

## **Mining and Communities: Turning Risks into Opportunities through Shared Approaches to Sustainable Water Management**

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### **Abstract**

Access to clean water and sanitation is one of the grand challenges of sustainable development, and a focus of UN Sustainable Development Goal (SDG) #6. With growing global demand, clean water is becoming an increasingly scarce resource, and access to water is a frequent trigger of tension between mining companies and communities.

Around two thirds of the world's largest mines are in countries experiencing high water stress. The point of intersection between community and company demands for water therefore creates the potential for conflict. It also creates an opportunity for mining companies to make a significant contribution to sustainable development.

Mining companies are increasingly recognizing that water is more than a commodity to be bought and sold. It is a strategic asset. The result of this new way of thinking has been an increase in collaborative partnerships between mining companies, communities, government agencies, and other water users, to support collective water solutions. The objective of these partnerships is the shared and sustainable use of water resources.

This paper examines the rationale and outcomes of collaborative partnerships undertaken by mining companies and communities in resource-rich areas of water scarcity. While acknowledging the diversity of perspectives on the value of water, the paper seeks to consider how disparate views can be reconciled to secure sustainable outcomes. Case studies from the Arequipa region of Peru and from the Gobi Desert of Mongolia explore the requirements for initiatives that deliver equitable benefits to business and society.

It will be argued that when mining companies take a long-term, strategic approach to their corporate social responsibilities, it is possible to establish frameworks for the sustainable use of resources and advance progress on the SDGs.

## Introduction

The United Nations has estimated that to meet global needs, the world will need 30 per cent more clean water by 2030 (United Nations, 2015), with the Intergovernmental Panel on Climate Change predicting that by 2025, 60 per cent of the world's population will be living in countries classified as "water stressed" (Intergovernmental Panel on Climate Change, 2014). For industries such as mining, which require considerable volumes of water for operations, and where industry demand is increasing at a time when water scarcity is a leading environmental issue, water now represents one of mining's fastest growing economic and social issues (IFC, 2014, p. 3). Competition for water, an increasingly scarce resource, has contributed to growing tensions between mining companies and nearby communities. In the years between 2000 – 2017, water issues drove 58 per cent of cases filed against mining with the International Finance Corporation's (IFC) Compliance Officer Ombudsman (ICMM/IFC, 2017).

In response to these pressures:

“ . . . more and more companies are embracing "corporate water stewardship" practices that expand traditional notions of water management to include their water-related impacts within communities and the river basins and ecosystems in which they operate. Corporate water stewardship also includes the notion of contributing to improved public water governance via responsible business engagement in water policy and collective action. (UN Global Compact, 2014)

The premise investigated in this paper is that shared approaches to water management are required for sustainable outcomes. Two cases from the resource-rich countries of Peru and Mongolia are examined to illustrate that the global mining industry is well positioned to advance progress on United Nations 2030 Sustainable Development Goals (SDGs). It will be argued that the SDGs provide a common platform whereby mining companies can work towards their own water stewardship aspirations while collaborating with communities and governments to advance progress on specific sustainable development goals. The case study objective is to generate a theoretical understanding of the determinants of success when planning a shared approach to water management. Key research questions explored are:

- Can a shared approach to water management strengthen productive dialogue between mining companies and communities?
- Can business value be generated through clear identification of social problems that intersect with industry needs?
- Can collaboration between mining companies, communities, civil society and host governments advance progress on the UN 2030 SDGs?

## The UN 2030 Sustainable Development Goals (SDGs)

The 17 SDGs were announced in September 2015 and set an agenda for equitable, socially inclusive, and environmentally sustainable economic development. The goals continue, or build upon, eight Millennium Goals introduced in 2000, and have been endorsed by 193 governments, civil society and non-governmental organizations (NGOs), development agencies, and business. Because the SDGs were introduced less than two years ago, there is little academic literature on the effectiveness of implementation strategies or how the global goals impact business. Yet business leaders describe the

opportunities inherent in SDGs as ranging from improved economic performance, employee attraction and retention, and the creation of more than \$12 trillion in growth opportunities (Business and Sustainable Development Commission, 2017).

