MINING REPORT

Canada may represent less than 3 per cent of global GDP, but nearly a quarter of the biggest mining companies worldwide are based here and a majority of equity financing is done through our stock exchanges. In this CK SPECIAL REPORT, we take a closer look at the rising influence of Canada's mining sector abroad, whether corporate efforts around social and environmental responsibility are enough, and what technologies are being tested or embraced to reduce ecological impacts.

With Influence Comes Responsibility

Canada is punching above its weight in the global mining sector, but being a dominant foreign investor isn't licence to behave badly

BY ELIE WAITZER

Canada is a member of the G8, and a nation widely regarded as one of the most prosperous in the world. And yet, compared to the 25 per cent share of global GDP contributed by the United States, Canada's GDP is tiny – representing just 2.8 per cent.

It raises the question, why is Canada generally perceived on the world stage as a wealthy nation? What gives us membership in the prestigious big players club? And why should a nation that accounts for such a sliver of the world's wealth have so much influence?

One answer: our mining sector.

In terms of market capitalization, nine of the 40 biggest mining companies worldwide are Canadian. Roughly 75 per cent of the world's exploration and mining companies have their headquarters in Canada. Barrick Gold and Goldcorp (both Canadian companies) are the only two gold mining companies on earth with a market capitalization exceeding $30 billion (U.S.). Barrick's 2012 market cap alone sits at nearly $50 billion.

According to the TMX Group, 90 per cent of all mining equity financings in 2011 were done on the Toronto Stock Exchange and TSX Venture Exchange, with more than $450 billion in mining equity traded over the year. Simply put, Canada's dominance in the global mining industry has enabled us to punch above our weight internationally.

But contrary to the popular misconception that Canada's bounteous domestic reserves of minerals and metals are fuelling our mining industry, the majority of Canadian mining assets are actually held abroad. *Corporate Knights* has identified that the largest concentrations are located in Latin America, the United States, Oceania and Africa. After narrowing the search to the 50 largest mining companies in Canada, we found that at least one Canadian resource company was a dominant private foreign investor in 19 countries.

On the surface, this appears like business as usual. Corporations have for years been making large investments in foreign countries to exploit resources for profits. While Canadian private investment is heaviest in developed and industrialized nations such as Australia, Mexico and the United States, it has the greatest impact in developing countries such as Mauritania, Madagascar and Burkina Faso where the inflow makes up a significant portion of incoming foreign direct investment.

The majority of Canadian mining assets are actually held abroad.

As the magnitude of this foreign investment reaches critical mass, it's reasonable to expect that the partnership between company and country transcend bare-boned capitalism and incorporate fiduciary duties. The gap here between the private and public sectors is quickly receding. It may be time in these more vulnerable geographies to reconsider the role of the corporation.

In many cases, such a partnership between foreign corporation and state has led to the successful development of nations, such as Chile's rapid economic ascendancy during the 1990s and 2000s. But the strategy requires sizeable and constant inflows of direct investment to counterbalance the volatility of export prices. Multinational corporations must provide the capital, specialized training and knowledge to attain the comparative advantage needed to realize profits. Socially and environmentally responsible practices must be put in practice to foster independence and ensure the continuation of development after the resource is depleted.

There are a range of regulatory requirements in North America designed to ensure the integrity and transparency of the domestic resource sector. But in less economically developed countries with weaker regulatory bodies – the same countries in which Canadian resource companies have been identified as significant private investors – lack of disclosure, tax evasion, badly structured resource rent agreements, and socially and environmentally unacceptable practices often lead to stagnation instead of growth and development.

Year after year, companies find ways to exploit loopholes in resource rent contracts. The main culprit is, in some form, the under-disclosure of profits in order to avoid making full royalty payments to host countries. Depreciation and amortization schedules are accelerated on financial reports, and mineral extraction figures are disclosed at the "mouth of the mine," allowing for discrepancies between the numbers reported and the actual amount extracted. In behaving this way, corporations are able to manipulate the profit brackets present in many resource rent contracts and significantly reduce their costs. In developing nations, the issue more often presents itself at the level

There comes a point where profit maximization and capital efficiency have to be more fairly balanced against the need for education, health care, infrastructure and institutional stability.

of communication: savvy corporate lawyers are able to secure long-term, company-friendly deals by promising large initial returns to inexperienced and sometimes corrupt heads of state.

The global dynamics are changing to a degree. As our earth's non-renewable resources dwindle at an unsustainable pace, the countries with surplus reserves are gaining more and more leverage, and resource hungry nations such as China and India are willing and able to give whatever it takes to keep their own rapidly growing economies running. Since the early '90s, China's trade with Africa has risen exponentially, passing $120 billion last year. From 2005 to 2010, sub-Saharan Africa accounted for about 14 per cent of China's outward investment (non-bond transactions over $100 million), with most of this money being funnelled to non-renewables. This partnership has taken off so quickly because, in many cases, Chinese firms are offering country-friendly resource rent agreements, better returns on resource extraction and superior infrastructure benefits.

China's presence in Africa has driven development in many key areas, including boosting employment figures and making basic manufactured goods more affordable and accessible. In fact, over the past two years China has given more loans to developing countries, mainly in Africa, than the World Bank. Canadian resource corporations operating in less developed countries would be wise to emulate these measures if they hope to stay globally competitive and grow profits in the long run.

If we look at the chart on page 34, of the 19 countries where Canadian private foreign investment represents a significant portion of country GDP, 14 were classified as either having "low" or "medium" human development levels, according to the UN's 2011 Human Development Index. Burkina Faso, a country reliant on Canadian investment for a whopping 69.1 per cent of its foreign direct investment, is listed as the seventh least developed country in the world. Also near the bottom is the Democratic Republic of the Congo, which receives 14.1 per cent of its foreign direct investment from Canada. In other words, the link is to the lower end of the human development spectrum.

