

Lithium supply development in Argentina



Bernardo Parizek & Simon Catchpole

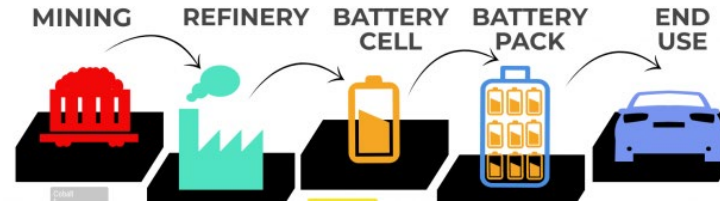
Impacts and Risks of Lithium and Rare Earths supply chain

Argentina

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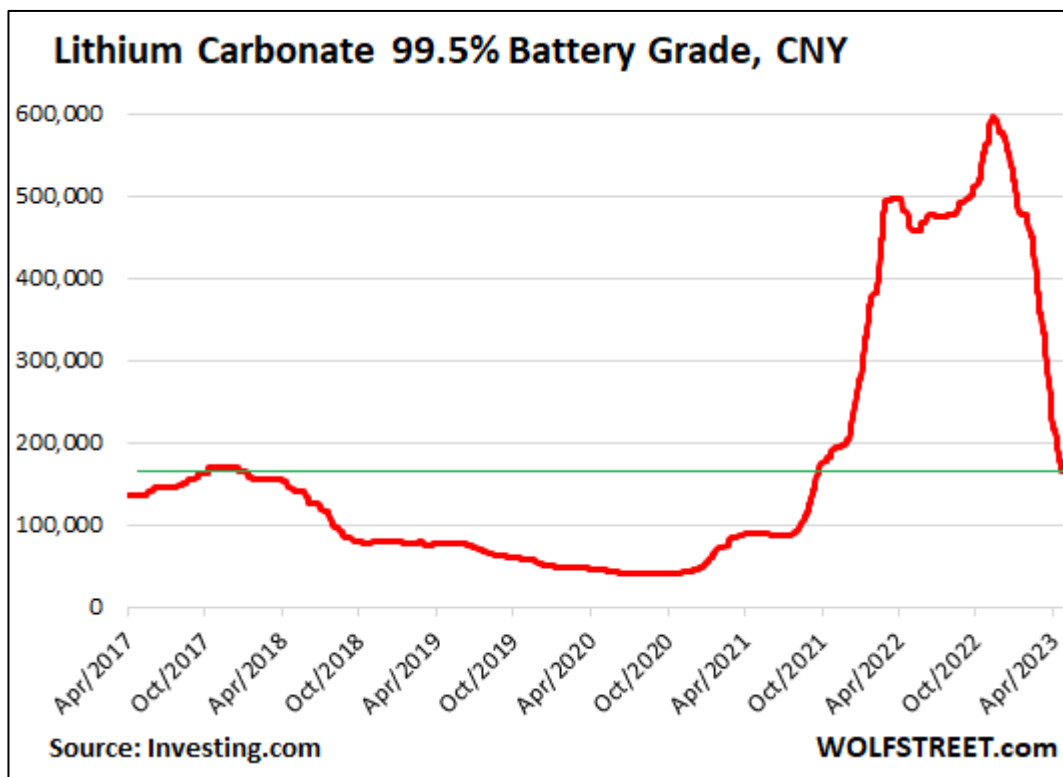
This presentation is about



1. The importance of Lithium for our society
2. Where lithium is found in the world and in South America
3. How lithium is concentrated in the Puna salt flats
4. How lithium is extracted
5. What effects/impacts does lithium mining have?
 - Communities
 - Fresh water
 - Biodiversity
6. What studies are necessary to mitigate the negative impacts and understand these systems in the long term?



Lithium is an essential ingredient in the most versatile electrical batteries. However, fluctuations of supply and demand have generated huge price variations, as shown in this graph of lithium price per ton, in Chinese Yuan (USD 1= CNY 17).



