong positive trend over time with communities receiving increasingly sustainable benefits from mining operations. The scope and size of these can vary greatly, however, depending on the location of the mine and the access to markets, both of which can greatly shape the realistic economic alternatives.

Almadén, Spain

The Almadén mercury mine has been in operation for over 2 000 years, perhaps as long as 6 000 years. It contained over 30 percent of the world's reserves of mercury. Other activities in this depressed, lightly populated area include crop-based agriculture, sheep farming, and tourism. The population of Almadén reflects the evolution of the mine.

During recorded time, Almadén has been owned by the state. Community members have few alternatives and see the state as obliged to give them employment. The workers have low productivity and there is little innovation. The mercury is very high grade—six times the global average—so there has been little emphasis on increasing productivity. Management's main concern has always been producing more. The estimated present value of production from the 16th century is about \$30 billion. In fact, historically the mine has been so important to the Spanish Crown that it was twice used to guarantee enormous sovereign loans.

Although from the 16th to 18th century, the government used infrastructure improvements and tax incentives to attract workers, in the 19th and 20th centuries there was little investment of rents in the area until 1975. There has only been good road infrastructure to the zone since 1985. (See Tables 1 to 6 for some of the main characteristics of the Almadén mining operation.)

Surprisingly, mercury contamination in the area is negligible. The most serious environmental problem is heavy deforestation as wood has been used for centuries to build tunnels and feed the fires needed in the metallurgical processes. Nevertheless, except for the trees, the flora and fauna are in relatively good shape.

In 1978, the Spanish government made the first serious attempt to diversify the area. These attempts became critically important as the market for mercury diminished, largely due to environmental concerns. The main elements of this plan, called Plan de Reconversión de Comarca de Almadén (PRECA, reconversion plan for the Almadén District) —were the following:

1. develop new mercury mines as well as lead and zinc mines;
2. develop a large 9 000 hectare agricultural area, including reforestation;
3. increase the production and sale of local agricultural products;
4. promote the production and sale of downstream mercury products;
5. market mining technical expertise; and
6. a slaughterhouse.

PRECA was financed 75 percent by the state and 25 percent with resources of the mine. There was little or no private sector or community participation in its design. Despite some technical successes, it has had very heavy losses and the state has had to make large capital injections. The failure was due to poor planning, a lack of community buy-in, no involvement or responsibility of the private sector, and a general placement of financial concerns after technical concerns. The fall in mineral prices in the 1990s and the environmental pressure on the market for mercury complicated the situation further. To date, the state has bailed out PRECA to the amount of \$150 million, although, to put this figure in perspective, in current dollars rents to the state from the mine just from 1960-1970 were about \$900 million.

The authors do not think that the problems with PRECA were caused by choices they made, but due to the poor methodology that was followed. Part of the reason for the lack of private enterprise in the plan was the long history of Almadén with state ownership and the district's almost complete reliance on the state. The plan also began way too late, only when the writing was on the wall. Project leaders were chosen by political connections, not by experience and professional capacity, and so the leadership of PRECA often changed with political fortunes.

Clearly Almadén is a typical example of a mining operation resulting in non-sustained development. For most of its history the mercury mine was used as a treasure chest of the

Spanish Crown. Little if any of the rents went back to the area, little attention was paid to developing the area or diversifying production, and the community never participated in the decisions that most affected it. The efforts that were made were not well thought-out and were probably too late.

Canada: Evolution of mine-community relationships

There is strong evidence in Canada that mining can both promote the socioeconomic well being of communities and be environmentally benign. Mining also leads to the development of clusters of activities centered on the mining operations, and it is even capable of resulting in the creation of a "mining metropolis" with a strong manufacturing sector. Nevertheless, socioeconomic agreements are crucial when dealing with aboriginal peoples. These should include employment quotas or targets, special training programs, targets for local procurement, support for local business development, support for women's employment and training, and a supportive work environment for distinctive cultures.

The first of the two chapters on Canada gives an overview of the evolution of mine and community relationships, focusing on four mines or mining regions —Voisey Bay, Labrador; Diavik, Northwest Territories; Sussex, New Brunswick; and Sudbury, Ontario. (See Tables 1 to 6 for some of the important economic and social characteristics of these mining operations.) The one factor common to most mining communities (however defined) in Canada is that their relationship with mining companies has evolved from paternalism to partnership, with both sides striving —with the help of governments —for sustainable community development. The active role of government in working with the local communities to facilitate this evolution has solidified the triangular dialogue which has been particularly important in the context of aboriginal communities, as there is usually a strongly asymmetric relation in the information held by mining companies and these communities. Given the poverty of many of these communities, it will usually be necessary to provide public funding for NGOs or consultant services to work with aboriginal peoples confronting a new mining project. Furthermore, a very important element in the evolution of the community-company relationship is the strong trend for new Canadian mines to be located in remote areas with predominant aboriginal populations. In most cases, high levels of poverty and unemployment characterize the aboriginal communities. Consequently, the needs of the inhabitants of the communities are generally very acute and their demands reflect their situation.

There are many different types of mining communities in Canada:

1. long-established communities dependent on the mine;
2. company towns;
3. long-established communities with diversified economic bases that have become home to new mines;
4. fly-in, fly-out operations;
5. temporary encampments; and
6. major, long-established mining cities.

Of the six types of mining communities identified by the authors, in recent decades the fly-in, fly-out and major, long-established mining cities have become the most important. Where feasible —due to a combination of location and the number of deposits —there has been a determined effort to develop a "mining metropolis" in Canada, of which Sudbury is the best

example. At the other extreme, given the remote and difficult, cold climate locations of many new mines, fly-in, fly-out operations have become quite common.

The pattern of community development in Canada is similar to the Latin America cases, albeit more evolved. In the first years of the mining operations, local community members tend to fill the lower skilled jobs and provide unsophisticated services to the mine, especially if it is in a remote location. However, as the community matures it is common for it to provide vehicle repair, machine shop services, welding, sheet metal work, plumbing, and electrical services. In areas with multiple mining projects, the next step for local business is complex construction projects. Finally, in major mining areas, production occurs of complex mine equipment that is also sold to other regions or countries. The Sudbury Basin is probably the best example of such a "mining metropolis" with a population of about 250 000 persons, 5 000 jobs in manufacturing, and a number of important government services.

The development of a well-established tripartite process among communities, companies, and governments has been instrumental to laying the foundations of sustainable development in many mining communities in Canada. As noted above, many of the new mines in Canada are located in areas predominantly inhabited by aboriginal peoples. While these operations provide many opportunities, there are many social problems to overcome, including the impact of the mine on traditional activities. Until the 1990s aboriginal peoples had very little participation in negotiations of mine development on or near their lands. Aboriginal peoples now can and do demand training programs for mine work and some assurances of buying local inputs. Companies must negotiate impact and benefits agreements with their communities. The Diavik diamond mine in the Northwest Territories provides for substantial purchases from northern businesses and includes a policy of eventual 100 percent northern employment.

Oddly enough, the increase in fly-in, fly-out operations coupled with employment guarantees in the impact and benefits agreements are now helping aboriginal communities. This is because:

- there are no semi-permanent or temporary communities to attract southern Canadians;
- small aboriginal communities are not broken up as young males flock to new mine sites; and
- traditional activities can be pursued in down periods.

In Canada, as in most mining countries, there has been a strong trend towards stricter environmental regulations and better environmental performance. In particular, there is a heavy emphasis on mine closure and rehabilitation. Companies usually have to set up environmental funds, especially when tailings must be stored into perpetuity. Comprehensive environmental reviews that include detailed analysis of social and cultural factors must be undertaken and they are generally functioning well. There is also a trend towards cooperative monitoring of environmental management programs, especially in aboriginal areas.

Uranium mining in northern Saskatchewan, Canada

The uranium mining experience in northern Saskatchewan demonstrates the evolution of company and community relations —with the participation of the provincial government — from one in which local communities had little input, to one that may well approach the most sophisticated models of tripartite relationships to be found anywhere in the world. Over about a twenty-year period the situation in northern Saskatchewan evolved from one characterized by minimal direct impacts and large negative externalities to one with large and positive

direct impacts and externalities. Over this relatively short period of time, good policies and practices have moved the mining industry from a situation in which it primarily generated revenues for faraway governments, to one in which it is the leading force for dynamic community development. Such development is clearly more sustainable in a regional context where new mines are replacing old mines, and the effects can take place over several generations.

Northern Saskatchewan is a remote area, home mostly to aboriginal peoples, who make up 87 percent of the population. Only 40 000 of Saskatchewan's one million inhabitants live in this area, which is about 60 percent of the size of France. In 1995, 44 percent of the population was still below the Canadian poverty line. Uranium exploration began in the 1940s and in the 1950s the first significant production began. Until the late 1980s, companies belonging to the provincial or federal governments undertook most production.

The first large-scale operation was El Dorado, a state-owned enterprise which began operations in 1953 near Beaverlodge. The province and the federally owned company built a town called Uranium City. Most of the jobs and virtually all of the procurement at El Dorado—which closed in 1982—went to persons and companies from outside of northern Saskatchewan. Uranium City attracted migrants from all over the region, resulting in social problems such as crime, alcoholism, and prostitution. Perhaps more importantly, it caused out-migration from small, traditional aboriginal communities. When the mine was decommissioned, local communities were not invited to participate in the planning, even though closure meant the death of the town of about 3 000 persons.

The unsatisfactory situation at El Dorado gave rise to significant opposition to uranium mining in Saskatchewan, from both southerners—mostly for environmental reasons—and aboriginals—due to a lack of economic benefits combined with potentially large social, cultural, and environmental costs. Concern with the effects of uranium mining coupled with the discovery of new, very rich deposits near Cluff Lake resulted in the Bayda Commission, which finished its report in 1978.

Implementation of the recommendations of the Bayda Commission resulted in an about-face in the acceptance of uranium mining by aboriginal peoples. In fact, their opposition to uranium mining declined by over 50 percent in the 1980s as the benefits to aboriginal communities increased and the costs declined. Among the recommendations of the Bayda Commission were:

- a movement from bipartite to tripartite consultations;
- inclusion of socioeconomic and cultural effects into the decision making process rather than a sole focus on the environment; and
- northern revenue-sharing of those fiscal revenues generated by uranium mining.

More importantly, the Commission laid out the foundation for uranium development in northern Saskatchewan that evolved and developed through the 1980s to include:

- best efforts (rather than targets) to deliver social and economic benefits;
- cooperative tripartite negotiations;
- increased monitoring of environmental and occupational health and safety performances;
- community based consultation procedures; and
- recognition of social spending as a legitimate royalty deduction for companies.

The movement from state-owned to privately-owned corporations has also been very important with respect to the levels of investment, ability to quickly adapt to new situations, and a stronger commitment to community development by firms whose survival and prosperity depends on strong, healthy relations. By the end of the 1980s the state was no longer involved directly in uranium mining after the provincial and federal state-owned companies merged to form Cameco Corporation, which was in turn quickly privatized. Cameco and other privately owned uranium mining companies have moved rapidly in the 1990s to take advantage of the lessons learned during the period of state-run mining operations. They have worked with the communities and various levels of government to dramatically increase the levels of benefits to residents of northern Saskatchewan, while at the same time they have been fulfilling more and more stringent environmental regulations.

The heart of the programs supported by Cameco and other mining companies are training for northern residents—most of whom have not completed secondary school—for both direct mine employment and mine procurement. (See [Table 6](#) for some of the social programs supported by Cameco.) The training for mine employment of aboriginal peoples has had large cost savings to the companies by reducing the prevalent extremely high turnover. Moreover, the government investment has also been rapidly repaid simply due to the decrease in welfare related payments. With respect to procurement, similar to Escondida in Chile, Cameco has placed strong emphasis on quality enhancement.

Employment in uranium mining of long-time northern Saskatchewan residents has increased from 31 percent in 1983 to 48 percent in 1998. Employment in contractors to the mines of long-time northern Saskatchewan residents has increased from 38 percent in 1992 to 52 percent in 1998.

Fly-in, fly-out has become the preferred method of mine employment. This practice allows members of small traditional communities to enjoy the benefits of mining without having adverse effects on the population of these villages. It also allows the miners to participate in traditional lifestyles for roughly 50 percent of the time.

Lessons learned and recommendations

The above studies on community costs and benefits of mining operations have generated a number of significant results. While any conclusions must be treated with caution, given the size of the sample and the differences across countries, there are important lessons to be learned for most or all countries involved in mining.

The studies have demonstrated clearly that there often are substantial social and economic benefits to local communities from mining operations, but they do not come automatically. Mining is an activity that will come to stay in a region "through thick and thin," and it is a powerful vehicle for transferring technologies and skills to developing countries and remote regions. Yet, some regions that possess no history of mining and hence no work force, nor an industry ready to take advantage of new opportunities, have needed proactive interventions to jump start the development process.

The key issue is the identification and sustainability of benefits. It was particularly important that there were proactive policies and training with respect to mine employment, non-mine employment, and goods and services provision. The most successful cases were those where the local communities (often gradually) provided many of the goods and services needed by the mining companies. In some cases, the mining companies played an active role in training their suppliers to enhance the quality of their products. The skills developed in all of these cases often were transferable to other industries. Companies and communities that took a

long-term view, including mine closure, were also more likely to have a clearer vision of what types of training and programs might provide sustainable benefits.

The studies confirm that sustainability is closely related to the local participation of the neighboring communities in the decisions affecting them. The need to ensure sustainability through increased participation of the local communities is present in the Canadian cases and quite consistent with the more recent—and less evolved—Latin American experiences. Most importantly, the Canadian cases illustrate the importance of the participation of government in the process, and the establishment of a trilateral dialogue. It is critical that the three main stakeholders—the community, company and government—all have direct communication with each other, in addition to a formal three-way dialogue where other stakeholders also participate. A key result of the studies is that legal licence is no longer adequate. Companies must obtain a social licence, and this depends on consultation, participation, and, increasingly, a strong trilateral dialogue.

Sustainability is partially dependent on the provision of infrastructure that could be used for other activities. In our sample, the case of Sudbury showed how in the right conditions, infrastructure provision can result in a vibrant industrial community. It seems likely that infrastructure creation will be one of the largest benefits of the Antamina mining operation in Peru.

In sum, the key characteristics of sustainability are:⁷

- non-renewable resource development should not threaten the environment and the renewable resources upon which future generations depend;
- mineral wealth should be maintained from one generation to the other;

⁷ These are summarized from Conservation Strategy Committee 1986.

- sustainable mining balances economic growth and protection of the environment by sensible trade-offs that consider all costs and benefits in the decision making process;
- recognizing that mining will affect the social structure and culture of local people and considering these impacts as part of the decisionmaking process;
- reducing, reusing and recycling while avoiding the waste of the resource base by inefficient mining techniques; and
- policy and taxation decisions which consider the economic health of the mining industry.

There were few negative social and cultural effects in the sample. With the exception of Canada, none of mines were in areas with substantial numbers of indigenous peoples who had not been exposed to mining or at least modern industrial culture. In the Canadian case, it has taken many years of experience and learning to eliminate or mitigate negative effects on aboriginal peoples. In the Latin American case studies, the biggest social problems were associated with land acquisition and the cultural clash between (usually domestic) immigrants and residents of the area. Clearly, there is no issue that is more likely to cause long-term damage to company-community relations than land purchases that are lacking in transparency and fairness, where the latter signifies that the company pays the same amount for land of similar quality, whenever it is purchased.

At a more general level, when a company is about to enter a new country or a new region it should ensure that it knows the country and communities that it is entering, including their social composition and political dynamics. In this regard, baseline studies must be undertaken

in order to have a good understanding of the local situation, and to monitor the progress of the community. The relationship that it is endeavouring to establish must include a long-term vision, even if—as in the case of the junior companies—the development is not permanent. The company must be clear that the responsibility it is about to assume in front of the local communities is part of its corporate ethics. It is not an obligation, but a practice, that the medium-term must benefit both the company and the community. Thus, the final objective of a company's assistance must be to strengthen local governance and the local capability to formulate projects.

The implementation of a successful development strategy for the local communities demands an adequate institutional design and the organized participation of the community. An important consideration for a company which is about to undertake an initiative related to local economic development refers to the instruments to be used for the channeling of funds and project implementation. Some companies have chosen to set up a "foundation" as an independent institution and assign them such responsibility. However, the foundation is, in fact, controlled by the mining company and the degree of local participation is independent from the mere presence of a foundation or of a company. A more recent alternative is the establishment of an informal "Governance Board" where the main stakeholders are represented and which acts on the basis of consensus building by the main stakeholders.

The creation of local social capital was found to be extremely important in all of the studies. Local communities are generally at a profound disadvantage when negotiating with large mining companies, and it often takes considerable effort and several years before they can be considered true partners. In the interim, higher level governments must fund NGOs or other institutions to provide advice and training to the local community members. Over the longer term, foundations or similar institutions—funded by both companies and governments—have become a very common way of providing social services and, more importantly, building up human and social capital in communities. In many respects, these have become partial substitutes for governments. It also seems likely that there are economies of scale in the delivery of such services as the medium-scale mines in the sample provided relatively much smaller amounts. A regional approach, grouping mining operations with considerable public input, may be necessary in such cases.

There were also few negative environmental effects. As the focus of the study was on modern mining operations, most of the mines were using up-to-date environmental practices. In the older mines that were included (Sudbury and Almadén) there was an environmental legacy from the past, although much had been done to improve the situation. Nevertheless, the communities and other stakeholders often used the environment as a political tool in order to extract concessions from the mining companies. At times, the mining companies partially invited problems due to poor communication strategies.

In sum, there were not many minuses in the accounting ledger. But in some cases there were also not many positives. Accordingly, the communities were not always very accepting of the mining operations. This was particularly true of the smaller medium-scale mines. Note that while the past agenda has been on reducing the minuses, the new agenda is on increasing the positives.

With respect to processes, there is a clear tendency for them to become more open. The more recently developed mines in the sample followed more open processes than older mines. Moreover, the processes of older mines generally became more transparent over the years. These results are probably not unique to the mining industry, but all part of a global trend in this direction, partially due to pressure from interest groups. The supposed trilateral relationship was mostly two bilateral relationships with the exception of the more recent

Canadian experiences and Antamina. In general, the company and the central government had a relationship with respect to macro issues, and communities were rarely at the table when negotiations took place. On the other hand, the company and the local communities had a bilateral relationship with respect to micro issues that developed in an informal manner. Most community initiatives were led by the companies, often with substantial community involvement. Central governments largely abdicated responsibility on community issues to companies with the exception of Canada. Nevertheless, most fiscal revenues generated by the mine went to central (or higher level) governments.

The importance of good communication from the company to the communities cannot be overestimated. Companies should begin early, be open, and give lots of information. It is essential to have a clear mission statement and human resource and environmental policies. There must be a dedicated group in the company with this task.

It is clear from the case studies that that central government needs to become more involved in the community development work in the Andean countries. Its role in the trilateral dialogue with the local communities and the mining companies is essential. Only the participation of central government will ensure the adequate insertion of the local plans with the national programs, thus multiplying their beneficial impact. In this context, central governments should:

- redistribute more tax revenue to local governments —or simply ensure that law-mandated redistributions are complied with (although often this will need to be accompanied by capacity building at local levels);
- promote social responsibility among the companies and the opening towards mining enterprises among the communities (this could initially be accomplished by playing the role of go-between that shows both the company and the community the fundamental nature and legitimate aspirations of each side); and
- play a proactive role in community development programs either directly or indirectly through the use of NGOs, community-based organizations, or religious organizations.⁸

A strong lesson from the Andean studies is the need for a concerted local economic development plan to be available as early as possible. Institutional and organizational weaknesses of the local populations constitute one of the key bottlenecks to local economic development. Capacity-building takes time, thus the need for an early start. A concerted process involving the participation of the local population (not just the local leaders) should bring about a reasonable action plan where the company can express its priorities. This is very different from unilaterally deciding what is good for the community. The company should start working on such a plan at the earliest possible stage, and, preferably during exploration, an information and consultation strategy should be implemented quickly.

