

Background

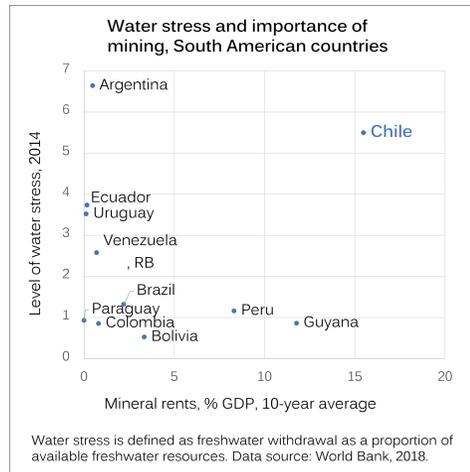
Global expansion of mining and impacts of climate change are contributing to conflicts over water

This is clearly evident in Chile

The country is highly dependent on copper mining in and around the world's driest desert, the Atacama. The National Institute of Human Rights lists 14 socio-environmental conflicts in Chile in which the "productive sector" is mining, and the "human rights involved" are related to water (INDH, 2018).

Conflicts over water are hydrosocial

They are a result of both environmental (hydrological) and human (social/political) factors (see Linton and Budds, 2014).



Project objective:

This dissertation project examines how grassroots communities in Latin America are affected by the converging impacts of mining and climate change on local water resources.

Research Questions

1. How does cooperation among communities, companies, and policymakers affect the management of water resources and hydrosocial conflict?
2. How and why have new water-management technologies like desalination been employed to resolve conflicts, and with what effect?
3. How does this cooperation and technological development differ between mining projects directed by state-owned and private companies?

Case study sites

Site	Recent water conflict	Cooperative measures	Desalination plant	Ownership	Source of conflict
Mina Escondida	✓	✓	✓	Private international	Scarcity
Mina Pelambres	✓	✓	Planned	Private domestic	Flooding, scarcity, contamination
Mina Andina	✓	✓	✗	Public	Glaciers, scarcity, contamination

Source for map country and regional boundary lines: "DIVA-GIS," 2011. Image sources: BHP, 2019; Los Pelambres, 2019; CODELCO, 2019.

Hydrosocial Flow

Climate change and community relations in Chile's mining regions

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Methods

1. GIS analysis of relationship between climate change and mining in Chile.
2. Survey and/or semi-structured interviews among 26 national-level experts in Santiago (three of these also included in #3).
3. Semi-structured interviews with 55 stakeholders representing communities, companies, or government institutions in case study sites.
4. Focus groups in each case study site and in Santiago.

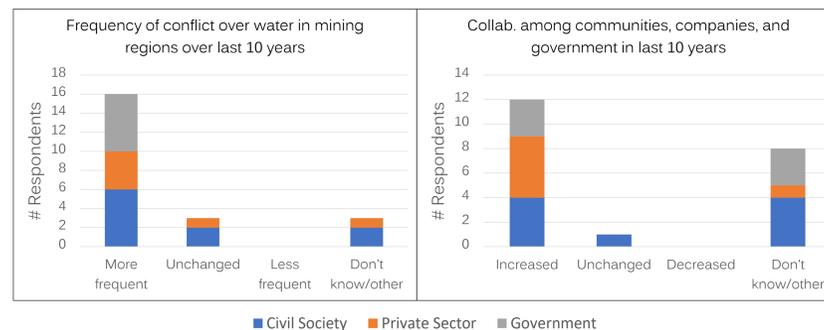
Methods 2-4 were carried out during a year of fieldwork in Chile.

Results and Discussion

Climate change is likely to affect Chile's mining regions

Spatial analysis suggests that most of Chile's mines may experience an increase in average annual temperature of between 1 and 3 degrees C by 2050 under RCP 4.5, as well as slight increases in precipitation (Odell, Bebbington, and Frey, 2018).

National-level experts perceive hydrosocial conflict and collaboration to be increasing



Common efforts to address hydrosocial concerns may transfer them to more vulnerable communities

"A concern has arisen [here] because... [protest] movements are created above, and a solution to the side. This is like saying, I have a problem in my house, but the neighbors have the solution."

- Member of a coastal community discussing hydrosocial relations with a community nearer the mine

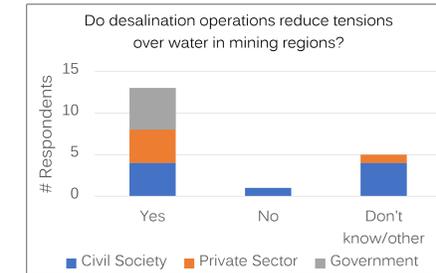


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Unless investment in the source of the conflict is abandoned altogether, efforts by companies and communities to resolve hydrosocial problems may simply move or transform them: a process I refer to as **hydrosocial flow**. Whether and how this occurs depends on several factors:

- Geographical constraints:** Suitability requirements determine where infrastructure like a tailings dam or desalination plant may be built.
- Downstream dynamics:** Sources of conflict tend to follow the flow of water and the movement of minerals to ports.
- Feasibility:** Economic, political, and technical constraints limit the range of options for movement or transformation of sources of conflict.
- Relations of power:** Power disparities exist between companies and communities, and between different communities. The latter may be due to factors including economic status, political influence, historical race relations, population size, location, and negotiation experience.

Experts are optimistic about the use of desalination in mining, but it may be a prime case of hydrosocial flow

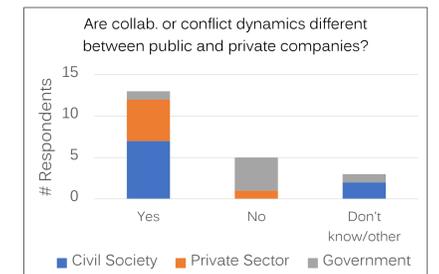


Following the four dynamics listed above, desalination may simply transfer water concerns near the mine to the coast, where they may transform into challenges related to energy and sustainability of marine environments and livelihoods.

Hydrosocial flow may be intensified when the mining company is state-owned

Interviewees indicated two possible reasons for this:

1. CODELCO, the National Copper Corporation of Chile, may justify individual socioenvironmental harms by providing "the wage of Chile" as a whole.
2. CODELCO may have less flexibility to spend money on community relations.



Implications of the project

Intellectual Merit

- Offers new understanding of power dynamics in socio-environmental conflict: community empowerment may be uneven, contributing to further harms to the most vulnerable.
- Demonstrates the importance of considering distinct stakeholders and hydrosocial resources (such as glaciers and oceans) linked by mining.

Broader Impacts

- Calls for greater communication by companies, governments, and communities with distant and diverse populations affected by a mine, including through existing EIA and SEA processes.
- Draws attention to the need for greater long-term consideration of climate change in community relations over water in mining regions.

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