Mining, which has contributed to many of the problems the SDGs seek to address, is also uniquely positioned to contribute to the transition to a sustainable world (World Economic Forum, 2014). More frequently than many other sectors, mining takes place in remote areas and in developing countries lacking basic human development and effective political institutions (Shared Value Initiative, 2014, p. 21). This creates the potential for mining to improve existing conditions by creating jobs and economic development, building needed infrastructure, designing education and training programs to reduce inequality, or initiating energy efficiency and environmental programs to correct past performance and to ameliorate the impacts of new projects. Opportunities for mining companies to contribute positively to social change can be found at every stage of the mining cycle (from exploration to closure) with some of the clearest opportunities for advancement found in SDG #1 No Poverty, #6 Clean Water and Sanitation, #7 Affordable and Clean Energy, #9 Industry, Innovation and Infrastructure, and #16 Peace, Justice and Strong Institutions (UN Development Program, Columbia Centre for Sustainable Investment, Sustainable Development Solutions Network, World Economic Forum, 2016). However, to be successful mining companies will need to make organizational changes to treat sustainability and social responsibility as business strategy rather than discretionary spending (Stubbs & Cocklin, 2008). Success will also require companies foster collaboration with stakeholders.

Collaborative partnerships will be important because while mining has a critical role to play in addressing the SDGs, industry will not be successful acting unilaterally. George et al. (2016) warn that business alone cannot address the “grand challenges” embodied in the SDGs, because the targets require collective, collaborative, and co-ordinated effort. Furthermore, there are very sound arguments against mining companies taking ownership of the SDGs including concerns that they may undermine the role of government or international development agencies, and stakeholder unease about company's willingness to set aside own economic self interest. These factors should not be a deterrent to involvement on the part of mining, an industry accustomed to complexity, but highlight the value of collective action to advance the SDGs. This paper illustrates there are considerable benefits to be achieved when companies and communities address water supply within the framework of SDG#6 (Access to Clean Water and Sanitation): one of the areas where mining has the most potential to leverage its expertise and make the greatest contribution to sustainable development.

### **Water Management**

Access to a reliable supply of water and energy is now recognized as one of the top strategic business risks facing the mining sector (EY, 2014). Studies suggest that two thirds of the world's biggest mines are in countries with water risk (Metcalf, 2013) and this situation is set to intensify (Northey , et al., 2017).

The social and environmental impacts of the mining sector's use of water has also led to significant community concerns. An interesting feature of recent conflicts is that they not only occur in new mining regions, but also in those with an established history of mining. For example, the Taseko Mines New Prosperity project in British Columbia, Canada, was recently rejected after the federal review panel concluded a mine would result in several

significant adverse environmental effects; particularly on water quality in Fish Lake (Federal Review Panel, 2013, p. 13).

A major challenge in resolving water issues in the mining sector is that they necessitate an interdisciplinary approach. Engineering knowledge is needed to optimize water use at the mine level and conduct scenarios for alternative management strategies. Companies also need to establish sound business strategies to integrate best practices into operations including the development of key performance indicators to motivate employees to shift behaviour. Hydrological expertise is needed to understand impacts on regional water systems and how availability and quality may change in future. The socio-political context beyond the mining fence is increasingly essential, and the rise of social conflict over mine site water use suggests that this has been neglected in the past.

More than ever, it has become essential for companies to adopt a proactive approach to understanding water risks that integrates perspectives from diverse stakeholders. It is no longer sufficient for mining companies to manage water in isolation. This is evidenced in the plethora of calls from NGOs, industry associations and governments asking mining companies to develop of context-based targets towards water stewardship (CDP et al., 2017), to increase transparency and consistency in water reporting (ICMM, 2017), and to actively contribute towards water provision and access through the SDGs and other national action strategies (UN Development Program, Columbia Centre for Sustainable Investment, Sustainable Development Solutions Network, World Economic Forum, 2016).