⁸ The Andean countries have preferred not to include community development provisions in their national mining legislation, as it bureaucratizes a process that they believe needs to be left flexible, given the unique considerations of each mining operation and the local communities in the area. Yet, it must be noted that some countries, such as the Philippines and (potentially) Indonesia, are opting to move in this direction. Companies are generally against such provisions as it gives them legal obligations even when the mine is not profitable.

The funds assigned by a company to finance a community development program should constitute only the seed capital of a broader financial strategy funded through other means. The company's contribution should be a minority contribution under a reimbursable credit scheme, once the productive projects are in operation. This support should be positioned to recover at least part of the amount invested—and certainly not the total assigned to productive projects. This financing would not subsidize nor lend at rates below market; it would simply make available to the community financial instruments that the market does not offer.

There were strong lessons for developing countries from the case of Almadén. Despite over 2 000 years of operating one of the most profitable mines in history, there had been little community development. For centuries the central government took everything and gave nothing back until it was too late to be effective. Even the community development programs that were undertaken in the last 20 years were run by the central government with very little community involvement or private-sector participation in their design or operation.

The Canadian studies contain equally strong lessons for developing countries. They show a number of cases of successful, proactive community development. Particular importance should be placed on the process that has evolved in Canada over time and the development of a tripartite relationship. This tripartite relationship was made viable by the proper funding of the process. While provincial and federal governments have extracted large financial flows from the mining companies in the form of royalties, fees and taxation, a substantial portion was returned to the mining region in the form of health and social service payments, welfare and regional development spending. The Canadian experience also shows that the role of government is more important in areas where there are indigenous peoples. Nevertheless, even in such cases, the private sector should still play the lead role in sustainable community development.

The most important result of the Canadian experience, however, is that it clearly demonstrates that although there are some rules that apply to all mining operations—e.g. tripartite negotiations, transparency—each mine has its own historical, social, cultural, and geographical characteristics that preclude the use of a "one size fits all" prescription. For example, not every mining city has the potential to be a mining metropolis—for this to occur, it is important to be in an area with many operations and not too far off of the beaten track. Training programs and other community initiatives are also more likely to have long-term success if a regional approach is taken, which in turn is only feasible when a succession of mines is being developed. Similarly, while the infrastructure that a large mining operation brings to a region can be its most important contribution to the local community, in remote regions with little possibility of significant industrial development due to climatic or geographic conditions, fly-in, fly-out mining is the preferred choice.

In sum, the goal is not to provide the community with a given package of benefits but to maximize the benefits that it receives. In the Latin American and the Canadian examples, the benefits received were partially due to the policies and strategies followed. But they are also partially due to the situation. It is important that the policies and strategies followed are adapted to the realities of the given operation, including its size, geographic location, climate, and socioeconomic and cultural conditions.

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CHAPTER 2.

Bolivia: Turning Gold into Human Capital

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Introduction²

Mining in Bolivia

In spite of developments in agriculture and agro-industry and the corresponding economic diversification in eastern Bolivia, mining continues to play a significant role in the country's economy. Table 1 illustrates the importance of mineral exports with respect to total exports and foreign exchange earnings. Although the dominant role of mining has decreased, it continues to be the primary export sector in the national economy. Mining also plays a secondary role as a generator of funds for the national treasury, although in this area, too, the sector's contribution has decreased significantly.

Table 1. Bolivia: Principal indicators of the mining sector's impact (percent).

	Average 1980-1985	Average 1993-1998
Mineral exports	48.2	39.4
Mining royalties	8.0	0.6
Contribution to GDP	9.0	5.9
Employment	4.4	2.1

Source: Central Bank of Bolivia, External Bulletin N° 20 and External Bulletin 1980-1988.

Mining's contribution to the GDP and employment levels has decreased and is not highly significant at the national level. Within traditional mining regions such as Potosí and Oruro, however, this industry's contribution remains significant, as shown in Table 2. Between 1993 and 1998, these sectors received between 73 percent and 92 percent of mining royalties, a principal source of financing.

Table 2. Mining's contributions (percent) to GDP of Oruro, Potosí and Bolivia.

Departments	Average 1980-1985	Average 1991-1996	Difference
Oruro	32.3	28.1	-4.3
Potosí	51.4	35.2	-16.2
Bolivia	9.0	5.9	-3.2

Source: Based on information provided by the National Institute of Statistics, National Accounts Department.

Potosí and Oruro's mining has decreased in importance since the 1950s. This decline was exacerbated by the crisis in tin mining of the mid-1980s. Currently, both sectors register the lowest income and human development levels in the country, and consequently the region experiences high levels of emigration. This situation appears to offer proof to those people

² The authors would like to thank the Mining Policy Research Initiative of the International Development Research Centre of Canada and the Mining and Industry Division of the World Bank for providing funding that made this study possible.

who believe that mining does not contribute to sustainable development at the local or regional level.

Mining and local development

Various studies on the mining industry and its local context have identified a typical model in which a specific type of local community and its relationship to a given mining operation can be predicted. In this model, the community is usually located in a remote region. Although the literature recognizes that such communities are not totally isolated from the market economy, in general the community's link to the market is secondary and complementary. The community's economy is essentially self-sufficient and sustains a culture and particular form of organization that is different from the market economy. (MEM 1996, 1997; Labat-Anderson Inc. 1997; May 1998; Kumalo 1999) Meanwhile, the type of mining operation prevalent in the literature is one characterized by its large size, with an annual turnover of US \$100 million or more. Such operations are usually run by a transnational mining company that maintains the corporate culture of competition in international markets, such as Rio Tinto, P.T. Freeport Indonesia, and Comalco.

The relationship between these specific types of local communities and mining operations produces several predictable results. Workers and others are attracted to the area by road construction and the promise of job opportunities because of the mine's opening. This migration entails high risks for the local communities, since the new arrivals bring diseases or alcoholism to the area. In addition, the migrants compete with local residents for the use of natural resources (May 1998). Increased demand for land causes a rapid increase in property and land prices. Worsening inequalities in income distribution favours young adults, modifying their position and prestige vis-à-vis their elders and affecting traditional social structures in the process (Labat-Anderson Inc. 1997). The growing population places excess demands on services and infrastructure such as roads, schools and hospitals.

According to Bisset (1996), such impacts are common during the mine's construction and exploitation phases and typically are followed by more severe impacts after the operation closes. Unemployment would increase significantly and property and land prices plummet. The demoralizing nature of a recession and unemployment causes an increase in alcohol and drug use among residents. The author even predicts that "many people would lose their cultural ability to survive without a paying job. Faced with the lack of alternative economic activities, severe social impacts can be foreseen—a potentially spectacular contraction." (Bisset 1996, pp. 9-10) In response to this situation, "local communities are demanding compensation far above what they have received in the past. They want infrastructure, training for mining or other jobs, and social services, including education and health." (McMahon and Strongman 1999, p. 8).

Evidence from case studies of large mining and petroleum projects show that a purely compensatory attitude on the part of the company toward the community is incapable of achieving sustainable development at the local level. Thus, a new trend proposes to replace compensation with the formation of social capital. (Labat-Anderson Inc. 1997; May 1998) Social capital formation focuses on the importance of strong social ties that make human groups more cooperative, productive and innovative. According to this focus, progress and development require groups or communities capable of identifying their limitations and the strategies necessary to overcome them. This in turn requires trust and experience among group members (May 1998, p. 22). The social capital focus favours community empowerment over mere compensation in goods and resources. A community's ability to identify its problems and their possible solutions is the best mechanism for promoting sustainable development.

From compensation to social transformation

This study evaluates the relationship between mining operations and local communities, identifying the impacts and transmission mechanisms for a type of local community that is substantially different from the predominant model in the research literature. Although the local community in this study is still a rural community whose economy is based on subsistence agriculture, its distinctive characteristic as an indigenous social unit is its state of "de-structurization." This means that the local community is in an advanced state of assimilation regarding the values of urban culture and the market economy. In contrast to the remote community so predominant in literature, these communities are connected to the urban realm by way of markets, roads, and highways. More importantly, the community's adolescents and young adults struggle to integrate into the urban world and end their marginalization. In this struggle, however, they do not abandon their ties to the community or the land, since these are the last refuges to which they can turn if insertion in the urban world becomes too difficult. Such communities represent some of the principal sources of marked migration from the country to the city that are so prevalent in Latin America.

As this study will argue, the opening of a large mining project next to local communities of the type described above produces impacts that are distinct (and usually opposite) to those expected under the prevalent model. For example, migratory flows involve displacement to urban centers because periodic commuting to the mine becomes an option. Moreover, employment at the mine or with associated subcontractors may provide sufficient income to enable a relatively smooth transition to the urban world and, in many cases, a higher rank on the socioeconomic scale.

In other words, the opening of a large mining operation can serve as the catalyst for a socioeconomic transformation at the local level, reducing the importance of compensation. In addition, the concept of sustainable development of a community takes on a different meaning, since it does not take place within the community itself but rather in the negation of the community within a westernized, urban social context. This implies that, in such cases, a socially responsible company should contribute to enabling the community to transform itself. It is not a matter of compensating for changes to a social system. What is critical is to convert these changes into a new or different equilibrium within a social entity which is in the process of change.

The significance of this study is to show that the relationships between large-scale mining and local communities do not follow a singular pattern, as literature suggests. It is necessary to establish a taxonomy of possible and relevant cases that contribute to the formation of recommendations. When this is achieved, then the state, mining companies and local communities can take actions oriented toward achieving the highest levels of well-being for members of the communities involved.

Methodological focus

This investigation analyzes two case studies: the operation of Minera del Sur at Puquio Norte, and the operation of Inti Raymi at Kori Kollo.

The Puquio Norte mining operation represents an excellent pilot case because the socioeconomic, cultural and environmental baseline of its area of social influence was easily determined. It began operation in March 1997, less than two years before the fieldwork for this study commenced. Therefore, reconstructing the baseline was less difficult and more reliable than an operation such as Inti Raymi, which began operations during the second half of the 1980s. Although the region where Puquio Norte is located has been home to mining operations since colonial times, these were largely artisanal operations. Until the discovery of

the Puquio Norte deposit, there had been no industrial-scale mining operation in the region. Because of this historical presence, the Puquio Norte case presented little "noise" or interference in the perceptions of local residents. A similar situation in western Bolivia is unlikely.

The main disadvantage of Puquio Norte was its size. Although this investigation is geared to an analysis of the impacts of large-scale mining operations, Puquio Norte is a relatively small operation by international mining standards. For example, Yanacocha in Peru produces 1 050 000 ounces and Inti Raymi in Bolivia produces 350 000 ounces of gold per year, while Puquio Norte produces just 27 500 ounces per year. Not counting silver production, Puquio Norte represents only 3 percent of Yanacocha's production, and 9 percent of Inti Raymi's production. This is a structural limitation of the Bolivian mining industry, which apart from Inti Raymi and the San Cristobal project¹⁰ (currently in the engineering design phase and thus not eligible for this study), consists solely of small mining operations.

Inti Raymi was chosen because it is the most important mining operation currently underway in Bolivia and because it contrasts with the Puquio Norte case. While Puquio Norte's area of social influence enjoyed economic growth during the period of study, Inti Raymi's area of social influence, at the rural level, experienced economic decline. In contrast to Puquio Norte, Inti Raymi had to compete with local community members for access to mining resources. Inti Raymi's policy toward the local community has consistently supported social and economic development requirements without demanding, in exchange, a counter-contribution on the part of the community, as has been the case with Puquio Norte.

In our investigations of the case studies, we adopted an empirical research focus. The study's design and execution, therefore, did not assume a specific theoretical focus. We have favoured a multidisciplinary analysis with the goal of establishing, through detailed and integral fieldwork, how and why a mining operation impacts on its area of social influence.

Puquio Norte

Antecedents

At the end of the 1980s, the Minera del Sur Company, (COMSUR 1992)¹¹ began exploration activities in the new Bolivian mining frontier of the Precambrian region. This is part of the Brazilian Shield located in the eastern part of the country where geological formations of economic interest exist, including precious metals and stones, as well as manganese. The company's exploration activities resulted in the discovery of the Puquio Norte gold deposit located 11 km from the town of San Ramón by highway. Puquio Norte is an open-pit operation that treats 1 500 tonnes per day by way of the carbon-in-leach process; the mine's lifespan is estimated at seven years.

COMSUR's exploration activities in this region were made possible after Rio Tinto, a British-based transnational mining company, acquired one-third of its shares. This enabled the incorporation of strict environmental and occupational safety standards at COMSUR's operations. Rio Tinto's association with COMSUR was geared toward the discovery of a large-scale mineral deposit, which has still not occurred. When small deposits like Puquio Norte are discovered, COMSUR develops and administers them, defining all necessary

¹⁰ A silver mining project in the Los Lipez area that would require an investment of approximately US \$450 million.

¹¹ COMSUR is a Bolivian company composed of several mining operations. Its most significant undertakings are: Porco (zinc-silver-lead), Don Diego (zinc-lead-silver), Bolívar (zinc-lead-silver), COMCO (silver) and Puquio Norte (gold).

policies for their exploitation, including environmental, personnel and community relations. Rio Tinto makes suggestions in any area it considers pertinent, but does not define business policies or administer the mining operations.

Environment

COMSUR was the first company to discover, develop and exploit a mineral deposit in the Precambrian region on an industrial scale. Thus, the company became a source of information on modern mining's impacts on ecologically sensitive regions such as the Bolivian Amazon. According to company executives, the mining operation complied with the most stringent international standards as well as with Bolivian regulations. In addition, officials decided not to construct a mining camp in order to minimize the risks and social costs involved in relocating the miners after the mine's inevitable closure. Instead, Puquio Norte's miners and employees integrated with the civil population of San Ramón.

Following practices that are in place at the international level, environmental management at Puquio Norte is based on principles of zero discharge and systematic monitoring. The zero discharge principle means that effluents are not discharged from the production process. Ore is crushed, milled and put in solution, then circulated from water tanks to the processing plant and back. Sterile solids from the plant are pumped to the tailings dam where they are separated from liquids by gravity. The water from the dam is recycled back to the plant. In this way, water loss occurs only through evaporation.

The effectiveness of this process depends on the stability and impermeability of the tailings dam. The material used in the dam's construction are the solids that remain after the mining process, and because of this region's climatic and ecological characteristics, these have a high natural capacity for revegetation and regrowth. To guarantee its impermeability, the dam is lined with compacted clay covered with a layer of geo-membrane, a flexible plastic.

According to company personnel, monitoring activities are fundamental to Puquio Norte's environmental management. Monitoring is performed on: surface water (10 points) and ground water (3 points); the volume and level of the San Julián River¹²; the pH and cyanide content of the tailings dam; soil at four points located north, south, east and west of the mine; sterile material from the mine; and dust and noise. Since the mine is currently extracting oxidized material from the deposit, there is no acid rock drainage.

In terms of closure and rehabilitation, Puquio Norte plans to cover the dam with oxidized material and revegetate the area. Despite its projected seven-year lifespan, our fieldwork research was unable to identify a closure and restoration plan in place for the operation.

Local community perceptions

Although the town of San Ramón is aware of COMSUR's presence in the area because of the Puquio Norte operation, this knowledge is fragmentary, partial, and often incorrect. Such a situation becomes fertile ground for false perceptions and misunderstandings regarding the impact of the mining operation.

Several interviewees expressed concern about the environmental risks associated with Puquio Norte and supposed benefits that the mining operation would leave in the region. For example, due to the intense rains the region usually receives, some residents worry about the

¹² The San Julián River provides water to the town of San Ramón and the Puquio Norte mining operation.

stability of the tailings dam, which is located upstream from the capture point for the town. This concern is expressed because, according to reports, the tailings dam at COMSUR's Porco operation in Potosí ruptured in August 1996 from severe climatic conditions.

The sensitivity of some San Ramón residents to potential environmental impacts of the Puquio Norte operation was evident when the morning paper *El Deber* reported that the tailings dam had burst, contaminating the San Julián River. The report was a false alarm. The company reacted with an open door policy, welcoming inspection visits and the collection of samples by authorities from the government, San Ramón, and the university. Such a response allowed national, regional and local authorities to verify, *in situ*, the high environmental standards by which the operation is managed. Nevertheless, not all San Ramón residents share this opinion, and some still express concern about the environmental risks of the mining operation.

This type of perception regarding mining is not exclusive to the area around Puquio Norte. Although the issue has not been studied systematically, the Bolivian population generally distrusts the mining industry. According to business people and field experts, this perception is due to the mining sector's history since the colonial era, which has been fraught with frustrations as well as negative environmental and social impacts. As such, modern mining operations such as Puquio Norte or *Inti Raymi* must bear the brunt of this legacy in spite of the fact that they comply with stringent environmental standards. Moreover, as we will see in the section on *Inti Raymi*, this legacy can give rise to a situation in which the environment becomes a mechanism for political pressure by local organizations toward the company or government in order to obtain greater returns at the local level from mining. In this context, an objective analysis of the company's environmental management is influenced by political positions that seek greater benefits from mining activities.

The local context: the town of San Ramon¹³

During the period of discovery, construction and opening of the mine, Puquio Norte's area of social influence —the town of San Ramón¹⁴—experienced rapid economic growth. According to our estimates, between 1992 and 1998, the average monthly income in San Ramón grew at an average annual rate of 17.4 percent. This growth prompted the construction of the interdepartmental Santa Cruz-Trinidad highway, which passes through San Ramón where the road forks toward Trinidad one way, and the towns of San Javier, Concepción, San Ignacio de Velasco and San Matías in the other direction. The highway provides a link to the department's capital, serves as a connecting axis between the departments of Santa Cruz and Beni, as well as a link between the towns located in the western part of Santa Cruz, near the Brazilian border.

¹³ Based on secondary information and an orientation field visit, the towns of San Ramón, Santa Rosa de la Mina and San Javier were selected as Puquio Norte's area of social influence. During the course of our field work it became evident, however, that San Javier was linked to Puquio Norte solely by way of municipal responsibilities. In addition, the mine has no presence in Santa Rosa de la Mina and none of its residents work at the mining company. In contrast, a highway links San Ramón to Puquio Norte. A few San Ramón residents work at the mining company and the company's technicians, administrators and workers live in San Ramón. For the most part, Puquio Norte workers and their families shop at the local market, and access local health and education services.

¹⁴ San Ramón is located 180 kilometers east of the city of Santa Cruz de la Sierra. It belongs to the Santa Rosa de la Mina canton, Ñuflo de Chávez province, Second Municipal Section (San Javier) of the Department of Santa Cruz.

Prior to the discovery of Puquio Norte, San Ramón experienced an intense immigration process because an alluvial gold deposit was discovered in the surrounding area and the construction of a highway. People from the interior of Bolivia were attracted by the prospect of amassing a fortune or simply earning a bit of money during the fierce economic crisis of the 1980s. As a result, towns such as San Ramón, where gold deposits accessible to artisanal mining were discovered, became migration magnets for hundreds of people. Almost all San Ramón residents were caught up in the gold rush. In addition, hostels, hotels, bars, cantinas and street stalls sprang up, offering various goods and services.

Although artisanal mining activities declined in the early 1990s, the interdepartmental highway's termination at the nodal location of San Ramón meant the town remained a destination point for migrants. According to our estimates, between 1992 and 1998 the town grew at an annual rate of 17.8 percent. This population growth invigorated economic activity (especially commerce), accelerated the process of urbanization, and prompted the regional electrification project. The fact that significant population growth was accompanied by exceptional economic growth is indicative of the notable dynamism experienced by San Ramón during the 1990s.

Mestizaje and westernization

It is evident that by the mid-1990s, when construction of the Puquio Norte mine began, the population of San Ramón was extremely diverse, both socially and culturally. First, there were the long-standing San Ramón residents who, even before 1980, did not recognize an ethnic identity, spoke only Spanish, did not use traditional dress, and did not make traditional crafts, despite the fact that the area was once inhabited by Chiquitano Indians (D'Orbigny 1994). Second, there were the immigrants to the region's communities and villages who arrived between 1982 and 1987 during the gold rush, and who consider themselves peasants or *cambas* due to their *mestizaje* — or advanced state of acculturation. Third, there was a wave of immigrants from the Andean region and the valleys. According to the majority of interviewees, less than 50 percent of the current population of San Ramón is made up of *collas* (western Bolivia natives).

