

# Mining companies, indigenous communities, and the state: The political ecology of lithium in Chile (Salar de Atacama) and Argentina (Salar de Olaroz-Cauchari)

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## Abstract

Based on intensive and long-term field research and document reviews, this article compares the historic evolution of lithium mining in Chile and Argentina. We highlight national development discourses and government regulatory frameworks in both countries. We illustrate and assess the diverse perceptions and strategies of local actors. Finally, we discuss the socio-spatial materialization of lithium mining in terms of power relations, ecology, and economy. Using perspectives from political ecology brings to light different power relations between the state, mining companies, and indigenous communities in Chile and Argentina. These power asymmetries have an enduring influence on local actors' possibilities for taking action.

**Keywords:** lithium mining, Argentina, Chile, political ecology, power relations

## Resume

Sur la base de recherches intensives et à long terme sur le terrain et d'analyses documentaires, cet article compare l'évolution historique de l'exploitation du lithium au Chili et en Argentine. Nous mettons en évidence les discours nationaux sur le développement et les cadres réglementaires gouvernementaux dans les deux pays. Nous illustrons et évaluons les diverses perceptions et stratégies des acteurs locaux. Enfin, nous discutons de la matérialisation socio-spatiale de l'exploitation du lithium en termes de relations de pouvoir, d'écologie et d'économie. L'utilisation des perspectives de « political ecology » met en lumière les différentes relations de pouvoir entre l'État, les compagnies minières et les communautés indigènes au Chili et en Argentine. Ces asymétries de pouvoir ont une influence durable sur les possibilités d'action des acteurs locaux.

**Mots-clés:** exploitation du lithium, Argentine, Chili, écologie politique, relations de pouvoir

## Resumen

Basado en una intensa y prolongada investigación de campo y revisión de documentos, este artículo compara la evolución histórica de la minería del litio en Chile y Argentina. Destacamos los discursos de desarrollo nacional y los marcos normativos gubernamentales en ambos países. Ilustramos y evaluamos las diversas percepciones y estrategias de los actores locales. Por último, discutimos la materialización socio-espacial de la minería del litio en términos de relaciones de poder, ecología y economía. El uso de las perspectivas de la ecología política saca a la luz las diferentes relaciones de poder entre el Estado, las empresas mineras y las comunidades indígenas en Chile y Argentina. Estas asimetrías de poder tienen una influencia duradera en las posibilidades de acción de los actores locales.

**Palabras Clave:** minería de litio, Argentina, Chile, ecología política, relaciones de poder

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## 1. Introduction

Over the last two decades, economic interest in lithium has been triggered by the growing importance of the mineral for technological innovations that are part of sustainable lifestyles and low carbon dioxide emissions. Due to its low weight, the mineral plays an essential role in the production of high-performance Lithium-ion batteries. Especially in the Global North and China, electro-mobility has become a symbol of hope for reducing greenhouse gas emissions in the growing global transportation sector.

These trends have led to renewed interest in the world's largest lithium deposits in the lithium triangle, which comprises parts of Bolivia, Chile, and Argentina. This region contains more than half of the world's lithium resources and more than 80% of lithium reserves in brine (USGS 2020). This large region already had a history of mining but only recently has it been on an industrial scale. This trend began in 1984 in Chile on the Salar de Atacama salt flat with the company Chilean Lithium Society (SCL in its Spanish acronym<sup>2</sup>), and expanded in the late 1990s with Society for Chemistry and Mining (SQM). In Argentina, lithium exploitation started in 1997 on the Salar del Hombre Muerto salt flat, with the Food Machinery Corporation's (FMC) Fenix Project. In 2014, the company Sales de Jujuy has been running the Olaroz Project to mine the Salar de Olaroz-Cauchari salt flat, which has rapidly increased Argentina's production. In Bolivia, nationalized extraction and industrialization is progressing slowly. Currently, there are pilot plants for potassium chloride and lithium carbonate as well as more substantial progress on producing lithium ion cathodes (Obaya 2019). Argentina and Chile now account for more than 80% of global lithium production and exports (Argento and Zicari 2017; Dorn 2021a).

