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The science of corporate social responsibility (CSR): Contamination and conflict in a mining project in the southern Ecuadorian Andes

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ABSTRACT

In this article, I explain the role that scientific studies play in shaping collaboration and conflict over mining exploration in the Ecuadorian highlands. Toronto-based IAMGOLD conducted water quality studies to simultaneously fulfill legal obligations and secure support for drilling in an environmentally sensitive zone. With these studies, IAMGOLD generated collaborative relations with local authorities and university scientists. However, water quality studies were also used by dairy farmers to establish new connections for an opposition movement. The scientific studies enabled IAMGOLD and the dairy farmers to make competing claims about the responsibility for contamination of an important watershed. This article analyzes the conflict that resulted and challenges conventional wisdom that distinguishes a corporation's legal obligations from its voluntary CSR programs.

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Introduction

One morning on June 2006, a group of angry farmers surrounded Esteban Ortiz¹ and his pickup truck as he drove to the parish council office.² Armed with sticks and machetes, they shouted “thief!” and “sell-out!” The farmers were protesting Ortiz's participation in a water sampling study led by Toronto-based IAMGOLD Corporation, which planned to extract gold, silver, and molybdenum from an area adjacent to rural watersheds. Only months before, Ortiz, the president of the Victoria del Portete parish government, had signed a letter directed at state authorities that denounced IAMGOLD's contamination of the local water supply. Now, Ortiz seemed to be participating in a study that some farmers believed would exculpate IAMGOLD from contaminating the local water supplies. Women opened the truck doors and pulled Ortiz out. The farmers detained Ortiz for several hours, demanding his resignation from the public office.

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¹ The name Esteban Ortiz is a pseudonym. Throughout the text, I have used pseudonyms for residents, local political figures, public functionaries, and IAMGOLD employees.

² A parish refers to a civil parish; the smallest administrative unit in Ecuador. Parishes make up a canton. In this case, the parish of Victoria del Portete belongs to the canton of Cuenca. The parish government is comprised of a president, vice-president, secretary and three council members. They are democratically elected by the residents of the parish and administer public funds for development and infrastructure projects.

Environment is a crucial site of struggle in mining conflicts. Industry and activist groups alike recognize the potential for metal mining to result in environmental contamination. Corporations increasingly adopt Corporate Social Responsibility (CSR) programs to “contribute to a better society and a cleaner environment” (European Commission (2001: 5) cited in Hamann and Kapelus (2004)). Although CSR is recognized as a viable route to solve poverty, social exclusion, and environmental degradation (Van Marrewijk, 2003; Merino and Valor, 2011), conflicts continue to mar mining development. Researchers identify several factors that may shape CSR-related tensions in the extractive industries. These include an unequal distribution of CSR benefits (Kapelus, 2002), asymmetries in power between corporations and community members (Calvano, 2008; Newell, 2005), corporate practices that undermine the collective and individual rights of communities (Kimmerling, 2001), and the absence of accountability measures (Coumans, 2010; Hamann and Kapelus, 2004). Although CSR programs may enable corporations to ‘go beyond’ compliance with local laws (Gunningham et al., 2003), programs can also be motivated by a corporation's search to secure profits (Blowfield, 2005; Hilson, 2007).

In this article, I examine scientific knowledge-producing practices and argue that they operate as a form of CSR that organizes and gives shape to public debates over mining development. I position my analysis within critical scholarship on CSR that redefines the term as a “system of knowledge and practice that embodies particular ways of interpreting and acting on the world” (Sharp, 2006: p. 215; see also Kirsch, 2010; Li, 2010;

Raman, 2010). Although scientific studies are not traditionally examined as part of CSR activities, in this case, IAMGOLD carried out water quality studies to both fulfill a legal obligation *and* to garner community support for mineral exploration. Focusing on the agency of scientific claims diminishes the importance of analyzing water quality studies as either voluntary or compulsory practices. This case disrupts conventional wisdom that distinguishes legally mandated practices from voluntary CSR programs.

Mining conflicts in the Andean region over water are well documented (see [Bebbington and Williams, 2008](#); [Bebbington et al., 2010](#)). Mining exploration and extraction can increase the risk of water contamination, decrease water supply, and erode the authority of community-managed water boards. Moreover, mining development can heighten long-standing inequalities over water access and distribution ([Acosta and Martinez, 2010](#)). As water becomes a central concern for rural communities living near mine sites, corporations are frequently turning to the “production and dissemination of scientific data and technical information” to assure the public “that mining will not generate pollution or reduce the availability of water resources” ([Li, 2011: p. 62](#)). In Peru, where farmers have staged protests against the mining industry, corporations have implemented participatory water monitoring mechanisms as a way to settle disputes with local residents (see [Himley, 2009](#)). Although scientific studies become a way that embattled mining corporations can promote an image of environmental responsibility, their ‘work’ does not stop at the level of representation. Scientific tools not only connect corporations to rural communities, but rural residents to each other, to corporations, and to various levels of government in ways that enable both collaboration and conflict.