Land tenure

Until 1995, San Ramón had 3 200 hectares of communal land. Due to population growth from constant immigration, these lands were divided for the benefit of the most senior residents. Lands adjacent to the urban center were ceded to the municipality so that they could be divided into urban lots. This enabled a process of relatively ordered urban growth for San Ramón, but in exchange, the town lost its communal lands, which were the principal reference and space for collective unity.

In terms of lands affected by the mining operation, there was no transaction with San Ramón residents or authorities, since COMSUR had acquired lands from a citizen of foreign origin by the name of Gehard. Now COMSUR owns 250 hectares of land, of which approximately 30 hectares are affected by the mining operation. Subsoil rights were acquired from the state by way of 7 200-hectare mining concession. COMSUR acquired plots within San Ramón from the municipal agency in order to build housing for the company's technical personnel. Other employees and workers have acquired their own plots of land or rented housing, according to their convenience and needs.

Impacts of the mine on San Ramón

Employment

Although COMSUR tried to hire the greatest number of local residents possible, *Ramoneños* are nevertheless a minority of the 118 member work force, equivalent to 30 percent. There are two reasons for this. First, Puquio Norte's salaries provide income levels similar to those San Ramón residents can earn in alternative activities. In addition, 13.5 percent of a worker's salary is withheld for social security and contributions to the National Housing Fund. For families used to working as independent producers, as the majority of San Ramón residents are, such withholdings are considered simple taxes, since many view their condition as salaried workers as a temporary situation. Second, local residents prefer activities that do not imply a relation of dependence and it is difficult for them to become accustomed to the discipline of working at a mining company that entails complying with a work schedule and safety measures. This attitude was confirmed by 100 percent of the interviewees.

Table 3 presents the statistics for absenteeism and acts of disobedience by workers at Puquio Norte between February 1998 and January 1999. Workers from eastern Bolivia (San Ramón and Santa Cruz) had an average absenteeism rate that was 45 percent higher than the rate for workers from other regions of the country. In addition, workers from other parts of Bolivia committed 38 percent fewer acts of disobedience than workers from eastern Bolivia.¹⁵

Table 3. Puquio Norte: Absenteeism and worker disobedience.

Origin	Workers	Absenteeism (days)	Acts of disobedience
San Ramón	19	67	9
Santa Cruz	3	20	3
Other regions	67	183	23
Total	89	270	35

Source: Puquio Norte, COMSUR.

Approximately 50 percent of workers are western migrants who arrived on their own accord before the mine opened. Only 20 percent of workers, mostly experienced miners, were contracted directly by the company in the western part of Bolivia. Thus the majority of mine workers are from San Ramón, (30 percent locals and 50 percent immigrant residents from the western Bolivia), representing 25 percent of the total salaried workers in San Ramón.

Income

The opening of Puquio Norte has had direct and indirect impacts on income levels in San Ramón. Direct impacts include workers' salaries and subcontractors' fees. As we mentioned earlier, the monthly salaries at the mining operation are similar to the average monthly income in San Ramón, or approximately US \$290 in 1998 according to our estimates.¹⁶

¹⁵ To address the problems of absenteeism and worker indiscipline, guidelines have been issued and the area superintendants and section bosses conduct motivational workshops.

¹⁶ The estimate for income levels for 1998 was obtained through a random stratified sample that involved in-depth interviews with 47 people.

Three types of subcontractors in the region provide goods and services to Puquio Norte. During construction, local sawmills sold important quantities of wood to COMSUR. Since production began, COMSUR has employed transport services available in the area. Four of the 42 transport firms in San Ramón were contracted by Puquio Norte, two for the daily transport of company personnel to the mine site and the other two for transportation of material from the mine to the mineral processing plant. Approximately 30 dump-truck subcontractors are from the interior of Bolivia. During the construction and exploitation phases, hotel owners have also benefited from the periodic arrival of delegations of technical personnel and executives from COMSUR's central and regional offices. In addition, San Ramón's location along the highway means there is a constant flow of travellers to local hotels and hostels.

In addition to the economic agents mentioned above, our fieldwork found that other classes of San Ramón society increased their income levels from spending by Puquio Norte technicians, workers and employees. For example, merchants and farmers benefited from the sale of staple goods. However, this effect was lessened by the fact that most clothing purchases were conducted at large markets in San Julián or Santa Cruz de los Andes, which offer greater variety and are easily accessible by highway. Nevertheless, several technicians, workers and employees invested in houses or land in San Ramón. Due to San Ramón's condition as an immigration center, many Puquio Norte personnel invested in the region. In addition, a portion of workers' income was spent in town, implying that part of the payment to workers and, to a lesser degree, subcontractors was converted into income for other town residents. In other words, the mine-generated income has a multiplier effect in the area of social influence, which shows the importance of systematically evaluating not only the direct income paid by the mine to local residents, but also the destination of spending by the mine's personnel and subcontractors. Such an analysis was conducted for the Inti Raymi operation that is discussed in the second part of this chapter.

Prices

Approximately 22 percent of San Ramón's population are vendors, primarily of clothes and food, though a small minority sells agricultural inputs and tools. Most vendors have agreements with suppliers from the city of Santa Cruz de la Sierra regarding the provision of mass goods to San Ramón at wholesale prices. As such, retail prices of mass goods in San Ramón are equal to those in Santa Cruz de la Sierra. Thus the market in San Ramón is highly competitive and any price increase resulting from product scarcity is immediately eliminated from the market. In this context, increased spending directly and indirectly attributable to the mine is unlikely to have affected the consumer price index in San Ramón.

The cost of housing and rent in San Ramón has increased dramatically in recent years due to the wave of immigrant arrivals. In consequence, the opening of Puquio Norte may have had positive impacts on inflation in the housing market, although it has not been possible to obtain sufficient information to conduct an analysis of this.

Company policy toward the community

COMSUR's policy strove to avoid a paternalistic or benefactor relationship with the community of San Ramón. The objective is to avoid a situation in which the community becomes accustomed to subsidies, leading to possible conflicts with the company. According to COMSUR executives, the policy is also the result of the operation's moderate profit margin, which has led the company to focus on cost reduction. Nevertheless, this does not mean that COMSUR does not cooperate with San Ramón; rather, the company provides assistance on the condition the community provides a counter-contribution in exchange. The community of

San Ramón is aware that it can enter into agreements with COMSUR on the condition that it complies with the principle of mutually beneficial counter-contributions.

For example, high rates of population growth during the 1990s lead to chronic overcrowding at the San Ramón primary and secondary schools. School directors were forced to reject new students or move students to other classes in the interim. Contributing to this difficult situation was the influx of the children of those immigrant families that provided services to COMSUR, leading the company and school directors to sign an agreement of mutual cooperation. In the agreement COMSUR committed to monthly contributions of approximately US \$500 during the 10-month school year; the school in turn agreed to enroll the children of COMSUR personnel.

Infrastructure and mining royalties

COMSUR and the Rural Electrification Cooperative (CRE) co-financed the construction of a 220-km gas pipeline between Mineros and the San Julián River. It provides energy to the mine and gas to the recently constructed thermoelectric plant in San Ramón that provides electric energy to the region north of Chiquitanía.

Initially, COMSUR planned to build a gas pipeline between 1.5 and 2.0 inches in diameter at a total cost of US \$1.6 million for the section between Mineros and the San Julián River. Nevertheless, the company had no problem agreeing to the joint construction with CRE of a 3-inch diameter pipeline, at a cost of US \$2.4 million. COMSUR contributed US \$1.6 million to the project's financing, while CRE contributed the additional US \$800 000 required to widen the pipeline's diameter to 3 inches. Thus COMSUR is the owner of two-thirds while CRE owns the remaining third.

This project was possible thanks to the opening of Puquio Norte and has had significant positive impacts in San Ramón and the surrounding area since it enabled rural electrification in the region of Chiquitanía. However, the project required the installation of a thermoelectric plant and subsequent infrastructure for the distribution of electric energy, works that could have been financed by mining royalties paid by the Puquio Norte mine.¹⁷ However, mining royalties constitute a departmental income and are distributed according to the department's budget. Rural municipalities such as San Javier (to which San Ramón belongs) have no control over budget allocations, and have not received any development projects or similar works that could be directly attributed to COMSUR's mining royalties for the Puquio Norte mining operation.

This lack of coordination between public investment policy and mining royalties as a potential financing mechanism generated undeniable social losses in the case of the rural electrification of San Ramón and the Chiquitanía region. The CRE had been negotiating with international cooperation agencies regarding financing for the construction of the thermoelectric plant, a process that delayed the project for three years. This illustrates the need to improve public investment policy instruments in order to avoid situations where the needs of small local communities surrounding a mining operation, such as San Ramón, are marginalized in favour of centrally determined needs at the departmental or national level.

¹⁷ Puquio Norte pays royalties equivalent to 9.5% of San Ramón's income. This is a significant figure, since it is equivalent to approximately 85% of the total taxes paid by San Ramón residents.

Overall, the Puquio Norte operation has had a positive impact on jobs, income levels, and infrastructure development within its area of social influence. It is important to emphasize that the intensity of these impacts is at least partially related to population flows in the area. For example, in the case of San Ramón, the mine's positive impact has been heightened by the town's role as migration center. Several minor negative impacts were identified, such as an increase in housing prices and the saturation of public services, including schools. Among the corrective measures taken, the company is making extra tax contributions to improve the local school system.

In terms of the distribution of benefits generated by the mining operation, the local population has suffered the consequences of the lack of coordination between fiscal mining policy and public investment policy. This is an area that could be improved considerably for the benefit of the local communities. There are important benefits from investing in infrastructure or complementary public services resulting from works linked to the opening of a mine, such as the generation of electric energy from the construction of the pipeline.

Finally, there is concern among some San Ramón residents regarding the environmental risks entailed by a relatively large mining operation and its impact on the regional ecology. The company's policy of openness regarding the environment has been useful but apparently insufficient given the negative precedents established by the national mining industry's traditional lack of attention to environmental impacts.

Inti Raymi and its local context

Antecedents

The Inti Raymi mining company was founded in 1982 by the Bolivian group Zeland Mines S.A. and the Texan group Westworld Inc. Its goal was intensive exploration of the Kori Kollo deposit located in the province of Saucarí, 42 km northeast of the city of Oruro. Since then, Inti Raymi's shareholder structure has evolved, reflecting changes in the mining operation. In 1999, 88 percent of the shares belonged to Battle Mountain Gold Company of the United States and 12 percent to Zeland Mines. In the same year, Inti Raymi had no other exploration activity underway except for Kori Kollo, although it had several exploration prospects. In 1999, preliminary results indicated important gold reserves in La Joya that could possibly double the operation's lifespan if the bio-oxidation metallurgical tests were positive.

Inti Raymi is a pioneering and innovative company whose Kori Kollo operation has been the reference point in Bolivian mining since its discovery and development. Inti Raymi brought new technology and production methods to Bolivian mining, including open pit mining and the concentration of minerals through leaching. The operation has been active in the introduction of technological changes, such as induced polarization and magnetic prospecting in exploration, cycle optimization and the use of pregnant solution. Such changes have enabled important increases in the recovery of gold and the reduction of costs (Loayza 1999). Moreover, Inti Raymi is the first industrial company in the country to establish a foundation to promote the social and economic development of local communities within its area of influence.

The mining operation

The Kori Kollo deposit is located within sub-volcanic or intrusive rocks, possibly originating in the tertiary period. The operation had two phases for oxide and sulfide production that provided much of the income necessary for the company's social policy, which will be addressed in following sections.

The oxide and sulfide projects have been mined in an open pit. This has required the excavation of the Kori Kollo mountain, which over time will become a lake. In Andean culture, some mountains are considered gods and thus the object of adoration and worship; however, this is not the case with the Kori Kollo mountain. Nevertheless, some community members feel that the disappearance of Kori Kollo has influenced the climate, since the mountain served as a windbreak for the strong air currents that affect the area.

Oxides were treated by heap leaching followed by the precipitation of gold and silver using the Merrill-Crowe method. In total, approximately 9.4 million tonnes of oxide were treated, the wastes from which were re-treated once the sulfide project had finished and then deposited in the tailings dam constructed for the sulfide operation.

Once the existence of approximately 64 million tonnes of mineral sulfide was proven, the company decided that the best method of treating this reserve were the carbon-in-leach process and the ZADRA process for putting the gold and silver in solution. The project was designed to treat 14 500 tonnes per day and in 1999 the company reached a capacity of approximately 20 000 tonnes per day. The product is gold ore, whose approximate content is 80 percent gold and 20 percent silver. Refining is done outside Bolivia.

Local context and population flow

Inti Raymi's mining operations, deposit, and camp are located within the territory of two communities, Chuquiña and La Joya, located in the cold and dry central highlands. In addition, the operation has relations with communities adjacent to Chuquiña and La Joya, as the action radius of the company's social arm, the Inti Raymi Foundation, encompasses 25 communities. Finally, Inti Raymi has important direct and indirect relations with the city of Oruro, the department's capital and administrative base.

Chuquiña

When Inti Raymi began operations in the area during the mid-1980s, Chuquiña's structure constituted a social and territorial unit, whose central axis was the village of Chuquiña. The community of Chuquiña is of Aymara origin and is part of the province of Saucarí. In addition, it forms part of the ayllu¹⁸ Chariri, which together with 11 other ayllus, makes up the larger social and territorial unit known as the Marka,¹⁹ with its ceremonial center in the village of Toledo (Ayllu Sartañani 1994). Nevertheless, by the mid-1980s, this traditional system of organization had lost practically all relevance in the area dominated by the republican state organizational system.

During this time Chuquiña's lands were divided. One secondary road connected the community to the principal highway to La Paz and another connected it to the city of Oruro. Transportation service was restricted to trucks or a few buses once or twice a week. It was necessary to cross the Desaguadero River at different points by boat. During the rainy season, the road became impassable since there were no embankment or drainage ditches.

Chuquiña's economy depended on sheep farming. Average family income, although the highest among the adjacent communities due to larger sheep flocks, was not sufficient to prevent the gradual migration toward urban centers, especially to the city of Oruro. In 1969,

¹⁸ The ayllu is the territorial, social, kinship and identity unit in the socio-ethnic organization of Andean culture.

¹⁹ The Marka is the territorial unit that corresponds to the grouping of ayllus that constitute a larger unit in the Andean organizational system.

out of a total of 220 families, 91 emigrated to other parts of the department of Oruro and the country's interior. In 1987, out of a total of 97 families, 62 emigrated outside of the area (Rojas 1995).

Nevertheless, this migratory process has not been definitive since many families continued administrating their land and livestock from the city of Oruro. Normally, they returned to their lands on the weekends and during planting and harvest times. This behaviour stemmed from a development strategy consistent with the maintenance of two complementary sources of income: a job in the city as a worker (either public employee or merchant) and agricultural producer in their own community of origin. This strategy was possible due to the short distance between Chuquiña and the city of Oruro (42 km) and the availability of cheap labour from the region's impoverished campesinos. These people were contracted on a part-time basis by the migrants for agricultural and livestock tasks necessary to maintain production.

La Joya

The village of La Joya is approximately 5 km from Chuquiña. During the mid-1990s, this community also adapted its organization to the political administrative system in effect throughout Bolivia. In contrast to Chuquiña, however, La Joya was not part of an Andean social and territorial organizational system. Until 1953, the area now occupied by La Joya was the *hacienda*²⁰ of La Barca, which was later expropriated during the agrarian reform process in favour of the families living on the estate.

By the mid-1980s, the most important activities in the community of La Joya were agricultural and livestock production and cooperative mining. Because they were not located along the Desaguadero River, the population's land parcels were smaller and less appropriate for grazing than those in Chuquiña. After the severe drought of 1982-1983, many residents migrated to the city of Oruro and other towns throughout the country. Other residents were obliged to take up artisanal mining in the La Joya mountain in the hopes of obtaining a complementary source of income. By the beginning of the 1980s, artisanal miners had formed the mining cooperatives of La Joya Ltd. and Concepción de Mayo Ltd., which exploited the mining concessions belonging to Inti Raymi.

Adjacent communities

In the mid-1980s, the adjacent communities that benefit from the Inti Raymi Foundation had an organizational structure similar to those for Chuquiña or La Joya. Their economy was and still is based primarily on subsistence agriculture and livestock production—a reality that is similar to Chuquiña and La Joya, except that these communities lack the presence of artisanal mining. Infrastructure consisted of an embanked road connecting several communities with the city of Oruro, while passing through Chuquiña toward Carangas. The most distant communities were linked by way of less-passable back roads. As with Chuquiña and La Joya, migration was the common denominator in the area.

The city of Oruro²¹

By the mid-1980s, the department and city of Oruro suffered a severe economic recession due to the drastic contraction in the mining industry, whose decline affected all other sectors.

²⁰ Rural estates, or *haciendas*, were large extensions of land belonging to a single landowner and dedicated to agricultural production. Their domain included the residents who lived on the land.

²¹ The city of Oruro is the capital of the department of the same name, located 230 kilometers south of the city of La Paz.

The city was favourably located for national and international commerce. It is linked to the Chilean port of Iquique by way of the Oruro-Pisiga-Iquique highway and to the port of Antofagasta by way of the Oruro-Uyuni-Antofagasta railroad. In addition, a paved road links Oruro to the largest cities in the country. Because of its strategic location, the city of Oruro has become the commercial emporium in Bolivia, especially for imported goods.

Acquisition of lands

As owner of the concessions in the La Joya-Chuquiña mining district, the Inti Raymi Mining Company S.A. (IRSA) acquired the lands necessary to exploit the deposit and to install the mining and administrative infrastructure. Inti Raymi believed that the richest part of the deposit was in La Joya, and so paid community residents nearly US \$1 000 per hectare, in spite of the fact that local market prices were on the order of US \$20-30 per hectare. Once the exploration study was concluded, however, it revealed that the Kori Kollo mountain, located in the jurisdiction of the Chuquiña canton, had a much more attractive deposit than that located in La Joya. But to acquire land in Chuquiña, the company adopted the following policy: acquire lands by phases according to the needs of the operation²²; negotiate separately with each landowner; offer a price per hectare significantly higher than the average price in the area²³; and once the mine closed, make every effort to restore the lands to their natural condition and return them to their prior owners.

In spite of the agreements signed by the parties, community residents continued with complaints, disagreements and pressures toward the company. During the course of our fieldwork, it was evident that community members used the issues of land and the environment (which will be addressed in a following section) as mechanisms of pressure with which to obtain additional benefits from the company. While pressures based on supposed environmental contamination by the mining operation have not been effective, pressures for additional compensatory benefits in exchange for the land are growing. In July 1999, community members staged a one-day work stoppage and occupied the area near the crusher, demanding additional compensation for the relocation of the community of Chuquiña.

The relocation of Chuquiña

In the early 1990s, the sulfide exploitation required the installation of a new processing plant near the town of Chuquiña. The company bought 9 hectares of land in Chuquiña at a cost of US \$200 000 in the eastern section of the town. The technological change from heap leaching to leaching in agitation tanks was going to require a finer grain in the mill as well as a 350 percent increase in production, entailing a significant increase in noise and dust levels that would have disturbed community residents. Thus, the company began negotiations with community residents, proposing to move the town to a new location far enough away from the mining operation to avoid disturbance. In contrast to what occurs in most towns in the Bolivian highlands, the company offered to build new housing for all current Chuquiña homeowners and to provide all basic services, including a new modern hospital.

²² Inti Raymi bought 500 hectares from the Chuquiña community for the construction of its productive facilities, paying US \$500 per hectare. Later, for sulphide mining operation, the company acquired approximately 1 000 hectares at a cost of US \$300 per hectare for the construction of the tailings dam. Finally, the company bought nearly 4 100 hectares at US \$350 per hectare for the construction of the evaporation ponds for the sulphide operation.

²³ According to company officials, the value of these lands was estimated at between US \$15 and US \$30 per hectare.