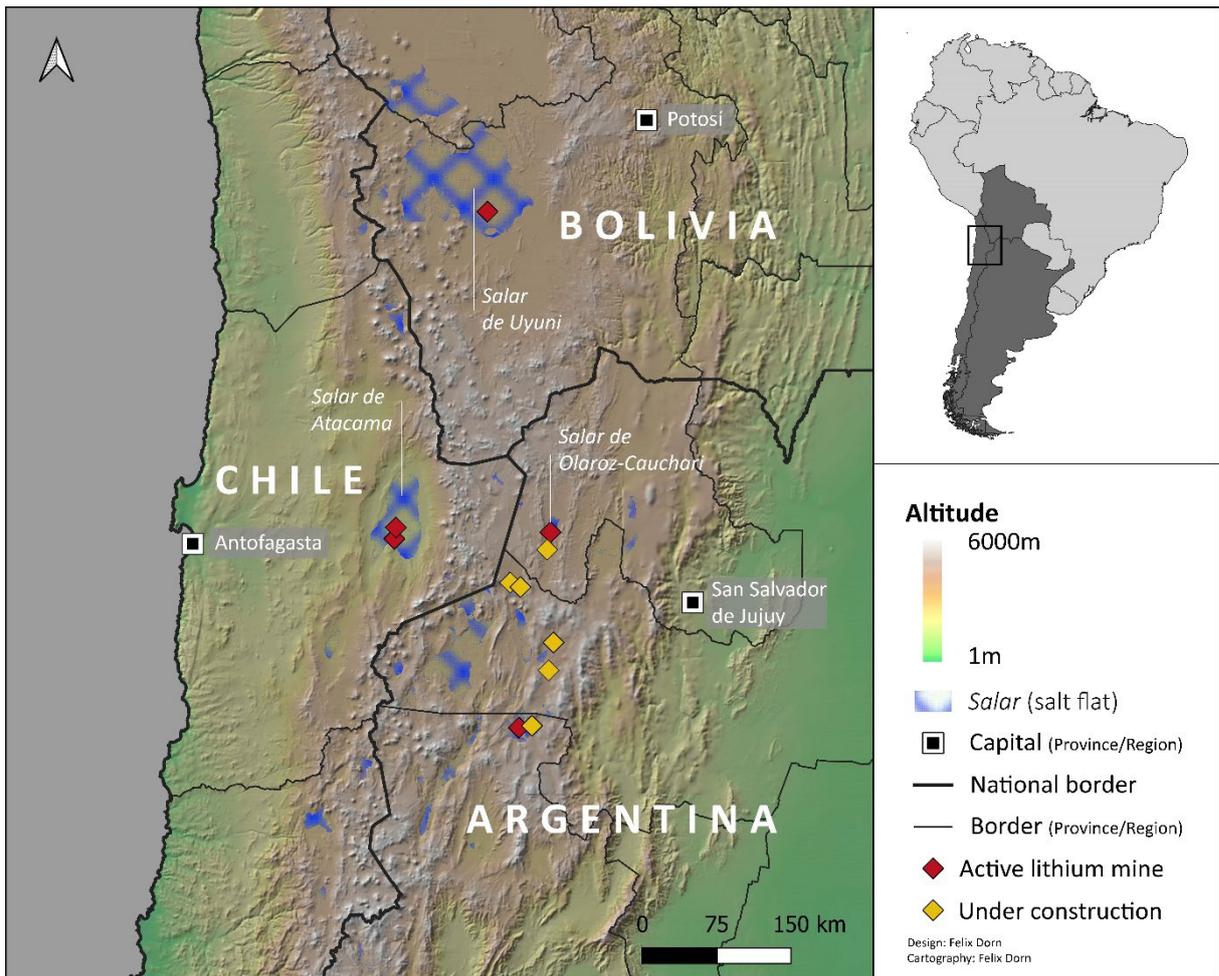
Lithium is considered an essential mineral for the sustainability transition. Due to the expansion of mining projects, the Atacama communities in San Pedro de Atacama in Chile and the department of Susques in Argentina are suddenly at the center of global economic processes. Nicknames such as "white gold" or "new oil" have not only fed national development discourses, but also circulate among local groups. Salt flat mining is, however, a social and environmental threat and has negative consequences in nearby indigenous communities. Therefore, we explore the question of whether lithium mining perpetuates and exacerbates existing North-South inequalities in the name of the sustainability transition. To do so, we use a political ecology perspective. This allows us to identify the socio-territorial transformations caused by salt flat mining in the Salar de Atacama and Salar de Olaroz-Cauchari salt flats, to record differences and similarities between the two cases, and to determine their causes. For our comparison, we focus on the institutional settings, the various actors, the underlying power relations, and the resulting social-ecological conflicts. We identify major power imbalances between the state, mining companies, and indigenous communities, particularly pronounced in Argentina. Given this, we seek to clarify the paradox of salt flat mining and lithium mining in particular, and how local impacts contradict the sustainability claims made for the global green economy. This article is part of a broad interdisciplinary debate on the social-ecological effects of large-scale "mega mining" (Bebbington *et al.* 2008; Dorn 2021c; Dorn and Ruiz Peyré 2020; Svampa 2008, 2019). Our interest lies in analyzing new social-environmental conflicts in the context of the "sustainability transition."

The following analyses of salt flat mining in Chile and Argentina are based on extensive fieldwork and documentary research that draw on official reports, information from government institutions (the Environmental Evaluation Service in Chile and the Secretary of Mining and Hydrocarbons in Argentina), press and web site records, and documentation from indigenous organizations. In Chile, field research was carried out intermittently from 2012. The Argentine case is based on ten months of ethnographic fieldwork realized between February 2018 and August 2019. Applied methods include qualitative social research with observations, participatory mapping, and interviews with different actors (n=109) as well as an extensive questionnaire.

We begin the article with a review of the history of lithium mining, national development discourses, and the two countries' regulations. We then discuss the local perceptions of salt flat mining and compare the actions and strategies of local actors. Finally, we discuss the socio-spatial materialization of salt flat mining in light of economic and ecological issues, as well as the power relations between actors.

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<sup>2</sup> We use approximate English translations for the names of companies and other institutional bodies but maintain their Spanish acronyms, which they are commonly known by.



Map 1: Lithium mining projects in Chile, Argentina, and Bolivia. Source: Felix Dorn.

## 2. The role of the state with respect to a strategic resource

### *Chile: a centralized state*

Salt flat mining and, more broadly, salt mining (e.g. for saltpeter and iodine) is an important chapter in the economic and social history of northern Chile (Chong *et al.* 2000). The urban configuration, population flows, transportation infrastructure, and ports in this region can only be understood in relation to the cycles and crises of mining and the export of copper and salt (Geisse 1983).

In the early 1960s, the US Anaconda Copper Company, which controlled the Chuquibambilla copper mine, undertook exploration for water in the Salar de Atacama and the salt flat's saline substrate stood out to them. At the end of the 1960s, the Chilean government commissioned the Institute for Geological Research to undertake further studies (Moraga *et al.* 1974). In 1974, the Mixed Salts Program was created within the state's Development Corporation (CORFO), which in 1977 became the Committee of Mixed Salts (CSM). The salt flat's potential stood out to Foote Minerals, an American company with experience with mining salt flats in Clayton Valley in Silver Peak, Nevada. In 1975, Foote reached an agreement with the Chilean government and did their own exploration, which confirmed the brine quality and the excellent

mining conditions. In 1977, CORFO established 59,820 mining properties,<sup>3</sup> later discarding parts of them and leaving the current number at 32,768. Also in 1977, the Copper Corporation (CODELCO), which controls Chile's state copper mines, obtained permissions on the Salar de Pedernales salt flat and registered others in Maricunga. This paved the way for its current incursion into salt flat mining. At the same time, Law Decree 2886 in 1979 reinforced the definition of lithium as a national resource, highlighting Chile's alignment with the US Cold War policy on potential nuclear resources. Lithium extraction was excluded from existing mining properties. This did not affect mining permits on salt flats, or mining properties with economically-viable salt, but it did affect the exploitation of lithium.<sup>4</sup>

In 1980, SCL was created to mine the Salar de Atacama salt flat. CORFO contributed the mining concessions and Cyprus Foote contributed the capital and technology to extract lithium carbonate from brine. The terms were in Foote's favor: no royalties, eight years of exclusivity, and a quota of 200,000 tons of lithium equivalent to be extracted over 30 years. In 1984, lithium carbonate extraction began. In 1988 and 1989, CORFO sold its stake to Cyprus Foote, meaning it was now in control of 100% of the operations and the concessions. Ten years later in 1998, Cyprus Foote was acquired by the German company Chemetall. In 2004, the US conglomerate Rockwood acquired Chemetall. In 2012, the Rockwood Lithium division was created. In January 2015, the American Albemarle Corporation acquired Rockwood and took control of the company, contracts, and mining facilities in Chile. In combination with the 2014 purchase of 49% of Talison Lithium, Australia's main lithium producer from conventional rock deposits, the control of Rockwood Lithium positioned Albemarle as a principal global player in lithium production and processing.

