Water, Extractavism and Social Conflict: A Guide for the Interested and the Concerned

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Water as Life

In communities across Latin America, from Ecuador to Argentina, the slogan is the same, “el agua vale más qu'el oro.” Water is more important than gold. The slogan speaks to an important fact about the recent wave of mining conflicts that have been affecting communities, both in Latin America and throughout the world, since the 1990's. Increasingly mining conflicts, long associated with strikes and fierce battles over unionization and nationalization, are becoming conflicts over water.[1] In countries such as Chile and Peru, there has been considerable mobilization by civil society to protect water resources, which have come under threat, with mining the main driver of these conflicts.[2] [3] In fact most mining conflicts involve water in some dimension, with use and control an integral part of the operation of a modern mine.[4] However, water conflicts as they relate to mining are multi-dimensional, with mining affecting waterways in a variety of ways depending on the local ecology and the type of the mining. This report does not attempt to be exhaustive and understand all of the different inter-relations between water and mining but rather provide an overview of the different effects mining can have so as to give an idea of this interrelationship in communities across Latin America. In particular it will look at the water uses of a modern open pit mine, the problems of contamination and acid mine drainage (AMD), mining and water scarcity, mining's impacts on glaciers, the connection between mining and hydroelectric conflicts and the ways in which communities have mobilized to defend their water from mining extractivism. The report also includes a reader, linked to other articles to provide a more developed overview.

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1 Bebbington et al. “Contienda y ambigüedad: minería y posibilidades de desarrollo.” *Debate Agrario.* Vol. 44.
2 “Conflictos por el Agua en Chile: Entre los Derechos Humanos y las Reglas del Mercado.” *Programa Chile Sustenable.*
3 Bebbington and Williams. “Water and Mining Conflicts in Peru.” *Mountain Research and Development.* 28:3.
4 Chaparro Ávila “Los processos mineros y su vinculación con el uso del agua.” *CEPAL.*

Water uses of a mine

The water uses of a modern open pit mine are enormous. Water is used both in the mining process itself as well as later in the transporting and processing of minerals, with an open pit mining such as the proposed Cerro Casale project in Chile using as much as 900 litres of water a second.[5] Thus securing access to water becomes crucial to a mine's successful operation.[6] The impacts of this water use is often highly regional in nature, therefore in a country like Peru, where mining only makes up between 2% to 5% of the country's total water usage.[7] In regions with high levels of mining activity water usage by the mining sector can be significantly higher, fueling local conflicts.[8] As will be discussed later this high water use can serve to severely exacerbate pre-existing water scarcity.

Mining and Water Scarcity

According to the Tyndall Centre for Climate Change Research, Peru is world's third most vulnerable country to the effects of climate change, with the loss of water reserves in the country's Andean highlands making it the most water stressed country in South America.[9] As luck would have it then, Peru is also in the middle of a mining boom, as the liberalization of the country's mining sector in the 1990's has lead to a dramatic expansion of foreign investment in the sector[10] which now accounts for 60% of export earnings.[11] As of 2011, 20.3% of the national territory was covered by mining concessions [see Appendix I][12] with more than 60% of water sources in the country affected.[13] As mining occurs mainly occurs in the Andean highlands, where the headwaters of many rivers are

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5 "Proyecto minero Cerro Casale." *INDH.*

6 Budds and Hinojosa-Valencia. "Restructuring and rescaling water governance in mining contexts: the co-production of waterscapes in Peru." *Water Alternatives.* Vol. 5:1.

7 *Isid.*

8 *Isid.*

9 Bebbington and Williams. "Water and Mining Conflicts in Peru." *Mountain Research and Development.* Vol. 28:3/4.

10 Bury. "Livelihoods, Mining and Peasant Protest in the Peruvian Andes." *Journal of Latin American Geography.* Vol. 1:1.