LITHIUM PRODUCTION BY COUNTRY

1995-2020

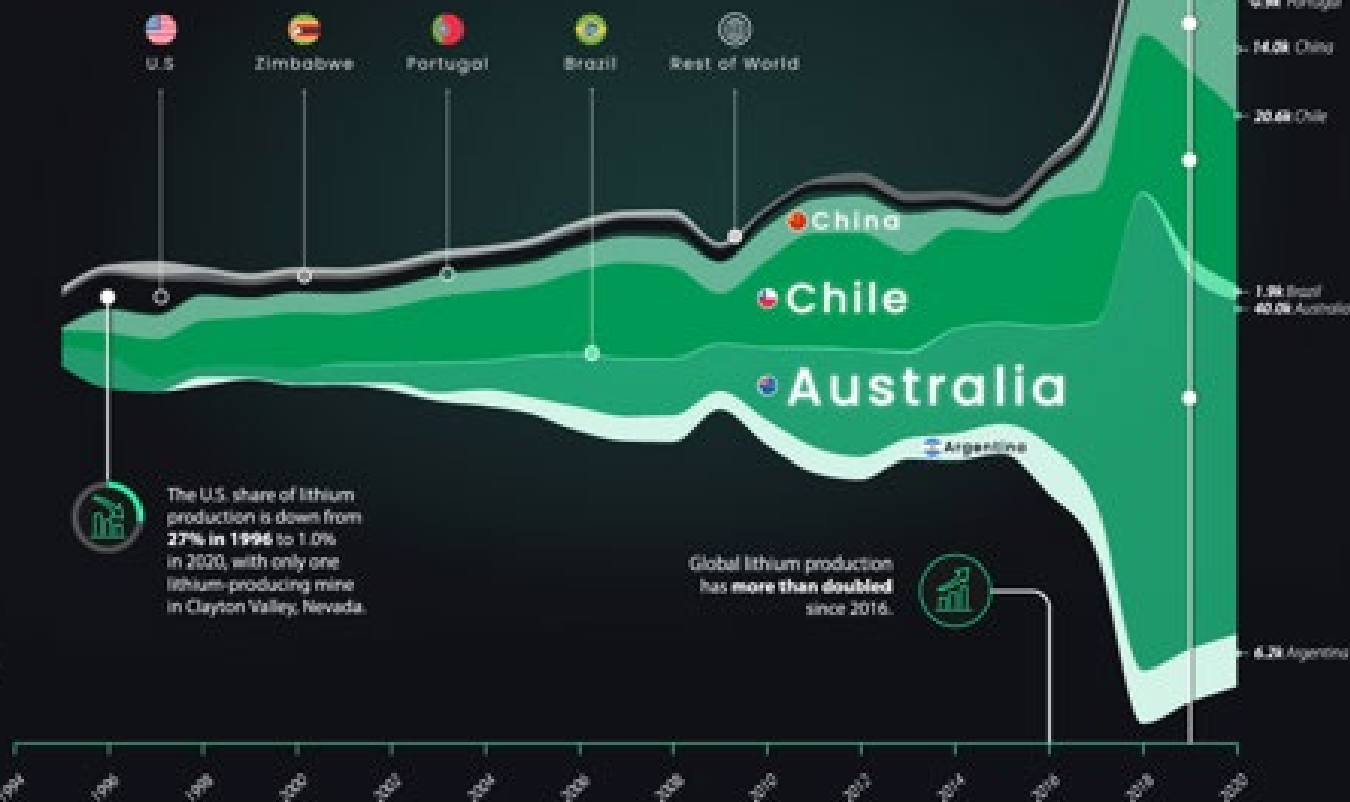
Increasing adoption of electric vehicles (EVs) and energy storage technologies has fueled a global boom in lithium production.

Here's a historical look at lithium production by country.

Mine Production of Lithium (tonnes of lithium content)

2020 Global Production
86,300 tonnes

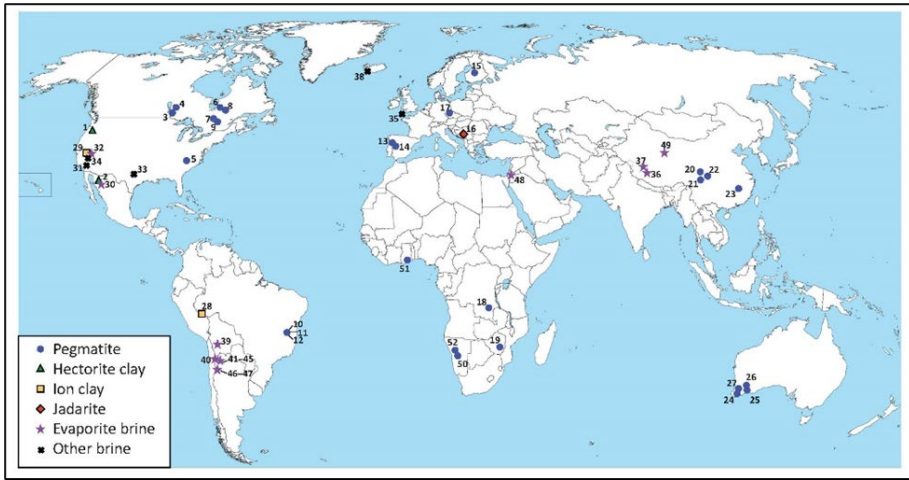
Australia, Chile, and China accounted for 86% of worldwide lithium production in 2020.





We ask ourselves:
*what are the social
and environmental
effects of this new
dependency on
lithium?*