I examine the agency of science in constituting and organizing public debates over the environmental impacts of mining exploration. Multiple, opposed actors are now turning to scientific studies to further their political goals. In environmental disputes where competing scientific studies are involved, scholars identify the role that social affiliations ([Horowitz, 2010](#)) or values play in shaping the conflict ([Sarawitz, 2004](#)). This type of analysis can be insightful because it can demonstrate how scientific “components can be legitimately assembled and interpreted in different ways to yield competing views of the ‘problem’” ([Sarawitz, 2004: p. 389](#)). However, a focus solely on social factors assumes that science works like a mirror; merely reflecting pre-existing social formations with no transformative capacity to alter the shape of those arrangements. The work of [Latour \(2005\)](#) is helpful in understanding environmental debates by distinguishing intermediaries from mediators. The former, he argues, are akin to a black box where the inputs are the same as the outputs while the latter, by contrast, “is never a good predictor of its output” because mediators “translate, transform, distort, or modify meanings and elements” (p. 29).

Following [Latour \(2005\)](#), I argue that water studies can be understood as a mediator, a set of practices that enabled farmers to transform the debate over the nature and responsibility of water contamination. Whereas science enabled IAMGOLD to establish that dairy farmers were responsible for fecal contamination of the Irquis River, when used by a small group of dairy farmers, water studies allowed the farmers to shift the terms of the debate and establish that IAMGOLD was responsible for lead contamination. Through the mobilization of science, the small groups of farmers were able to establish new connections among other farmers and open up a public debate over the potential risks of mining exploration. Conflicts were further shaped when public regulatory agencies, infused with new protocols and duties under neoliberal legal reforms in 2000, appropriated scientific methods to argue that IAMGOLD did not contaminate the local river supply. This resulted in the bifurcation of the initial protest

movement where some rural residents decided to maintain alliances with the government and IAMGOLD, while others joined the growing opposition movement.

By following the use of scientific studies through the different actors and debates, I show how science enabled different collaborations among the various actors. My aim is not to adjudicate between the different scientific studies to ascertain whether one set of studies is more valid than another, nor to analyze the underlying motivations for why some individuals chose to create certain alliances over others. Instead, my goal is to understand how science enabled new social and political formations to emerge.

Ecuador is an apt site for studying the formation of mining conflicts. A politically and ethnically diverse group of activists, both rural and urban, have staged marches and road blockades and created art, media, and music to protest state plans to extract minerals. Ecuador is not considered by the international mining community to be a ‘país minero’ or a ‘mining country’; neoliberal and post-neoliberal governments reformed legislation in 2000 and again in 2008 to jumpstart a large-scale industrial mining sector. While analysts and activists often posit farmer and indigenous peoples opposition to mining development as a ‘natural’ defense of livelihoods, in this case, I show how farmer opposition was forged across ethnic, class, and social difference through science. This case sparked a local anti-mining movement that eventually won the local government and spurred a nationwide movement to challenge large-scale metal mining development. This movement, combined with legal reforms under the presidency of Rafael Correa, has caused lengthy delays to IAMGOLD’s project start date.

The events that I describe in this article occurred in the course of a year from 2005 to 2006, well before my arrival in Victoria del Portete. I conducted 30 months of dissertation field research in Victoria del Portete and the nearby city of Cuenca from 2008–2010 among dairy farmers and urban activists. Information presented in this article was gathered through informal conversations from movement leaders and participants, oral histories, and several semi-structured interviews with community leaders, an IAMGOLD official, municipal government authorities, and scientists from the University of Cuenca and the University of Azuay, and archival research. A portion of the interviews were conducted alongside Jennifer Moore, an independent Canadian journalist.

The article is organized as follows. I begin by demonstrating how IAMGOLD Corporation, out of both procedural obligations under Ecuadorian Law and a desire to expand exploratory work, carried out studies to establish the water quality of the Irquis River. The water quality studies showed a presence of fecal matter from which IAMGOLD consultants established that dairy farmers were responsible for the contamination of the river. From these conclusions, IAMGOLD proposed that the farmers and community members participate in an environmental oversight committee to “co-manage” the Irquis river watershed, which had up until then, been managed by various community-based irrigation and drinking water boards.

Second, I show how farmers, already concerned with decreased flows in the river and convinced that mining activity can contaminate the environment, turned to scientific studies. Their studies showed that the Irquis River had four times the amount of lead permissible under environmental legislation. They established that IAMGOLD’s exploratory work was the source of such contamination. These scientific studies became the basis for community mobilizations and enabled farmers to radically transform the terms of debate over water contamination.

Third, I describe how farmers petitioned the state for increased regulation and oversight over IAMGOLD’s activities and obligated the state to take additional samples to verify the extent to which

IAMGOLD caused contamination. While the state authorities did take additional samples, the laboratory did not have the technology to detect permissible limits of lead content and conflict ensued over the ambiguous results. The state encouraged the farmers to participate in an IAMGOLD environmental oversight committee, which some of the farmers rejected and others, such as leaders from the parish governing council, accepted.