On CORFO's initiative, an international request for bids was made in 1983 with the aim of mining potassium, boron, and lithium. It was awarded to an investment consortium comprising the Chilean Molymet, American Amax, and CORFO, from which the Mining Society of the Atacama Salt Flat (MINSAL) emerged in 1986. CORFO leased 14,814 properties to MINSAL and authorized the exploitation of 180,100 tons of metallic lithium or its equivalent. SQM, a state-owned company privatized in 1985, bought 75% of MINSAL in 1993.<sup>5</sup> It obtained an extension to 16,384 properties, a term of execution until 2030, and a commitment not to mine the 11,670 properties still held by CORFO. In 1995, SQM bought the additional ones that remained in CORFO's hands, thus taking over 100% of MINSAL's ownership. In 1996, SQM started extracting lithium carbonate and potassium chloride (Aserta Consultores 2010; Lagos 2012; Poveda Bonilla 2020).

In the late 2000s, Chile's proportion of the world lithium production declined with the appearance of lithium extraction in Greenbushes, Western Australia, operated by Talison Lithium and refined in plants in China. In response to the increased demand for lithium batteries and rising market prices, new lithium projects were announced in Argentina, Australia, China and other countries for rock and brine mining. The Chilean government adopted two initiatives to respond to these developments: the first, which failed, was undertaken during the conservative government led by Piñera (2010-2014). It tried to foster greater lithium and potassium production via private actors (national and international investment capital and companies) and with lax regulations. The second initiative had the same goal, and was successful. It was the implementation of a national lithium policy based on a political and institutional transformation of salt flat mining, which involved state institutions, revised contracts, new market actors, research and development, and better relationships with local communities. It also created a more hierarchical administration and articulation in order to carry out the national policy (Poveda Bonilla 2020).

In mid-2012, international bids were requested for a Special Contract for Lithium Operations (CEOL; contained in Decree Law 2886/1979), to extract 100,000 tons of lithium metal, equivalent to 532,000 tons of lithium carbonate. The chosen company had the responsibility of obtaining the mining rights and fulfilling environmental requirements. The bidders were POSCO from Asia, NX Uno de Peine

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<sup>3</sup> Under Chilean law, a mining property or license can either be for exploration or exploitation. One precedes the other. The ownership of the property or concession is indefinite as long as the payments required by the legislation and regulations are made.

<sup>4</sup> This was in accordance with the national mining policy that began in the 1980s. The Mining Code of 1982 maintained the principle of state-owned mining resources. At the same time, it promoted a system of licenses that provided legal guarantees to those granted licenses. At a time when public resources and national private financing were limited, this attracted the interest of foreign investors. This policy is one of the liberal pillars of Chile's mining growth, which occurred earlier than other Latin American countries.

<sup>5</sup> CORFO preferred a company with domestic investment capital over international stakeholders, in particular FMC (ex-LITHCO).

(Samsung) with capital from Korea and Chile, and the Chilean company SQM. SQM's bid of US\$40.9 million was declared the winner. From the outset, the initiative generated active political opposition, and several legal challenges in the Chilean Congress. The bid was annulled due to accusations of noncompliance with the bidding rules. This failure brought things back to square one, and for a time ended the use of such special contracts.

With the beginning of Bachelet's second presidency in 2014, the National Commission on Lithium was formed. The commission was headed by the national Minister of Mining and included national and international experts, researchers, authorities, and directors of public agencies. The president of the Committee of Atacama Peoples (CPA) and a workers' representative were included. The commission's final report was published in early 2015. Its recommendations have become the roadmap for public policy on lithium. For the first time, a reasoned and comprehensive position on salt flat mining was achieved. By 2017, the recommendations were increasingly put into practice. The report highlights the lack of sufficient control and regulation by the state. It stresses the fragile, complex, and dynamic character of salt flat ecosystems and the need for a paradigmatic change regarding the relationship between companies and communities with respect to their territory and water resources. It proposed the notion of "shared values." It emphasized that the state owned natural resources and reiterated the state's substantive role in salt flat mining, obtaining income, and environmental sustainability. It raised the need to strengthen public institutions involved in administering salt flats and proposed the formation of a state company dedicated to salt flat mining. By pursuing public-private alliances, it was suggested this company be dedicated to advancing state control in all salt flat projects in the country.<sup>6</sup>

The report suggests short-term measures meant to change the situation. First, revised contracts with SQM and Albemarle gave the state a more active role. These company operations were expanded and new ones were authorized, under the condition that they were carried out following a new structure for economic returns, environmental sustainability, and social responsibility. Second, the state Board of Directors for the management of salt flats was created, which included CORFO, the Mining Ministry, and the Chilean Nuclear Energy Commission, among others. It was in charge of proposing a new government institutional framework that would replace or confirm the Board of Directors and create a state-owned mining company.<sup>7</sup> In the meantime, new public-private agreements for lithium exploration and exploitation were made, for example, CODELCO's holdings in the Maricunga and Pedernales salt flats in the Atacama region. These changes reinforced the state's more active role in mining contracts as well as the responsibility of privately run projects to meet environmental and social requirements.

What has resulted from the new lithium policy? Recently, lithium mining has gained considerable momentum. Four main factors have reconfigured salt flat mining in Chile. First, at the beginning of 2017, CORFO and Albemarle formalized a revised contract that allowed for expanding lithium production and extending the terms. Albemarle is now authorized to produce 262,132 tons of lithium metal equivalent (LME) until 2043. Its annual lithium carbonate production increased from 26,000 to 82,000 tons. The contract stipulates state revenues of several billion US dollars over this period and includes a novel agreement, at least with respect to other mining projects in the country, between Albemarle and the indigenous communities of the Salar de Atacama basin and the CPA (Babidge *et al.* 2019: 743).<sup>8</sup>

Second, SQM's renegotiation with CORFO went through a long and difficult process. Since mid-2014, the relationship has been subject to legal proceedings. In successive lawsuits, CORFO accused SQM of financial non-compliance of its contracts, blocking competitors from the Salar de Atacama, and environmental damage. The latter had strong repercussions in the Chilean Congress, among the national press, and Atacama indigenous organizations. At the end of 2017, the parties announced an agreement: a

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<sup>6</sup> The report highlights on lithium's strategic nature. While lithium was considered a strategic resource due to its use in nuclear applications in the past, today it is because of its energy applications. The status of a non-licensable mineral is therefore maintained. Likewise, the report points out the interest in promoting lithium business and fostering the circulation of knowledge, technologies, and research and development.

<sup>7</sup> Such a company would be dedicated to the exploitation of salt flats, especially lithium, and favor a business model with a public-private partnership (Comisión Nacional del Litio 2015: 34).