After lengthy negotiations, community members finally accepted the company's offer to move the town to a new location called Villa Nueva Chuquiña. The houses would consist of two bedrooms, a kitchen, dining room, bathroom, and patio. The company would provide construction material that did not exist in the area, such as cement and iron bars, as well as labour. For their part, community members provided locally available construction material, such as rocks, sand and an assistant bricklayer. The relocation process attracted several community residents who had years before moved to the city of Oruro or other departments. These return residents were included in the Villa Nueva Chuquiña project. By 1999, 135 houses, market facilities, hospitals and educational centers had been built at a cost of US \$1.8 million for the company.

In spite of the agreements mentioned above, Chuquiña's relocation was not free of discrepancies and criticisms. Some residents resisted the move to the new town out of fear of being tricked by the company and losing their houses in the old town. Those who rented houses feared losing their tenants. Some residents argued that since the town of Chuquiña, especially its church, dated to the colonial era, it had great historic value in terms of preserving the memory of their ancestors and would be at risk from the company's mining activities.

Toward the middle of 1992, a conflict developed between the company and the Oruro Human Rights Assembly over complaints lodged by Chuquiña residents.²⁴ For its part, the company demanded compliance with the negotiated agreements, renewing its commitment to conduct operations in a way compatible with the environment and citizens' rights. Finally, the community agreed to the relocation and several members ended up renting their houses to workers from the interior of the country because many of them had already established residence in the city of Oruro.

Company-community relations

As analyzed above, one of the company's most serious challenges from the beginning was achieving local community acceptance within an unfavourable context created by the company's competition with locals for access to mineral resources and land. In addition to land acquisition and the town's relocation, Inti Raymi was able, after several conflicts, to buy and freely transfer the gold concessions of "Independencia," "Vera," and "Iroco" in favour of the cooperatives holding the La Joya concession, even assuming subsistence costs for the first month. From then on, the company gradually dedicated itself to activities of cooperation and assistance to local communities in order to facilitate its insertion in the local context.

During the oxide phase, Inti Raymi became subject to multiple demands on the part of neighboring communities and civic institutions in Oruro that included the donation of sporting equipment and the construction of social infrastructure works such as secondary roads. When construction on the sulfide project began in the early 1990s, Inti Raymi was a pioneer in social assistance. Nevertheless, Inti Raymi's experience shows how easily a company's efforts at social action can be diluted in the medium term if they are not

²⁴ Complaints included: supposed threats by company officials to demolish the church and the town; company pressures regarding relocation to Villa Chuquiña; invasion of the town's urban radius; that the new mining methods would contaminate the town, which would end up inhabitable due to its proximity to the smelter; impediments to the residents' free movement because of the construction of a TRANCA; and the suspension of transportation of children to the school in Villa Chuquiña. See Córdova, 1993.

accompanied by an adequate sustainable development strategy for the region. In order to systematically attend to these needs, in 1991 the company decided to create the Inti Raymi Foundation.

The Inti Raymi Foundation

The foundation was established as a means of leveraging financial resources (in addition to those provided by the company) for investment in the region. Initially, the foundation was successful at mobilizing state resources from the Social Investment Fund in the area. Since 1997, the foundation has received funds from Spanish and Dutch international cooperation agencies as well as the Inter-American Foundation.

The Inti Raymi Foundation adopted a participatory policy designed to include community priorities in its plans and projects, as well as involve community residents in its activities. The foundation has presented itself as a willing partner eager to cooperate in the design and execution of projects sponsored by the communities. From the administrative and financial points of view, this policy entailed the foundation's role as a counterpart agency and pre-investment funder for community projects. The foundation's important role in developing effective community management capacity, however, has not been understood by some residents. During our fieldwork, it was evident that several beneficiaries view the foundation as illegitimate since it does not exclusively invest its own resources but rather, in many cases uses public funds.

In order to define the activities to be discussed with the communities within its scope of action, the foundation carried out a two-stage process involving:

1. a diagnosis and characterization of its area of action; and
2. creating a series of community workshops designed to identify and prioritize infrastructure needs.

Using these demands as a starting point, the foundation designed projects that emphasized agricultural and livestock activities, as well as those geared toward improving health, basic education, hygiene and water supply.

Mining's dual role

Despite the creation of the Inti Raymi Foundation as a mechanism for social development projects that address the communities' most pressing needs, the company continued to directly attend to the demands and requirements of the communities of La Joya and Chuquña. There were two reasons for this.

First, the company considers these communities part of its area of strategic action. Interaction with such communities was much less structured than with the other communities targeted by the foundation. Avoiding conflicts was a priority for the company and relations with La Joya and Chuquña were the responsibility of the highest executive levels within the company. For its part, residents of the two communities did not directly relate to the mining company; instead their interaction was always mediated by community authorities. For example, during the land acquisition phases, the company always initiated contacts with community leaders, while residents waited for the go-ahead from their leaders prior to any direct negotiation with Inti Raymi.

Second, the mining company has been much more accessible to La Joya and Chuquña's demands than the Foundation because the latter uses a clearly defined methodology for approving projects. Its priority is to support activities that promote regional development,

including after mine closure, rather than merely avoiding conflicts that could delay the normal timeframe for a mining operation.

It is important to note that this duality in relations between Inti Raymi and its area of social influence has been successful in avoiding conflict or confrontations. In some cases, it led the company to adopt assistential and even paternalistic positions with respect to La Joya and Chuquiña. This occurred due to the joint circumstances of a favourable market and the high quality of the Kori Kollo deposit. Now that gold prices have dropped to their lowest point in 30 years, the sustainability of this policy is precarious, to say the least. The company has been systematically reducing costs but pressure from La Joya and particularly Chuquiña have not let up. Since there has been little change in the area's difficult social and economic conditions, the communities could react confrontationally to the company and its mining activities. The company is faced with the serious challenge of how to maintain trouble-free community relations during a market slump, after having established relations during an economic boom.

Environment²⁵

Just like a coin, the issue of the environment at the Kori Kollo operation presents two opposing sides that form a whole. On the one hand, there are the technical aspects of the company's environmental management policies; on the other, there is the natural environmental degradation prevalent in the area and the resulting political pressure on the company and the government. Both aspects are fundamental to understanding the relationship between the company and its surrounding social context.

The analysis that follows addresses each side of the coin. We have attempted to emphasize that in a context like that faced by Inti Raymi, the relation between a large mining project and its environmental impact is not limited to technical management of the operation itself, as many companies wrongly assume. On the contrary, interest groups use the environmental issue as an opportunity to question the legitimacy of mining activities, particularly at the local community level. If this reality is not incorporated in a timely and appropriate manner within the company's environmental management and communication policies, the best technical efforts can do little, later on, to reverse the mutual distrust between the mining operation and the local community. This not only constitutes a source of conflicts and tensions during the operation of the mine, but also will likely continue beyond the closure of the mine.

Environmental management at the mining operation

As we saw in the first part of this section, the Kori Kollo operation advanced rapidly. In less than a decade it went from a project worth a few million dollars (the oxide mining operation) to the most important industrial project in the country. By the early 1990s, it had an estimated investment of US \$150 million. Financing this was beyond the Bolivian financial and banking system's capacity. Thus, the project turned to international financial

²⁵ This section is based on information from different sources. Its goal is to obtain an objective analysis of Inti Raymi's environmental management. The sources were: (i) Oruro's regional environmental evaluation as undertaken by the Swedish Geological AB in the Oruro pilot project (1993 and 1996); (ii) Internal company documents such as "Environmental Management at the Inti Raymi Mining Company" written by Marwin Columba, Superintendant of Environmental Control; (iii) Interviews with key company and community informants; (iv) Press articles and other information found in bulletins such as "Informa y Opina" by the Pastoral Society; and (v) the technical evaluation conducted by one of the present authors during the early 1990s with the support of environmental specialists (Loayza 1999).

institutions such as the World Bank, the Overseas Private Investment Corporation, and the Andean Development Corporation. Even though Bolivia had not passed an environmental law at that time, Inti Raymi's operation had to comply with strict monitoring and environmental impact mitigation norms.²⁶

The Inti Raymi mining operation, like Puquio Norte, is based on the principles of zero discharge and systematic, continuous monitoring. The water used in the processing plant is recycled. The resulting tailings from the concentration process are sent in pulp form to the tailings dam, where the solids are separated from the liquid, which is recycled back to the treatment plant. Following international standards, the leftover cyanide solution in the dam is kept under 50 parts per million by way of the application of hydrogen peroxide, which facilitates radiation's ability to break down cyanide. Due to their high salinity, waters flowing from aquifers into the mining pit are not discharged into any water body. They are discharged into the evaporation ponds, specifically constructed to liberate water through evaporation. The salt that remains at the end of the project is deposited in the base of the mine pit and, over time, covered with water.

In order to avoid the formation of acid rock drainage, both the tailings dam, which will accumulate approximately 65 million tonnes of tailings, and the sterile solids generated by the mine, which will be in the magnitude of 70 million tonnes, will be encapsulated with oxidized material. The base of the sterile deposit is a four-foot thick liner made from oxidized material extracted during the operation's first stage. The liner of the tailings dam has been made impermeable with a layer of compacted clay in order to avoid the tailings coming into contact with ground and surface water.

Because the Desaguadero River flows close to the mine, a 5-km dam has been constructed around the mine site. The dam will prevent floodwaters from entering the mine as well as discharge from the mine entering the river. The site also has a ring of monitoring ponds throughout the operation, which are used to take monthly samples of physical parameters and tri-monthly tests of chemical parameters. In addition to water quality, soil and air quality are also monitored. The goal of the restoration program is to restore lands affected by the mining operation to their original condition.

While conducting the fieldwork, we observed that the mine's restoration programs have already begun, affecting 70 hectares in 1999. In addition, also underway within the area of the mining operation are the rehabilitation of green spaces and artificial lakes which are home to regional bird species such as ducks and flamingos. Finally, according to company officials, the company has established a fund to cover the costs of adequate closure measures.²⁷

Currently, there have been no confirmed incidents of contamination or environmental damage due to the mining operation. Nevertheless, visits to the area and conversations with local residents and Oruro inhabitants demonstrate that the dominant perception is that the operation has significantly and negatively affected the region's ecology.

²⁶ As an example, in 1997, Inti Raymi was granted first prize by the Latin American Mining Organism (OLAMI) in the category of large-scale mining in the ecology and environment competition.

²⁷ Bolivian environmental legislation does not require the establishment of a fund or monetary reserves for restoration or rehabilitation activities associated with the closure of a mine.

The environment as an instrument of political pressure

As we explained earlier, the discovery and exploitation of the massive Kori Kollo deposit coincided with the crisis in the state-directed economic model, revealing this model's defects. First, centralism resulting from the state's role as economic planner had practically

asphyxiated regional aspirations. Thus, the crisis provoked regional movements. Second, with the drop in metals prices, the mining departments of Potosí and Oruro suffered severe unemployment and recession. Inevitably, the population of these mining regions has questioned the mining industry's long-term contributions to the areas. Among other aspects, criticism has been leveled against the amount and distribution of mining royalties paid to the central government and the regions.

Within this context of decline, Inti Raymi's arrival as a dynamic operation (and the most important gold mine in South America) served as a starting point from which to attack the centralist model and promote its reform. Newspapers from the period 1993-1998 reflect the uncertainty regarding gold and mining royalties on the part of Oruro institutions. Oruro institutions lobbied the central government to impose higher royalties on Inti Raymi's gold operation, suggesting that a greater percentage of these royalties go to the department. One of the main arguments employed in this fight was the environmental degradation that the mine left in its wake. In other words, Oruro institutions were demanding higher royalties not only because the resources were located in the department, but also as a form of compensation for the environmental harm or risks associated with mining. Western Bolivia's experience with mining contamination since colonial times was cited. Because this perception was based on experience, Inti Raymi faced the difficult challenge of persuading the population of its responsibility and commitment to environmental management. The situation became even more complicated because Inti Raymi's sulfide project commenced simultaneously with the natural degradation of the Uru-Uru and Poopó lakes. Mining's negative environmental reputation led to the belief that such degradation was largely due to the Inti Raymi operation.

The department of Oruro is part of the closed basin or high Andean plateau that serves as a drainage system from Lake Titicaca to Lake Poopó by way of the Desaguadero River. The volume and depth of Lake Poopó depends primarily on the level of Lake Titicaca, which in turn is subject to cyclical fluctuations due to natural events such as the El Niño phenomenon.

"The close relationship between water levels in Lake Titicaca and the size and depth (or even the existence) of water in Lake Poopó, is due, of course, to the fact that the volume of the Desaguadero River (which contributes approximately 80 percent of the water that feeds Lake Poopó) varies depending on the level of water in the lake that it drains. Between 1984 and 1987, Lake Titicaca reached its maximum level... The result was a tremendous expansion of Lake Poopó, which reached a surface area of 3 500 square kilometers in 1986 and a maximum depth of 9 meters... In subsequent years, Lake Titicaca's water level dropped once again... It is not surprising that during recent years, Lake Poopó has almost ceased to exist as a lake with a visible surface of water" (SGAB 1997, pp. 38-39).

The gradual disappearance of the principal lake in the department of Oruro, which coincided with Inti Raymi's sulfide mining operation, had serious effects on the region's flora and fauna. For example, as the lake disappeared, fish species such as *orestia* and *pejerrey* could no longer feed many of the communities scattered around the lake. In addition, the lake's disappearance negatively affected local flora, because soil salinity increased. This situation

negatively affected local campesinos. Inti Raymi was accused of being responsible for these processes, in part so as to pressure the company for compensation.²⁸

Initially, the company did not realize that mining's environmental impacts and risks could be cause for such concern and fear among local communities. The company was slow to develop a communications or community relations policy to focus on dispelling fears and creating trust, even at the cost of suffering a few delays or adjustments in the project's schedule. Local residents say they were not consulted about the use of cyanide in the oxide mining operation, which could have served to dispel fears in a timely manner. Moreover, after a few isolated incidents involving animals that evaded company security and drank from the cyanide ponds, the company compensated the owners far above the market value of their livestock in order to avoid conflict. Such action gave the community the false impression that the operation's negative environmental impacts explained the high compensation.

Thus, the mining industry's negative environmental legacy, the local population's distrust of the company and its activities, combined with the company's insufficient and tardy attempts at communication with local residents all opened the door to fear and uncertainty. If we add in the political manipulation of the environmental issue, together with the phenomenon of the natural degradation of the area, the discrepancy (which in the authors' opinion exists) between the operation's level of environmental management and the communities' negative perception of the operation is not surprising.

In conclusion, this section has shown that the most basic feature of the relationship between Inti Raymi and local communities is the distribution of benefits generated by mining activities. For local residents, the arrival of the mining operation is both an opportunity and a threat. It is a threat because the mine competes with residents for land and mineral resources, but it is also an opportunity because it can provide them with resources or, as we will see in the following section, well-paid jobs. Due to the deposit's richness and the cooperation of company executives, Inti Raymi adapted to the situation by developing an assistance policy vis-à-vis local communities with the goal of avoiding conflicts that could affect the normal functioning of mining activities. Over time, it became apparent that the region's pressing needs required a more structured and effective response, and so the company created the Inti Raymi Foundation. Thus, the company's initial assistential role matured into the role of an agent committed to local development. But because the company's assistentialist policy was not eliminated, it effectively developed a dualistic response to local residents' demands. In other words, the company seeks to promote local development but also seeks to avoid conflicts.

²⁸ For example, the following press clippings from the time are highly revealing: "The use of toxics and poisonous chemical products represents a grave danger, not only to residents' health, but also to soil fertility, water quality and environmental equilibrium, the contamination of which is caused by Inti Raymi's use of cyanide in its gold mining operations, poisoning not only the site but taking its deadly effects to the Poopó and Uru-Uru lakes, endangering and destroying the fish populations, the only source of sustenance for the residents and town of Oruro." OPINION, 3 September 1991, *"Mining companies contaminate the soil, water and environment."*

"Jaimes (from the department of Oruro) was emphatic in attributing the disappearance of all vestiges of life in the area around lakes Poopó and Uru-Uru to the effects of lethal cyanide used by the Inti Raymi company in Saucarí... Lake Poopó is dead, there is no longer any life because all the species of flora and fauna have disappeared, affirmed the interviewee..." La Patria, 27 October 1993, *"Inti Raymi responsible for ecological disaster in the department."*

Impacts of Inti Raymi

In this section we analyze the principal economic and social impacts in the mining operation's area of influence.

Employment and human resources management

Inti Raymi's policy is to give hiring preference to workers from the communities of Chuquiña and La Joya. Table 4 shows the evolution of the local communities' share of mine employment.

From 1990 to 1997, between 54 percent and 68 percent of Inti Raymi workers were from the communities of Chuquiña and La Joya. The number of contract workers, as a response to pressures from local communities for jobs, is notable. Thus, between 1997 and 1998, when international gold prices fell approximately 30 percent and Inti Raymi was forced to reduce costs, contract workers were the most severely affected, practically disappearing from the work force. Clearly, this type of employment was largely surplus or unnecessary to the operation and had to be abandoned when the company's economic situation went through difficulties. This explains the smaller percentage of workers from Chuquiña and La Joya for the year 1999.

Training

Initially, Inti Raymi's mining operation was heavily weighted toward unskilled labour. Nevertheless, the technological changes implied by the shift to sulfide mining required the company to train workers by way of three programs focusing on equalization, professionalization and specialization. All operators and employees at the oxide operation were trained in order to proceed to the sulfide operation.

Table 4. Inti Raymi: Employees from Chuquiña and La Joya.

Classification	1990	1995	1997	1999
Workers	120	158	179	217
Workers at Sermat and La Barca (*)	50	53	—	—
Contract workers	30	250	283	15
Workers from Chuquiña and La Joya	200	461	462	232
Technicians and employees	0	0	0	0
Total from Chuquiña and La Joya	200	461	462	232
Total workers at Inti Raymi	295	855	761	493
Workers from Chuquiña and La Joya as a percent of total workers IRSA	67.8	53.9	60.7	44.0

(*) Until 1996, the mining operation contracted the services of Sermat and La Barca, dedicated cargo transport and mining exploration service providers, respectively. Starting in 1997, these companies were acquired by Inti Raymi, with many of their workers being absorbed in the process.

Source: Prepared with information provided by Inti Raymi S.A.

The equalization program involved the development of cognitive tools such as language, technical knowledge and quantitative training, as well as general technical skills in areas such as mechanics or electricity. The professionalization program was oriented to training operators in relation to their job positions. Courses consisted of 20 percent theoretical training and 80 percent practical training. Finally, the specialization program formed specialized resources within the area of professionalization. For example, within the area of auto mechanics, a specialty could be electronic injection. Whereas 51 percent of workers were trained under the first program, 25 percent were in the second and 3.3 percent in the third.

Importance of employment originating in the mining operation

The impact of the mining operation on employment in Chuquiña and La Joya can be evaluated in relation to the communities' economically active population (EAP). The analysis includes employment by subcontractors engaged in various services such as transport, food service, operative contracts, cleaning and civil works. In 1997 an estimated 143 additional jobs for local residents were created with subcontractors.

Table 5 presents the total impact of the mining operation on employment in Chuquiña and La Joya. Note that the direct employment at the mine plus indirect employment with subcontractors equals 56.2 percent of the EAP of Chuquiña and La Joya for the year 1997. Due to the human capital development experienced by much of Inti Raymi's labour force, which we will discuss later, the possibility of unemployment problems once the mine inevitably closes is low.

Table 5. Inti Raymi: total impact on the EAP of Chuquiña and La Joya.

Employment generated by the mining operation	Jobs	Impact on the EAP of Chuquiña and La Joya
Workers at the mining operation	462	42.9%
Subcontractors	143	13.3%
Total	605	56.2%

Source: Prepared using information from Inti Raymi S.A, the National Institute of Statistics, and fieldwork data.

Income

Direct impact on income of local communities

Table 5 showed that most employment generated by the company in Chuquiña and La Joya was through the direct hiring of workers at the operation, who have always received salaries higher than the regional average, as we can appreciate in Table 6.

The wage differential between Inti Raymi workers and the department's average is increasing over time. A similar situation occurs with the variations in the opportunity costs for the average worker from Chuquiña or La Joya, which is the sum of the average income of a worker in the city of Oruro and that of an agricultural producer in the department of Oruro. As a result, residents from La Joya, Chuquiña and adjacent communities have a strong incentive to enroll as workers at the mining operation. During our fieldwork, various interviewees from the rural area adjacent to the mine expressed their indifference and — in some cases — opposition to the Inti Raymi Foundation's activities. Nevertheless, they all expressed the desire to one day get a job at the mine. When asked about their expectations regarding Inti Raymi, they have very clear ideas: they value the foundation's support, but do

not expect it to significantly change their lives; in contrast, a job at the mine represents a significant change.