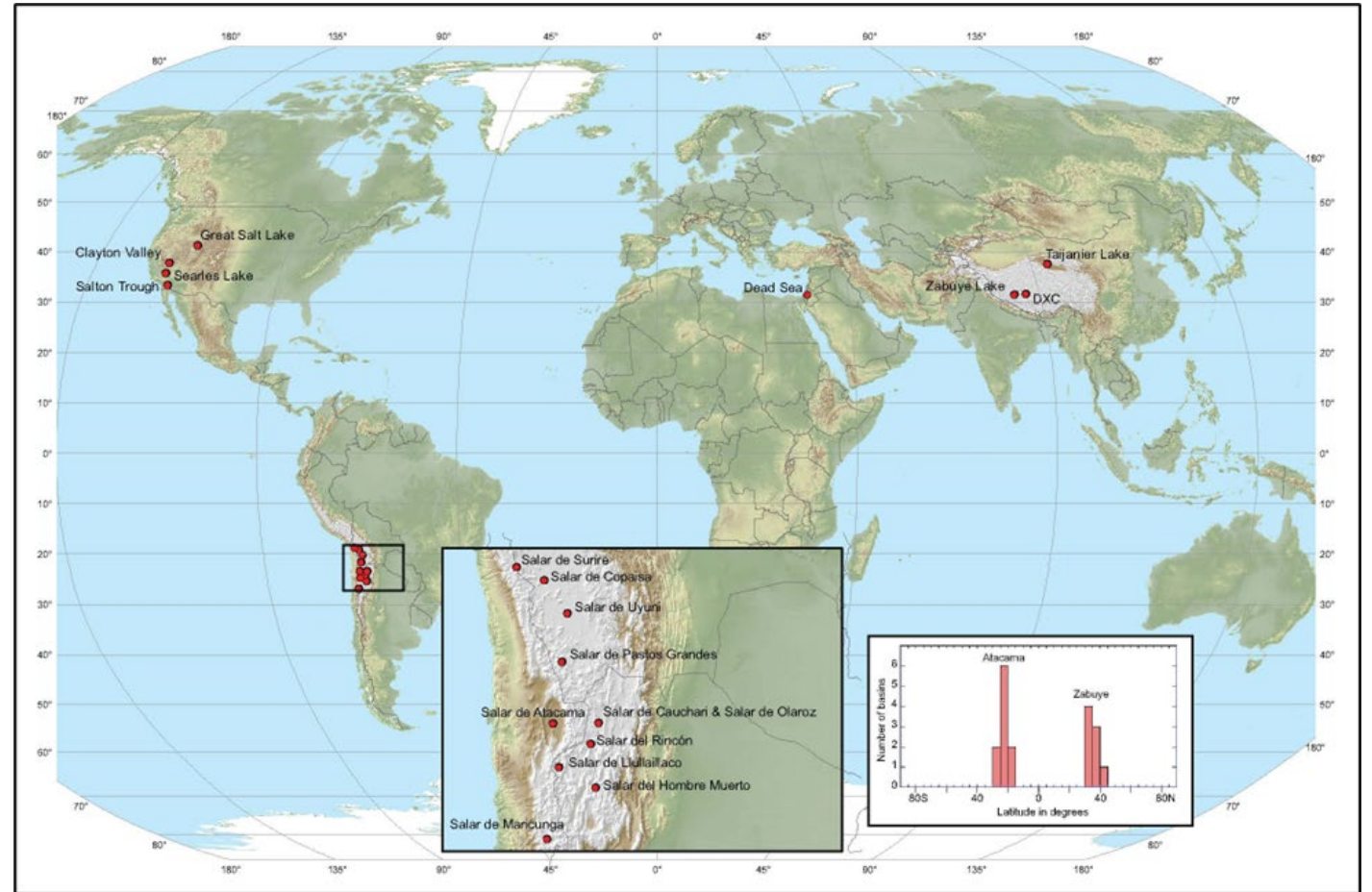




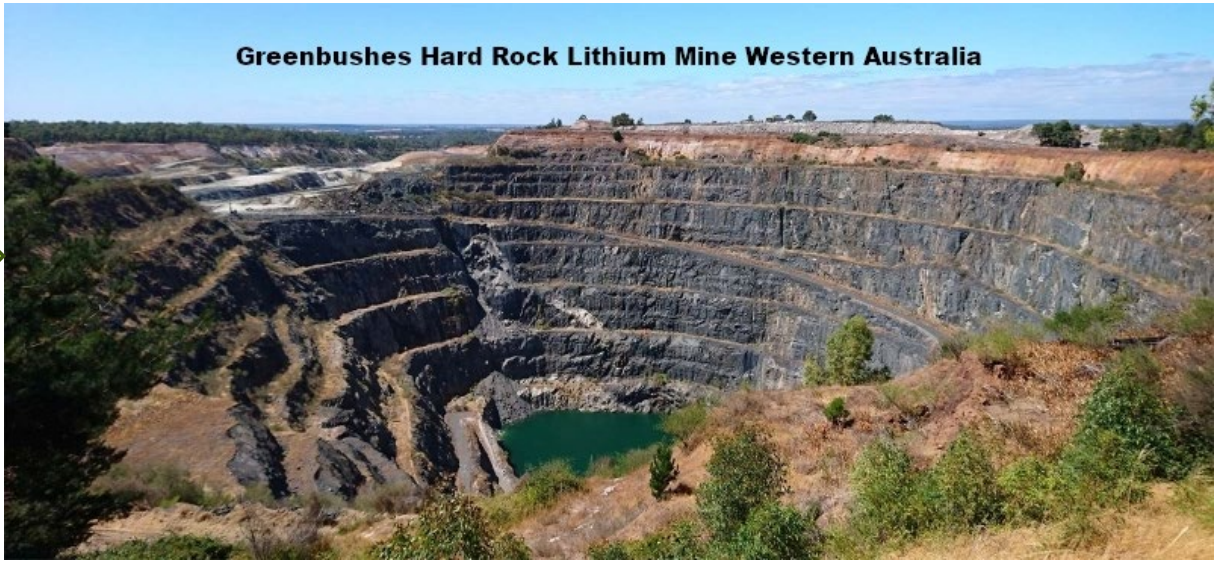
Major lithium deposits of the world, from “Elements” – Journal of the American Mineralogical Society, August 2020.

Where are the main lithium deposits in the world?

Major lithium brine deposits of the world, from Munk 2016, Lithium brines global perspective.