<sup>8</sup> In addition to the new lithium extraction quota, the agreements include the construction of a lithium carbonate plant, the option to build a lithium hydroxide plant, and contributions for research and development.

compensation payment of US\$17.5 million claimed by CORFO and an extension of the exploitation quota until 2030.<sup>9</sup> This was formalized in early 2018, at the end of Bachelet's second administration.<sup>10</sup>

Third, with the aim of jointly operating mining projects with private companies in the Maricunga and Pedernales salt flats, CODELCO created the subsidiary company Salar de Maricunga in 2017. In mid-2019, CODELCO announced an agreement with Salar Blanco Mining (MSB) to operate its subsidiary under the terms of a CEOL special contract. Salar de Maricunga obtained the CEOL from the Mining Ministry in March 2018, days before a new administration came into power. Implicitly assuming its role is in copper but not salt flat mining, the state conceded its direct participation in lithium mining.

Finally, within days of the start of Piñera's second administration in 2018, MSB was authorized to extract lithium and other salts from the Salar de Maricunga salt flat. This company is controlled by the Australian company Lithium Power International Ltd (51%), the Chilean mining company MSB, and the Canadian Bearing Lithium Corporation (18%). MSB obtained a favorable environmental agreement that includes agreements with local communities. After MINSAL, which later became SQM, MSB is the only salt flat mining project that has been authorized for lithium mining by a private company.

### *Lithium mining in Argentina: a strategic resource and commodity*

Like in Chile, debates over the lithium deposits in Argentina have gained visibility in the past two decades. The discovery of deposits in northwestern Argentina dates back almost a century. Between 1923 and 1927, Luciano R. Catalano<sup>11</sup> conducted five expeditions to the Argentine Puna to investigate mineral deposits on high-altitude Andean salt flats. He immediately recognized the region's potential for borate and lithium wealth. In his report *Lithium: A new natural source of energy*, he describes the importance of lithium for energy production, including nuclear energy. He suggested Argentina use this raw material wealth for national benefit. He argued that the government and its military were obliged to defend it and prevent extraction and export abroad at all costs (Catalano 1964: 19). In the following years, in the Salt Flats Plan of the General Directorate of Military Manufacturing (DGMF), the political strategy for salt flat mining largely followed Catalano's recommendations. Between 1969 and 1974, several salt flats in Jujuy, Salta, and Catamarca were explored. The main aim was achieving a profitable lithium supply for alloys in the aerospace industry as well as for civil nuclear energy (Nacif 2019; Slipak 2015).

Beginning in 1976, Videla's military government initiated a fundamental economic liberalization. Lithium was included as a licensable resource under the national mining law. In 1982, Galtieri's military government tried to sell the DGMF project in the Salar del Hombre Muerto salt flat to LITHCO,<sup>12</sup> but the transaction was postponed due to the beginning of the Falklands War (Nacif 2018). In 1989, Carlos Menem was elected president of Argentina. Within the framework of the Washington Consensus, he consolidated the neoliberal orientation of the country. After losing the bid for the Salar de Atacama to SQM (see above) and failing to sign a contract with the Bolivian government to mine the Salar de Uyuni, due to local protests, LITHCO turned its attention back to Argentina. In 1990, LITHCO agreed to a contract with Menem's administration to operate the former DGMF project. Both the DGMF and the province of Catamarca received a 2.5% stake in the operating subsidiary, Altiplano Mining (Argento 2018).

During the 1990s, there were legal and institutional reforms that were initiated and supported by the World Bank (Nacif 2018). These reforms were particularly aimed at the mining sector. Among the most

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<sup>9</sup> Among other things, it considers the modification of the current contract and an increase of the extraction quota by 349,553 tons of LME (approximately 1,860,000 tons of lithium carbonate). Contributions for research and development of US\$10.8-18.9 million per year are stipulated for the development of extraction technology and water use. Contributions of US\$10-15 million per year are dedicated to economic and cultural development in the Salar de Atacama basin. In addition, 1.7% of SQM Salar's total sales will be for local municipalities. It is estimated that between 2018 and 2030 a total of US\$8.3 billion will be transferred to the state, the region, and the communities.

<sup>10</sup> Given the SQM-CORFO conflict over payment evasion, environmental sanctioning processes, and political corruption in monetary transfers, this last-minute agreement came as a surprise. Parliamentarians, social leaders, NGOs, academics, and Atacama organizations demonstrated their opposition to the agreement. The CPA and other interested parties took part in annulment court cases. In early 2019, the Chilean Supreme Court dismissed all claims and confirmed the agreement.

<sup>11</sup> Catalano had a doctorate in chemistry and specialized in geology and mineralogy. From 1922 to 1930 he was head of the Geology Department of the Argentine Ministry of Agriculture. Under the government of Arturo Umberto Illia (1963-1966) he was appointed State Mining Undersecretary.

<sup>12</sup> In 1985, LITHCO was acquired by the American company FMC. In early 2019, the FMC Lithium division was separated from FMC and renamed Livent, which is now listed independently on the stock exchange.

far-reaching changes was the 1993 Mining Investment Law. It guaranteed tax advantages, 30 years of fiscal stability, and maximum royalties of 3% for operating companies (Law 24,196/1993). Additionally, Article 124 of the 1994 constitutional reform transferred the ownership of natural resources from the state to the provinces. In the course of the 1993 state reform, the DGFM's stake in Altiplano Mining was transferred to the province of Catamarca, increasing its share to 5%. The following year, Governor Arnoldo Castillo signed a new contract with FMC, reducing the provincial share to 3% and exempting the company from water use fees (Nacif 2019).

Between 1993 and 1997, Altiplano Mining built the Fenix project in the Salar del Hombre salt flat Muerto, located in the northern part of the Catamarca province. The project was officially inaugurated in December 2017. It produces 23,000 tons of lithium carbonate annually, and 5,000 tons of lithium chloride. A lithium carbonate production plant is located on site. A plant for transforming concentrated brine to lithium chloride is located in General Güemes in the province of Salta. Exports are out of the Chilean port of Antofagasta and are mainly shipped to the company's own plants in China and the United States.