## **Methodology**

This paper is anchored in stakeholder engagement theory and employs a qualitative multi-methods approach. For the Peru case, desktop research was conducted to review current academic literature on water management in the mining sector as well as collaborative approaches to advance sustainable development. Reports of third-party groups such as the World Economic Forum, International Finance Corporation (IFC), management consultancies, industry associations, and NGOs were also reviewed. Field visits to the Arequipa region of Peru provided valuable observational data, as well as the opportunity to conduct in-person semi-structured interviews. The interviews used a series of open ended questions to frame and guide the discussion. Interview candidates were purposefully selected to represent a diversity of stakeholder groups, including government regulators, NGOs, community water users, and company officials. The Mongolia case draws upon academic literature, publicly available documents and first-hand field experience from one of the authors who has worked on a project in the South Gobi region for over 18 months to strengthen the water management and stakeholder engagement practices of participating mining companies.

## **Peru Case**

In 2015, Peru was the third largest global producer of copper, silver, and zinc, the fifth largest gold producer, and had the second largest known copper reserves in the world. Mining in this resource-rich nation is a vital component of Peru's economy. In 2013, the industry contributed US\$2 billion to the Peruvian government via tax and royalties (Brereton, Arts, & Sturman, 2016). In 2014, mining accounted for 14 per cent of the country's gross domestic product (GDP), and mineral export revenues were US\$16 billion, or 50.3 per cent of the country's total exports, providing direct employment for close to 200,000 people (EY, 2015, p. 24).

Despite its financial contribution, there is little public trust in mining and Peru has been one of many countries around the world where mining-community conflict has increased in recent years. One issue of ongoing concern is that many of the mineral-rich areas of Peru are characterized by water scarcity due to arid conditions, or situations where surface water is abundant but only at certain times of the year in certain regions, and by the presence of existing water users including farmers, hydro-electric power, mining, other industrial users, and communities. Concerns about the allocation of scarce water resources has been a driver of social opposition for numerous mining projects in Peru, including Conga, Las Bambas, and the Tía María project, which The Guardian newspaper branded as Peru's most significant environmental issue (Hill, 2015).

When personnel at Cerro Verde copper mine in the Arequipa region of Peru began planning for a mine expansion – to increase production from 120,000 metric tonnes per day to 360,000 metric tonnes per day – a key consideration was how to access the volume of water that would be required for processing the additional ore. As the mine operates in an area of water scarcity, and where access to clean water is one of the region's most important needs, securing access to water for mining operations was recognized as both a fundamental operations requirement and a potential social risk. Mining company personnel knew that to reduce the risk of the type of conflict that had disrupted or stalled other mining projects in the country, it would be critical to engage stakeholders and to avoid placing the mine in competition with farmers for clean water.

As the mine expansion planning got underway in 2008, Cerro Verde evaluated the river basin and discovered that already limited volumes of fresh water had the potential to be adversely affected by drought<sup>1</sup>. It was therefore assumed that any proposal to use fresh water for mining was likely to provoke opposition from other water users. The Cerro Verde mine is located approximately 200 kilometres from the Pacific Ocean so desalination was considered. However, the project team recalled an earlier suggestion by social leaders and decided to explore the possibility of treating municipal wastewater from the city of Arequipa in exchange for water for mining operations. Municipal sewage offered a source of water not in use by others, a more reliable supply than fresh water, and one that had the potential to increase given Arequipa's growing population. In addition, the re-use of effluent is being promoted by the Peruvian government as a sustainable water supply for the mining sector. This meant the project could help to meet an important policy objective of a key stakeholder.

Following a period of consultation with the mine's stakeholders, it was decided that Cerro Verde would finance, build, and operate a plant to treat municipal wastewater from the city of Arequipa. (At the time of the consultations, the only wastewater treatment facility in the city of Arequipa was operating at capacity yet only treating 10 per cent of municipal sewage. This meant most of the city's wastewater was being discharged directly into the principal water source for the region, the Chili River). In exchange for wastewater treatment, the mine would receive a portion (1m<sup>3</sup>/second) of the treated wastewater for use in mining operations. Local water authority – SEDAPAR – would be responsible for

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<sup>1</sup> In January 2016, the Peruvian government declared a temporary state of emergency with respect to the water supply in the Rio Chili Basin because of drought conditions. As a result, the Cerro Verde water rights from the Rio Chili were temporarily decreased during February 2016 (FCX Form 10K, p.48)

managing distribution of the remaining treated water to the Chili River to improve water quality in the river.