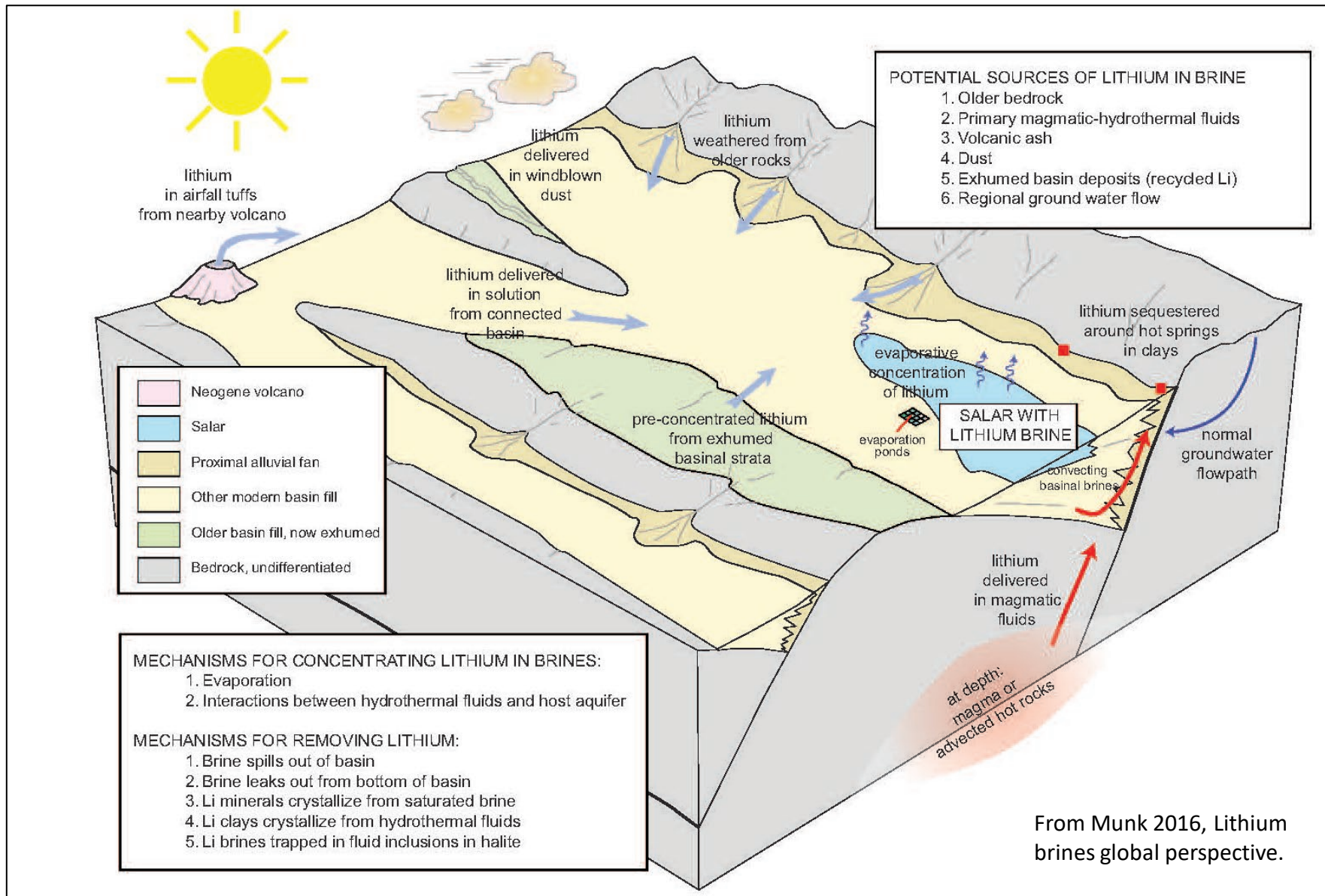
Hard-rock, lithium bearing pegmatites. Spodumene is the sought-after mineral.



The larger lithium mineral deposits are of two types:

Lithium bearing brines hosted by unconsolidated sedimentary sequences, below salt flats in volcanic terrains.