IAMGOLD uses science

On June 29th 2005, the president of IAMGOLD-Ecuador dispatched formal invitations to government authorities and community leaders to attend a 'Public Dissemination and Information Workshop'. The workshop aimed to "receive opinions and observations" related to IAMGOLD's Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP).³ Local invitees were from the parish of Victoria del Portete and San Gerardo, areas situated within or nearby IAMGOLD's mineral concessions and recognized as 'potentially affected populations'. This was the first time that IAMGOLD tried to use science to establish cordial relations with the farmers from Victoria del Portete.

Briefly, IAMGOLD obtained two mineral concessions in the highland páramo known as Sombrederas in 2001 on the heels of neoliberal reforms to the mining law. The two concessions overlap with two nationally protected forests for which IAMGOLD successfully petitioned the state to obtain an environmental license to conduct exploratory work. Legislation required that IAMGOLD submit trimester reports detailing its environmental and social activities in the area, conduct trimester water testing, submit EIA and EMP, and hold information meetings with local communities.

By the end of 2005, IAMGOLD completed its first phase of exploratory work concentrated in the parish of San Gerardo located southwest of Victoria del Portete. There, IAMGOLD financed community development programs and enjoyed the support of local leaders. IAMGOLD hoped to establish similar relations with leaders from Victoria del Portete. The second phase would move exploration work into the Irquis River watershed, which provides more than 1500 rural families with drinking and irrigation water. Although the community information and participation workshops are compulsory by law, IAMGOLD's ability to secure a social license to operate is dependent on local community consent (see Gunningham et al., 2002).

The workshop convened on July 8th 2005 took place at the Hostería del Lago de Cristal, a luxurious inn (by most Ecuadorian standards), located in San Gerardo and up the steep road towards the Sombrederas wetlands. The inn is set around a lake and offers a variety of outdoor activities such as horseback riding, fishing, and swimming. It attracts Ecuadorian and international tourists, and contains facilities for seminars and retreats. According to IAMGOLD documents, 40–60 people attended the meeting. Consultants from Ambigest Consulting, Jonathan Padilla and Alejandro Hohnstein led the meeting in their capacity as IAMGOLD subcontractors (see footnote 3).

Padilla provided an overview of the EIA and PMA and shared details on how exploratory drilling would proceed: drilling machinery and accessories would be brought in through the existing road, vegetation would be removed to make way for a drilling platform, and once the drilling was finished, the platform would be dismantled and the same vegetation initially removed would be reseeded with the same dirt (IAMGOLD, 2005:2, see

footnote 3). The company planned to drill approximately eighty holes, 200–300 m deep, and six centimeters in diameter (see footnote 3). Exploratory drilling work would enable IAMGOLD to recover hard rock samples, analyze them for mineral content, and create a detailed mineral deposit map.

Padilla surprised the assembled farmers with the information that IAMGOLD's periodic water sampling, which went "further than those required under the Environmental License and related legal norms" (IAMGOLD, 2005: 2), proved that the water in the páramo was impure. Furthermore, Padilla said that testing showed that the "contamination was produced by community pasture [practices]" whereby the "streams receive the excrements of the cows, and become more contaminated downstream from human influences, be they from domestic activity...or chemical products from agriculture" (IAMGOLD, 2005:2).

Indeed, several of IAMGOLD's technical reports and state environmental audit reports from 2003, 2004 and 2005 noted an increase in fecal matter in the effluents of the Irquis River compared with 2000 levels. IAMGOLD's expanded EIA, published a month before the meeting, noted that the effluents of the Rio Irquis had presence of bacteria, coliforms, fecal coliforms, and yeast and fungus above the National Regulation (IAMGOLD, 2004–2005).⁴ Padilla's presentation concluded with various avenues for corporate-community collaboration including financing of a project to co-manage the Irquis watershed, maintenance of roads for conservation work, environmental monitoring, and reforestation (IAMGOLD, 2005).

At the meeting, IAMGOLD's results provoked skepticism. Both Luis Morocho, representing the Victoria-Tarqui community drinking water board, and Leonardo Calle, a local authority figure appointed by the governor, spoke up (IAMGOLD, 2005: 4). They were concerned about mining's effects on the water supply. Padilla assured the leaders that exploratory work is safe because they use the popular cooking oil, *El Cocinero*, to lubricate the drill. Unsatisfied with the answer, Calle questioned, "but what happens when we are in exploration? We don't want our water to be contaminated" (IAMGOLD, 2005: 4). IAMGOLD Community Relations manager Xavier Terán stepped into the conversation to argue that oversight committees would be formed (IAMGOLD, 2005). This was not enough for Luis Morocho, who explained: "We ask that things be clear, water comes first since our water comes out of the Irquis watershed. Please don't be offended, but we simply want to guarantee water for future generations" (IAMGOLD, 2005:4).