For Jujuy, Salta, and Catamarca, three provinces with relatively high poverty rates, this was an opportunity to sell permits, charge royalties, and receive foreign investments that created jobs, brought income to the provinces, and increased political independence from the national government. In the 1990s, Argentina opened up to economic globalization through economic liberalization and flexibility. At the same time, the state's role was drastically restricted through deregulation. The government allowed the extraction of resources and minerals that were once considered to have strategic national importance. The expansion of lithium mining was part of larger trend in mining in the 1990s (Dorn 2021a; Hafner *et al.* 2016; Paolasso *et al.* 2013). Under the progressive governments of Néstor Kirchner (2003–2007) and Cristina Fernández de Kirchner (2007–2015) the country's alignment remained unchanged. By 2004, Argentina ranked ninth on the list of countries by direct foreign investment (Bridge 2004). That same year, the Kirchner government launched a National Mining Plan, which consolidated the trends of the 1990s and encouraged further expansion of the mining sector. Thus, mining would become a fundamental pillar of the country's economic future (Walter and Martínez-Alier 2011).

Lithium mining in Argentina can still be considered a relatively recent development. The inauguration of Sales de Jujuy's Olaroz project in the Salar de Olaroz-Cauchari in 2014 made the country the fourth largest lithium producer after Australia, Chile, and China, and the second largest lithium carbonate exporter after Chile. Recently, Argentina's neoliberal policies have increased its market share and it has increased lithium carbonate production. Today, there are more than 60 lithium projects in the Argentine Puna in various phases of exploitation, exploration, or feasibility studies. All salt flats in the provinces of Jujuy, Salta, and Catamarca are covered by mining licenses (Dorn 2021a). Since 2010, this process has been accompanied by a social, scientific, and political debate on the geostrategic and industrialization potential associated with the country's lithium deposits. There have been many political initiatives and legislative proposals aimed at claiming a greater share of the value chain. This wide-ranging debate includes the socialization of the means of production and the development of national battery production (Nacif 2015; Fornillo 2015).

The Kirchner administration based its economic policy on a massive expansion of mining. At the same time, it promoted specific investments into key sectors of scientific and technological development. The goal to produce batteries in Argentina moved onto the political agenda. The Ministry of Science, Technology, and Innovation (MinCyT) called this goal a strategic social-productive focus for guiding the structural policy in its *National Plan for Science, Technology and Innovation 2012–2015: Towards an innovative Argentina* (MinCyT 2011). At the end of 2012, with the participation of CONICET (49%), the state oil company YPF (51%) founded YPF Technology (Y-TEC). Y-TEC was created to research and develop technologies and products related to oil, gas, and alternative energy. Lithium exploitation and battery development have been the main research areas. Likewise, the Sustainable Energy Laboratory (LAES) was established as a cooperative project between the universities of La Plata and Córdoba. It researches lithium batteries and hydrogen cells. In the province of Jujuy, the General Savio Technology and Research Center was inaugurated in 2017. In addition, the INQUIMAE institute (Faculty of Exact Sciences, University of Buenos Aires), directed by Ernesto Calvo, is working on a lithium extraction method with low water consumption. Y-TEC has been able to establish offices and laboratories in Córdoba, La Plata, and Catamarca, there is a pilot factory in Ensenada, near the city of La Plata, to test upscaling of commercial battery production. A total of 234 CONICET scientists from a variety of disciplines are

working on lithium. However, Argentinian innovation has increasingly suffered from a lack of funding (Argento and Zicari 2017; Dorn, 2021a; Fornillo and Gamba 2019).

The number of lithium mining projects has increased considerably in recent years, and with it, political attention to lithium deposits. Following Cristina Kirchner's interest in industrialization, the next president, Mauricio Macri, regarded lithium deposits as a means to sustain his policy of "raining investments" (*lluvia de inversiones*). Under the current administration of Alberto Fernández's (2019-2023), lithium, in addition to soybean agribusiness and oil and gas extraction in Vaca Muerta, is expected to play a major role in paying off the national debt. While the social and political desire for further lithium industrialization is constant, Argentine social scientists such as Nacif (2018) and Argento and Zicari (2017) have criticized the lack of growth in productive capacity and economic development, and the absence of a national lithium strategy. In view of the oppressive national debt, the urgent need for foreign currencies and, in particular, for the know-how required for battery production, the goal of producing batteries has been pushed farther into the future.

### 3. Conflict and cooperation

#### *Territory and water in the Chilean Atacama*

In the 1990s, when democracy returned to Chile, governments provided favorable political opportunities for Atacama communities to become actors in the formulation of their collective demands and the defense of land, water, and other resources (for an overview of indigenous organization and the processes of shaping ethnic demands see Gundermann and Göbel 2018; Gundermann and Vergara 2009).

After Chile annexed these territories back in the late 1800s, ownership of traditional pastoral lands was not recognized. In the 1930s, these extensive grazing areas were registered to the Chilean government. This included lands without private titles or claims made by individual land holders. To begin to transfer ownership and control of land and water in the 1990s, agreements between agencies were made that included financing. Between 1996 and 1999, the community territories of Atacama and Quechua were defined.

In cooperation with indigenous organizations, the National Indigenous Corporation (CONADI) identified the corresponding lands and resources of each formalized indigenous community.<sup>13</sup> This was the basis for state involvement and it allowed for transferring and issuing property deeds. The organizations formulated an aggregate land demand of three million hectares, 69.9% of El Loa province. This included the Salar de Atacama, Alto Loa, Ollagüe, and both mountain ranges up to the borders with Argentina and Bolivia. It excluded the western sector of the San Pedro de Atacama community and the Barros Arana mountain range, where large copper mines, the state-owned CODELCO mines, and other mines with international stakeholders are located. Generally speaking, the demand covered the Atacameña and Quechua ancestral areas while avoiding the copper mining projects, especially the government one. The Ministry of National Assets (MBN) and CONADI, in agreement with the indigenous organizations, then reduced the claim to 905,000 hectares, covering areas with effective occupation by 19 previously recognized indigenous communities. At present there are 33 communities: 20 Atacameña, 3 Quechua, and one Aymara. Communities founded after the agreement have not obtained comparable land transfers, but they have had access to other benefits such as local development projects and tourism permits.

After two decades of negotiations with the state, land transfers cover a total of 398,933 hectares, according to information available in 2020, or 44.08% of the agreed amount. The rest are subject to various legal issues (licenses, purchases and transfers, provision of property titles) as part of the ongoing property transfers to communities. The slow pace of land transfer is due to the MBN's inability to process so many cases. Authorities often attribute this to unresolved overlapping land demands between communities, but the central issue is the doubt in public agencies that indigenous people can control sensitive border areas as well as important mining rights and activities.<sup>14</sup> This is particularly evident at the Salar de Atacama. The land transfer to indigenous communities is less than half of the agreed area. It includes surface water but excludes the mining properties of SQM and Albemarle, and other properties with planned operations by

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<sup>13</sup> For example, ancestral lands, community lands, running water, quarries, cultural or religious heritage sites, and landscapes used for tourism.