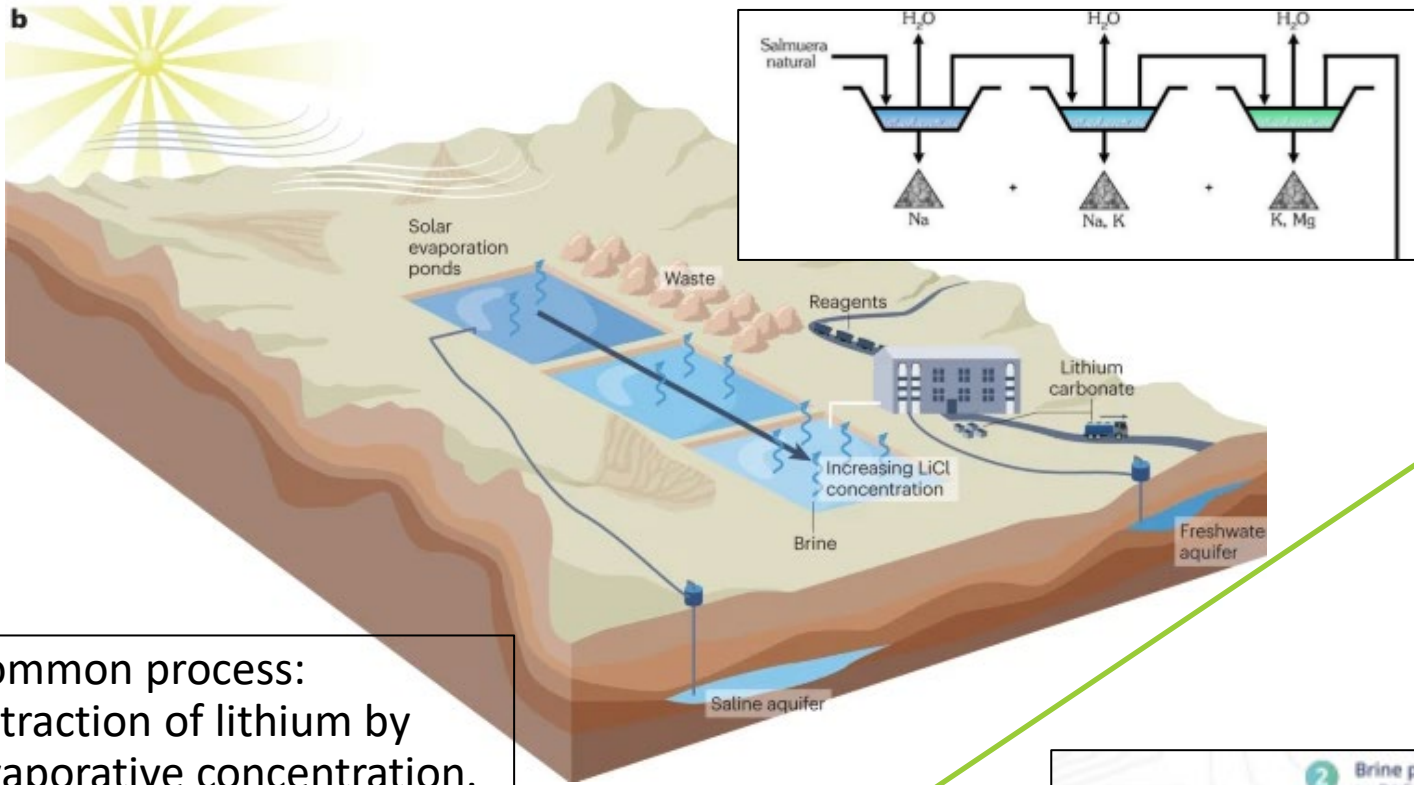




Lithium bearing brines are hosted by unconsolidated sedimentary sequences, associated with salt flats in volcanic terrains.

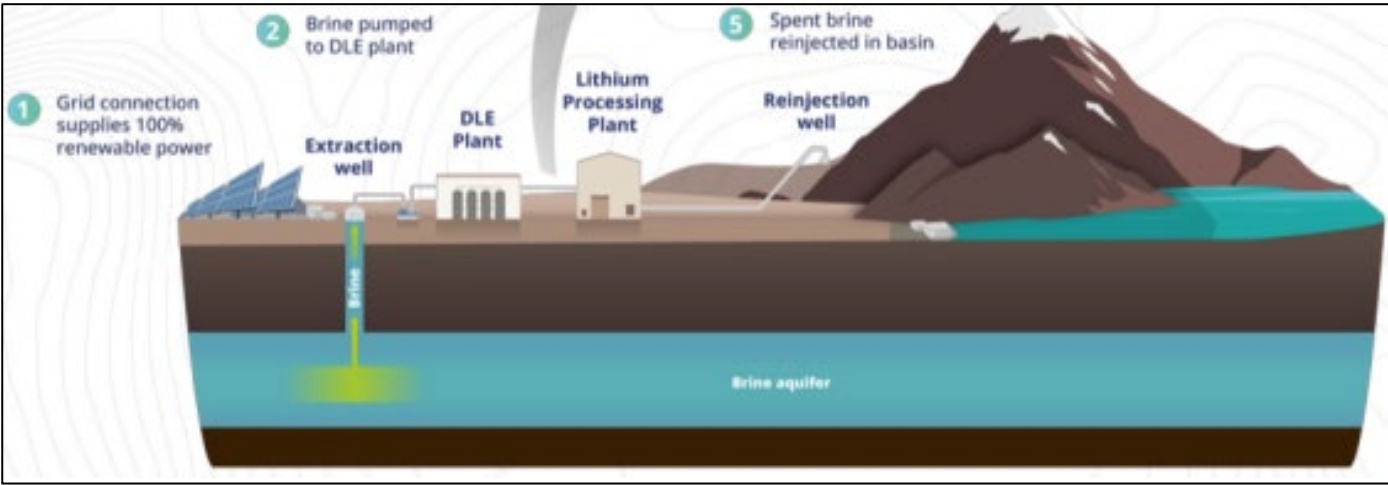
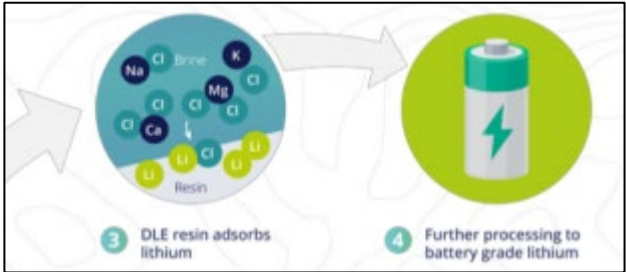
Lithium has evaporatively concentrated in brines in closed – arid basins

Fresh water continues to enter the basin but with limited mixing with underlying, denser brines.



Common process:
extraction of lithium by
evaporative concentration.

Alternative process:
extraction of lithium from
brine by electrochemical
separation