11 Cespedes and Taj. "Peru rolling back indigenous law in win for mining sector." *Reuters.com.* 2013.

12 "Concesiones mineras y conflictos sociales en el Perú." *Cooperacción.*

13 Amancio. "Minería usa más del 60% de las fuentes de agua." *El Comercio.* 2011.

located, the effects for communities downstream are significant.[14] Mining places additional strain on already water stressed communities by severely affecting the quality and quantity of the water available, undermining traditional livelihoods dependent on these resources, such as agriculture and herding.[15]

Contamination and Acid Mine Drainage

One of the most important aspects of the relation between mining and the water supply is the risks posed by contamination, in particular Acid Mine Drainage (AMD). An open pit mine, entails the removal of vast quantities of waste rock, with a medium sized mine generating several hundred million tonnes of it.[16] These rocks are often rich in sulfides (primarily iron sulfide)[17] particularly in porphyry type deposits associated with many gold and copper mines.[18] Upon exposure to water and oxygen, the sulfides in these rocks are metabolized by a variety of bacteria, accelerating the oxidization of metals in the rock such as iron, arsenic, copper, lead and zinc, and lowering the pH.[19] This produces an acidic runoff with pH's as low as -3.6[20], causing further leaching of heavy metals into the water supply.[21] The effects of this contamination can be highly hazardous to human health.[22] In the case of Gold Corp's San Martín mine in Honduras improper disposal of mine waste lead to the leaching of heavy metals into the local water supply.[23] The effects on the community have been devastating, with residents complaining of adverse health effects ranging from skin illnesses, birth deformities to abnormally high cancer rates,

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14 Bebbington and Williams. “Water and Mining Conflicts in Peru.” *Mountain Research and Development.* Vol. 28:3/4.
15 Bury. “Livelihoods, Mining and Peasant Protest in the Peruvian Andes.” *Journal of Latin American Geography.* Vol. 1:1.
16 “Two Million Tonnes a Day: A Mine Waste Primer.” *MiningWatch Canada.*
17 Akcil and Koldas. “Acid Mine Drainage (AMD): causes, treatment and case studies.” *Journal of Cleaner Production.* Vol. 14.
18 *Isid.*
19 *Isid.*
20 McLemore. *Basics of Metal Influenced Water.*
21 Akcil and Koldas. “Acid Mine Drainage (AMD): causes, treatment and case studies.” *Journal of Cleaner Production.* Vol. 14.
22 *Isid.*
23 Amezaga and Jarvis. “Technical review of mine closure plan and mine closure implementation at Minerales Entre Mares San Martin mine, Honduras.” *Caritas/CATHOD.*

which they attribute to Gold Corp's contamination of local waterways.[24] The effects of AMD may vary substantially depending on geographical and climatic conditions[25] with regions of intense seasonal rainfall, such as the case in Honduras, particularly affected.[26] Whats more, the effects of AMD are chronic and endure long after the mine is closed, with Roman mines in Jordan still leaching heavy metals into the environment, more than a millenia after their closure.[27] Dumping of toxic waste from mining can also seriously degrade fresh water bodies, making them nonviable for humans and fishes a like. Since a revision to the *Fisheries Act* by the Canadian government in 2002, it was be legal for mining companies to reclassify lakes and rivers as tailings impoundment areas, allowing mine waste to be dumped.[28]

Mining and Glaciers

While destruction of water resources due to over exploitation and contamination, may seem to be the most obvious link between water and mining, there are a number of ways in which mining affects local hydrology. One example is the impacts of mining on glaciers. In the Argentinian province of La Rioja, an expansion of mining development had had a significant impact on the region's glaciers. Located high in the Andes the province is home to a number of important glaciers which are increasingly threatened by mining development.[29] In particular the construction of roads, which often cut through glaciers as well as the deposition of dust and black carbon from road construction and traffic, decreasing the glacier's reflectiveness, have lead to increased glacial melting.[30] There are also concerns about the contamination of glaciers, which form the headwaters of many of the region's river