<sup>14</sup> No one publicly acknowledges these suspicions, even though in private, they question why indigenous people want so much land.

NX1 de Peine, Lithium Chile, and Wealth Minerals. It also excludes the CONICYT scientific concession, sectors of the Los Flamencos Natural Reserve, the Ramsar sites, other tourism areas and other as-yet unexploited mining properties.

The demand for three million hectares has been defended based on ethnic and political arguments, but is not perceived as being achievable. This same land is the subject of claims, controversy, vindication, legal actions, and demonstrations that involve public agencies, mining companies, businessmen, hotels, tourism companies, and scientific agencies. One example is a 2014 claim filed by the Toconao community against CONICYT for its construction of an astronomical science center (ALMA astronomical park) in an area the community claims. Similarly, several communities are trying to establish eminent domain or physically occupying lands pending transfer, breaking with the legalistic nature of the process.

The surface waters used by the Atacama communities were not subject to specific legal protections. In the past, this allowed permits to be granted to public and private companies, for example the Antofagasta-Bolivia Railroad and the Chuquicamata copper mine. Companies that supply drinking water to the urban centers in the Antofagasta region have notably affected some locations in the Loa River basin, for example, Toconce and Aquina-Turi, San Pedro River in Alto Loa. In the early days of enacting the 1993 Indigenous Law, the ownership of water and the appropriate legislation for their registration – at that time regulated by the 1981 Water Code (DFL N°1.122)<sup>15</sup> – attracted more attention than the fate of grazing lands and indigenous territories.

Individual rights and licenses provided by the Water Code did not sufficiently protect them from mining companies, drinking water companies, speculative intermediaries, and the growing tourism sector. Non-indigenous or unorganized farmers sold water rights in the oasis of Quillagua, in rural Calama, and in Chiu-chiu and Lasana. In accordance with the Indigenous Law, between 1995 and 1998 the waters of the Salar de Atacama and Loa basins, between Quillagua at the foot of the desert and Alto Loa, were registered in the name of indigenous communities and indigenous irrigation associations. The lawyer who assisted CONADI pointed out that the vast majority of ancestral water rights of the Atacama communities were judicially recognized and registered (70 rights in favor of 18 indigenous organizations, for a total flow of 2,278.8 L/s) (Cuadra 2000: 111).

In those same years, groundwater also began to be claimed. However, the registration and use of groundwater remained subject to the terms of the Water Code; that is, the first people to register groundwater were the owners. In this regard, the same lawyer emphasized that situations that threaten the legitimate existence of water rights have arisen in recent years. This is because of the strong pressure from mining companies to extract groundwater from Atacama territory (Cuadra 2000:111). In addition, the expansion of mining in the region, the growth of the urban population, indigenous rights to water, and the prior control of surface water by CODELCO increased the demand for water in the face of limited available sources. This encouraged the exploration and constitution of groundwater rights, not always for immediate exploitation but as reserves. In the community of San Pedro de Atacama, the exploration of groundwater was carried out by private companies in search of water that could be traded on the market such as drinking water used by mining companies, the San Pedro de Atacama drinking water cooperative, hotel and service establishments, and indigenous and non-indigenous residents.

When Atacama communities were confronted with other groups registering their water on lands they owned or claimed, they initiated political opposition, judicial protection, and public protests.<sup>16</sup> However, the communities have not always been successful in stopping this loss of water rights. The wells are the property of those who build and register them. The use of groundwater has become controversial because the water is often on indigenous land and drinking water sources can be contaminated in addition to other environmental impacts, particularly in the Salar de Atacama.

The Atacameño demand for land and territory, water and environment protection, and autonomy and representation is a complex process. Actors and their relationships are produced within the context ethnic organization, state action, civil actors (environmental, political, and expert knowledge), and

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<sup>15</sup> This law considers water to be a social and economic good. It establishes a separation between land and water ownership. The state grants water use rights to private individuals or legal entities, free of charge and permanently. The law also enables trade on a water market. Successive reforms have not changed this structure.

<sup>16</sup> The case of *Mínera Escondida* (BHP Billiton) had great local resonance and impacts regional and national mining projects. Due to pressure from indigenous organizations and a negative resolution from the Regional Environmental Council (COREMA), BHP had to abandon a project to capture groundwater in the high Andean sector of Pampa Colorada (about 1 m<sup>3</sup> per second) (Babidge 2015; Bolados 2014; Morales and Azocar 2015).

companies (with investment projects or the territory forms part of their area of influence). The 1990s post-dictatorship indigenous policy (Law 19.253) put a new organization in place that recognizes Atacama lands and the legal protection of water. The implementation of the 1997 Environmental Law (Law 19.300) and its subsequent reforms is another milestone. It requires investment projects (e.g., copper mining, salt flat mining, energy projects, hotel investments) to obtain environmental permits (through declaration or environmental impact study) and to be open to citizen participation and to a potentially active opposition. In 2009, the persistent indigenous demand for approving ILO Convention 169 finally led to its ratification. The Convention provides an important legal tool to oppose private investment and public action in the province of El Loa. Both the indigenous communities and even more frequently, the CPA, have actively used it, with mixed results. Today, indigenous consultation is a key instrument that companies usually try to avoid. Several public agencies have been required to comply. With the notion of "shared value," the 2015 lithium policy reinforces the need for converging interests between the mining companies, the indigenous communities, and entities of wider representation. At the national level, negative results in the indigenous consultation process have often led to disinvestment.

#### *Absence of conflict in the Argentine Atacama*

The Salar de Olaroz-Cauchari is located in the southwestern tip of the province of Jujuy, at 4,000 meters above sea level. The region has historically been marginalized in both the international and the national context, and is now part of the administrative department of Susques. Most inhabitants are descendants of indigenous communities and self-identify as *Atacameños*. Their traditional economic activities include transhumant grazing (llamas, sheep, goats), small-scale agriculture, and barter trade with donkey caravans. These activities are important economically and culturally (Göbel 2013) and are often supplemented with temporary paid work, for example in mining. In this region, small-scale mining operations have been around since the beginning of the twentieth century, mostly to mine gold, silver, and borate and to a lesser extent copper, iron, lead, and salt. In the following decades, local groups started to see regular employment with the opening of several large-scale mining operations such as the tin and silver mine Mina Pirquitas, opened in 1935, and the lead, zinc, and silver mine Mina Aguilar, which opened in 1936 (Abeledo 2017). Until the second half of the twentieth century, most Puna villages were small groups of houses around a church (see Bolsi and Gutiérrez 1973 for Susques). Most people were very mobile and lived dispersed across the countryside. The strong increase in borate extraction in the second half of the twentieth century and the massive increase in all extractive activities since the 1990s has intensified the ties between the local pastoral economy and the global capitalist economy. The relative increase in wage labor, a greater control of compulsory education, and the introduction of social assistance during the Kirchners' administrations created the need to move households to the villages.