Table 6. Inti Raymi: Average monthly salary (US \$).

Classification	1990	1995	1997	1999
Workers	218	535	678	760
Contract workers (*)	200	280	350	390
Average monthly income in the department of Oruro (**)	99	132	142	n.a.
Average monthly income for a worker in the city of Oruro	89	120	129	n.a.
Average income for rural farmers	42	41	44	n.a.
Opportunity cost	131	161	173	n.a.

(*): Including workers at Sermat and La Barca.

(**): Average earnings from work, capital, natural resources, and business training.

n.a.: Not available.

Source: Prepared using information from Inti Raymi S.A, the National Institute of Statistics, National Employment Survey, Nov., 1999, and data obtained in field work.

Indirect impact on income of local communities

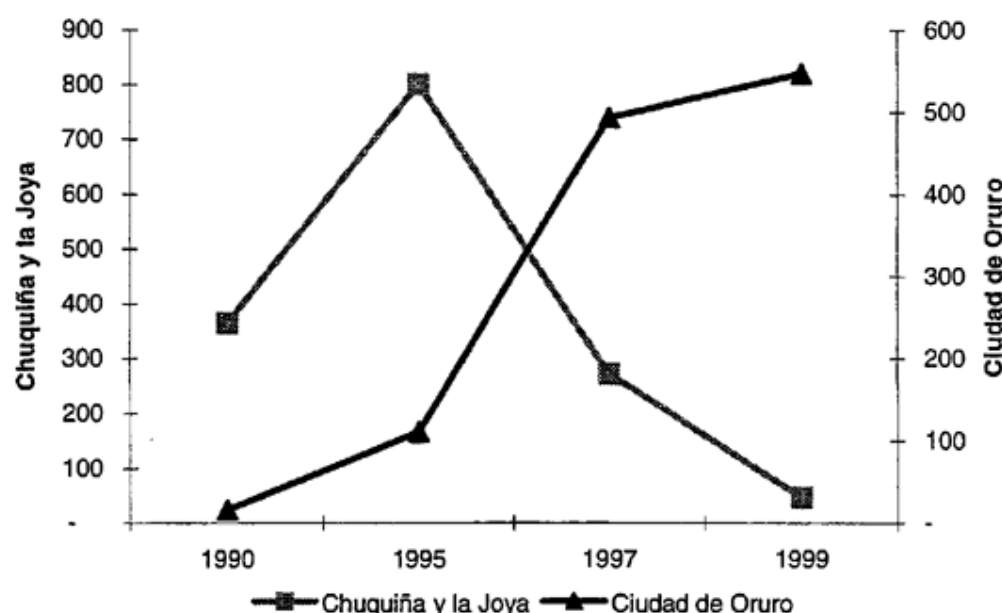
Indirect impacts on communities' income result when wages earned at the mining operation are spent on goods or services produced in Chuquiña and La Joya. Among the goods consumed by mining personnel are meat, different varieties of potatoes and potato products, and Andean grains such as quinoa, wheat and barley. In turn, this indirect income is not usually spent on goods produced in these communities. However, because recipients view it as an extraordinary income, they usually spend it on the acquisition of durable goods or clothing. Thus the wages spent by workers in the area around the mine do not have an expanded multiplier effect in the area.

Migration to the city of Oruro

Until 1995, 83.7 percent of mine personnel resided in Villa Chuquiña and La Joya, while 10.6 percent lived in the city of Oruro and the rest in other cities. However, this high level of local residence was not desired as local residents aspired to live in a city like Oruro, and their income levels made this possible. Due to a growing state of frustration, in spite of repeated refusals by mine administrators to provide transportation from the mine site to Oruro, in 1996 the union decided to contract a transportation fleet using its own resources. Later, union negotiations with the company resulted in an agreement that Inti Raymi would cover 50 percent of transportation costs and later assume all such costs.

Figure 1 illustrates two unmistakable tendencies. Between 1990 and 1995, the number of mine workers, employees and technicians residing in Chuquiña and La Joya reached its peak, due fundamentally to the company's policy. In contrast, between 1995 and 1997, the local population decreased drastically while the number of workers living in the city of Oruro increased.

Figure 1. Place of residence of mine workers.



The year 1995 represented a historic turning point for Chuquiña and La Joya residents. Consolidating their residence in the city of Oruro implied a better standard of living and multiple new opportunities for them and their families. Moreover, this change did not imply a jump into the unknown or the transition to an unfamiliar and risky world. In addition to having stable incomes, the company facilitated access to housing and vehicles and, in some cases, assisted with real estate investments in other cities in the country.²⁹

Impact on income in the city of Oruro

Table 6 showed the mine workers' salaries were significantly higher than the average income in the city of Oruro. This was also true of technicians and professionals employed at the mine. In the following section we analyze the impact of these salaries on the city of Oruro.

Workers invest approximately 40 percent and technicians 25 percent of their income in real estate. Nearly 45 percent of the income is spent in the city of Oruro. According to data collected during our field work, the average worker is relatively frugal and has the following investment priorities: the purchase of a plot of land in Oruro; the construction of a house on this plot; their children's education (with aspirations of becoming a professional with a university education); the purchase of a plot of land in another city; the purchase of a store or commercial venue; the purchase of a minibus to provide urban transport services; and the purchase of an automobile.

Although mine workers earn considerably less than technicians, they devote a greater proportion of their income to savings and investments. For their part, technicians and employees have the following investment priorities: acquisition of real estate (or if they are already owners, additions to and improvement of their property); changing their existing automobile for a more recent model, which involves a mixture of investment and consumption; and financial assets, which are generally obtained in the banking system, such as savings accounts or fixed-rate deposits.

²⁹The facilities granted by the company to workers were interest-free cash loans in order to obtain bank credits.

Discounting wages spent on investments and in the communities of Chuquiña and La Joya, nearly 100 percent of the remaining wages are spent in the city of Oruro. This is because Oruro is probably the cheapest city in the country. As a result, investment spending and consumption in the city of Oruro together represent 78 percent of workers' income and 86.25 percent of technicians' and employees' incomes. A portion of this spending, however, leaves the city of Oruro in the form of payment on imports and goods and services produced elsewhere in the country. Discounting these losses, the resulting net spending in turn becomes income for other families in Oruro, and so on, successively.

The sum of this successive spending represents the income multiplication of wages and salaries paid by Inti Raymi. The estimate of this multiplier effect is presented in the first column of Table 7.

Table 7 shows that in 1997, every dollar paid by Inti Raymi as wages and salaries became US \$2.6 in income in the city of Oruro's economy. For example, the approximately US \$7.1 million paid in salaries became US \$18.3 million for the economy of Oruro. This impact can be more concretely appreciated comparing it to the number of families that the income could maintain. The average family in Oruro had an annual income of US \$2 691 in 1997; thus the indirect income generated by the mining operation would have maintained approximately 6 800 families that year, or 18 percent of families living in the city.

Table 7. Inti Raymi: Impact on income in the city of Oruro, 1997 (US \$).

Impacts	Workers, technicians and employees	Subcontracted employees	Total
Income earned	7 132 961	3 649 151	10 782 961
Direct impact	5 580 000	3 650 000	9 230 000
Indirect impact	12 720 000	8 210 000	20 930 000
Direct plus indirect	18 300 000	11 860 000	30 160 000
Multiplier	2.5656	3.2528	2.7982

Source: prepared by the authors using their fieldwork data.

Using this methodology, we can estimate a multiplier of 3.25 for the income earned by the operation's subcontractors³⁰ residing in Chuquiña, La Joya and the city of Oruro, as shown in the second column of the same table. Considering both the direct and indirect effects, in 1997 approximately 6 percent of Oruro families could have been maintained with this income. The multiplier effect of both types of income — workers plus subcontractors — is shown in the third column, which could have maintained approximately one-fourth of the families residing in Oruro.

Infrastructure

Inti Raymi's infrastructure development program constructed road and communications works. These works were incremental improvements in the area's roadway system.

³⁰ The interviews conducted established that Inti Raymi's subcontractors consume or invest 100% of their income in the city of Oruro. This could be due to the fact that in most cases, the companies are already in the process of consolidation in the Oruro market.

The company built a bridge across the Desaguadero River and a highway connecting the city of Oruro at a cost of US \$320 000. The project benefited various communities in addition to Chuquiña and La Joya by significantly improving the links among the communities and to the national highway system and the city of Oruro. Instead of travelling along poorly maintained roads and crossing the river by boat, community members could now travel quickly and comfortably along well-maintained highways, completing the journey in much less time than before. The project also helped facilitate the migration of families living in these communities to the city of Oruro. With the new highway and the bridge it is now possible to live in Oruro and work at the mining operation. In addition, the project facilitated the integration of the rural population into the city of Oruro.

Departmental income

Gold production in Bolivia was subject to minimal royalties on the order of 1 percent and 1.5 percent of the gross sales value. This was because most of the country's gold came from alluvial river deposits north of La Paz, produced by mining cooperatives and individual gold panners. Gold nuggets were easily smuggled out of the country, which invariably happened when the government raised gold royalties beyond minimum levels. Thus, during its first few years, Inti Raymi's oxide operation benefited from this exceptionally favourable tax treatment.

Once the oxide operation became well-known and was treating several thousand tonnes a day, the government decided to differentiate the gold produced in Kori Kollo from alluvial gold and subjected the former to royalties of 3 percent. Estimates realized by the National Mining Secretary show that for the period 1993-1996, during which gold prices fluctuated between US \$350 and US \$400 per troy ounce, Inti Raymi paid mining royalties equivalent to between 9 and 12 percent of profits. During this same period, taxes on profits in Chile fluctuated between 15 and 35 percent, in Argentina and Venezuela reached 30 percent, Peru 38 percent and Mexico between 35 and 40 percent.

In 1997, the government reformed the mining tax regime and established a single system that combined mining royalties with income tax. Since then, Inti Raymi's gold production has been subject to the Impuesto sobre las Utilidades de las Empresas (IUE, Corporate Income Tax) and royalties between 4 percent and 7 percent of the gold value according to international market prices. Under the new regime, the IUE is applicable as a fiscal credit upon paying mining royalties. All royalties paid are destined to the department in which an operation is located — in Inti Raymi's case, the department of Oruro.

As shown in Table 8, Inti Raymi contributed 14 percent and 10 percent of the total departmental income during the years 1997 and 1998, respectively. These figures reveal the absence of other large mining operations in the department of Oruro and the country in general, a phenomenon that has existed since the 1980s. This is even clearer when we consider Inti Raymi's contribution to the department's total royalty-related income. Between 1993 (when the sulfide operation commenced) and 1998, Inti Raymi was responsible for between 74 percent and 99 percent of Oruro's income from mining royalties. Thus, the Inti Raymi deposit is the principal natural resource currently exploited in the department of Oruro. Without the Inti Raymi operation, the department would be virtually without income from natural resources.

Table 8. Inti Raymi: Mining royalties and departmental income (thousands of US \$).

Income and royalties	1990	1993	1997	1998
Oruro's budget			33 094	41 776
Royalties paid to Oruro	1 679	2 443	6 284	5 358
Royalties paid by Inti Raymi	964	2415	4 643	4 179
Inti Raymi's contribution to the department			14.0%	10.0%
Inti Raymi's contribution to royalties	57.4%	98.8%	73.9%	78.0%

Source: Vice Ministry of Mines and Metallurgy, Sector Policy Analysis Unit; Inti Raymi.

In terms of the department's budget appropriations, there is no correlation between the source of income and how it is spent. Instead, income is expended according to political considerations and usually goes to areas with greater influence within the department, such as the city of Oruro. As a result, it is possible that the mining royalties could, for example, be spent on agricultural development projects, on projects in the city of Oruro, or the community of Chuquiña. During the interviews with regional government officials, we did not detect that the actions of Inti Raymi or its foundation had had the effect of displacing public investment in the area. On the contrary, it is more probable that public investment in the region increased due to the Inti Raymi Foundation's active role as a mobilizer of public resources.

Human development and social capital

Personnel at the mine

Although subject to debate, perhaps the greatest impact on human development in the area resulted from employment of a significant number of Chuquiña and La Joya residents at the mine. The company's work conditions favoured the social and economic development of workers' families by offering higher incomes as well as access to quality health and education services.

For Chuquiña and La Joya residents, employment at the mining operation brought a 400 percent increase in income levels. Residents went from being agricultural producers and poorly paid workers or functionaries in the city Oruro to stable and well-paid jobs comparable to middle-class levels in the city. Moreover, since their frugal habits enabled them to save approximately 40 percent of their income, and because the company did not tolerate alcoholism, workers spent their income acquiring land, real estate, and small businesses such as stores. Thus workers and their families went from being socially and ethnically marginalized to being upwardly mobile residents in Oruro.

In terms of health care, the change was also positive and significant. In many cases, families had neither individual or family health coverage, and employment at the mining company entailed full coverage of medical insurance. In terms of education, the mine brought favourable conditions both for workers and their children. As mentioned earlier, workers were exposed to an educative process framed around developing and applying the skills required by a company such as Inti Raymi. It is not difficult to imagine that these workers and technicians are well paid both within and outside the mining industry. For example, the workers, technicians and employees interviewed during our fieldwork did not express concern for their future after the mine closes. They assume they will be able to find work at other mining companies or in other industries if need be, thanks to their professional training and specialization in such jobs as a mechanic or electrician.

In addition, migration to Oruro increased the educational opportunities available to Inti Raymi workers' children, both in terms of formal education and the advantages offered by the environment of an urban society. The children of these new members of the middle class were able to advance beyond a primary school education, which is the level attained by 59 percent of the department. (National Institute of Statistics, National Housing and Population Census 1992; Muller and Associates 1997).

Human development in communities adjacent to the operation

The presence of the company and the Inti Raymi Foundation in these communities enabled the development of alternative economic activities and the improvement in health and education services.

The company and the foundation constructed primary and secondary schools capable of housing 1 000 students in the communities of Chuquiña and La Joya.³¹ The schools are similar in quality to the average private school in the city of Oruro, and include mechanics and welding workshops, computer laboratories, library, and sports facilities. In addition, the company provided children from La Joya and Nueva Chuquiña with breakfast, uniforms, and school supplies.

In addition, the Inti Raymi Foundation supported the construction of an educational infrastructure through the formulation of pre-feasibility and feasibility projects presented to the Social Investment Fund. The result has been an improvement in learning conditions and compliance with the population's demand for quality educational infrastructure. In addition, Caritas and the Anti-Hunger Foundation, with participation from parents, have been providing school breakfasts in order to combat the low nutritional levels that negatively effect learning. Likewise, the foundation has provided teaching material each year. Schools have received book donations that complement other learning materials and help improve learning conditions. Finally, the foundation granted bonuses to local teachers who agreed not to interrupt their teaching responsibilities. However, such improvements have not improved dropout rates caused by migration.

Simultaneous to building the new community of Chuquiña, Inti Raymi constructed a hospital similar to a top-level private medical center in the city of La Paz. According to the hospital's director, "there is no health center of this kind in the city of Oruro." Among other services, the hospital offers medical and dental attention, childbirth facilities, an isolation ward, and a laboratory for the detection of tuberculosis. The hospital attends to 24 area communities with a total of approximately 5 200 inhabitants.

The foundation has established a health care system composed of a reference center (the Health Center of Villa Chuquiña); monthly visits to the communities by an itinerant doctor-and-nurse team; health promoters³² in each city; and transportation service to the city of Oruro for those requiring specialized medical attention. This system has allowed important gains, as shown in Table 9.

The principal efforts of the Inti Raymi Foundation at the rural level were focused on improving the region's agricultural productivity in order to boost incomes and living standards for the region's inhabitants. To that effect, the foundation conceived and developed the Livestock Promotion Center (CEPROGAN), which provides technical assistance and

³¹ These works had 90 percent co-financing from FIS.

³² Community members trained as health workers promoted health-care programs offered at the local health center. They also assist in childbirth and first aid.

training to agricultural and livestock producers within the foundation's scope of action in the areas of livestock production, soils, grazing lands, and forestry. Although this program has benefited local campesinos, it has not managed to raise income levels sufficiently to avoid the systematic abandonment of the region.

Table 9. Adjacent communities: Comparative health indicators.

	1995		1996		1997		1998	
	No.	%	No.	%	No.	%	No.	%
New consultations per 100 residents	2 998	55.1	3 179	58.4	3 831	70.4	4 446	96.2
Dental consultations per 100 residents	265	9.7	541	19.9	615	22.6	723	65.7
Malnutrition (moderate and severe) under 2 years of age	44	14.5	22	7.2	22	7.2	32	29.4
Malnutrition (moderate and severe) under 5 years of age	69	9.3	41	5.6	40	5.4	32	29.4
Prevalence of malnutrition under 5 years of age	349	47.3	232	31.4	289	39.2	174	55.9
Attention to pregnancy before the 5th month	—	24.9	-	21.8	-	35.2	-	27.7
Coverage of home childbirths by medical personnel	34	26.2	29	22.3	34	26.2	1	4.8
Childbirth coverage	58	33.3	61	35.1	64	36.8	27	57.4
Tetanus vaccinations	345	33.9	399	39.2	224	22.0	61	21.0

Source: SNIS 1995 to 1997, 1998 Villa Chuquiña Health Center.

Formation of social capital

The Inti Raymi Foundation's policy is to seek community participation so that its projects reflect local priorities and get community members to participate in the solution of their problems. The Local Development Fund (FONDEL) illustrates such efforts and their results.

FONDEL is an investment fund created by the Inti Raymi Foundation and Inter-American Foundation (IAF) with initial capital of US \$300 000, to which each institution contributed 50 percent. FONDEL was created to counteract widespread poverty in the area by solving some basic problems, such as the lack of negotiating and management capacity on the part of local communities. These problems are relatively simple for most organizations in the modern world, but have long been unsurpassable for communities within the foundation's area of influence.

The strategy adopted by FONDEL was that each participant — FONDEL, the beneficiary community, and the state — has clearly defined roles and responsibilities with which they must comply. FONDEL establishes the procedures, fixes relations among diverse actors, and co-finances projects. The community identifies, develops and executes the projects, in addition to providing local materials and labour. Other private organizations and the state provide co-financing and technical assistance.

FONDEL works according to projects. Each must comply with the following stages: identification of the project; formulation of the project profile; successful search for financing; project execution; supervision of the project execution; and project maintenance for the benefit of current and future generations. In each of these stages, the communities are trained by the foundation.

FONDEL's initial results are encouraging, including the construction of productive and basic hygiene infrastructure and the strengthening of communities' management capacity. It is important to note that initial FONDEL contributions were multiplied by 2.85. In addition, communities have been the principal contributors to FONDEL projects, providing 37 percent of total resources.

Human development in the city of Oruro

Although subject to debate, the foundation's principal contribution to human development in the city of Oruro (which as we have seen is a center of attraction for human resources) has been the establishment of the Multi-Service Educational and Intercultural Center (CEMEI). The foundation became involved in education because it is an issue common to all foundation projects; one which represents its central thrust of development. The city of Oruro suffered poor-quality public education services, characterized by lack of infrastructure and equipment such as libraries, furniture, and teaching materials, as well as low professional levels among teachers.

In the area north of Oruro, the foundation initiated an innovative project inspired by the Jesuit-sponsored Multiservice Educational Center (CEMSE) in La Paz. The foundation's project, known by its initials CEME³³, provides teaching materials to the city's public schools and implements innovative teaching methodologies at a well-equipped center periodically attended by all students from area schools. CEMEI encourages free expression and creativity, and provides access to technology, new teaching methods and resources that complement the educational process.

According to parents and teachers, the center's support is very important because it provides children with a space offering novel elements—workshops, a gymnasium, sports field, video library, and computer lab — that keeps them off the street. Students receive support to enjoy those school activities that teachers cannot always provide given the lack of equipment in their schools. CEMEI figures confirm these goals. Between 1996 and 1998, coverage increased from 12 000 to 16 000 participants, reaching the limit of 1 000 participants per day, above which the quality of attention and services would suffer. CEMEI's attends to approximately 30 percent of Oruro's students.