The amount of responsibility here

cannot be underestimated. The question is: whose responsibility is it? As citizens of this nation, is it our duty to recognize the changing role of the corporation and demand environmentally and socially responsible practices? Should the government be in charge of drafting and enforcing stringent disclosure legislation, or facilitating equitable resource rent agreements?

These are difficult questions to answer, but in the countries that are truly dependent on Canadian investment, mining giants like Barrick and Sherritt must be held accountable for their actions. There comes a point where profit maximization and capital efficiency have to be more fairly balanced against the need for education, health care, infrastructure and institutional stability.

Despite Canada's relative lack of global influence, our resource companies hold the futures of these poor and less developed nations in their hands.

2012 CORPORATE KNIGHTS

Canada's Top 10

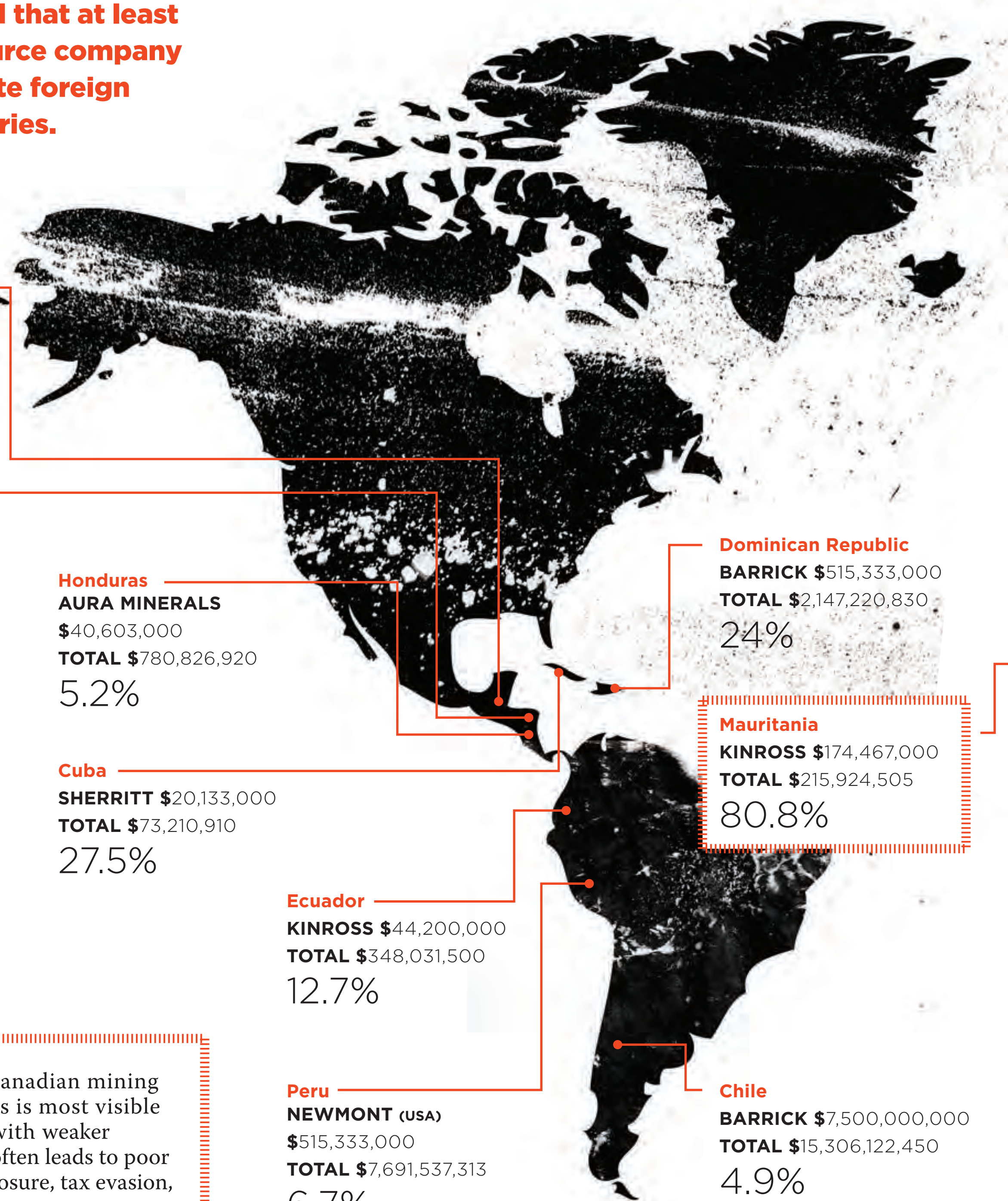
Responsible Mining Companies

Methodology: Source is Corporate Citizen Database. Data is from fiscal 2011 for all Canadian metals and mining companies in the database.

Rank	Company	Score
1	Barrick Gold Corp	56%
2	Teck Resources Ltd	54%
3	Inmet Mining Corp	49%
4	Goldcorp Inc	45%
5	Agnico-Eagle Mines Ltd	39%
6	Eldorado Gold Corp	35%
7	Kinross Gold Corp	34%
8	New Gold Inc	33%
9	Lundin Mining Corp	25%
10	First Quantum Minerals Ltd	24%

Canada's Overseas Mining Impact

A CK analysis found that at least one Canadian resource company is a dominant private foreign investor in 19 countries.