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24 "Verdict." *Health Tribunal: In the case of GoldCorp vs. Mining affected Communities.*
25 McLemore. *Basics of Metal Influenced Water.*
26 Amezaga and Jarvis. "Technical review of mine closure plan and mine closure implementation at Minerales Entre Mares San Martin mine, Honduras." *Caritas/CATHOD.*
27 Grattan and Pyatt. "Some consequences of ancient mining activities on health of ancient and modern human populations." *Journal of Public Health Medicine.* Vol. 23:3.
28 "Canada's Valuable Fresh Water is Not for Dumping Toxic Wastes." *MiningWatch Canada.*
29 Brenning, Martini and Milana. "Los Glaciares y la Minería de la Provincia de la Rioja." *CEDHA.*
30 *Ibid.*

systems, from acid mine drainage and cyanide spills.[31] Despite efforts by communities and activists to implement a law to protect the glaciers, little has been done, with the governor of La Rioja, going as far to deny the existence of glaciers in the province.[32] Even more absurd is the case of the recently suspended Pascua Lama project in neighbouring Chile, in which the company Barrick Gold, has proposed the moving of two glaciers so as to develop its mine.[33] Despite repeated calls to do so by aboriginal and environmental groups, the law has not been repealed.[34]

Water and Energy: The Hydroelectric Connection

Other than water, the other major input for a modern open pit mine is energy. A large mine can consume as much as 71 000 kilowatt hours for every kilotonne of ore that is mined; with a project mining as much as 60 million tonnes a year.[35] This can often put a huge strain on a country's energy consumption. In Chile for example, mining accounts for 33% of the country's energy consumption, the largest single user, with mining in the north of the country accounting for over 80% of consumption.[36] As the mining industry expands so does demand for energy. This has lead to the reshaping of waterways, far from the site of the mine itself as a new source of energy is exploited: hydroelectricity. As Latta and Williams report prepared for the *Council of Canadians* explains, Chile's expansion of mining in the north has lead to a parallel expansion of hydroelectric projects in the south, most notably the highly controversial Aysén project, which was the cause of nationwide protests in 2012.[37] The project is predicted to have a serious adverse effects on the local ecosystem, reducing biodiversity and undermining traditional livelihoods.[38] The development of hydroelectric projects in the south, will also mean the construction of an energy corridor to get the power to where it is needed, the mineral rich

31 *Ibid.*
32 *Ibid.*
33 "Proyecto minero de Pascua Lama." *OLCA.*
34 *Ibid.*
35 "Benchmarking the Energy Consumption of Canadian Open-Pit Mines." *Natural Resources Canada.*
36 "Distribución y consumo energético en Chile." *Chile INE.*
37 Latta and Williams. "Chilean Patagonia in the Balance: Dams, Mines and the Canadian Connection." *Council of Canadians.*
38 *Ibid.*

north in what is being described as a 2300 km clear cut.[39] Thus through its enormous energy needs, the effects of a mining economy on local water systems can extend far beyond the site of the mine itself.

El agua vale mas qu'el oro: Water and Social Conflict

The story of mining conflicts in Latin America today is the story of water, as communities come together to defend the watersheds that provide so much of their livelihood from mining expansion. For each of the issues above you can find dozens of cases in which communities have resisted mining development and attempted to regain control of their water resources. In Honduras and Guatemala, attempts by communities to hold Gold Corp accountable for the contamination caused by their San Martín and Marlin mines respectively, have attracted international attention.[40] [41] In the Andes, conflicts over water have led to a nationwide movement demanding for greater protection of water resources[42] as well as government repression of anti-mining activists.[43] In the case of Pascua Lama, citizen concerns over glacier destruction and the impacts on the local water supply helped lead to the temporary suspension of the project[44] while in countries such as Chile and Panama, concerns over mining and hydro dams have already lead to massive nationwide protests.[45] [46] Across Latin America the movement in defence of water and against mining is growing. As water begins to emerge as one of the principal causes of social conflict in the world, especially in the era of anthropogenic climate change, communities across the continent are finding themselves at the front lines of the protection of the planet's most important resources.[47]