Morocho's drinking water board was already struggling with a scarcity of water and some families, particularly those living furthest from the páramo, did not even have reliable water access throughout the day. Terán insisted that the company's concern for the protection of water was not merely discourse but that water should be guaranteed for all Ecuadorians and the protection of water required a project and collaboration of all parties: company, the state, and communities.

In the meeting, IAMGOLD consultants used scientific studies to establish that dairy farmers are responsible for water contamination of the Irquis River. Based on these studies, IAMGOLD proposed to develop a collaborative partnership with local authorities and leaders in the form of the co-management of the Irquis watershed. Once Morocho and Calle expressed worry over the impacts of mining on water resources, Terán redirected their attention back to the formation of an oversight committee. As Terán said, "It's the only way". The science studies enabled IAMGOLD to fulfill its legal obligations and claim that

³ IAMGOLD (July 8, 2005), "Acta de la Audiencia de Difusión y Participación Ciudadana del Alcance al Estudio de Impacto Ambiental y Plan de Manejo Ambiental de Proyecto Quimsacocha (Áreas Mineras Cerro Casco y Río Falso)".

⁴ The public copy I obtained had a blank page where lab results should have detailed the precise levels of the contaminants.

contamination was a pre-existing condition caused by local livelihoods. Establishing contamination as a pre-existing condition can work as a way that a mining company can counter claims of contamination in the future by establishing it as unrelated to mining activity (Li, 2009). Moreover, by making light of the potential impacts of mining development, IAMGOLD attempted to secure community support for the next phase of mining. Like other CSR programs, scientific studies and the proposals that followed from it, were used as an attempt to “anticipate and dissipate” community conflict before project opposition even began (Bebbington, 2010). Despite the failure of the meeting, the debate over science set the discursive and practical terms for future debates over mining in the region.

Farmers use science

Discontent was growing among rural residents. Benjamin Macias, a mid-sized dairy farmer and president of the local group, Committee for the Environmental Defense of the Irquis River, had met with IAMGOLD representatives in 2005. Macias has a degree in animal science and is locally known as the ‘Engineer’. He and a small group of dairy farmers from the southern end of Victoria del Portete are, like many residents and leaders, already concerned about the reduction of water flow in the river. They went to the Provincial Council office in Cuenca to find funding for a reforestation project, only to be turned in the direction of IAMGOLD.⁵ At that time, IAMGOLD, with the help of rural residents from San Gerardo, carried out a reforestation project in which it hoped to sow 20,000 plants in 2005.

After exploratory work began, Macias noticed what he saw as a deterioration of the wetlands and native grasses. Most significantly, he noticed a set of hoses belonging to IAMGOLD that discharged what he believed to be untreated water directly into the effluents of the Irquis River. In December of 2005, a small group of dairy farmers decided to finance their own water study. This idea was initially raised by a local landowner who, like Benjamin, also had a scientific background. They took lab samples to the Ecuadorian Commission on Atomic Energy. The lab results, according to a brief written by Macias, identifies that the effluents of the Irquis River have 100 micrograms (μg) of lead per liter of water, twice the amount of permissible limits which, according to Ecuadorian environmental legislation, is set at 50 $\mu\text{g}/\text{l}$.⁶ The farmers attributed this to IAMGOLD’s drilling. But when they confronted IAMGOLD representatives, they shrugged off the results as anomalous, a one-time accident from a motorcycle gasoline spill. Later, IAMGOLD’s community relations manager would tell me that the lead “occurs naturally”.⁷

Macias convened community assemblies and conducted awareness-raising workshops and a core group of dairy farming activists began to protest against IAMGOLD. Rosita, for example, is a subsistence dairy farmer from the community of San Pedro de Escaleras. She heard Benjamin Macias give a presentation after mass in the community of San Pedro de las Escaleras. She was impressed by his engineering expertise. She summed up her subsequent activism as a way to “defend life...the maize, beans, *choclo*, wheat, and barley,” [...] “they say we have worms in the water...but we have always lived like this, my parents drank from that water. Water is born from mother earth; she sustains us by feeding us. Pachamama [mother earth] is mother water”.⁸

Her story is significant because it illustrates how Macias, considered by some as a local elite, came to enjoy the support of indigenous and subsistence farmers in his efforts to hold IAMGOLD accountable to the contamination. The two social groups had historically disputed access to water. Small and subsistence farmers living in communities furthest from water sources had occasional access to irrigation water depending on the location of the plots of their grazing lands. Mid and large-scale dairy farmers occupied pasture lands closest to water sources and often monopolized claims to water. Through technical studies revealing contamination, collaboration between these two antagonistic groups emerged.

For Julio Loza, scientific results had confirmed his suspicions. Loza is an elderly dairy farmer and was an active member of Macias’ environmental group. In the first half of the 20th century, some *Victorienses* worked the mines of Portovelo, a gold mine of the US-owned South American Development Corporation (SADCO). His family sold cheese, clothes, and other highland goods to the miners.⁹ Both he and Marcelo, who worked in the Portovelo mines, recalled a yellowish sludge discharging into nearby rivers. Similarly, Benjamin Macias learned that small-scale mining activity was responsible for the contamination of rivers in Tenguel, just west of Victoria del Portete on the other side of the páramo. In that case, scientists established that small-scale mining was responsible for heavy metal contaminants in the water that was adversely affecting small banana growers and their families (Moore and Velásquez, 2012).