Guatemala
GOLDCORP
$101,133,000
TOTAL $796,322,830
12.7%

Nicaragua
B2GOLD CORP
$48,927,000
TOTAL $635,415,600
7.7%

Honduras
AURA MINERALS
$40,603,000
TOTAL $780,826,920
5.2%

Cuba
SHERRITT $20,133,000
TOTAL $73,210,910
27.5%

Dominican Republic
BARRICK $515,333,000
TOTAL $2,147,220,830
24%

Mauritania
KINROSS $174,467,000
TOTAL $215,924,505
80.8%

Ecuador
KINROSS $44,200,000
TOTAL $348,031,500
12.7%

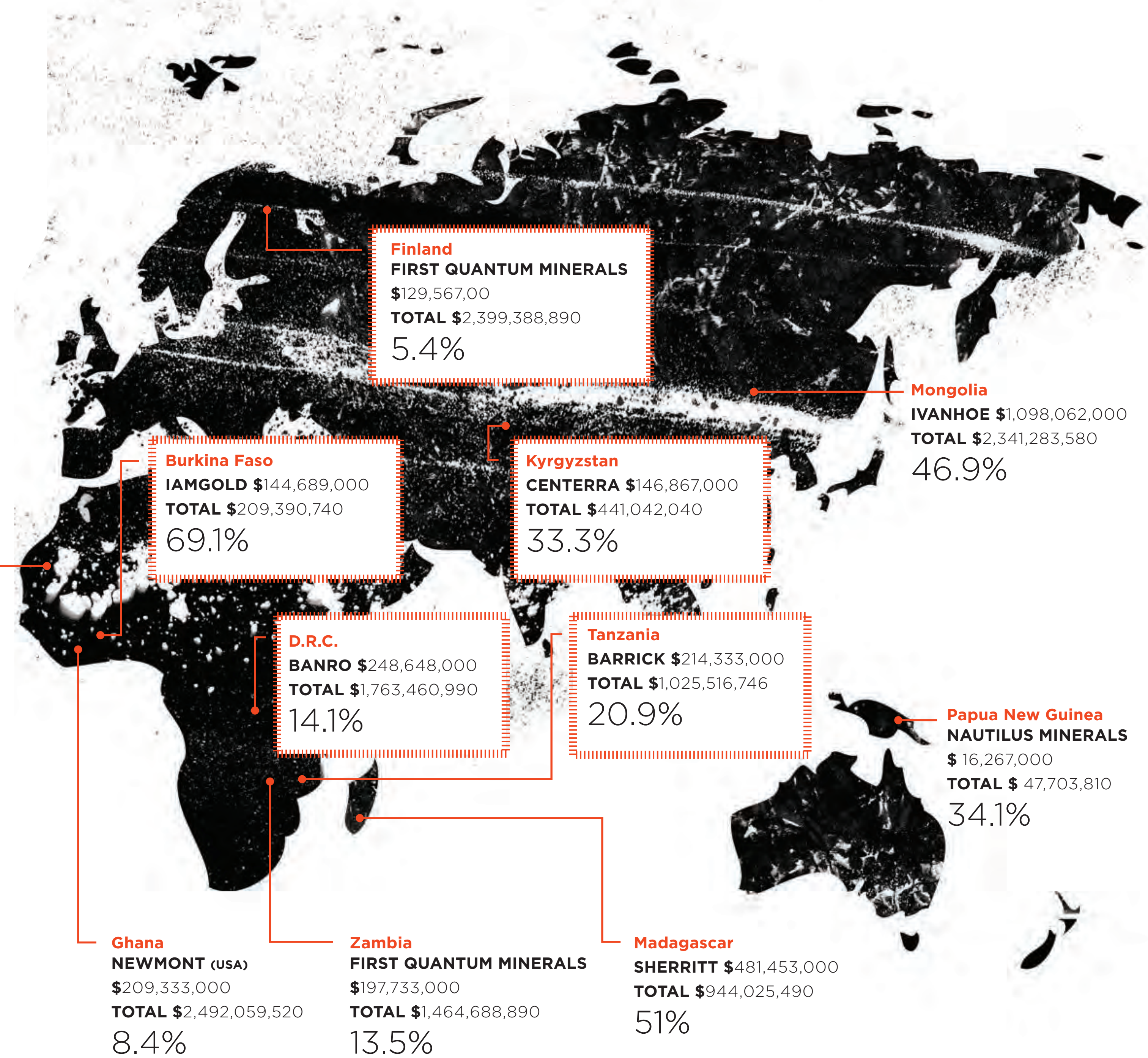
Peru
NEWMONT (USA)
$515,333,000
TOTAL $7,691,537,313
6.7%

Chile
BARRICK $7,500,000,000
TOTAL $15,306,122,450
4.9%

The dominance of Canadian mining companies overseas is most visible in developing nations with weaker regulatory bodies. This often leads to poor or complete lack of disclosure, tax evasion, badly structured resource rent agreements, and socially and environmentally unacceptable practices that would never be tolerated in developed countries.

Legend

Country —
COMPANY — Three Year Average Capital Expenditure (CAPEX) In Country (USD)
TOTAL — Three Year Average Foreign Direct Investment (FDI) Flowing Into Country (USD)
% — Company CAPEX as Percentage of Total Country FDI



Too Close for Comfort?

When mining companies partner with NGOs focused on lifting poor communities out of poverty, it may come at a cost to the environment

BY ANTOINE DION-ORTEGA

Barrick Gold, the world's largest gold mining company, has made big commitments to improve the lives of Chileans living in the country's Atacama region, the location of its controversial Pascua-Lama project. The company has funded a wide variety of projects, including development of a rehabilitation centre for handicapped children, a housing project, and the delivery of wireless Internet access to the area's remote villages.