Impacts, best practices and sustainability

Using the Bolivian experience, this study has evaluated the positive and negative impacts that the opening of an industrial mining operation can have on the its socioeconomic area of influence. In this section we discuss the study's implications for public policy and business strategies, with the goal of contributing to a maximization of benefits and minimization of identified costs.

³³ CEMEI was constructed by the Inti Raymi Foundation with co-financing from FIS. In addition, FIS gave support to cover the 25% of the administrative costs for 18 months.

One of the study's most important results has been to show that a mining operation's costs and benefits (and their intensity or magnitude) depend on the characteristics of the socioeconomic and cultural context into which the operation inserts itself. As a result, in a socioeconomic context, the potential costs and benefits identified, as well as the best practices recommended, are applicable in Inti Raymi and Puquio Norte's areas of influence. The fundamental characteristics of these areas are: origin linked to native cultures (the predominance of western culture notwithstanding); rural communities connected by good highways to urban centers or important cities; marked migration of local populations; and an agrarian-based economy which possesses an important and growing flow of commercial goods.

Potential benefits

Employment and income

Employment is one of the most efficient mechanisms for distributing benefits among rural communities. Employment permits the productive use of the labour force with high levels of productivity and, as a result, income. In addition, the growing importance of information and advanced technology used in the mining industry provides local workers with opportunities for training and skills acquisition, as well as work discipline. For example, the Inti Raymi sulfide operation provided local workers with education and training to which they would never have had access, otherwise. Finally, high and stable income levels provide workers and their families the means to acquire assets as well as access to new opportunities. This is essential if rural peasant families are to escape the social and economic marginalization to which they are commonly subjected.

In addition to these multiple benefits, other forms of compensatory (or surplus) employment also usually arise, as in the case of Inti Raymi. In such a situation, that policy should be considered part of an efficient benefit-distribution policy rather than a strictly personnel policy.

This study has shown that while employment at the mine has significant impacts on rural communities, affecting a significant portion of the EAP, the multiplier effect of mine salaries primarily occurs at the urban level, especially in cities where the provision of goods and services and a considerable population is concentrated. In the case of Inti Raymi, for example, the multiplier effect in rural communities was practically zero, while in the city of Oruro, each dollar paid by the company became approximately 2.8 dollars in income, benefiting approximately one-fourth of the families residing there.

Infrastructure, mining income and public investment

Since mining operations are located in rural areas with infrastructure deficiencies, the construction of these facilities is another important mechanism for promoting regional development in a mining project's area of social influence. Puquio Norte, for example, required the construction of a 220-kilometer pipeline, which provided an opportunity for the Rural Electrification Cooperative to assume the additional cost of widening the pipeline in order to electrify not only the town of San Ramón but also all of Chiquitanía Norte.

The maximization of benefits derived from the infrastructure works depends on the level of state involvement in their construction and financing. Infrastructure works are commonly public goods that can produce high social benefits that do not correspond to the private sector. For this reason, works initiated exclusively by private sector entities, such as a mining company, do not maximize the collective well being. For example, if the gas pipeline to Puquio Norte had been extended to Trinidad in the department of Beni, the benefits for the eastern region of the country would have been considerably greater. A work of such

magnitude, however, would not only have required widening the pipeline but also nearly doubling its length. Investment in infrastructure works represents an additional cost that can make a mining project less feasible and thus endanger all the other positive effects for the region's development. This situation can be minimized if the state assumes partial or total financing.

In current circumstances in Bolivia, portions of mining royalties or taxes are seldom invested in rural areas contiguous to the mining operation. We suggest incorporating infrastructure works with clear local benefits within the department's budget in relation to royalties or taxes paid.

Local development promotion

Increasingly, mining companies are taking part in the local development process by establishing foundations. Inti Raymi is a pioneering company in this respect. In general, this study found that the Inti Raymi Foundation had positive effects. The most effective programs were those oriented to basic infrastructure development, the provision of basic health and education services, and the formation of social capital. In other words, the most effective programs were those oriented to the provision of goods and public services. Projects geared toward productive ends, which are part of private investment, have had positive impacts but their efficiency and sustainability is debatable.

The study also showed that, notwithstanding the creation of the Inti Raymi Foundation, the company continued to directly address community needs within its area of social influence. Over the long term, this dualistic approach to company-community relations hurt the company's image. A best practice for a socially responsible strategy would be to avoid dualistic actions in the social context. It is evident that entities specializing in social work, such as a foundation, provide the greatest benefits.

Magnitude and sustainability of benefits

This study has shown that population flows will determine the magnitude and sustainability of the benefits from a mining project to its area of social influence. Benefits are diluted or even disappear when they are focused on an area with high emigration levels. In contrast, benefits are heightened in an area receiving migration flows. Thus, mine-sponsored productive diversification will be more effective and sustainable in a migrant-receiving area, where the multiplier effect of mining-related income is most evident. As such, a diagnosis of general population flows within the area of social influence is important when designing a company's social programs. This analysis should be conducted during the project's environmental and social baseline studies.

Potential costs

Natural resource competition

Mining companies often compete with local communities for natural resources, particularly land and water. For example, Inti Raymi had to compete with its neighbors for natural resources, land, and minerals. One practice that allowed the company to avoid or overcome conflicts with the local community has been compensation, in the form of assets similar to those displaced or, when that was impossible, compensation by an asset whose market value exceeded the value of the displaced asset.

Nevertheless, problems have arisen due to the fact that Inti Raymi established a mechanism for individual negotiation with each one of the community members that sold land. Due to differences in prices among land of similar quality, a few community members have

complained to the company, arguing for higher compensation and, in some cases, have initiated legal action. While it would be naïve to deny the existence of opportunistic attitudes aimed at obtaining advantages from the company, it is also evident that the company's approach to negotiation generated mistrust within the community. As a result, land negotiations should be collective or the conditions offered by the company be made public. Transparency is essential to building the trust necessary for conflict-free, company-community relations which can so easily compensate for additional costs.

Environment

This study has shown that in countries like Bolivia, the environmental management of an industrial mining project has two intimately related facets: The technical facet linked to environmental standards and practices applied, and the public facet related to the company's and the industry's image within society. As a result, it is not enough to comply with strict environmental standards or practices; it is also necessary to respond to the public's perception of mining. Both facets merit careful attention from the outset, which will give results in form of community relations based on mutual trust.

In addition to impeccable technical standards, sound environmental management means creating trust and credibility among local communities. We suggest the adoption of ongoing information and consultation policies with local communities, particularly those that feel exposed to risks from mining activities, and certification of a company's environmental programs by a credible third party that inspires confidence in the local communities.

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CHAPTER 3.

Chile: Size Does Matter

Julio Castillo, José Miguel Sánchez, Verónica Kunze, and Rodrigo Araya³⁴

Introduction

The main objective of this study is to analyze the relationship between large-scale mining projects and affected local communities in Chile. There are three fundamental dimensions that we will consider: the economy, the environment, and social development.

Our analysis is based on detailed case studies of three mining projects. While the cases selected do not pretend to offer a statistical representation, they present a range of characteristics (in size, geographic location, type of operation, and methods of relating to local communities) that allow us to draw conclusions and lessons applicable to other mining projects. The usefulness of the case studies is not limited to the knowledge of concrete experiences between large mining projects and the community, nonetheless they permit us to propose some "best practices" for future mining projects. These best practices derive from observed "actions" in the cases or "omissions" detected over the course of the study.

The three mining projects analyzed are La Escondida (Region II), La Candelaria (Region III) and Fachinal (Region XI). The first two projects are located in areas with long mining traditions, while the third is where mining has never had much economic importance. In terms of size, Escondida is a mega-project, according to international standards, while Candelaria is a medium-sized operation. Fachinal is a much smaller operation, but one that can nevertheless be considered large-scale mining and which has a significant impact on the area where it is located.

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This study presents the conceptual framework, followed by an exploration of three case studies. We then present a series of conclusions and propose a series of best practices to follow.

Conceptual framework

The objective of this section is to present the conceptual framework and the variables analyzed in the three cases. These variables are grouped together in the areas of the economy; the environment; as well as social and human development capital, and community-company relationships. We use each variable group to analyze the relationships between mining mega-projects and local communities. In addition, we present the methodology used to collect, organize, and interpret information for each case study.

Methodological model

The methodological model used to analyze the dimensions and variables is common to the three case studies. It distinguishes between the corporate context that gives rise to the projects (the internal realm of the companies themselves) and the greater community (the external realm). This schema is presented in Graph 1, which is used to systematize mining companies' "best practices" with regards to both the internal and external realms.

We gathered primary information through qualitative techniques and used secondary information taken from studies conducted by public entities, universities, business organizations, and the mining companies themselves. The qualitative primary information was obtained through in-depth interviews with key informants, such as managers from the three companies, regional mining, labour, and health authorities, Regional Environmental Commission officials, union leaders, NGO and regional association representatives, in addition to university professors and researchers specializing in mining.³⁵

We will focus on the companies' policies and their impacts on the community. Nevertheless, the information generated by various company officials is contrasted with the visions of other relevant actors from the external realm mentioned earlier.

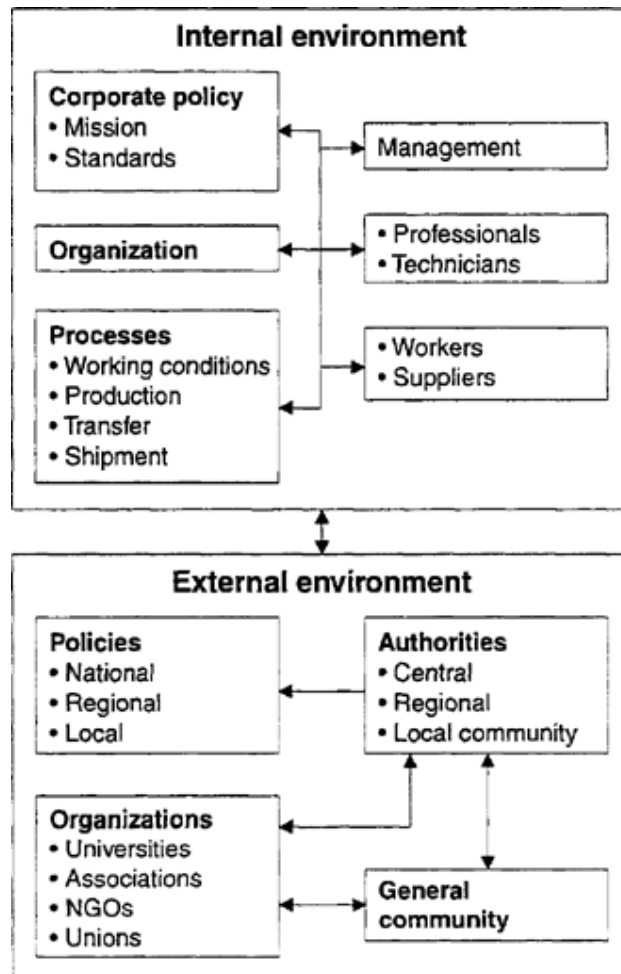
Internal context

The companies' internal realm is composed of a series of institutional relations that comprise a corporate model. It determines the way in which the company defines its corporate policy, organization, and the processes between the different actors within the company.

The first component of a company's internal realm is its corporate policy, which is a mental model shared by company representatives and understood as a series of corporate decisions that characterize the institution's culture. This model defines the corporate guidelines for "how things are done." Two important elements of a corporate policy are the mission statement and standards that the company establishes or assumes.

³⁵ The methodology of the In-depth Interview (II) supposes a situation of direct conversation on specific themes proposed in a broad manner by the interviewer. The interviewee is asked for his/her perspectives that emerge during the interview. The interviewer turns over the direction of the conversation to the interviewee, although the interviewer controls the conversation by way of content guidelines. This method enables the argument sequences and emotional positions that structure the conversations to be studied. In particular, the way in which distinct collectives participate in the conversations are studied, with a view to analyzing their experience and social practice. Interviews lasted approximately 20 to 40 minutes.

Figure 1. Internal and external environment of the firm.



The mission statement outlines the company's corporate model and defines its reason for being. It provides the guidelines that are translated into policies and strategies with regards to the company's internal and external realms.

Safety standards help define the quality of the workplace by establishing the correct operating procedures for activities within the company. These standards can be based on international norms, such as ISO 9000 and 14000, which companies can assume in order to create safe working conditions.

A company's "organization" refers to the definition of functions and the rights and obligations associated with each function. Organization allows companies to establish each person's responsibilities in order to avoid overlap or omissions in certain areas. For example, it is important that the company define which organizational division is in charge of information generation and distribution, both internal and external.

A company's "processes" refer to conditions under which work is carried out, production takes place, materials are moved and shipped, etc. The company defines guidelines for how both direct employees and subcontractors should perform these processes. In some cases, companies put more emphasis on guidelines for direct employees, while subcontractors and suppliers (in the areas of exploration or food service) are not subject to the company's internal guidelines. This can generate inconveniences, especially in terms of community relations.

Thus, it is important that everyone associated with the company be held to and understand its guidelines.

External realm

The external realm in which a company operates is often heterogeneous in terms of its organizational characteristics, complexity and level of participation. In such cases, companies must adapt to the structured discourses expressed in national, regional and local policies, but should also incorporate the opinions and impressions held by other, less organized members of the community. Likewise, in terms of organization, companies relate with highly organized social actors such as national, regional, and local political authorities, universities, business associations, workers associations, NGOs, producer confederations, and social organizations — as well as with the community in general.

Given the complexity of the external realm, companies should design strategies for optimal relations with each of the distinct social actors. An important element is the information policy toward the community, which determines the level of consultation with and participation of each community actor with respect to the mining project. Another important element is the distribution of benefits within the community, which range from taxes and royalties to sporadic petitions from less organized groups. It is necessary to distinguish between short- and long-term actions that a company can undertake regarding community benefits.

Issues such as training, education, health, local development, and environmental impacts are important in the external realm. Companies should define their role in each of these areas, as well as their corresponding rights and obligations. They should define their level of involvement in each of the aforementioned themes, which can range from a commitment to comply with the applicable laws to full participation in local or regional bodies. The type of commitment made has strong implications for the definition of short- and long-term policies.

Variables analyzed

In this section, we present the variables analyzed in each case study, which are classified as economic variables; environmental variables; social and human capital variables; and variables in community-company relations.

Economic variables

Economic variables quantify the economic impact of the mining project in terms of its contribution to the economic development of the host region, as well as the direct economic benefits that can accrue to the country, such as foreign exchange earnings, employment, investment, trade balance, and technological support.

Environmental variables

The environmental policies of the companies in our three case studies allow us to identify the practices they develop as part of the relations they establish with the surrounding area.

The safety and quality standards variable refers to the designs, controls, evaluations and actions that companies establish in order to mitigate the impacts of productive processes such as mineral extraction and processing. For our objectives, it is important to define these standards and identify the potential best practices that the companies employ in this area.

Social and human capital

Socio-cultural dimension of the project

The socio-cultural dimension of a mining project refers to the impact the project has on variables such as health, education and training, work shifts, community relations, communication strategy, and citizen participation.

The socio-cultural impact of a mining mega-project on the community has been one of the most relevant issues for environmental authorities, community organizations, and the mining industry. From the exploration stage to the mine's closure and abandonment, there are diverse points of contact and potential conflict between communities and mining interests with regards to social, socioeconomic, and environmental issues.

In northern Chile, mining is without a doubt the most important economic activity. The history of mining goes back to the first settlements recorded in the area. This tradition has been a central component of regional identity. The presence of international companies in the first decades of the century had a considerable impact on the region's history. Workers' movements and political parties appeared as early strategies of establishing community counterweights to the presence of mining mega-projects. Thus, there are historical references to the relations between mega-projects and local communities that are present in the collective memory. This long history has produced resistance to the presence of foreign mining companies.³⁶

Health

There are various dimensions to relation between health and mining, which are important to distinguish.

An analysis of the issue of health within a mining company requires the identification of company strategies for addressing problems related to worker health, stress management, obesity, alcohol and drug use, sexually transmitted diseases, and accidents. The common denominator among these strategies is that the company has control over detecting and neutralizing the effects of mining work on the health of its workers via the design of preventative plans and programs.

The health and community theme refers to the impact that large mining projects can have on the health of the general population of a specific community. At this level, issues such as prostitution, sexually transmitted diseases, alcoholism and drug use are significant. Another important aspect of the relationships between large mining projects and health is the benefits that mining companies can provide to local communities.

Education and training

Education and training have become recurring themes within discussions of the modern mining industry. The industry's general shift to clean production technology has produced a strong demand for a skilled, multifunctional work force for its diverse operations. The country's educational centers have not necessarily produced workers who can meet this demand. Faced with this reality, the companies in this study have developed diverse strategies for the formation of the work force their operations require.

³⁶ There are several phases to the presence of foreign companies: first the Spanish, then the British (both for nitrates), later the North Americans (copper mining) and currently multinational companies (mostly copper).

Companies can organize work shifts in different ways, from a normal work shift in which the worker returns home each day (in cases where the mine is located close to town) to 20 or 10-day stints that oblige the worker to remain in camps adjacent to the mine. There are pros and cons to each of these schemes for the company, workers and their families. In many cases, the mine's remote geographic location requires prolonged stays at the project site in order to maintain continuous exploitation. However, long stays at camp generate a series of problems for workers and their families that are difficult to evaluate.

Community-company relations

The community's perception

Traditionally, good relations with the local community have not been an important part of the mining culture. For its part, the local community tends to view mining activities as isolated and oriented toward a purely economic end. The community is apprehensive about being excluded from the benefits produced by the mining project and requires information about the status of the project.

In turn, the mining industry is conscious that its activities are costly, risky and require huge investments in exploration in order to determine if a deposit is worth exploiting. Given the uncertainty of success, the mining company has little interest in establishing relations with the community until the project is well underway. In this scenario, community relations have traditionally not been a company's first priority.

Thus, a situation of fear and mistrust arises from the lack of communication and comprehension between the mining industry and the community.

A community's response to mining company interests is shaped by mining's historic legacy. Thus, in areas with a long mining tradition, such as northern Chile, communities' expectations are different from those in areas where this tradition does not exist, such as the extreme southern region of the country.

Strategic communication with the community

A company's communication strategy is key to understanding certain aspects of its relations with the community. In this study, we examine the ways the three mining companies approached such communications from the beginning of operations.

Citizen participation

Citizen participation refers to the degree of involvement by the general public or community organizations in the mining project's development. Participation can vary depending on the different stages of the mining operation. It is important to understand each company's strategies with respect to citizen participation in order to determine whether it really exists.

Integration of company employees in the community

Another important variable in community-company relations is the integration of employees and workers in the cities and towns near the mine. The way the company approaches this integration can be a determining factor in how the community perceives the project.

Community benefits

The variable of community benefits refers to the positive impacts from the mining companies or alliances established with other firms that directly benefit the community.

The Case of La Escondida Mining Company

Description of the project

On March 15, 1989, construction began on the La Escondida mining project. The first shipments of copper concentrate began on December 3, 1990. Exploration activities began in 1978 and lasted four years, after which ensued a period of technical studies and the search for financing.

La Escondida is located in the Atacama desert 3 000 meters above sea level, to the southeast of Antofagasta and 240 kilometers south of Chuquicamata. It is the third-largest copper deposit in the world after Chuquicamata (Chile) and Bingham Canyon (USA). The mine is owned by BHP-UTAH (57.5 percent), Río Tinto of London (30 percent), Jeco of Japan lead by Mitsubishi (10 percent) and the International Finance Corporation (2.5 percent).

The mineral deposit has reserves of 1.8 billion tonnes with an average grade of 1.59 percent copper. Planning for the mine considered the utilization of 662 million tonnes with an average copper grade of 2.12 percent. Initially, the mine's lifespan was estimated at 52 years from the start of production. Nevertheless, new investments have increased production capacity significantly and the lifespan is now estimated at 34 years.