The legal and institutional reforms of the 1990s initiated profound changes. In addition to a new political-economic framework for mining, the 1994 constitutional reform recognized the ethnicities of the indigenous population. Article 75(17) established the legal status of indigenous communities and recognized their ownership of traditional lands. In 2000, Argentina ratified Convention 169 of the International Labor Organization (ILO 169). This addresses the self-determination and self-government of indigenous peoples, the recognition of sovereignty over the territories they historically inhabit, and the ownership of all natural resources on their lands. Equally fundamental is the right to consultation before any type of mining project within the direct or indirect sphere of influence of the indigenous communities. In the department of Susques, this process has led to a new ethnic self-identification as *Atacameños*. Ten indigenous communities have been recognized by the state.<sup>17</sup> In 1996, the national government signed an agreement with the provincial government of Jujuy to legalize community lands, and started a program to accomplish this, called the Program for the Regularization and Adjudication of Land to the Indigenous Population of Jujuy (PRATPAJ). In the department of Susques, land deeds were transferred. However, both in the national and provincial context, this has yet to be considered an exception (Göbel 2013; Solá 2016).

In the province of Jujuy, mining companies are required to submit a biannual environmental impact report. Reports are reviewed by the Provincial Mining Environmental Management Unit (UGAMP), which advises the Mining Application Authority of its decision to approve, reject, modify, or extend the report. The indigenous communities of the affected area are represented among the 16 members of the UGAMP's

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<sup>17</sup> These communities are Susques, Olaroz Chico, Huancar, Puesto Sey, Pastos Chicos, Catúa, El Toro, Coranzulí, Jama, and San Juan de Quillaques.

committee. This process dates back to the 1998 Law 5063 (the General Environmental Law of the Province of Jujuy), which was put into effect by Decree 5772 in 2010. As a result of issuing land deeds, mining companies require the signature of a representative from the relevant indigenous communities before commencing their activities (Pragier 2019).

Thus, on the one hand, the "arrival" of the lithium mining companies in the late 2000s coincided with general improvements for the indigenous population, new legal conditions and a greater degree of local organization. On the other hand, all borate mining projects shut down in the early 2000. Mina Pirquitas closed in the late 1980s and Mina Providencia closed in 1997, which left many local residents, especially young men, out of work. Due to the lack of education opportunities, many young people left their communities so local perception of lithium mining projects is ambivalent. There are expectations of jobs to keep young people from leaving. There are hopes lithium will deliver on the mining companies' promise to be the future, but there is also great uncertainty about the ecological consequences. Besides the general lack of independent hydrogeological studies, there is a pronounced asymmetry of information between the lithium mining companies and the indigenous communities:

I don't agree with the process that we have today and the methodology that is used by the state. That is, we are not working together. The inquiries are made on the basis of existing material. So it's like they give you a book you don't understand. A monograph that consists of thousands of pages and scientific explanations. If you read it, you understand 5% of it. And imagine if you've never read. That's even worse. Then you have the possibility to ask, but if you didn't read the material, what possibility is there to ask? (Interview with vice-president, indigenous community of Olaroz Chico)

The extensive licensing of community lands commodifies commonly-held property, which must be considered in the context of a general expansion of the capitalist resource frontier. This also leads to an overlapping of different territorial visions (Göbel 2013). Lithium mining is a globalized territoriality of the valorization of a primary resource. In many places, this vision is now opposed to local indigenous territorialities. Here, we use territoriality as a category of performative practice (Haesbaert and Mason-Deese 2020). In this sense, pastoralism is not only a purely economic and productive activity, but it also serves as an organization of space that shapes local identity (Göbel 2013; Rivet 2014). Although there have been individual protests, particularly from herders near the salt flat, all threats of legal claims against the companies have ended with compensation payments and the resettlement of the affected families (Interview with lawyer of indigenous law). Unlike in the neighboring communities of the Salinas Grandes-Guayatayoc basin, aside from the initial resistance of the community of Susques and the continuing Colectivo La Apacheta (comprised of a few families), there is no organized opposition in the department of Susques. Existing tensions, the need for more active participation, and disagreements with the mining companies rarely translate into real claims. Instead, they are channeled into the demand for more local jobs.

#### **4. Contracts and agreements between indigenous communities and mining companies**

##### *Chile: From social assistance to "shared value"*

In the late 2000s, Atacama indigenous organizations perceived themselves as distant from state tutelage. They strived for more independence from public agencies such as CONADI and government development programs. The formation of indigenous communities and associations was aimed at channeling information, services, local demands, and transfers to and from the state. A decade after their creation, the limitations of indigenous policies became apparent. The pace of land recognition is slow, and the approval of ILO 169 and its promise of greater ethnic autonomy has been delayed. Indigenous consultation is still non-binding and people are frustrated with the institutional framework for state action provided by the Indigenous Development Areas (ADI). Public support for development is perceived as limited.

The position of greater autonomy has three dimensions. One aims at reducing dependence on the state in terms of organization, autonomy, development, and territorial control, for example, the Declaration

of Quetena.<sup>18</sup> It also implies greater scrutiny of the leadership and guidance of indigenous representatives and authorities. Another dimension is the opening up to civil society (social movements, non-governmental and international organizations, universities, political leaders, liberal professionals and specialist advisors) and to the business world (mining and energy companies, engineering consultants). In the former, communities find institutional and political allies (e.g., on environmental issues) and expert knowledge (social, environmental, legal). In the latter they find assistance, local projects, organizational financing, and agreements. The third dimension is economic and refers to the agreements and financial transfers from the companies to the communities (Interview with the president of the Committee of Atacama Peoples).