The company isn't spearheading these projects on its own. Instead, it has relied on developing close partnerships with non-governmental organizations (NGOs) and local institutions in the affected communities. "What we recognize, by using this approach, is that we are good miners, but when it comes to meeting needs in terms of education or of health, we do not have this expertise," said Rod Jimenez, Barrick Gold's vice-president of corporate affairs for South America, during an interview at his office in Santiago, Chile's capital. "It is better to go with NGOs who have this expertise."

By working with local organizations that are familiar with the situation on the ground, Barrick says it ensures that the projects it funds are adapted specifically to the needs of these communities, thus increasing the projects' chances for success, and, in the end, improving the reputation of the corporation itself. "From a business perspective, that is what ensures the sustainability of a business model," added Jimenez. "We're not in the business of building one mine; we're in the business of building many mines. If you do the right thing, then when you go and build the next mine, that legacy follows you."

But the "legacy" that follows Barrick Gold might not exactly be the one Jimenez has in mind.

Indeed, the business model – increasingly shared by North American mining companies – has become a matter of intense concern for local observers. Many fear that as the number of partnerships between the industry and local organizations increase, NGOs, who have traditionally represented civil society as a crucial counterweight to government and private sector interests, might soften their stance in the public debate on the social and environmental impacts of large-scale mining. Such partnerships are often perceived as a form of "co-optation" – a way for companies to more easily navigate through the more than 160 environmental conflicts currently registered on the South American continent. Through these partnerships, mining multinationals ensure that the NGOs and municipalities they financially support will be more inclined to stand alongside their

Illustration Paul Roger

decisions, effectively severing civil society from its main spokespersons.

Lucio Cuenca, director of the Latin American Observatory of Environmental Conflicts (OLCA), shares this concern. He points to Barrick's Pascua-Lama project, which instigated one of the most widely covered environmental conflicts in the media over the last decade. "What Barrick did is block an entire sector of the population's potential for mobilization, and to co-opt other sectors, through promises of employment, economic benefits, sums allocated to the municipality for local projects, and establishing parallel aboriginal organizations from those which oppose the project," he said.

Cuenca deplores this tendency for mining companies to convert their public image to one of a "social actor" through such partnerships. It's a conversion made possible by the confusion between philanthropy and economy, as suggested by University of Buenos Aires professor Diana Mutti, who with colleagues published a study on the issue this summer in *Resources Policy* journal. It specifically addressed the corporate social responsibility (CSR) initiatives of mining companies in Argentina.

"There are complexities in identifying whether contribution to local development is part of economic or philanthropic responsibilities of companies," the authors wrote. "Mining companies substitute contribution to local economic development by increasing philanthropic activities, as managers admitted."

Under the pretext of holding local communities' interests at heart, many mining companies manage to dangerously expand their private sphere of influence to the public sphere, thus increasing the perception, the authors contend, that CSR is nothing less than "a manipulation tool" used to "undermine civil institutions" with the objective to "reduce community resistance."

The case of the Renacer (Rebirth) project in northern Chile is a concrete example of this phenomenon. Recently inaugurated in a suburb of the mining town of Copiapo, this residential complex will welcome 125 families from slums in the area. The project emerged from a partnership, signed in 2008, between Barrick and Un Techo para Chile (A Roof for Chile), a local NGO whose mission is to eradicate shantytowns in the north, replacing them with adequate housing.

"We recognize that the environment is important, but we also believe families have the right to live under a roof, in dignified conditions."

"Slums spring up here because of the high demand for labour in the mining industry," said Daniel Gallardo, director of Un Techo para Chile. According to Gallardo, three Canadian projects alone – Maricunga (Kinross), Cerro Casale (Barrick) and Pascua-Lama (Barrick) – will require no fewer than 15,000 new workers between now and 2014, which could mean an influx of up to 45,000 people. "The objective, both for us and for the ministry of housing and urban planning, is to prevent exponential expansion of these camps," he said.

It is not surprising that Barrick decided to provide financial support for the Renacer project. After all, it is in great part its own future employees who are now looking for a roof. The catch is that the Cerro Casale project, which has been shelved recently due to substantial capital requirements, is very likely to be met with resistance from the surrounding farming communities. In fact, this megaproject, which is located 145 kilometres southeast of Copiapo, will pump more than 900 litres of water per second during its exploitation phase, in a region known for severe drought. Indeed, on April 22, only a few days prior to International Earth Day, Chilean authorities declared a state of emergency on the Copiapo River watershed. After two decades of overexploitation in the mining and agricultural industries, the basin has virtually run dry.

Barrick Gold has consistently denied that its activities in the north of Chile could have any material impact on water resources in the region, where its Pascua-Lama and Cerro Casale projects reside. In the latter case, the company insists that the totality of its freshwater consumption will be drawn from outside of the Copiapo River basin.

A great deal is at stake, as the drying up of water reserves in the region's valleys, upon which thousands of farmers depend, could result in a new rural exodus toward urban centres like Copiapo. These populations, displaced by depletion of water sources, would be added to an already overwhelming influx of mine workers from the south.

Gallardo is no stranger to this problem. "There are many valleys that are being closed down due to water shortages," he said. "All of this labour force will sooner or later have to move toward the cities to find work. This is a problem."

But when asked if the mining companies' consumption of enormous supplies of water is in part responsible for this exodus, Gallardo was evasive. Given the fact that his organization is sponsored by these very mining companies, is there a risk that his point of view may be biased in public debates concerning this type of mining in desert areas?

"If we are in the eventual position where we must take up opposition to bad practices, we will do so," he affirmed. "However, there is another important theme: families. We recognize that the environment is important, but we also believe that families have the right to live under a roof, in dignified conditions. And if we are in need of financial support from a mining company, we will accept it."