The science studies began to reorganize community alliances. The results of the farmer’s tests accorded new meaning to the scarcity of water noted by some residents and their previous knowledge of mining and its effects. Most significantly, water quality studies carried out by the farmers shifted the debate over contamination. As I discuss below, once the farmers took the studies to public authorities, IAMGOLD and pro-mining authorities would have to demonstrate that IAMGOLD did not contaminate the water with lead.

The state uses science

In February of 2006, a group of nineteen water-board leaders, parish authorities, and supporters of Benjamin Macias sent a letter to the regional office of the National Direction of Mining. In the letter they said that they were “extremely concerned” about IAMGOLD’s concessions in Sombrederas, pointing out that “IAMGOLD did not explain the effects of their work and that adverse environmental effects on water reserves used by thousands of users were already visible”.¹⁰ They demanded that the Regional Direction of Mining (DIREMI), a local arm of the Ministry of Energy and Mines, immediately shelve and extinguish IAMGOLD’s mining concession in order to respect the right of the community to live in a healthy environment.

The director of DIREMI, Mauricio Andrade, cited the 2000 neoliberal reforms to mining law in his response two weeks later. Annulment of a concession title could only take place upon nonpayment of patent rights and not on the grounds of environmental contamination.¹¹ Andrade promised to send an inspection team in the coming days. In the end, the inspection never took place due to disagreements within different branches of the national and provincial bureaucracy.

⁵ Interview Benjamin Macias, May 24th, 2009.

⁶ Macias, Benjamin “Proyecto Minero Quimsacocha,” March 26th, 2007. Unpublished paper.

⁷ Interview, Xavier Terán, November 29th, 2007.

⁸ Interview, Rosita Chuñir, May 28th, 2009.

⁹ Interview, Julio Loza, August 30th, 2009.

¹⁰ Letter directed to “Director of Regional Direction of Mining,” February 17th, 2006.

¹¹ Letter to “Representatives of the Social Collectives of the parish of Victoria del Portete, Tarquí, Girón and the Province of Azuay,” dated March 2nd, 2006. Oficio no. 236.

Community groups were angered by the months of delay, until finally, on May 3rd 2006, water board leaders and a diverse coalition of dairy farmers blocked a road. For 24 hours, rural residents stopped traffic on the Pan-American Highway, which connects Ecuador's central and northern zones with major southern cities. In their declaration, the water board leaders wrote, "we are concerned with the deterioration and destruction of the water sources... the shortage of water can be felt, there is little water for drinking and the in the summer months, the cows do not have pasture".¹² They demanded that local authorities take action.

On May 6th, the newspaper reported that nearby Cuenca's influential municipal water agency had established that levels of lead in the water were well below legal limits. The newspaper published the results. Some 80% of water samples showed lead results less than 10 µg/l and the remaining 20% well below the 50 µg/l limit established by law.¹³ Although to some farmers, the article showed evidence of a "natural" alliance between authorities and IAMGOLD. When I spoke to the Environmental Director at the municipal water agency, Janeth Leon, in 2009, this relationship seemed more complex. She was worried that multinational mining companies in the area may not have the adequate technology to safeguard the water supply, particularly during mining exploration, but suggested that it was "easier to regulate one company, rather than 200 [small scale miners]" that might invade the páramo where gold deposits were confirmed (see also Moore and Velásquez, forthcoming).

In May, IAMGOLD and authorities made one more attempt at diffusing conflict by proposing yet another environmental oversight committee with Macias' participation. However, the issue of contamination remained unresolved for some people in Victoria del Portete as well as those from Tarqui, a neighboring parish, which also drew its water from the Irquis River. On June 16th 2006, 300 campesinos from Victoria del Portete and Tarqui held a demonstration outside of DIREMI's office in Cuenca. Farmers demanded to know what actions the Ministry of Energy and Mines had taken to control environmental impacts in Quimsacocha. In response to community protests, Mauricio Andrade released a letter the same day to the Undersecretary of Environmental Protection (UEP) in which he wrote; "It is evident that with all of the obstacles and delays, this case has not been given importance, which may lead to tragic consequences between community members and IAMGOLD".¹⁴ He made an urgent call for the UEP, housed within the Ministry of Energy and Mines, to send a delegate to meet with the communities and explain the impacts of mining and the actions that the institution is undertaking to control environmental impacts of mining-related activities. Given the tense political atmosphere that was evident in May, the UEP in Quito ordered an inspection of IAMGOLD's concessions, overriding the earlier denial.¹⁵

The inspection was conducted in early May and recommended that water samples be taken with community participation and sent to two different laboratories in order to crosscheck results. The laboratory results were processed by ETAPA and highlighted in the newspaper articles. But after a month and a half, the Undersecretary of Environmental Protection had not followed-up on the results with all community and water-board leaders, thereby provoking the protest in front of DIREMI.