Project infrastructure includes a well field 25 kilometers east of Escondida in the Punta Negra salt flats, with a water supply system capable of providing 65 000 GPM at an average of 12 000 GPM at maximum capacity. This salt water is treated by reverse osmosis for consumption. Additional infrastructure includes a high-voltage energy line connected to SING, a 165-kilometer mineral pipeline for transporting concentrate from the plant to the port of Coloso and a filtration plant to eliminate water from the concentrate. The port facility at Coloso, located 15 kilometers south of Antofagasta, can house ships of up to 45 000 DWT.

Economic variables

In recent years Region II has experienced a series of social and economic changes, to which La Escondida mine has contributed significantly. Nevertheless, it is difficult to isolate those impacts directly attributable to the mine. This is because various mining companies have been operating in the region simultaneously with La Escondida.

In 1999, Region II had an estimated population of 461 300 inhabitants and a population density of 3.7 inhabitants per square kilometer. The region's economy is based on mining, which generates close to 59 percent of the gross regional product. Copper is the region's principal product, representing between 52 percent and 55 percent of national copper production.

Production

Within the region, GDP per capita rose from US \$2 923 in 1985 to US \$11 420 in 1996, a 290 percent increase. Meanwhile, GDP per capita for the entire country rose from US \$1 360 to US \$4 994 in the same period, an increase of approximately 260 percent.

Region II has been one of the country's fastest growing regions during the last decade. Between 1988 and 1997, while the country grew at an average rate of 8 percent per year, Region II grew at a rate of 9.6 percent. The mining sector grew 71.6 percent in the region for the same period, while the national average for mining sector growth was 43.2 percent. While these figures are not solely attributable to Escondida, the company has had a significant influence.

The company's production levels, for both concentrate and cathodes, are represented in Table 1.

The production of copper concentrate (41.4 percent fine copper content) in 1997 was 2 098 256 tonnes. National copper production in 1998 was approximately 3.7 million metric tonnes. Escondida contributed 23 percent of national copper production for that year. Its average share from 1994 to 1998 was also 23 percent. Thus we can determine that Escondida's contribution to the national GDP was on average approximately 2 percent between 1991 and 1996 (Escondida Mining Company 1997a).

Table 1. Escondida Production: 1990–1998.

Year	Metric tonnes		
	Concentrate	Cathodes	Total
1990	8 900	0	8 900
1991	298 386	0	298 386
1992	336 632	0	336 632
1993	388 756	0	388 756
1994	481 249	2 382	483 631
1995	438 831	28 083	466 914
1996	792 272	49 089	841 361
1997	868 678	64 021	932 699
1998	829 495	47 418	876 913

Source: Escondida Mining Company.

In 1997 copper production in Region II was approximately 2 million metric tonnes and Escondida's contribution to regional copper production was 55 percent for this year. This means that Escondida contributed to 34 percent of the regional GDP between 1991 and 1996 (Escondida Mining Company 1997a). Meanwhile, 54 percent of Region II's GDP came from the mining sector in general (Aroca 1999).

Investment

Foreign investment in the region during the period 1990-1998 was US \$5.33 billion, or approximately 20 percent of the national total, almost US \$27 billion. Approximately US\$11 billion correspond specifically to mining investments during this period, in which Escondida invested nearly US \$2.3 billion. Thus Escondida's impact on foreign investment was 8.9 percent at the national level, 21 percent at the regional level and 44.4 percent within the mining sector.

Exports

Escondida's exports quadrupled between 1991 and 1998, from US \$466 million to US \$1.96 billion. In 1997, exports from Region II represented 30.2 percent of the total national exports. For that same year, Escondida represented 30.3 percent of exports from Region II, 18.3 percent of national mineral exports and 9.1 percent of the country's total exports.

Taxes paid

It is possible to determine Escondida's direct contribution to the Chilean government by looking at the destinations of national and regional budget allocations. Contributions to the national budget are related to income tax payments. Tax contributions to the region are related to payments for land rights and permits related to the Escondida operation.

Between 1990 and 1998, the company paid US \$1.19 billion in income taxes, of which US\$253 million were paid in 1996, US\$331 million in 1997, and US\$111 million in 1998. The decrease in taxes paid for 1998 reflects lower incomes due to the drop in world copper prices. The 1996 value represents 25.6 percent of total income taxes paid by the mining sector³⁷ and 10.5 percent of total income taxes collected by the state.

Table 2. Destination of Escondida's regional payments (US \$).

Payment destination	National	Regional	Total	%
National budget	331 000		331 000	12.9%
FNDR		1 260 000	1 260 000	49.2%
Municipal		970 000	970 000	37.9%
Total	331 000	2 230 000	2 561 000	100.0%
Percent	12.9%	87.1%	100.0%	

Source: Escondida Mining Company.

In addition, Escondida made periodic payments of surface fees and permits, which are necessary for the normal functioning of operations. These include mining patents, real estate contributions, purchases, obligations, leases, patents, rights, and municipal circulation permits.

These payments go to the state budget according to the distribution represented in Table 2, which shows Escondida's contribution to the estimated budget for the year 1997. According to the table, 87 percent of payments for land rights and permits go the regional budget, whether through the National Fund for Regional Development (FNDR) or the municipalities.³⁸

Escondida's contribution to the regional budget is significant, considering that for 1997, Escondida made payments of US \$1.26 million that went to the FNDR for Region II, which represented 20 percent of the total contribution of mining patent payments and more than 6 percent of the fund's total.

Employment

Escondida directly employs approximately 2 000 permanent workers, of whom 80 percent are from Region II, 11 percent from Regions I and III, with only 9 percent being from Santiago and other regions in Chile.

³⁷ Estimate by Gémines Consulting using a representative sample of mining sector companies.

³⁸ In this case, corresponding are payments made to the Illustrious Municipality of Antofagasta.

Using an input-product matrix for Region II, Aroca (1999) estimated the employment multiplier for Escondida. Considering subcontractors as service providers and not as direct Escondida workers, and without considering the effect of salaries and wages paid to workers in the region, this author arrives at a multiplier of 3.1. In other words, for each worker hired by Escondida in the region, 3.1 additional workers are hired. The employment multiplier for the rest of the regional mining sector is only 1.04.

By assuming that all wages and salaries are spent in the region and adding a line for these remunerations and a column for regional consumption to the input-product matrix, the author obtains a multiplier of 5.7. In other words, for every worker hired by Escondida, 5.7 additional workers are hired in the region once it is taken into account that the workers — whether working in the mine itself, subcontracted firms, or suppliers to the mine — will spend some of the money they earn and generate more jobs. This tends to overestimate the effects on employment, since not all salaries and wages are spent in the region.

This same calculation for the rest of the regional mining sector produces a multiplier of 1.76 workers for every worker hired in the sector. The difference between figures obtained for Escondida is due to the different management systems used by various companies in the sector. While Escondida subcontracts many activities associated with the project operations, other companies in the region subcontract few activities. As a result, they have more personnel directly working at the operation. In sum, total employment (direct and indirect) in the mining sector represents around 9 percent of the region's total employment, without considering those jobs at projects related to investment and construction.

By using the multiplier of 5.7 indirect jobs for each job in the mine, it is possible to estimate the indirect effect that the salaries received by the workers and management in the mine. In Table 3, the direct, indirect, and total expenditure in the region resulting from the mine is calculated. As noted earlier, it is assumed that all expenditures are made in the region, so these estimates can be considered upper-bound impacts.

In Table 3, the direct impact is the expenditure of the mine workers, while the indirect impact is the expenditure of those receiving employment indirectly due to the mine. The income multiplier is total income generated in the region divided by the income earned by the mine workers and management. Note that it is different from the employment multiplier as: it is lower because some money is saved and, hence, not recycled; it is higher as it includes the first round of expenditures (by the mine workers), while the employment multiplier is only the additional jobs and thus does not include the mine workers jobs; and it can move in either direction if non-mine workers earn on average different salaries than mine workers. In this case, (the usual one), it is lower because mine workers earn more, (i.e., the same expenditure will create more jobs resulting in a relatively greater effect on the employment multiplier).

Table 3. Impacts generated by the incomes received by workers and management in Escondida (US \$; 1999).

	Workers	Management	Total
Income	148 059 780	110 543 939	258 603 719
Direct impact	120 520 661	87 440 256	207 960 917
Indirect impact	686 967 769	498 409 457	1 185 377 227
Direct plus indirect impact	807 488 431	585 849 713	1 393 338 143
Employment multiplier	5.7	5.7	5.7
Income multiplier	5.45	5.30	5.39

Environmental variables

Company policy

Environmental concerns are prominent in the company's mission statement, which also includes aspects of the internal realm, such as safety, the workplace environment, human relations needs and worker well-being. Attention to these areas is considered as a fundamental part of its mission and corporate principals.

In the external realm, the company's mission statement establishes the responsibility to constantly inform local authorities, especially with regard to the environment. From our conversations with company representatives, we could detect a corporate attitude recognizing the need to anticipate possible environmental events, which are approached through the environmental impact studies conducted at each phase or step the company takes.

Another principal that characterizes Escondida's mission with regard to the external realm is the rapid response to any occurrence that could affect the company. For example, it hired an expert in a marine species that was supposedly at risk from activities performed in the port of Coloso, who conducted a thorough investigative study. Something similar happened in the case of Andean flamingos, which are found in the Punta Negra salt flats, which are the object of constant study. An element of this best practice with the external realm is the policy of company relations with the university and academic worlds, which admit the company into a scientific society dedicated to investigation.

Since the start of operations, Escondida has complied with all health and safety regulations in the country and with the corporate policies of the companies operating the mine. Escondida conducted an environmental impact study before this was required or regulated under Chilean law, and has introduced clean technologies to its productive processes.

To comply with its environmental programs, the company has signed cooperation agreements with different national public agencies, including SAG (Agriculture and Livestock Service) and CONAF (National Forestry Corporation). In addition, Escondida is a member of the National Oceanographic Committee, the Chilean Society of Sea Sciences, and other organizations having to do with environmental protection (Escondida Mining Company 1998).

Nevertheless, the local population frequently expressed concerns about possible problems stemming from company activities. For example, coastal residents as well as professors at the University of Antofagasta mentioned in interviews that the company is causing pollution problems in Coloso Bay. When we asked the company's environmental manager about this concern, he said the company was informed about the matter and had conducted the relevant studies in order to control possible contamination problems in the bay. Study results did not find contamination problems.

Water use is another issue that sparks a certain level of controversy. Since the mine is located in a desert region, water must be obtained from groundwater tables below the salt flats by way of 120-foot wells, on average. Again, academics from the University of Antofagasta expressed concern during the course of our interviews about groundwater extraction. They worry that since water table recharge takes years, over the long term, water levels in the salt flats could drop drastically, adversely affecting the area's flora and fauna.

Nevertheless, the results of studies conducted by the company do not anticipate the existence of adverse effects on local flora and fauna. In addition, the company is very conscious of the region's water scarcity and has taken all the necessary measures to maximize water recycling, such as reusing tailings water in the process. The tailings pond has a system to reduce surface

area and therefore the loss of water through evaporation, which maximizes the amount of water recycled.³⁹ As part of its environmental program, Escondida controls groundwater levels to ensure there are no negative effects on the ecosystems surrounding the Punta Negra salt flats, where the company has its well field.

Given the project's long lifespan, closure studies have not yet been conducted, although in the future this will be an important issue in terms of restoring the environment to its normal conditions.

It is important to note that Escondida recently certified its Coloso port facilities under the ISO 14 000 system, which certifies the existence of an environmental management system.

Safety and quality standards

Escondida's environmental management system allows company personnel to conduct inspections and evaluations, as well as implement mitigation measures. The system provides for both internal and external audits. Some of the company's main environmental considerations include tailings management, dust control at the mine, hazardous waste management, and the continuous and permanent monitoring of the marine environment at the port facilities in Coloso.

Social and human capital

Health

Internal company health

Escondida has implemented an integral health plan, which includes a pre-employment exam and an annual preventative medical exam. The annual exams are voluntary and provide company employees with the means to discover potential pathologies. In addition, the company has a fully equipped first-aid center with qualified medical personnel to manage emergencies and health problems that can occur in camp. This allows for the timely diagnosis and effective treatment of common illnesses.

With regard to work-related stress, Escondida's work shifts are organized according to the "4×4 system," explained more fully later. The system avoids the adverse health effects of remaining at high altitude for prolonged periods of time.

Obesity problems stem from two main causes: the lack of healthy eating habits among rural workers or "old timers," and the over-consumption of products from the cafeteria, especially during the first days when new workers are getting used to their surroundings. Faced with this, the company has obesity prevention and control programs, which are complemented with sports and recreational facilities inside the camp comparable to the best and most complete in the region.

The company treats other, more sensitive health issues with special care. The introduction of drugs and alcohol to camp is controlled by an electronic detection system. If such substances are detected, the worker is punished and could be subject to dismissal. The existence of sexually transmitted diseases, including AIDS, is verified by annual preventative medical exams, although the company does not yet have any specific policy in place to address the issue.

³⁹ The company's water recuperation system has allowed for a reduction in the operation's water needs such that 75% of the water needed for the milling process is recycled.

Work shift

As we mentioned earlier, Escondida has a "4×4" work shift system. In other words, workers spend four days at the mine and four days at home. During the mine stay, workers have 12-hour shifts, from 8 a.m. to 8 p.m., or from 8 p.m. to 8 a.m. The company maintains that its analysis shows this system is better for workers in terms of personal health and family relations. In the event that problems arise from the work scheme, the company consults and converses directly with the affected worker. According to the Labour Secretariat for Region II, the 4×4 work scheme does not constitute a problem.

Community health benefits

One of the areas in which Escondida has been very deeply involved is precisely in the area of health benefits for the community. However, all the actions related to this area have not been done directly by the company but through the Escondida Foundation which is described below. In fact, community health programs form the largest share of its budget. Among the programs financed by the foundation are: implementation of an emergency primary health service, contest for research projects on cancer in Region II, development of a children's oncology unit at the regional hospital of Antofagasta, hospitality housing for oncology patients, and an early cancer detection program.

Education and training

Training

Due to the lack of training centers and qualified technicians in Region II, Escondida created a professional institute in Antofagasta to provide training and develop required skills. In January 1997, the company contracted the services of the British Columbia Institute of Technology (BCIT) to oversee technician training. The company built a 2 200 square meter facility to house the institute, which together with other necessary components required a total investment of US \$8 million.

Since training began in January 1997, 307 technicians have completed the first of four stages in the heavy machinery mechanic, plant mechanic, and electrician training programs. It is estimated that all 560 participants will complete their training and aptitude evaluations in order to reach the level of master of trades (*maestro de oficios*) at the end of 2002.

In addition, Escondida implemented an extensive career development program for company personnel in April 1998. The company hired specialized personnel to conduct trainings and develop a resources system to support the respective activities. Moreover, utilizing the SENCE (National Training and Employment Service) Antofagasta facilities, Escondida places first (SENCE 1996) in terms of courses offered, personnel trained and amount invested. In addition to the courses authorized by SENCE, this effort involves training programs specific to each employee. In total, Escondida invested US \$2.105 million in diverse training programs through 1998, the equivalent of approximately US \$1 000 per person.

Education

Escondida created the Escondida Educational Foundation, which runs a four-year apprenticeship program in which 70 percent of the skills are learned within the company, according to standards set by Canadian specialists. Currently, the company is creating an educational establishment in the area north of Antofagasta.

Through the Escondida Foundation, the company has addressed the issue of high-school graduates' technical skills and work attitudes. The foundation uses tests and rigorous work

orientation programs, which, in addition to providing training, strengthen personal attitudes regarding work. Certain basic values are addressed, such as punctuality, responsibility, and the ability to work as a team. The Escondida Foundation also seeks to address the gap between high-school level technical formation, which is characterized by a lack of direct experience in the company, few practical skills, and many lecture classes, and university or professional institute training, which bestows a professional title but also low skill levels in a given specialization.

The Escondida mine has also clearly contributed to an improvement in the capacities of local suppliers. These small-and medium-sized firms have benefited from training programs oriented at improving their service quality as suppliers to the mine.

With respect to the themes of education and its relation to the community, the opinions that we collected generally agree that there is a generalized demand for educational services starting from the arrival of the mining mega-projects such as Escondida. In particular, there is a demand for private schools (*colegios particulares pagados*), due to the arrival of workers from outside the region who look for quality services. There is also a demand for these schools on the part of local mine workers whose high salaries allow them to access these services. In addition, these workers value higher education, which they desire for their children in order to consolidate their social status.

The Antofagasta International School is an Escondida school that initially offered correspondence courses through the home countries of the mine owners. The school had 20 students from Escondida and 20 from Zaldívar. Like the mine, the school is run by subcontractors and is currently administrated by ISS, a US company. The school offers levels 1 through 8 with curriculum similar to that in the United States. Mid-level students still study by correspondence. Almost all of the professors are from the United States and Canada, while there are only two Chilean instructors. The school offers an international bachelor's degree. Though the Ministry of Education (MINEDUC) does not recognize it, the school is trying to obtain certification in order to incorporate Chilean students. One of the biggest problems faced by Chilean executives moving to Antofagasta is the lack of quality schools.

Community-company relations

Community perceptions

The community's perception is heavily influenced by Antofagasta's current economic situation. The city's economy has grown explosively in recent years, primarily due to large mining-related investments. The population views Escondida as the milestone that marked the beginning of the growth period. Economic growth is evident in the increasing number of companies offering subsidiary mining-related services, the arrival of national and international hotel chains, commercial store chains and travel agents with high national and international demand, as well as population growth, the construction boom and an increase in consumption and debt.

There are two points of view regarding Escondida's impact. Local authorities and company directors consider the city's economic growth a result of the mining operation. But small-and mid-sized business owners feel excluded from the benefits of economic growth as a result of Escondida's high technological and environmental standards. The latter sector tends to feel that resources are not retained or obtained in the optimal manner, which obliges them to engage in productive re-engineering in order to satisfy the potential demand for services associated with mining and thus access the highest subcontractor links.

The region's over-dependence on mining, together with the temporary nature of a mining economy, result in moderate forecasts for the future. Residents have a strongly ingrained vision of the cyclical nature of the regional economy, while the past experience of the rise and fall of nitrate mining is ever-present to successfully contain excess enthusiasm.

Strategic communication with the community

Escondida's organizational structure consists of a Corporate Affairs division and, within this, a Communications and External Affairs department, which is in charge of community relations. This department develops the communications policy oriented toward processing information related to the mine's impact on national and regional development. The company has contracted local universities to measure the project's impact on the local community, especially in socioeconomic terms.

Initially, development of the cathodes plant in Coloso sparked fierce opposition by organized community groups, especially local environmental groups backed by national organizations. Faced with this pressure, Escondida adopted a strategy of informing the community through local media and organizing informational meetings with various groups. The meetings were used to inform participants about the company's safety measures and environmental risk and impact analyses. According to company officials, this strategy managed to reverse the situation and win over groups that originally opposed the project.

The company's communication strategy also includes project site visits open to the community.

Citizen participation

Company officials say that even before the Environmental Law regulations were published, they provided information concerning every new project in an official manner, first to the authorities and later to interest groups such as the Lion's Club, the Rotary Club, the Red Cross, local universities, small business groups, and the Businessperson's Association.

Insertion of workers and employees in the community

Escondida has a housing plan that builds new houses for workers and employees, available through a finance plan with low-interest loans. As part of the company's policy, the houses or apartments are built in different parts of Antofagasta in order to avoid the creation of a "miners' ghetto" and to promote the natural insertion of company employees in the community.

In the southern part of Antofagasta is an area known as the Southern Gardens, a modern gated community on the south side of the University of Antofagasta planned as a *barrio alto* with lawns, small plazas and gardens. Residents are business people, wealthy professionals and Escondida employees.

According to articles in the Antofagasta newspaper *El Mercurio*, in the last five years Antofagasta has become a real-estate paradise due to the region's economic boom. The arrival of mining companies and their subcontractors has generated a floating population that demands a large quantity of real estate.

Community benefits

Escondida Foundation

One of the company's primary strategies for establishing links with the local community was the creation of the Escondida Foundation. The idea was approved in 1994 and began operations in 1996. It represents the way the company chose to pursue the increased

effectiveness of its community relations program as well as more effective social actions both for the poor and extremely poor sectors.