The case of Un Techo para Chile is emblematic of this tendency. Through direct contact with families that migrate toward urban centres, the NGO is a front-line observer of the social and environmental impacts of the mining boom in the Atacama region. However, its numerous partnerships with mining companies place the organization in a predicament in which it may be discouraged from taking a public stance on the very problem it is supposed to be fighting: temporary housing sprawl. Citizens therefore find themselves without one of their primary representatives in the debate on the social and environmental costs that are generated by this industry. For its part, the NGO finds itself stuck treating the symptoms of the mining boom – the slums – without being able to publicly address the origin of these symptoms – the mines.

The drying up of the Copiapo River risks drawing significant attention to mining sites in the area, such as Cerro Casale. Many observers are challenging authorities' consistent approval of such mining projects, considering the fact that inhabited zones are already facing water shortages. They wonder why NGOs and local institutions are being boosters of such projects instead of openly questioning their value.

"Stakeholders perceive that the increase in philanthropic activities does not compensate for reduction in environmental and ethical responsibilities," wrote authors Natalia Yakovleva and Diego Vazquez-Brust in a 2011 study published in the *Journal of Business Ethics*. As long as North American mining companies fail to give adequate weight to their environmental responsibilities, the public's perception will be that this philanthropy is merely a way to deflect communities' attention from the real issues.

In this context, partnering NGOs run the risk of being perceived as accomplices in this deflection effort. They risk losing credibility with the public they were created to represent and defend.

Illustration Paul Roger

When Push Comes to Shovels

Fast-growing Goldcorp says it takes corporate social responsibility seriously, but words don't always line up with actions

BY STEPHANIE BOYD

Last year, Vancouver-based Goldcorp was removed from the Dow Jones Sustainability Index as accusations swirled of human rights abuses and environmental contamination at several of the company's Latin American gold mines. This past September, the company was put back on the North American list, a cause for celebration in the executive boardroom.

Goldcorp has spent heavily on improving its corporate social responsibility image. The company has partnerships with high-profile non-profits, like WWF, and has won safety awards from the governments of Canada and Mexico. It's also signed a landmark agreement with a Cree community in northern Canada to partner in the development and operation of a gold mine currently under exploration.

David Deisley, Goldcorp's executive vice-president, sounds as if he works for a non-profit organization when he speaks about being a "catalyst for social change" and "stimulating agricultural production and creation of markets." He's especially proud of the company's logo, created in a corporate brainstorming session: "Together, creating sustainable value."

Our interview takes place in a swank meeting room overlooking the Pacific Ocean on the 34th floor of one of Vancouver's most exclusive skyscrapers. At a time when many mining companies are downsizing, Goldcorp has expanded from a little junior into one of the fastest growing, low-cost producers in the Americas region.

Six years ago, Goldcorp forged several lucrative mergers with companies like Placer Dome, Glamis Gold and Wheaton River. Now, it's a self-defined "senior" company with a growth profile of 4 million ounces. And it's the second-largest mining company in the world in terms of market capitalization.

"We take mineralization that is in the ground and has no value and extract it in such a way that it has value – and not just for our shareholders but also for the local communities," says Deisley.

But behind Goldcorp's slick publicity material and fancy jargon, the company faces heavy opposition from local communities living near its mines operating in Latin America.

In July, farmers affected by Goldcorp mines in Guatemala, Honduras and Mexico held an International Peoples' Health Tribunal. A panel of international judges heard testimony and reviewed scientific evidence about the company's impact. The judges found Goldcorp guilty of contaminating the environment, damaging human health

Illustration Paul Roger

and violating the local peoples' right to self-determination.

When I mention the tribunal to Deisley, a cloud passes over his face. "It wasn't a tribunal under any objective means," he says, accusing organizers of selecting witnesses and judges biased against the company.

Further south, conflict is also raging at the Alumbrera copper-gold mine in Argentina, where Goldcorp and Canada's Yamana Gold hold a 50 per cent stake. Since February, locals from the province of Catamarca have held numerous blockades of the mine's vehicles to protest an expansion plan. They accuse the mine of contaminating water resources and demand that the company shelve plans to build a new mine in the neighbouring Agua Rica area.

But the conflict that has most tarnished Goldcorp's image involves one of its largest holdings, the Marlin Mine in Guatemala. Indigenous Mayan leaders living near the mine accuse the company of environmental contamination and human rights abuses, including violations of International Labour Organization regulations on the rights of indigenous people.

"My daughter is losing her hair, and my neighbours have skin rashes," says Salomon Bamaca. "Most of the people living near the mine have health problems that didn't exist before the mine," he adds.

The well-spoken Mayan used to work for Goldcorp in community relations and security, until he realized the mine was damaging the ecosystem and human health. Bamaca says he also found out the company was digging tunnels underneath private property in cases where owners refused to sell their land.

His fears about the mine's impacts were echoed by dozens of people I interviewed in May while visiting communities near the mine.

Locals accuse the mine of tricking or coercing people to sell their land. Once the mine started operations in 2005, they say their wells began running dry, animals died after drinking water from local rivers and men, women and children began developing skin rashes and respiratory problems. People cite an unusual increase in miscarriages, birth defects, hearing loss, nervous system disorders and other health conditions. Sturdy adobe brick homes close to the mine started developing cracks, blamed on vibrations from the mine's daily explosions. Leaders who stand up to the mine are harassed, threatened and beat up, and one elderly woman lost her eye after being shot.

MiningWatch believes that senior mining companies often use juniors to do the upfront dirty work.

Goldcorp denies all these accusations. In a published statement, the company says it adheres to national and international environmental standards. It blames the skin rashes and infections on "inadequate prevention and sanitary conditions" common to people living in the "developing world." Likewise, the cracked homes were the cause of "ambient conditions and/or construction methods."

Although Goldcorp won't admit responsibility for local health problems, the company kindly threw in $2.8 million to help build a new clinic where people can seek treatment for their skin rashes and other diseases.