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39 *Ibid.*
40 "Verdict." *Health Tribunal: In the case of GoldCorp vs. Mining affected Communities.*
41 "GOLDCORP IN GAUTEMALA: Seven Years & No End In Sight to predictable harms, violations, impunity and profits." *Rights Action.*
42 "Peruanos muestran mayor preocupación por uso responsable del agua." *Andina.*
43 "Continúa la represión a la protesta antiminera en Perú." *OLCA.*
44 Cambero and Esposito. "Pascua-Lama halt carries repercussions for Argentina, Chile." *Reuters.com.*
45 Latta and Williams. "Chilean Patagonia in the Balance: Dams, Mines and the Canadian Connection." *Council of Canadians.*
46 Meléndez. "Cesan las protestas indígenas en Panamá tras pactar con el gobierno." *El País.*
47 Conca. "The New Face of Water Conflict." *Woodrow Wilson International Center for Scholars.*

Annex I-Petroleum and Water

While this report mostly considers the relationship between water and mining, the effects of other extractive activities on water bodies, most notably petroleum extraction are very similar. Large oil spills, such as the 1500 million barrels of oils dumped by Texaco in the Ecuadorean Amazon, can have devastating ecological effects, rendering vast areas completely unliveable.[48] As well as direct contamination, Texaco's operations used as much as 200 000 litres a day and cleared over a million hectares of forest, severely disrupting the ecosystem of the surrounding watershed.[49] In total, Esperanza Martínez of Acción Ecológica estimates Texaco owes Ecuador an ecological debt of 709.220 million dollars for the destruction their operations caused.[50] Similar concerns over water contamination persist with non-conventional sources of hydrocarbon extraction such as shale gas fracking and bitumen extraction. The leeching rate of water from tailings ponds at the Athabasca Tar Sands has been estimated to be in the order of millions of litres a day prompting serious health concerns for downstream communities.[51] Other impacts include the heavy water uses of the operations themselves, with operations diverting up to 349 million cubic metres a year, as well as further contamination of surrounding waterbodies due to the emissions of Nitrogen Oxides (NOx), Sulphur Oxides (SOx) and volatile organic compounds (VOC's) into the atmosphere.[52] Of even greater concern is the effects of shale gas extraction on water sheds. Groundwater contamination from methane released during the fracking process as well as from the chemicals used to liberate the gas can pose serious health risks, with leaching from tailings ponds poses an important secondary risk.[53] In Nova Scotia, waste water containment methods have proved insufficient leading to significant leaking of toxic wastes, leading to a call for a moratorium on fracking, an initiative supported by over two-thirds of Nova Scotians.[54]

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48 Martínez, Esperanza. “¿Cuánto debe Texaco a Ecudor” *SERVINDI.*
49 *Ibid.*
50 *Ibid.*
51 Carter, Angela V. “Regulating the Environmental Impacts of Alberta's Tar Sands.” *Buffet Centre.*
52 *Ibid.*
53 “Safety First, Fracking Second.” *Scientific American.*
54 Patterson, Brent. “Fracking wastewater leacking in Nova Scotia, calls grow for a ban on fracking.” *The Council of Canadians.*

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3. “Concesiones mineras y conflictos sociales en el Perú.” *Cooperacción.* 2012.
4. “Verdict.” *Health Tribunal: In the case of GoldCorp vs. Mining affected Communities.* 2012. http://healthtribunal.org/the-final-verdict/
5. “Proyecto minero Cerro Casale.” *INDH.* 2012.
6. “Two Million Tonnes a Day: A Mine Waste Primer.” *MiningWatch Canada.* December 2009.
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8. “Continúa la represión a la protesta antiminera en Perú.” *OLCA.* Mayo de 2012. http://olca.cl/articulo/nota.php?id=101847
9. “Proyecto minero de Pascua Lama.” *OLCA.* 2013. http://www.olca.cl/oca/chile/pascualama.htm