Two days after the DIREMI protest, a group of community members went to the páramo to do their own inspection of the mine site. They wanted to see for themselves what the company

was doing. The entrance of the mine site was blocked by a large contingent of IAMGOLD supporters from San Gerardo. IAMGOLD representatives and local officials, including then parish council president of Victoria del Portete Esteban Ortiz, were present and, according to some, accompanying IAMGOLD in its trimester water testing. Arguments among the different actors present ensued. Confrontations at the páramo heightened anger and indignation among local residents. Some felt betrayed. They perceived that local authorities, who had initially supported the initial protest efforts, were now siding with IAMGOLD.

A few days later, the farmers decided to take action. As I described at the beginning of this article, farmers held Ortiz captive and shut down the public functioning of the parish government office for approximately three years until new elections were held. Ortiz affirmed that he was participating in IAMGOLD's periodic water monitoring project which revealed that IAMGOLD was not contaminating the local water supply.¹⁶ He pressed charges against 18 farmers for attempted murder.¹⁷ In the following months, Ortiz and the rest of the parish council were forced to meet in secret but continued to maintain their links to IAMGOLD. The UEP, sent its Environmental Management Unit (UAM, by its Spanish acronym)—created under neoliberal reforms—to mediate relationships with the company and opposition leaders.

On June 28th 2006, members of the water boards, environmental committees, and a local authority from Victoria del Portete and Tarqui met with the UAM. Opposition leaders once again denounced the Ministry of Energy and Mines and its environmental units, for their lack of accountability. They argued that Victoria del Portete has traditionally lived from dairy farming and that mining activity posed a threat to this form of livelihood. In fact, leaders from the opposition movement affirm that Victoria del Portete produces approximately 200,000 liters of milk per day, of which 25,000 liters are sold to Ecuador's most important yogurt company, *Toni*.¹⁸ The following day, on June 29th, in a final effort to quell tensions, the company and state agreed to take another water sample the following day with opposition leaders.

The laboratory results were interpreted in different ways by the actors. Macias insisted that the results of the water samples showed an elevated presence of lead in the effluents of the Irquis River where the second phase of IAMGOLD's exploratory work was being carried out. In a technical report that Macias prepared, he noted that the water samples show 200 mg/l of lead per liter of water.¹⁹ In contrast, the UAM affirms that water used by IAMGOLD for its drilling activity did have some cloudiness and turbidity but that through their water treatment process, the water quality would be restored to the permissible limits established by environmental legislation.²⁰

The different interpretations seem to point to the ambiguity in the lab results. The laboratory where the water samples were taken has a detection limit of 200 µg/l of water. This means that the laboratory could only analyze lead levels above 200 µg/l of water. The laboratory results established that the amount of lead in the water sample fell below 200 µg/l, but because of its technical limitations, could not identify whether or not this was above or below 50 µg/l limit established as safe for human consumption by Ecuadorian legislation.²¹ Moreover, the laboratory report disclosed a

¹⁶ El Mercurio, "Exigen renuncia de autoridad parroquial," June 20th, 2006.

¹⁷ El Mercurio, "Presidente de Junta Parroquial condena acción de sequestro," April 5th, 2007.

¹⁸ Interview, Juan Carlos Serrano, March 25th, 2010 and Macias, Benjamin "Proyecto Minero Quimsacocha," March 26th, 2007. Unpublished paper.

¹⁹ Macias, Benjamin "Proyecto Minero Quimsacocha," March 26th, 2007. Unpublished paper.

²⁰ Memorandum No. 1963-DINAMI-UAM, dated July 19th 2006.

²¹ "Informe de ensayos No. 7628-C-02," July 11th, 2006

¹² "Manifiesto a la Ciudadanía: Ni todo el oro del mundo vale una gota de agua," dated May 3rd, 2006.

¹³ El Mercurio, "Disvirtúan contaminación del agua con plomo," May 6th, 2006.

¹⁴ Memorandum No. 295-DIREMI-2006, dated June 16th, 2006.

¹⁵ Memorandum No. 177-DEREPA Azuay-2006, dated May 3rd, 2006.

20% error margin for its lead tests. The ambiguity of these laboratory results stoked rather than settled any disputes over contamination.

For soil samples taken, the laboratory findings suggested that the samples did show an elevated presence of hydrocarbons and oil and grease levels (related to the operation of a water pump). The state interpreted these results to fall within the permissible limits for remediated soils. The state report suggested that this was “temporary contamination” that “does not constitute any risks”.²² The UAM did conclude that IAMGOLD should “avoid potential [soil contamination] by a strict adherence to the measures of prevention, control, and contingency” (see footnote 22). Furthermore, the UAM reported that it would coordinate the participation of affected communities in an oversight and environmental monitoring program to be established by IAMGOLD.