"But only the miners can afford to buy the medicine prescribed by the doctors," says Crisanta Perez, who lives next door to the mine. She shows me a severe rash on her two-year-old daughter's arm. Perez's own heart-shaped face is obscured by a large blotch and her other children also suffer from rashes. The money she makes selling fruit in the local market isn't enough to cover these new medical expenses for her seven children.

Perez is one of the "resistance leaders," the local term for people who want the mine to close. There are also people in favour of the mine, most of them miners or people who earn money from service industries for the mine.

Then there are the self-described "neutral" citizens, like Alvaro Perez, a restaurant owner and member of the municipal environment commission in San Miguel. (The Marlin Mine sits between two districts: San Miguel and Sipakapa.)

Alvaro Perez started his municipal post in January and is appalled by the lack of independent environmental monitoring. He says the Association of Community Environmental Monitoring (AMAC), a local group, carries out water testing but is controlled by the mine so its results are suspect. When I ask about government monitoring, he laughs bitterly.

"The Ministry of Energy and Mines doesn't even have enough money to put gas in their motorcycles," he says, "let alone conduct proper water tests."

"Guatemala doesn't have the resources for a laboratory to carry out this kind of environmental monitoring. They haven't made it a priority," he adds.

Goldcorp cites the government and AMAC monitoring results as proof the mine isn't causing contamination. But I heard widespread criticism of both entities during my stay in San Miguel. People are especially suspicious of the national government. Guatemala's new president, ex-general Otto Perez Molina, has been accused of human rights abuses during the country's 36-year civil war in which an estimated 200,000 people died.

The president is a close friend of the mining industry and has already lifted the previous government's moratorium on the approval of new concessions.

Goldcorp's cozy relationship with the Guatemalan government is no secret. In August, Goldcorp brought four Canadian members of Parliament and one senator to Guatemala to meet with the government's Committee on Energy and Mines.

The company's Guatemalan subsidiary denied allegations that Goldcorp

A - *A new school in Guatemala's district of Sipakapa that was built using funds supplied by Goldcorp.*

B - *Timoteo Vasquez, a Catholic Church leader from Sipakapa, opposes Goldcorp's planned expansion in the area.*

C - *Salomon Bamaca, former company worker, says people living near the mine see more sickness and ecological damage.*

was trying to influence the country's mining legislation, currently under review. In a published statement, the company insisted the trip was simply a "goodwill visit" and had "no hidden agenda."

Goldcorp, a private corporation, nonetheless picked up the tab for this high-level social visit between foreign ministers.

Goldcorp seems to have friends in many high places. Two years ago, the Inter-American Commission on Human Rights ordered the Guatemalan government to suspend Goldcorp's operating licence "to prevent irreparable harm to the life, physical integrity and environment" of indigenous peoples living near the mine.

Guatemala refused to comply with the ruling and instead petitioned the commission to alter the sentence, insisting there was no evidence of contamination from the mine.

The commission reversed the suspension order in December 2011, but the government is still required to follow "precautionary" measures. These include providing adequate potable water supplies to the 16 communities near the mine, a provision that has not yet been met. Goldcorp says it is "working with the government" on this issue.

Meanwhile, local tensions continue to mount. Marlin's open pit has been fully mined and Goldcorp plans to close it by the end of 2012 to concentrate on mining underground reserves and develop expansion plans. An independent study by American engineers estimated the mine's closure costs at $49 million. Goldcorp came up with a more conservative estimate of $27 million. Either way, the company initially put aside only $1 million for the mine's closure. (Under Guatemalan law, companies aren't required to provide a remuneration bond to cover mine closure fees.)

At the company's annual general meeting in April, an independent shareholder resolution supported by Amnesty International and other North American activist groups, like MiningWatch and Oxfam, called on Goldcorp to put aside enough money to close the mine properly and to make public its closure plan. The resolution wasn't passed, but the company has now agreed to put aside $27 million.

North American activist groups worry that Goldcorp is underestimating closure expenses.

"No one knows how they came up with this figure," says Jen Moore of MiningWatch, a Canadian-based non-profit. "The amount should respond to independent analysis that is based on full access to the company's plans for closure and post closure. The post-closure plan is important because there's real concern about the possibility of acid mine drainage. That's where the costs post-life of a mine start to double and quadruple."

Moore says Goldcorp still hasn't disclosed its closure plan and is negotiating with the Guatemalan government "behind closed doors," without involving the local communities.

Goldcorp acquired the Marlin mine, and the conflict, from its merger with Glamis Gold in 2006. But Moore says Goldcorp can't use the legacy argument as a defence.

"Mining companies are very aware of the role that junior corporations play," she says. "Goldcorp bought into the mine knowing the problems that existed." Moore believes that senior mining companies often use juniors to do the upfront dirty work. Once the larger company takes over, "they rid themselves of the ties that would bond them to any responsibility, taking advantage of the corporate structure that allows them to have impunity."

Moore cites Goldcorp's expansion plans as evidence that the company still doesn't respect the rights of local indigenous populations. Although Marlin is closing, Goldcorp is set to explore a hotly contested deposit in the neighbouring community of Sipakapa.

Seven years ago, when the Sipakapa concession was held by Glamis Gold, the community held a referendum and 98 per cent of voters rejected mining as a form of economic development. Although the referendum wasn't legally

Photos: Stephanie Boyd

binding, the company realized the situation was too conflictive and put the Sipakapa project on hold.

Once Goldcorp merged with Glamis, it offered to provide the community with funds for development projects. Sipakapa's local mayor was a key supporter of the anti-mine campaign and refused the funds until last year, when an amazing transformation took place. The mayor and his local government made an abrupt turnaround and began accepting the funds and supporting Goldcorp's expansion project.