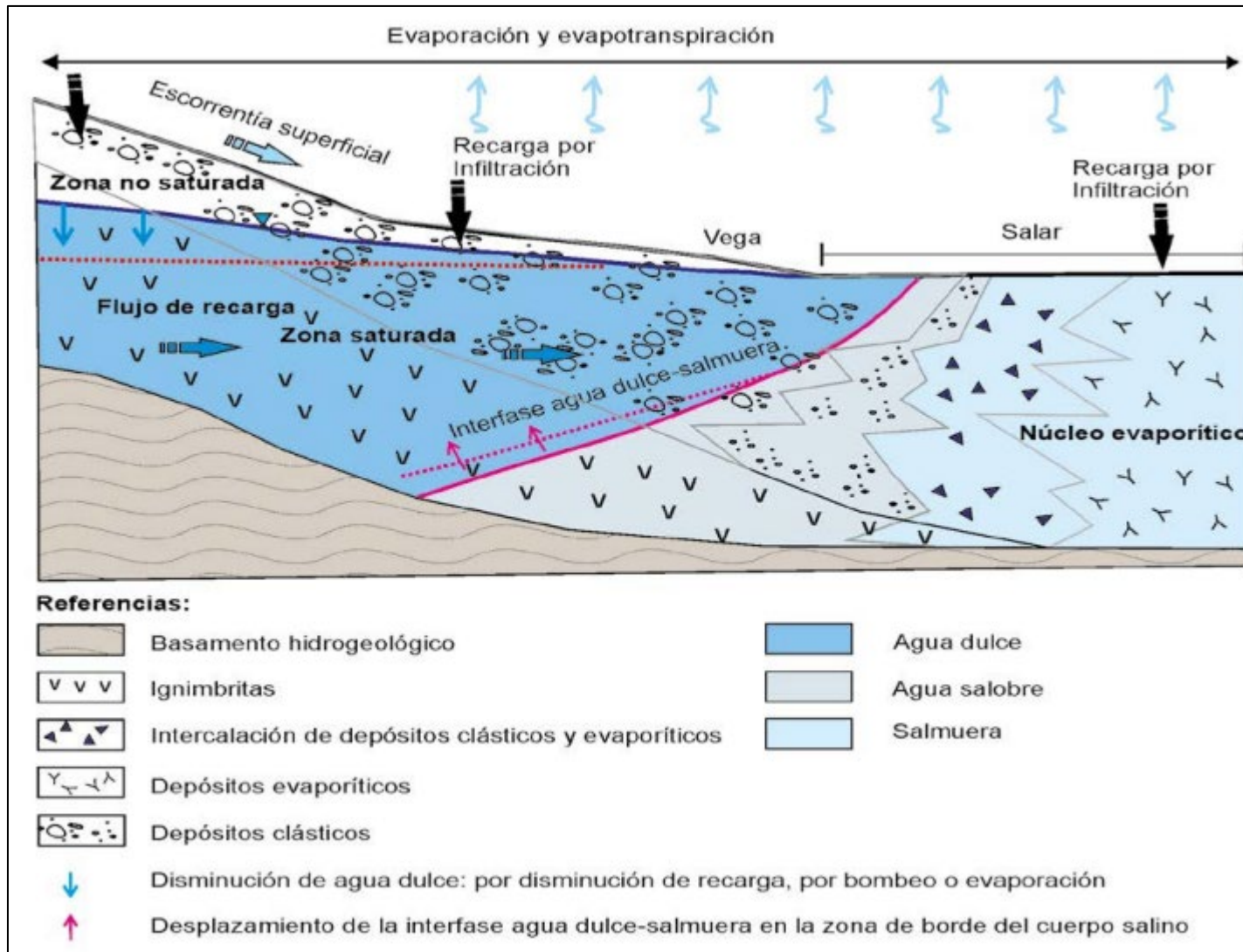


Brine lithium concentration methods



Different types of salt flat in Argentina

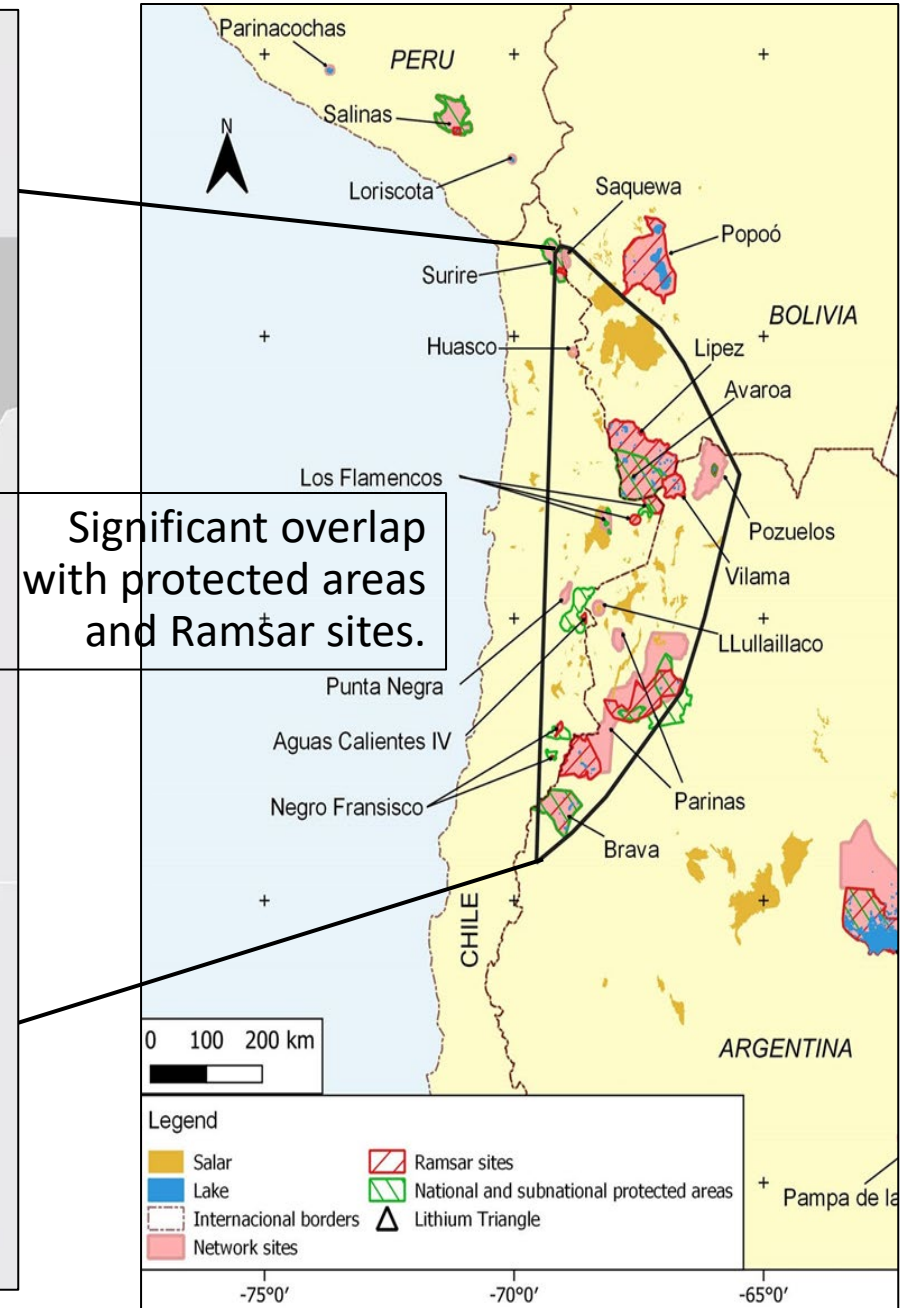
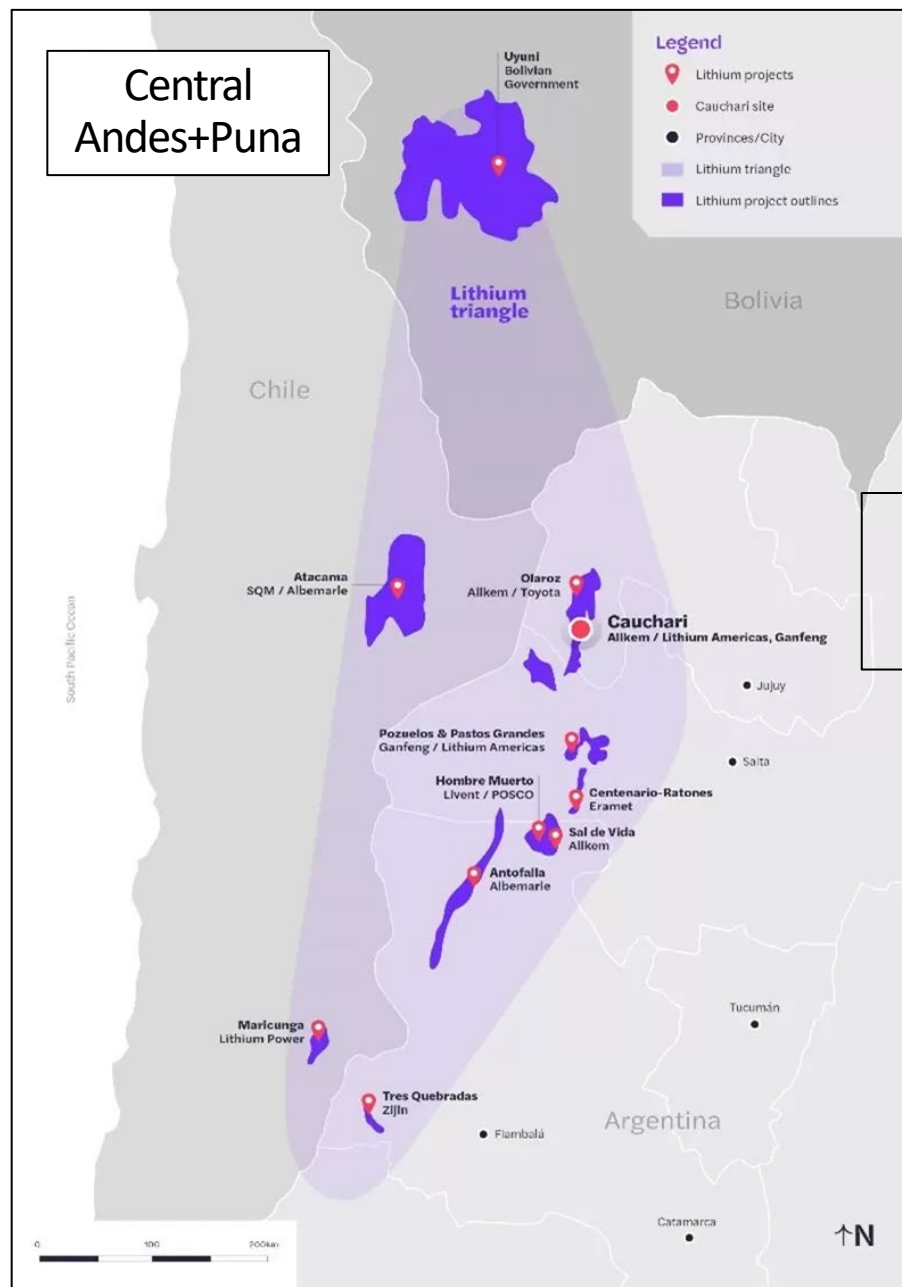
The development of lithium mining projects: What effect has it had on water management?



- ❑ The deposits are located at the hydrographic base level where fresh and brackish water systems mix with brine, as illustrated here.
- ❑ They are desert systems with low aquifer recharge capacity for long-life projects (+20 years).
- ❑ There are wetlands (vegas) associated with these systems where livestock and wildlife come together.
- ❑ There are discrepancies regarding the understanding of the interactions of fresh water, brackish water and brines.
- ❑ There is a risk that extraction of brine disturbs overlying brackish and fresh water, affecting biodiversity as well as livelihoods.

The development of lithium mining projects: What effect has it had on biodiversity?

- The salt flats and some areas with the presence of lakes and wetlands are small areas of high biodiversity - mostly seasonal.
- Migratory birds, especially flamingos and waders, are indicators of the state of these wetlands.
- Many protected areas and Ramsar sites are located on these lakes and wetlands.



The development of lithium mining projects: What effect has it had on **biodiversity**?

- Impacts to wetlands and lake water levels.
- Impacts to wildlife - areas of refuge, foraging/feeding /reproduction.
- Possible changes in migration systems?
- Reduction of the irrigated area due to the exploitation of fresh water for lithium operational activities.
- Affectation of vegetation cover and diversity, potential soil salinization due to aquifer depression or brine intrusion.
- Affectation of the Andean Microbial Ecosystems Associated with Minerals (EMAM) which occur in the wetlands.

Industrial lithium activities and unrestricted livestock farming are the main stressors.