While neoliberal reforms opened up nationally protected forests for mining extraction and expanded environmental regulations to regulate the various phases of mining activities, these regulatory agencies and procedures fall short of effectively dealing with community claims of contamination. In this case, dairy farmers were redirected back to company funded oversight programs as a way to resolve conflicts, which further animated the conflict. Shortly after the state released its report, Macias and other leader cut ties with UAM and IAMGOLD and radicalized their opposition movement against the mine.

Expanding connections and consolidating alliances

UAM and IAMGOLD did not succeed in establishing a broad-based community participation in an oversight committee. Julio Loza, the elderly dairy farmer, believed that IAMGOLD had paid off scientists and state representatives. In regards to farmers' water studies, Loza says “everything was done right; it's just that they took the company's money.”²³

Not all residents of Victoria del Portete agreed with Loza. By the beginning of 2007, Ortiz, who had been participating in IAMGOLD's water testing program, signed an agreement with IAMGOLD in which the company promised to co-finance and provide technical assistance to carry out the parish's development plan.²⁴ IAMGOLD community relations manager maintained that its role was to be simply “another citizen” by working with local authorities.²⁵ Yet, set within the context of the debates over the contamination, it appeared that IAMGOLD's community relations approach instantiated the authority of a severely questioned and embattled local institution, adding to the complexity of the conflicts.

Science enabled IAMGOLD to establish collaborations with local authorities as well as university scientists. During the course of the conflict, IAMGOLD signed a contract with a reputable scientific program housed in a public university to develop a baseline hydrology study. Joaquin Saldaña, director of a program on water and soil at the University of Cuenca, explained to me that the contract with IAMGOLD has enabled his research team to conduct an intensive investigation on páramo soils and water. With financing from IAMGOLD, his research team has placed more than 30 sensors to monitor fog, precipitation, water flow, variation in water pH, among many other hydrological aspects.²⁶ They have also discovered a 200 year old polylepsis forest.

For Saldaña, IAMGOLD's funding has enabled his team to pay for expensive equipment needed to carry out scientific research

on the páramo hydrology that the University of Cuenca, a public institution, would have otherwise never been able to afford. Such research has enabled his team to publish and present academic papers at international conferences. Although some dairy farmers believe that IAMGOLD has ‘bought off’ his research team, he contended that IAMGOLD did not interfere with the publication of their scientific studies. In addition, he pointed out that his team has carefully chosen to use a laboratory that is able to detect permissible limits. He explained: “we are the first defenders of this water, if something should happen here, we will know first, we are the ones that are monitoring it”.²⁷

By the time of my arrival in the field in 2008, IAMGOLD had renewed its contract with the University of Cuenca and signed a contract with biologists from the University of Azuay to conduct a baseline biological study. The head biologist for the program spoke of the possibility of training rural residents in biological monitoring and of creating a university graduate program in environmentally sustainable mining techniques to develop mitigation practices that are adapted to the specific environmental contexts of the region.²⁸

As IAMGOLD's use of science enabled connections with authorities and scientists, Macias, dairy farmers, and water board leaders continued to organize themselves against IAMGOLD and its exploration work. Dissatisfied with the way that the state handled the conflict, the groups began to organize protests. In November of 2006, they staged a road blockade that prevented *Victorienses* from voting in the second round of presidential elections protesting the unwillingness of the provincial electoral tribunal to depose Esteban Ortiz from the presidency of the parish government. By January of 2007, the farmers joined other farmers across the country who also feared that mining development was going to threaten local natural resources. A three day meeting and a march was organized with the participation of urban intellectuals and environmentalists. The meeting resulted in the formation of a national movement against large-scale metal mining called the National Coordinating Committee for the Defense of Life and Sovereignty. The final declaration read: “The people demand that the State and Government declare Ecuador free of large scale and open pit mining. This implies the declaration of all mining concessions as null and void [and] the immediate cessation of transnational mining companies and their subsidiaries”.²⁹

Water continued to be the most pressing point for farmers in Victoria del Portete. As a result of IAMGOLD's exploratory work, the company determined that a deposit of 2 million ounces of gold was situated within the small area between two effluents of the Irquis River.³⁰ After staging a march in June of 2007, water board leaders were able to negotiate with the state the conservation of 3220 ha of wetlands in the páramo but left out the effluents of the Irquis River (see Moore and Velásquez, forthcoming). Marches and protests against IAMGOLD's operations as well as new state policy under President Correa to expand mining development continued through 2007, 2008, and 2009. By early 2010, Macias and water board leaders established an alliance with the national indigenous movement lead by CONAIE (the Confederation of Indigenous Nationalities in Ecuador) and successfully derailed a water bill that had implications for mining development. Farmers and water board leaders also turned to legal tools to safeguard farmers' access to water. As IAMGOLD tried to secure the right to use and draw from local rivers and watersheds, the farmers filed counter-claims in SENAGUA, the

²² Memorandum No. 1963-DINAMI-UAM, dated July 19th 2006.