Juan Mejia, one of the mayor's local councillors, starred in a documentary about the referendum called *Sipakapa is Not for Sale*, using his popular radio show to promote the anti-mining campaign. He squirms uncomfortably when I ask him to explain his change of opinion.

"The mine is coming and we can't stop it," he says. "We want to learn from San Miguel's mistakes with the Marlin Mine and negotiate with the company, and do it well."

Sipakapa's grassroots leaders are suspicious of this sudden pragmatism. They accuse Mejia and the mayor of being "bought off" by Goldcorp.

Timoteo Vasquez, head of the Catholic Church environmental commission in Sipakapa, says the majority of the population still opposes mining in Sipakapa. And they want another referendum to prove it.

"The company must respect the results of the vote," he says, adding that the entire community has the right to decide if they want a mine, and not just a few leaders.

Goldcorp's executive vice-president says there are no plans to hold a referendum. Deisley insists that the mayor and his local council's approval is enough. Indeed, he holds up the mayor's flip turn as a major victory for the company's corporate social responsibility program.

But activist groups say it's ridiculous to talk about corporate social responsibility if companies don't first obtain a social licence to operate. The International Labour Organization's convention on the rights of indigenous people states that local communities must give "free, prior and informed consent" before foreign companies begin operations on their land.

Although Guatemala has signed the convention, the country's mining laws don't include provisions for consulting indigenous populations. This hasn't stopped communities from holding their own referendums. To date, at least 62 municipalities have held consultations on mining and other extractive industries and 99.5 per cent of voters have rejected these industries as a form of economic development.

If Goldcorp insists on moving ahead with plans in Sipakapa without obtaining consent from the community at large, it's likely to detonate yet another social conflict. That's bad news for private investors, who could see a fall in share prices. And bad news for the Canada Pension Plan Investment Board, which has public funds tied up in Goldcorp stocks.

Not Your Father's Mining Company

New innovations, from gold-extracting bacteria to ventilation on demand, are helping the mining sector economically reduce its environmental footprint

BY PETER GORRIE

Since the 1970s, sulphur-dioxide emissions from the Inco nickel smelter in Sudbury, Ont., have shrunk 90 per cent. That achievement cost $1 billion.

Now, the current owner, a subsidiary of Brazil-based Vale SA, is spending another $2 billion to reduce the remaining emissions by about three-quarters.

Vale's Clean AER (Atmospheric Emission Reduction) project seems a high price to pay for a relatively small result. It's necessary, the company says, to comply with pollution limits imposed by the Ontario government. Plus, it says, the project is "simply the right thing to do." It means cleaner air, 1,300 jobs at peak construction, "and a sustainable future for our operations."

That's the new reality of mining: Spurred by tougher regulations and public pressure, leading companies are greening their operations to ensure they can continue to operate and expand.

The changes improve the environment and the bottom line – usually cutting costs and often producing profitable new resources. And they're essential for the industry to meet increasingly stringent, albeit informal, conditions for a "social licence" to operate, says Ben Chalmers, vice-president, sustainable development, at the Mining Association of Canada, whose 36 members operate nearly half of Canada's 200 mines. "It's a competitive advantage."

"Mining companies can no longer extract resources without full consideration of the local environment, communities or lasting impacts," says Dallas Kachan, executive director of the Vancouver-based Clean Mining Alliance, launched last spring to promote high-tech solutions to environmental challenges. "Those that ignore their corporate social responsibilities are instantly decried by shareholders, communities, NGOs and even government."

These assertions seem at odds with the industry's image. The Inco smelter became infamous in the late 1980s when sulphur emissions from its giant smokestack combined with precipitation to create acid rain, which decimated fish in cottage-country lakes north of Toronto and turned Sudbury into a treeless moonscape. And it wasn't unique. At mines everywhere, toxins leaked from tailings ponds, rainwater leached acids from massive piles of waste rock into lakes and rivers, and clouds of pollutants streamed from smokestacks.

> **Many miners are adopting renewable energy to reduce costs and emissions.**

Many operators simply abandoned exhausted ore bodies, leaving toxic waste dumps and, eventually, immense cleanup bills like the estimated $500 million for 250,000 tonnes of poisonous arsenic trioxide under the former Giant gold mine, near Yellowknife, N.W.T.

Reports such as Canada's National Pollutant Release Inventory and the American Toxics Release Inventory show mine emissions are dropping, and companies insist every new project will be environmentally friendly. Even so, critics decry the legacy of past practices and demand tougher regulations. They fear backsliding as governments push projects to boost job creation and cut their capacity to enforce regulations.

This summer, for example, the Yukon government stripped significant environmental conditions – including a groundwater study – recommended by the territory's Environmental Assessment Board before approving a silver mining project of Vancouver-based Alexco Resource.

And new technologies and processes are being adopted slowly, according to a 2010 Natural Resources Canada report, which cited regulatory barriers, upfront costs and the industry's conservatism as main reasons. It's a "first to be second mentality" that's not surprising given the financial, worker safety and environmental risks of innovation on mining's massive scale, says Janice Zinck, manager of mine waste management and footprint reduction at Natural Resources Canada, which heads the federal government's Green Mining Initiative. "The technology needs to be proven."

Still, "there's tremendous interest in the industry in becoming greener," Zinck says.

A - *A locomotive that runs on Ballard Power fuel cells is helping Anglo American Platinum reduce emissions at its South African mines.*

B - *Barrick is using earthworms and bacteria to purify wastewater from a mine in Chile that's safe for food crop irrigation.*

Eight years ago, the mining association introduced Towards Sustainable Mining, or TSM, which requires members to track, improve and report on their impacts. The Mining Association of British Columbia has formally adopted TSM and industry groups in other provinces unofficially follow its principles.