The development of lithium mining projects:
what effect has it had on the **communities**?



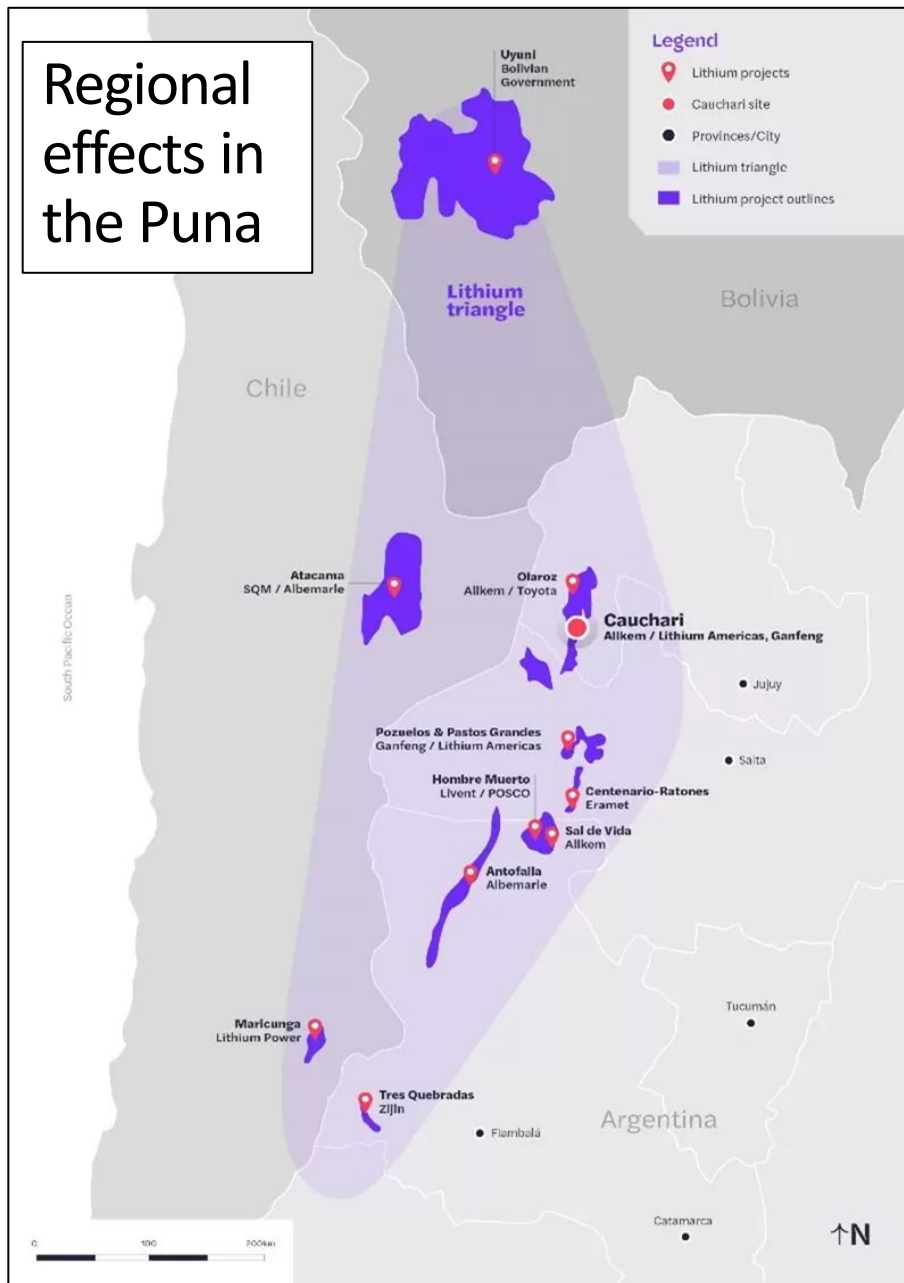
- ❑ Culture shock
- ❑ Demand for work from companies and training from the Communities
- ❑ Intensive use of public services; routes/security/health/education
- ❑ Shared territory and fresh-water resources
- ❑ Possibility of employment and local development and youth permanence
- ❑ High sensitivity of heritage and ancestors, vindication of indigenous peoples

What happens if we continue business as usual?

The case of the Salar de Hombre Muerto:

- 1. Atacameños indigenous community begins relationship with lithium mining company around 1996 in Hombre Muerto Salar*
- 2. Mining company begins operations and develops a dam in a wetland to take water. The wetland food source for their livestock (llamas and sheep) limits their livelihood.*
- 3. Community initiates legal action. This action takes shape in 2021.*
- 4. Five more mining projects are added to the Salar del Hombre Muerto basin. Different environmental organizations and consultants warn of the lack of coordination between companies and the use of water (especially from the Los Patos River).*
- 5. Judge dictates the mandatory nature of a comprehensive cumulative impact study of the Los Patos River basin, Salar del Hombre Muerto. New mining concessions are not granted and new environmental approvals are prohibited.*

Regional effects in the Puna



The benefits of lithium brine mining include:

- ✓ activation of local economies in these remote locations,
- ✓ support for new infrastructure (roads, powerlines, gas pipelines, solar and wind power generators),
- ✓ increased government revenues at all levels, and
- ✓ increased surveying of environmental and cultural media.

However, what is at stake is not a single location, but the impact of an industry on an entire region of the continent. This goes beyond the capability of one company or one provincial administration to govern.

This could and should be addressed with a strategic impact assessment for lithium in the Puna

For this reason, the authors are convinced that a concerted efforts should be made by industry-wide entities, multilateral lenders and national governments to foster a responsible development of lithium brines in the South American Puna.

Let's continue the conversation!

Post questions and comments in the IAIA24 app.



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