²³ Interview, Julio Loza, August 30th, 2009.

²⁴ “Convenio de Cooperación Inter-institucional” Parish of Victoria del Portete and IAMGOLD, dated February 23rd, 2007.

²⁵ Interview, Xavier Terán, November 29th, 2007.

²⁶ Interview, Joaquin Saldaña, March 9th, 2009.

²⁷ Ibid.

²⁸ Interview, January 20th, 2009.

²⁹ “Declaración del Encuentro de los pueblos por la vida,” January 2007.

³⁰ Iamgold News Release, “Quimsacocha Gold Mine Development” Aug 7th 2008.

National Secretariat of Water to stop the adjudication of IAMGOLD's water rights.

Conclusion

On a cold evening in June 2009, at the parish communal house, men and women hugged tightly, jumped up and down, laughed, whistled, and shouted, "We won! We Won!" Benjamin Macias' light skin turned crimson. After a gripping race, Macias won the elections for parish president. Macias had won double the number of votes of Esteban Ortiz. This seemed to be a definitive win against IAMGOLD. That night, Macias spoke directly against the claims of IAMGOLD and the local authorities that blamed farmers for water contamination; "we cannot continue to be marginalized by the authorities of Cuenca who say that 'the farmers are the destructors of natural resources,' or 'the farmers are destroying the water,' to the contrary, comrades."³¹ He promised to confront authorities as well as parish council members that supported multinational mining interests. Once in power, the continued concern over water enabled Macias to create a partnership with the municipality of Cuenca to carry out environmental conservation initiatives to co-manage the Irquis River watershed. This demonstrates that the tensions and collaborations in disputes over water and mining contamination are never fixed or stable.

In this article I have argued that when science is used in environmental conflicts, the challenge is not to determine whose science is right, but understand what science does. I have presented a case in which dairy farmers, IAMGOLD mining company, state authorities, and parish authorities have disputed three different water quality studies. In doing so, I have demonstrated that science has worked as a 'mediator,' transforming and structuring a public debate over the effects of mining exploration on water resources. Scientific studies enabled collaborations and conflicts between and among the different actors to emerge with lasting consequences on the nature of community–corporate relationships. Most significantly, science enabled dairy farmers to jumpstart a local anti-mining movement, elect local government leaders, and form part of a massive nation-wide political movement in defense of 'life,' which demands that local communities be consulted before large-scale metal mining in community watersheds or lands take place.

IAMGOLD's trimester water studies were the first set of water studies in question. Although these studies are legally mandated by law, they were deployed in such a way that effectively established positive relations between IAMGOLD, the local parish authorities in San Gerardo and in Victoria del Portete, and municipal authorities in Cuenca. Legally mandated studies became part of IAMGOLD's broader CSR programs when it was used to form relations with and support some community authorities. Moreover, IAMGOLD expanded its relations in the city of Cuenca by signing various contracts with scientists from a public and a private university.

However, a small group of mid and large-scale dairy farmers used a second set of water studies that enabled these farmers to establish an unprecedented political alliance among a diverse set of farmers that vary across ethnicity and access to water, land, and markets in opposition to IAMGOLD's activities. In contrast to IAMGOLD's trimester reports that established high levels of fecal contamination due to local dairy farming, the farmer's water study revealed lead contamination of their water sources. They attributed this increase in lead as an adverse effect of IAMGOLD's exploratory work. The second set of water studies shifted the

nature of water contamination from fecal matter to lead contamination and the responsible party from dairy farmers to IAMGOLD. This set of studies also shifted the "work" of science from CSR to a political organizing tool.

A third set of studies were undertaken by the environmental unit within the Ministry of Energy and Mines. Dairy farmers staged protest to pressure state authorities to regulate and oversee IAMGOLD's exploratory work. By that time, it was evident that the relations between dairy farmers, parish authorities and IAMGOLD were beyond repair. Rather than resolve the question of contamination, the third set of studies stoked local controversies over whether or not IAMGOLD was responsible for lead contamination. The laboratory used to process the new set of water samples did not have the technical capacity to measure permissible limits of lead. The final report by the state stated that IAMGOLD was effectively treating water, while dairy farmers insisted that the studies revealed lead contamination.

Overall, this case study demonstrates three key aspects of mining conflicts. First, water impacts are the primary way in which Andean farming communities dispute the extent to which a mining company lives up to its claims of sustainability and environmental protection. Second, legally mandated scientific studies can be deployed in ways that extend our common notions of corporate social responsibility. They can be used as a springboard to secure a collaborative relationship with local communities in environmental oversight programs. Yet, the studies can also be used to dispute the meaning and practices of 'sustainability'. Science enables actors to 'visibilize' certain elements over others and thereby transforming the debates over contamination and shifting political alliances. Third, the neoliberal legal reforms to the mining law in 2000 expanded environmental regulatory agencies and measures but in a moment of conflict over contamination, these agencies, whether due to corruption, internal disputes, or by its very own structural limitations, animated rather than ameliorated the conflict.

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