In this case, water was viewed as a shared company-community risk. A key to the success of the project was the recognition that communities are made up of many distinct groups, with different – sometimes conflicting – needs and expectations. In Cerro Verde's case, stakeholders included city of Arequipa residents, a population that has increased significantly in recent years due, in large part, to in-migration from the highlands. This has resulted in new neighbourhoods in areas where the city has not planned for services. Farmers in the agricultural region of La Joya are equally important stakeholders but with very dissimilar needs and interests from those living in the city. The interests of government officials, water regulations and authorities, civil society organizations, and the company's head office executive and shareholders, made each group important stakeholders for the project. The diversity of stakeholder interests meant finding projects that matched community aspirations with business needs required a willingness to engage, remain open to innovative ideas, and commit to collaborate.

The company secured several important outcomes from the shared approach to water management. The expansion project was completed on schedule and unlike other projects in the region, Cerro Verde did not experience any lost production due to community opposition. A water supply for expanded operations was secured and by using treated waste water, which is not a water source included in agricultural allotments, Cerro Verde avoided competition with farmers for scarce water resources.

Equally important when assessing sustainable development is the fact that the shared approach delivers clear benefits to the community. Approximately 99 per cent of city sewage is now treated - up from less than 10 per cent before the wastewater treatment plant was built. Fecal coliform levels in the Chili River, which vastly exceeded World Health Organization standards for safe exposure, have been reduced and the improved water quality in Rio Chili basin will enhance agricultural production, as well as recreational activities and tourism opportunities for the region. In addition, as part of the wastewater treatment plant operations, water intake from the Chili River is now measured. This systematic approach means that water authorities have access to scientifically measured water volumes. Sharing this information has helped to answer questions from stakeholders about water allocation and availability.

### **Mongolia Case**

Mongolia has similarities with Peru with respect to rapid growth of the mining sector and its economic significance. Recent statistics indicate that mining accounts for 18 per cent of Mongolia's GDP and employs over 20,000 people (Mineral Resources Authority of Mongolia, 2016). Mining is often regarded as the backbone for the country's future economic growth (IFC and ICMM, 2017). However, the rapid growth of the mining sector has created tensions with local communities that have traditionally relied on animal husbandry for their livelihoods. Developing robust conclusions about the actual impacts of mining on water quantity and quality are especially challenging due to a lack of baseline data and effective governance mechanisms (McIntyre et al., 2016). This uncertainty contributes to significant distrust between mining companies and local communities (IFC and ICMM, 2017).

Mining development has expanded most rapidly in the arid South Gobi, a region of scarce water resources but home to vast deposits of resources including copper, gold, and coal. Communities have expressed concern about the impacts of mining development on water availability. A baseline survey commissioned by the International Finance Corporation (IFC) in 2014 found that public trust was an all-time low (IRIM, 2014) and this was not necessarily targeted at specific companies but rather affected all mining companies unanimously (IFC and ICMM, 2017).

In 2012, against a backdrop of growing conflict between herders, NGOs and mining companies, the local legislator implemented a law to new ban the use of groundwater for mining operations (IFC and ICMM, 2017). This represented a major turning point for the mining sector because such a ban would significantly stall, if not halt, mining development. Many mining projects, including Oyu Tolgoi, the country's largest mine, rely on deep groundwater aquifers to extract the water needed to mine ore bodies and process the material into valuable products (Oyu Toigoi, 2011).

The IFC, a member of the World Bank Group, and an investor in the Oyu Tolgoi project, subsequently engaged with partners in a program to strengthen the collective water performance and the stakeholder engagement practices of mining companies in the South Gobi (IFC and ICMM, 2017). A key part of this program has involved convening quarterly round tables to bring together mining companies operating in the region. The goal of these meetings has essentially been two-fold: (1) improve the water management and community engagement practices within the companies themselves, and (2) engage trusted third-parties to understand the concerns of local communities and to explain efforts being made by companies to address these concerns. In working towards these objectives, the program team has made a dedicated effort to complement related programs being coordinated by other actors, including government and other multi-lateral institutions.