The foundation's principal objectives are centered on the areas of education, health, and technology. Projects presented to the foundation must comply with a series of requirements regarding formulation, programming, costs, and management before they are submitted to the board of directors for consideration. The board of directors consists of 11 people, five of whom are distinguished members of the community at the national and regional levels.

The foundation's programs focus on five principal areas, each of which has its own specific projects: micro-enterprise, labour insertion, educational support, health support, and development funds programs.

The foundation avoids assistentialism, aiming instead to train people to resolve their own problems, a clear indication of their long-term objective. The foundation's main strategy is to form teams or strategic alliances with other organizations in its program areas. From its founding as a non-profit institution, the majority of the foundation's resources have been oriented toward the poor and extremely poor sectors, as is evident in the list of current or completed projects that received support. The foundation's development programs are geared to job creation and access, as well as quality of life issues, which constitute the backbone of its objectives.

The fishermen of Coloso Bay (the copper concentrate port) constitute another community group that has benefited directly from the Escondida mining company. The company financed the construction of market stalls, public bathrooms, road improvement, drinking water tanks and the group's office headquarters. The company also finances school transportation for children and drinking water.

Escondida has collaborated with local universities and the Antofagasta Industrial School on cultural, educational, sports, and recreational activities. It has organized art and literary activities with secondary schools, and sponsors Antofagasta Day, the municipal orchestra's concert series, and the professional football (soccer) team, Deportes Antofagasta.

Productive Development Corporation

An interesting way in which the company builds relations with the local community is through the Productive Development Corporation, which began as a regional government initiative in accordance with its development strategy. One of the corporation's central objectives is to link the regional development strategy to large companies and universities, to foster joint public-private efforts.

The informed community (technicians, academics and local authorities) views this corporation as an important initiative for long-term regional development. The corporation seeks to strengthen the capacities of small-and medium-sized companies associated with the mining industry. Once installed, these capacities become part of the region's human capital. Incorporating the concept of a "productive association" and encourages measures to promote it are seen as important for strengthening the abilities of small businesses to compete and capture resources.

The regional government, the mining companies of Escondida and Codelco and other mid-sized firms participate in the Productive Development Corporation. Important electric and sanitary companies from the region are also involved, as well as the University of Antofagasta and Northern Catholic University. The corporation's composition is similar to that known as the "strategic peak," which brings together the principal regional actors involved in development. The corporation's associates consider Escondida's participation as

very important, both in terms of start-up and subsequent maintenance. Escondida's support of the Productive Development Corporation is part of its policy for linking the company with the community.

The Case of the Candelaria Mining Company

Description of the project

The Candelaria mining project was inaugurated in March 1995. The Phelps Dodge Corporation, the main owner of the Candelaria mine, began explorations in 1983 and finished in 1987. The mine is located 9 kilometers south of Tierra Amarilla and 20 kilometers south of Copiapó in Region III, at approximately 650 meters above sea level. The operation extends over approximately 4 000 hectares that include the mine, the concentrator, the tailings dam and other facilities. The Candelaria Mining Company is owned by Phelps Dodge (80 percent) and a consortium made up of the Japanese companies Sumitomo Metal Mining and Sumitomo Corporation (20 percent). Estimated mineral reserves are 366 million tonnes with a grade of 1.29 percent, which at an extraction rate of 50 million tonnes per year should last 34 years.

The water needs of the mine are met by five wells in the town of Alcaparrosa. Each is between 60 and 100 meters deep, more than sufficient to reach the groundwater table that lies 30 meters below the surface, on average. The concentrator consumes approximately 95 percent of the water used in the mining operation, or some 2 800 cubic meters per hour. Eighty-five percent of the water is recuperated, meaning that fresh water consumption is about 130 liters per second.

The concentrate (with an approximately 9 percent humidity level) is transported by truck to the port of Padrones, located opposite Caldera Bay on Padrones Point about four kilometers south of the city center. This is where the company built the Clean Mechanized Port, where the concentrate is prepared for shipment. Construction began in August 1993 and the facility was inaugurated on 3 February 1995. Preparation capacity is 1 200 tonnes per hour, which means that it takes two or three days output to fill a 35 000-tonne capacity ship.

Economic variables

Mining is the principal economic activity in Region III, which has an estimated population of 269 100 inhabitants and a population density of 3.6 inhabitants per square kilometer. Production of copper, gold, silver and iron represent 41 percent of the gross regional product. Agriculture accounts for 17 percent, especially the production of table grapes for export in the Copiapó and Huasco valleys. Fishing and construction have emerged as important activities in the last several years. During recent years the growth of Region III (Atacama) has been strongly influenced by the arrival of large-scale mining projects, principally the Candelaria project.

Production

During 1993–1995, Atacama's gross regional product grew at an annual average rate of 11.5 percent, which was significantly higher than the average national growth rate of 6.3 percent. Indeed, in 1995, when Candelaria began Phase 1 of production, Atacama's gross regional production grew at a rate of almost 24 percent. In the same year, mining accounted for 11.3 percent of the gross regional product.

Candelaria's production is presented in Table 4.

In 1997, national copper production was nearly 3.7 million metric tonnes. Candelaria's share of national copper production was 5.8 percent for that year. Between 1994 and 1998, Candelaria accounted for an average of 4.4 percent of national copper production.

Region III produced approximately 380 000 metric tonnes of copper in 1997, 41 percent of which was attributable to Candelaria. Its average contribution to regional production for the years 1994 to 1997 was 36 percent. Finally, copper mining in Region III accounted for 10.8 percent of national copper production.

Investment

With an investment of more than US \$565 million during Phase I, the Candelaria mining project is the largest investment in Atacama in the last several decades. The project represents 48 percent of the total foreign investment in the region's mining industry realized via DL 600 between 1974 and 1997 and 5 percent of the country's total foreign investment under the same system for the same period. In 1997, the company's accumulated investment reached approximately US \$902 million through the end of Phase II of the project, which increased annual average production to 175 000 tonnes of high-grade copper. At these production rates, the project lifespan dropped to 17 years.

Table 4. Candelaria production: 1994–1998.

Year	Concentrate (mt)	Silver (oz)	Gold (oz)
1994	30 900	119.4	27.4
1995	150 300	981.2	97.8
1996	136 800	478.6	82.6
1997	155 700	527*	76*
1998	215 000	616*	69*

Source: Candelaria Mining Company.

* Estimated figures.

Total foreign investment in the region for the period 1990–1998 was approximately US \$1.3 billion, of which 68 percent came from the Candelaria project. At the national level, total foreign investment for the same period was nearly US \$27 billion, of which 3.4 percent was attributable to Candelaria. Finally, Candelaria's contribution to total foreign mining investments is 8 percent. Based on these indicators, we can conclude that Candelaria has a significant regional impact.

Exports

In 1998, Candelaria exported 206 000 metric tonnes of high grade copper, which represents approximately 39 percent of total regional exports and 6 percent of national mineral exports.

Employment

Originally, Candelaria employed 650 workers, which increased to about 900 workers as the project expanded. In 1997, in addition to the 791 workers employed by Candelaria, an additional 435 workers had permanent jobs at the company's subcontractors. Currently, there are 869 direct employees, of which approximately 82 percent hail from Region III. Meanwhile, there are 450 indirect workers, of which 95 percent come from Region III. These numbers represent approximately 4 percent of the work force in Region III.

In order to analyze the indirect effects on the local economy of the salaries received by the workers and management at Candelaria, we used the multiplier for the mining sector estimated by the Faculty of Economics and Administration of the Catholic University of the North. (See Table 5.) According to this study, for each worker employed by a mining firm in Chile, approximately 1.76 indirect jobs are generated on the assumption that all of the income is spent in the region. We will use this indicator to get an order of magnitude of the indirect employment and income effects of the mine, keeping in mind that it is a general multiplier and not specific to Candelaria.

Table 5. Direct and indirect impacts generated by the income received by the workers and management of Candelaria (US \$) 1999.

	Workers	Management	Total
Income	58 951 768	31 030 046	89 981 814
Direct impact	47 703 770	24 405 131	72 108 901
Indirect impact	83 958 636	42 953 031	126 911 667
Direct plus indirect impact	131 662 406	67 358 162	199 020 568
Employment multiplier	1.76	1.76	1.76
Income multiplier	2.23	2.17	2.21

As in the case of Escondida —see Table 3 —the direct impact is the expenditure of the mine workers, while the indirect impact is the expenditure of those receiving employment indirectly due to the mine. The income multiplier is total income generated in the region divided by the income earned by the mine workers and management.

Others

Including investments in the port facilities at Padrones Point, total infrastructure investment was approximately US \$62.5 million. In addition, the company has constructed 21.5 kilometers of new roads, 17 of which are in or around the town of Tierra Amarilla and 4.5 of which are in Caldera.

Between 1993 and 1996, Phelps Dodge paid approximately US \$30 million in taxes, including taxes on income, patents, concessions and others.

Candelaria has developed a housing assistance plan that aims to help workers find housing solutions in the communities of Copiapó, Tierra Amarilla or Caldera, depending on their work location. This has meant accumulated costs, through May 1997, of US \$3.3 million. In addition, Candelaria is constructing a modern sports facility in the town of Copiapó.

Environmental variables

Company policy

The issue of the environment has been fundamental in the development of the Candelaria mine. Environmental protection is a constant concern and priority in each of the company's institutions, a concern born in the directives and objectives of the Phelps Dodge Corporation. The company's mission statement declares that its central objective is to create value for its associates and workers within a context of responsibility, ethics, and safety.

The company aspires to be a good neighbor who protects the environment. In addition, the company expressly declares its commitment to and involvement with the local community where the company is located. The company pledges to use the cleanest and most advanced

technology throughout the exploitation process. The company's primary objectives are to protect the natural environment, serve as an example of the best environmental practices in the industry and to be recognized as a responsible entity by the community, other companies and government authorities.

Candelaria was the first company in Region III to voluntarily conduct environmental impact studies before beginning operations. These studies allowed the company to obtain environmental authorizations starting in 1992. The company conducted a detailed study of solid waste management, which led to the control and minimization of the operation's adverse environmental impacts. In addition, the company continuously monitors air, soil, and water quality. It also has signed agreements with schools and universities to realize investigations and joint seminars.

Safety and quality standards

Environmental protection measures at the mine and processing plant in Tierra Amarilla and the port facility in Caldera Bay include: an emissions control program in the area of the mine, environmental training programs, a fully enclosed concentrate transport system, and a system of water recovery and reuse that has made the company the lowest water consumer per tonne of processed mineral in the region. Between 82 percent and 85 percent of the water used at the mine is recycled, according to information provided by the company.

Nevertheless, some agricultural producers express doubts with respect to the water recycling figures reported by the company and feel the mine is taking water away from producers in the area. However, the company periodically sends regional and local environmental authorities all monitoring data and maintains it has not received a single complaint from any neighbor with respect to water use.

It would appear the company is doing everything in its power to comply with Chilean and international norms. Nevertheless, the population does not feel entirely sure about the solutions or studies presented by it. This could be due to a lack of information or to the industry's historical legacy that has led community residents to believe that mining is a polluting activity with little concern for the environment.

Starting in 1997, Candelaria began to design an environmental management system (EMS) based on strict international guidelines under the voluntary ISO 14001 standard. In December 1999, the company's EMS was certified under this system for all mine and port facilities, making it one of the first copper mining operations in the world to achieve full certification under the ISO standards.

Social and human capital

Health

Company's internal health

Candelaria's total health program provides for drug and alcohol testing. The Risk Prevention Department is in charge of testing under the Phelps Dodge philosophy known as "zero and lower," which refers to the company's goal of a workplace, home, school and community that is free of material damage, injuries and accidents.

The work shift is not a health problem for the workers at Candelaria. Since workers return home daily, there are no problems associated with prolonged stays at worker camps.

Benefits to community health

Candelaria has contributed significantly to the remodeling of emergency services at the Regional Pediatric Hospital in Copiapó and to the construction of the general clinic in Rosario.

Education and training

As the owner of Candelaria, Phelps Dodge's education strategy is oriented to strengthening relationship between the formation of new mining technicians and the company's needs in the context of a cleaner, more technologically advanced mining industry. Toward this end, the company collaborates with the Benjamín Teplinsky Center, which provides technical training for the mining industry.

A second area of focus is the implementation of student and teacher training programs at the region's technical and professional schools. The programs consist of internships at the mine, which provide participants with a realistic vision of the mining industry. In this way, the company seeks to overcome the problem of a lack of articulation between technical training and company needs.

A third area of focus is an orientation program for the company's own workers and suppliers. The program's main objective is to introduce every worker, employee or supplier to Candelaria's corporate model, which has clear procedural guidelines regarding such considerations as technological management, worker safety, and environmental protection.

Between 1993 and 1996, the company invested US \$630 000 in employee training, the equivalent of 143 person-hours of training. According to the National Employment and Training Services (SENCE), the total of US \$1.9 million was invested in training programs for Region II in 1995. Phelps Dodge's training investment that year was US \$288 000, or 15 percent of the regional total. In addition, Phelps Dodge created the San Lorenzo School in conjunction with the Placer Dome Company. The two companies have set up a scholarship program for workers and their families. Candelaria's contribution to this program was US \$194 000 in the first semester of 1997.

Community-company relations

Community's perception

The region has numerous recognized comparative advantages for its development, including significant natural resources available for exploitation. This does not mean that region's advantages and possibilities are free of risks or threats. The community has a clear sense of the risks inherent in large mining projects. Residents make constant references to large projects of the past that extracted minerals and left behind nothing more than a hole in the ground. In this sense, Atacama is a region with mining experience. The community also has a clear vision of what contributions a mining project should make to regional development. In this case, references point to important projects that in the past left their mark on the region by constructing lasting public works.

The presence of companies such as Candelaria attracts banking institutions and large stores to the region. This is seen both as an opportunity for general employment and as a threat, since local businesses are displaced. Thus the arrival of a new mining project is viewed with a mixture of mistrust and enthusiasm. The negative experiences of the past are not enough to contain the enthusiasm generated by arrival of new projects, and people create expectations that they pass on to family members in other parts of the country, causing migration to the region in search of jobs. Expectations center on jobs and increased business for local

commerce and service providers, since mine employees receive higher salaries than the local average and thus have greater purchasing power.

Nevertheless, our interviews with members of the commercial sector revealed a different perception of mining in general. The perception is that mine employees tend to spend their wages on recreation and diversion in other parts of the region, since many of them live in other cities. Miners do not spend their income at local businesses, but rather spend it in other cities. This is attributed to the fact that there are important mining companies in the area that import workers from other regions who generally do not reside in Copiapó, or if they do, it is only temporary.

Local suppliers

With regard to input purchases, large companies generally purchase items needed immediately in Copiapó or locally, while big ticket items or larger orders are purchased in Santiago. Candelaria has made efforts to give priority to regional companies during bidding for goods and service provision. Nevertheless, there are various areas in which local businesses are not qualified to provide to the company. Some 56 percent of Candelaria's costs from the acquisition of goods and services are spent on companies outside of Region III.

The company's policy states that, all things being equal, it prefers to use local suppliers for the provision of goods and services. Above all, the company gives priority to local residents in the area of employment, in an attempt to capture all qualified human resources from people in the area. For example, the transport of mineral concentrate from the mine to the port is done by a local company, with which Candelaria has very close relations.

Since operations began, many companies from Santiago have opened branch offices in the area. There has also been significant growth in purchases from local businesses and the appearance of several small local subcontractors in areas such as shipping, welding, vehicle repair and facilities engineering. Instead of maintaining a long list of potential suppliers, which was the company's initial policy, Candelaria has chosen to concentrate on a few key suppliers. Suppliers can thus maintain their competitiveness and count on a certain volume of business, allowing them to maintain a stable work force and keep experienced workers. In addition, this allows the company to inculcate suppliers with its corporate values, such as safety and environmental protection. The company has been extremely rigorous on this point and subcontractors have assimilated key corporate values.

Commerce

In the local commerce sector, there is the perception that benefits have not been as significant as those in nearby towns such as Antofagasta or Iquique, where large-scale mining has produced visible and explosive development. According to our interviews, public authorities have an important role to play in pressuring large companies to make significant and lasting investments, such as housing complexes, that ensure workers will live in the area and, in consequence, require local services. Our interviewees indicated that local commerce tends to benefit more from small-and medium-sized mining companies.

Infrastructure

In the community's view, the most important contribution that a mega-project can make is the construction of large public works. Candelaria has not built any large public works for the community, such as a highway or housing complex. While it is true that Candelaria built houses for its executives, the community does not view this as a contribution to the city. The area where Candelaria managers and upper executives live is perceived as an exclusive

enclave that has not been incorporated into the city and does not contribute to the company's integration into the community.

The lack of a large housing complex for Candelaria employees and workers has been strongly criticized.⁴⁰ The company adopted a policy of letting all supervisors and worker choose their own housing in the region by way of its housing plan. Under this plan, 60 percent of workers have their own homes. This was an attempt to integrate workers into the community.

Employment

Our interviewees agree that Candelaria's impact on job creation has been significant. While the community's expectation is that it will be able to meet all of the company's labour needs, there is the perception that even though this is not the case, the project nevertheless represents an important boost to the regional economy. Interviewees refer to prior project phases, such as construction, during which there were 2 000 new jobs in the region.

However, not all jobs went to regional workers. According to the labour secretariat, the local work force covered approximately 20 percent of the demand, which from the local perspective is positive, since it meant 400 direct new jobs for the region. The remaining 80 percent went to outside workers who arrive in search of work. According to one informant, they are viewed as a contribution to the region, since they constitute a qualified work force that will be integrated into the community as a factor for change. As a result of this migratory flow, Copiapó's population has grown nearly 7 percent since 1990.

A negative aspect of this new source of employment stems from the distortions in the local job market caused by the relatively high salaries. Services tend to become more expensive, especially for the sector of the population that is not linked to the mining project.

Work shift

Candelaria does not use worker camps at the mine; instead, workers return home at the end of every shift. This situation directly benefits the community since it is able to capture a larger share of the work force's expenditures. The situation is very different for the employees of subcontractors. According to the region's labour authority, this is one of the greatest concerns generated by Candelaria. There are significant differences between Candelaria employees and subcontractor employees, in areas such as salary levels, the length of contracts, work conditions and internal relations. The Candelaria worker, for example, has access to a sports facility and many other advantages for building a family life that the subcontractor employee does not have.

Union

The appearance of a union at Candelaria has not been exempt from the general problems of unionism at the international level. Our interviewees indicate that the appearance of Candelaria's union was hidden and gradual. Issues such as medical leave and housing programs sparked workers' interest.

The union's objective is to be fully organized in time for the next collective bargaining round in 2001. Its strategy has been to establish alliances with similar entities and to participate in worker confederations, especially the metal mining confederation. Union leaders have initiated conversations with unions at the parent company's projects in the USA and Canada

⁴⁰ There are mechanisms for workers to buy housing through Serviu, where workers are obligated to stay at the company for 12 years.

who are interested in supporting their Chilean counterparts. It is worth noting that the union does not participate in the CUT (Unified Workers Central), which is seen as politicized entity that does not represent workers' interests.

Union leaders are concerned with the unequal working conditions between Candelaria and subcontractor employees. They are not indifferent to the situation and they consider it unjust. While the issue is not part of their demands, it is something that concerns them and is cause for solidarity.

Contributions to the community

The union is critical of the company's contributions to the community, which it considers insufficient and opportunistic. Union leaders note that many company donations appear to be part of a communications strategy to attract press coverage rather than a real contribution to the community. According to union leaders, the company should have a budget item specifically for contributions to the community. This situation prompted the union to generate its own funds to help the community, since they feel they are in a privileged situation.

From the company's perspective, Phelps Dodge's policy seeks to establish a strong commitment to the communities where its operations are located. The company has contributed US \$1.6 million to the regional community since it arrived in the area. Starting in 1994, when Candelaria began production, the company has concentrated on maximizing its contributions to the regional community, principally the towns of Tierra Amarilla, Copiapó and Caldera. Between 1995 and 1997, the company contributed US \$830 000 for various health, education and sports initiatives.