The Prospectors and Developers' Association of Canada promotes practices labelled e3 Plus, which, it tells members, "will result in improved environmental performance" and "help to preserve access to lands for future exploration and the development of new mines."

Other countries have codes and some companies aim for ISO 14001 certification, which sets standards for environmental management and requires external audits.

The voluntary TSM code "goes above and beyond" regulations, Chalmers says. "It's not the only way of achieving a social licence but however you obtain one, it's critical.… Communities are looking for it." That includes indigenous people, impacted by most mine projects. And, in Canada at least, water boards are building it into approvals.

Typical of large corporations, Teck Resources last year launched a sustainability strategy, and 10 of its 13 mines, all in Canada or the United States, have achieved ISO certification.

Cliffs Natural Resources, of Cleveland, Ohio, has volunteered to undergo the most stringent form of provincial environmental assessment for its proposed $3.3-billion chromite mine and processing facility in Northern Ontario.

Many miners are adopting renewable energy to reduce costs and emissions and improve reliability. Toronto-based Barrick Gold has installed a one-megawatt solar farm at a mine in Nevada, as well as massive wind farms in Chile and Argentina.

The Diavik Diamond Mine has built four wind turbines with total capacity of 9.2 megawatts to generate electricity at its operation in the Northwest Territories, 300 kilometres northeast of Yellowknife. The turbines will reduce the amount of diesel trucked to the site by an ice road that, because of warming weather, is available for shorter periods each winter.

Vale and an Australian partner plan two wind farms – total capacity, 140 megawatts – to power iron mines in northern Brazil. Large wind and solar arrays are being installed at mines in Germany and China.

Canada's three-year-old Green Mining Initiative, or GMI, is working with industry, universities and other research centres on more advanced methods to reduce energy consumption and waste generation from mining and refining; cut water use; develop better strategies for reclaiming old mine sites; and reduce environmental risks. Projects include:

• The world's first hybrid propulsion for loaders and other large underground equipment. Tests of a fuel-cell-powered loader are underway at mines in Arizona, Nevada and Quebec.

• A novel process to effectively extract gold from ore without the use of cyanide.

• Applying organic wastes from the pulp and paper industry and municipal collections on tailings to grow willows, canola and other potential bio-energy crops. The main tests are at the Vale and Xstrata Nickel mines in Sudbury, as well as a Goldcorp Canada property in nearby Timmins.

• Replacing Portland cement, which requires huge quantities of energy to produce, with mine site materials to stabilize rock that's backfilled into mines.

• Ventilation on demand, which cuts energy consumption by delivering fresh air only as needed to underground work sites.

• Using alternatives to explosives to break rock.

• Reducing energy consumption in milling.

Outside the GMI, Anglo American Platinum last spring launched a prototype underground locomotive powered by fuel cells at its mines in South Africa.

The Clean Mining Alliance is on a similar track, Kachan says, aiming to promote "radical" solutions generated by its members to an industry "waiting to be revolutionized by clean technology." Members testing innovation include:

• American Manganese, a venture company based in British Columbia, says its refining process uses only 6 per cent of the energy of conventional high-temperature roasting. That will let it produce electrolytic manganese – essential for lithium-ion batteries and specialty steel – from low-grade ore at an Arizona property more cheaply than

Photos: Ballard Power (left) and botonyspeaking (right) the high-grade resources in the dominant producer, China. The company also plans to generate power with heat energy from production of sulphur dioxide.

• Nevada Clean Magnesium, another B.C. junior, plans a Nevada mine that, to keep greenhouse gas emissions low, will recover energy from waste heat sources; use a technology that purifies carbon dioxide so it can be sequestered in abandoned oil wells; and provide slag to a cement producer to halve its energy consumption.

• Kemetco Research, a services company, is working on using bacteria to capture gold from ore without cyanide, and to stop acid rock drainage.

Outside the alliance, Toronto-based BacTech has a bacteria-based technique to clean up wastes at old mine sites. Its first commercial-scale project is near Snow Lake, Man., where a former gold mine left tailings that contain cyanide – and gold. The company aims to detoxify the wastes and harvest gold in about a year, says president and chief executive Ross Orr. BacTech will pay for the cleanup and keep the gold – a profitable trade-off at current prices, he says.

Mines use billions of litres of water annually to extract ore from rock, cool machinery and suppress dust. Spills and tailings frequently pollute lakes and streams.

Barrick is among the companies aiming to reduce water intake through greater recycling, including treated wastewater, and the use of saline sources. At a mine in Chile, it's using earthworms and bacteria to purify wastewater to a quality that's safe for irrigation of food crops.

The American Manganese project is to include closed-loop techniques that cut water consumption, including filters made of advanced nano-materials that purify water and help to create tailings that, because they're solid and inert, can be put back underground, eliminating the need for settling ponds and fear of contamination.

In fact, Kachan says, advanced materials "could one day lead to mining projects that produce no greenhouse gas emissions, emit benign tailings and return produced water to the natural habitat as clean, if not cleaner, than it was originally."

New forms of mining promise to reduce the industry's impacts. Last year, California-based Simbol Materials began extracting lithium carbonate, used for electric-vehicle batteries, from the hot, mineral-laden brine that bubbles from deep underground to fuel geothermal power plants along the San Andreas Fault. The company aims to supply 20 per cent of the world's lithium market from this source by the end of the decade, without what it calls "ecologically dubious" mines.

Though mining can never be free of environmental impacts, it has plenty of room for improvement. Still, notes Zinck, the industry is making strides. "Its reputation is not what it should be. It's not an industry that promotes its success stories ... but significant improvements are being realized."