The program has improved company water management practices in several ways. One example is through delivering a training workshop to educate companies about how to develop a mine site water balance and a water account. These workshops have build upon best practice frameworks including the Minerals Council of Australia's (MCA) water accounting framework (Minerals Council of Australia, 2010) and the new International Council Mining and Metals (ICMM) water reporting guidelines (ICMM, 2017). This is important because without a reliable understanding of their own water use, companies are unable to benchmark their performance with other sites to identify opportunities to improve, nor do they have the data needed to communicate effectively with external stakeholders.

Participating in the program also allows the companies to communicate their achievements to local communities through a third party. The IFC established a Voluntary Code of Practice on water management, to which eight participating round table companies voluntarily committed. Signatories file annual reports about their performance across six pillars and these data will be used to summarize water performance information for local communities. The program is also pioneering efforts to share private water data (e.g. mine water use and hydrogeological water monitoring data) with the Mongolian government and thereby contribute towards improved regional water management and governance (IFC and ICMM, 2017).

## Discussion

The two cases discussed offer examples of successful collective action initiatives undertaken to address water supply and management issues. Both employed effective stakeholder engagement strategies to facilitate discussion on water, which is both a critical social and mining-operations issue. The outcomes of the projects illustrate how shared approaches to sustainable water management can transform a risk into an opportunity. Yet questions remain. Who should convene collective action initiatives? Who should lead water stewardship? Should this be a government function? An industry function? Or should a trusted third-party, such as academics, civil society groups or NGOs, lead collective action?

Based upon the two cases discussed, some common attributes of successful partnership projects can be observed. Sustainable water management requires financial resources, local knowledge, technical expertise, effective communication skills, and a willingness for each party in the collective action to play to its strengths. Because water is a shared resource, valued by both mining companies and host communities, it can be a highly emotional issue where trust plays a vital role. Stakeholders need to have a high degree of trust in the organizations partnering on sustainability initiatives. There must also be high trust amongst the partners themselves because individual partners can be required to set aside self interest in the favour of collective action and shared benefits. These attributes provide a framework for assessing who is best positioned to convene collective action and who is best positioned to lead a given initiative.

While mining companies and their industry partners may appear well positioned to lead collective action, we argue that in most cases industry is not the best choice. To their advantage, individual companies have significant financial resources, and often have a convening power that reaches through their supply chains into financial markets and government. In addition, personnel within mining companies have access to networks to recruit specialized expertise for social and environmental innovation. While these attributes are all important for progressing improved water management and governance, we believe that in most instances concerns are likely to be raised about the ability of industry to act as a neutral party when designing projects in which they have a vested interest. Companies may simply not be trusted enough by other groups to lead collaborative partnerships. In addition, mining companies need to be careful not to create situations where communities are dependent on the mine for services government should provide. Miners do not have the skills of development agencies and community engagement strategies are typically linked with the life of mine, which may last for several decades but which can be as brief as several years. In other words, while industry may have some attributes needed to convene collective action initiatives, they may not be the best choice to lead.

Government seems the natural group to convene and lead water stewardship. They are the guardians of their country's natural resources, and have a fiduciary responsibility to citizens to ensure the sustainable use of resources such as water. In some jurisdictions, governments at the national, regional, or even municipal level have embraced this role. For example, in Australia's Fitzroy basin, the Queensland government has been an active participant in convening broader collective interests between agriculture, industry, research and communities towards improving the catchment river health (Fitzroy Partnership for River Health, 2017). In the Northwest Territories of Canada, settler and indigenous governments worked together to establish a collaborative, partnership-based

approach to water stewardship. Regulatory boards, agencies, environmental organizations, the mining and oil and gas industry, and the public came together to develop a strategy and associated action plan to address pressure on water supply from large scale development and climate change (Government of the Northwest Territories, 2017). However, in other jurisdictions, governments have ceded their authority to others for a variety of reasons. Government's abdication of its responsibility for the issues such as water governance may be attributed to lack of financial resources, lack of technical expertise, lack of capacity within the public sector, or an interest in securing foreign investment in the extractive sector, which trumps sustainability concerns.

Another group well positioned to take both a convening and leadership role is NGOs. These groups are often established specifically to advance progress on many of the topics the SDGs seek to address and frequent act as a catalyst to draw public attention to sustainability issues. Their perspective on sustainability issues is often broader than that of the mining industry, meaning that NGOs may be better positioned to identify opportunities outside of the 'business-as-usual' approach that miners may employ. Initiatives such as the CEO Water Mandate, the Alliance for Water Stewardship and the World Wildlife Fund (WWF) are all working to raise awareness of water risks and facilitate collective action. Many companies, both within and beyond the mining sector, acknowledge the important brokerage role that NGOs can play in mediating community-company tensions and have already established partnerships with various groups. It is suggested that the public perception of NGOs, which includes faith-based groups, is that their core values are anchored in the common good, rather than corporate self interest, and this has earned many such groups a credibility that industry lacks.

Appreciating that in each collective action initiative there may be unique geographic, governance, and stakeholder considerations, we propose that the best group to convene and to lead shared approaches in sustainable water management is the one that is most trusted. Identifying the most trusted party may be challenging. Research shows trust in government, business, industry, and even non-governmental organizations (NGOs), has declined broadly in the past decade (Edelman, 2017). Further complicating the issue of identifying the most trusted party is the fact that there are varying amounts of trust in different regions of the world. For example, in the resource rich countries of Africa and Latin America, trust in government is significantly lower than trust in business, yet in Asia trust in government is very high (Globescan, 2017). In countries such as China, where the NGO sector has been repressed trust is low; North Americans place a lot of trust in NGOs. Two groups uniformly trusted across all geographic locations are science and academic institutions (Globescan, 2017), suggesting these groups could be respected leaders on collaborative sustainability projects. It is also relevant to note that each successful project should build trust amongst the partners and provide a foundation for future collaboration. Indeed, extensive research on industrial symbiosis networks has highlighted trust as a necessary foundation for triggering by-product exchanges between companies ( Ashton, 2008, Ashton and Bain, 2012)

## **Conclusions**

The premise investigated in this paper is that shared approaches to water management are required for sustainable outcomes. The two case studies helped to illustrate the determinants of success when planning a shared approach to water management: convening power, financial resources, local knowledge, technical expertise, effective communication skills, and a willingness for each party in the collective action to play to its

strengths. Trust, amongst partners and with the broader set of stakeholders, is a critical attribute. Given low trust levels in the mining industry and government, there appears to be a role for third-party groups from civil society and academia to take a leadership position. Leadership is important because without it, projects are at risk of becoming paralyzed due to lack of decision making and competing agendas or the self-interests of collaborators.

The fact that there are significant mineral resources in water-stressed countries suggests there are many potential opportunities for mining companies and communities to take a shared approach to sustainable water management. The two case studies highlight the positive outcomes that can be achieved when mining companies seek the points of intersection between the needs of business and those of society. In both cases examined, taking a shared approach to water management reduced mining-community conflict, helping to reduce project risk, and made a significant contribution to advancing SDG#6.

For companies, there is a clear return on investment that can be quantified (for example, no lost days of production due to protests, securing the water supply required for production, earning a social license to operate, reducing risk to shareholders). Society also benefits through the advancement of the SDGs. This paper has focussed on SDG#6, but there are also water management opportunities inherent in SDG#9 (Industry, Innovation and Infrastructure) and SDG#13 (Climate Action). Furthermore, successful collaborative partnerships on water projects creates an opportunity to build trust and reputation capital for all convening parties.

Mining is one of the many businesses and industries that suffer from a lack of public trust. One reason trust is declining is a failure on the part of business to contribute to the greater good (Edelman, 2017). This suggests there is an opportunity for mining to earn public trust by realigning itself with the values of society, embodied in the SDGs. One of the lessons learned from the delivery of the Millennium Development Goals, the precursor to the SDGs, is the importance of private sector participation. Academics, advisory groups, and practitioners stress that the private sector must be engaged and provide leadership to secure the ambitious SDG targets (Business and Sustainable Development Commission, 2017; Sachs, 2012; WEF, 2014).

Questions remain about who should convene and who should lead collective action initiatives. But there is no question these initiatives are needed to address critical social and environmental issues, such as clean water and sanitation. When mining companies take a long-term, strategic approach to water management, the outcome can be collective action to deliver both business and social value.

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