This has opened a space for "private" links that generate synergies, new capacities, and resources but also ambiguities and contradictions.<sup>19</sup> Not all communities participate the same way in this space and given its new importance. Communities have moved toward a more complex and challenging type of organizational management. The communities who are directly affected by salt flat mining and the CPA, Peine, Socaire, and Toconao have taken this furthest.<sup>20</sup>

The arrival of lithium mining in the 1980s raised hopes for jobs among the communities surrounding Salar de Atacama. The mining companies offered material and financial assistance to the neighborhood councils and indigenous communities, understood as a non-binding "good neighborly" action. This is reflected in the following testimony:

On one occasion we invited them to a meeting here [in a nearby community] (...) those from the company told us that they had no obligation to come and inform us what they were doing with the lithium or what they were producing in the Salar. (Interview with Atacameño leader)

This is still the case today. However, back in the late 2000s, internal conditions (e.g., territorial demands, critical views of salt flat mining and water extraction, the expansion of tourism) and external conditions such as environmental demands and ILO 169 led to conflicts between indigenous communities, and salt flat mining and other investment projects. In response, SQM and Rockwood Lithium started to revise their community-relations strategies. In 2007, SQM created a department of environmental management and expanded the area of corporate social responsibility. Rockwood hired a specialized consulting firm to do an environmental impact study. Until then, there had only been an environmental impact statement. Management attempted to open up and begin a dialogue with nearby communities. In 2009, Rockwood agreed to a contract with Peine, establishing an annual contribution of approximately US\$120,000 (or more, depending on production) for local development and for a group to work on environmental, social, and labor agreements. In 2016, the company signed a contract with the CPA.

With this contract, the company recognizes the existence of Atacama rights and claims over the Salar de Atacama and commits to indigenous participation in environmental monitoring and significant payments: 3.5% of total lithium and potassium sales; of which 0.5% must be allocated to planning and development studies. With current production levels, these payments amount to US\$10-15 million annually, distributed among 18 communities and the CPA. Payments of this scale are unknown in Chilean mining and have been widely highlighted by Albemarle, CORFO, and the Mining Ministry. The continuous struggle of the indigenous communities and strong negotiating positions of CPA directors, strengthened by the advice of experts and businessmen, explain this achievement (personal communication with ex-CPA

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<sup>18</sup> This declaration was made in Quetena Grande (Sur Lipez, Bolivia), on March 24, 2012, by a group of indigenous leaders during a trade fair at the Meeting of Atacama Peoples without Borders. It proposes, in accordance with ILO169, to demand that the governments of Argentina, Bolivia, and Chile recognize Atacama territory beyond national borders.

<sup>19</sup> The latter is well exemplified in the case of the exploration of the El Tatio geothermal field for electricity generation, which began in 2008. Due to the poor management of a thermal wall, it was suspended in 2010. The project encountered opposition from various local actors. The indefinite suspension of the project was considered a success by the conglomerate of actors "defending" El Tatio. However, the company Northern Geothermics had already reached agreements with the communities of Toconce and Caspana (Alto Loa). This triggered the division of the CPA into a CPA Alto Loa and another that comprised the communities of the Salar de Atacama basin.

<sup>20</sup> The CPA of the Salar de Atacama basin is an indigenous organization acting on behalf of 18 Atacameño indigenous communities. It has its own offices in San Pedro de Atacama, employs professional and administrative staff, and has the capacity to hire expert advice, and do studies. It has a wide network of relationships in environmental matters and has sufficient financing. As of 2016, Albemarle has the most funds.

president). In addition, at that time Albemarle was negotiating with CORFO to revise and extend its contract. Besides a favorable environmental resolution, the novel and far-reaching "social license" made Albemarle an acceptable partner to give impetus to the new Policy of Lithium and Administration of Salt Flats. The contract includes local development plans, reports to the company, and dependence on new transfers to correct spending allocations. But due to the lax finance regulation scheme, there are heterogeneous outcomes in different communities, with variable visions of community development, priorities, administration, and accounting management. In 2019, Albemarle commissioned a consulting firm to report and evaluate this issue. Its conclusions are still unknown.

SQM, on the other hand, does not have a reputation of working toward "shared value." The company points out its continuous relationship with the communities and the CPA as well as its willingness to make local development agreements, similar to Albemarle's strategy. However, the agreements with CORFO and the attempt to open up to agreements simply do not meet the expectations of expanded corporate social responsibility. They are rather the type of responses needed help SQM advance its negotiations with the state and to deal with the Atacama legal opposition, bad press, public demonstrations, and environmental sanctions.

In 2018, SQM and CORFO agreed to extend extraction until 2030 and further expand lithium production. The contract includes annual payments to indigenous communities and municipalities of US\$10-15 million. However, the SQM-CORFO contract stipulates an external body to administer the money, and this has been rejected by the communities and the CPA. They believe an external administrative entity reflects politicians' mistrust of communities. In contrast, the negotiations with Albemarle are considered to be a prolonged dialogue and a freely consented agreement, which later transferred to negotiations with CORFO. There is a rumor about something a state official said – whether true or not: "...and what are these indigenous people going to do with so much money?" (Interview with mayor of San Pedro de Atacama).

The communities want to receive their payments. They reiterate their autonomy, stay in ongoing conversations, and in one case, even entered into a formal agreement with CORFO and SQM. The CPA has delayed the issue, in addition to pending lawsuits in the Antofagasta Environmental Court and the Inter-American Court of Human Rights. The post-pandemic economy could be an additional factor in what happens next.

#### *Argentina: social assistance and non-binding agreements*

In the late 2000s, lithium mining companies began contacting indigenous communities in the department of Susques. Today there are several active mining projects in the Salar de Olaroz-Cauchari.<sup>21</sup> The company Sales de Jujuy<sup>22</sup> started commercial extraction in 2014. Exar Mining<sup>23</sup> is currently constructing evaporation pools and plans to enter commercial production by mid-2022. In addition to other licenses, South American Salts<sup>24</sup> and the Canadian company Millennial Lithium have carried out explorations (Dorn and Ruiz Peyré 2020).

At first, these companies negotiated with community presidents. Instead of negotiating with all ten communities of the Atacama Peoples' Association, they focused on bilateral dialogue. They employed anthropologists and local residents to better understand the needs of the local population and support them with favors and donations of goods and money. In Sales de Jujuy, the department of Shared Values has 10 employees. In Exar Mining, the Community Relations department has 12 employees. Some bilateral contracts and non-binding agreements were made to obtain approval of UGAMP's environmental report. Sales de Jujuy maintains it is close contact with all ten communities but only signed a contract with the closest one, Olaroz Chico. Exar Mining has bilateral contracts with the six communities in its direct and

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<sup>21</sup> In general terms, one could speak of salt flat mining instead of lithium mining. In several cases, lithium is extracted alongside with potassium and other minerals. The companies operating at Salar de Olaroz-Cauchari only commercialize lithium.

<sup>22</sup> Sales de Jujuy is a joint venture between the Australian company Orocobre (72.68%), the Japanese company Toyota Tsusho (27.32%), and the state-owned company Jujuy Energy and Mining State Society (JEMSE; 8.5%).

<sup>23</sup> Exar Mining is a joint venture between the Canadian company Lithium Americas (44.8%), the Chinese company Ganfeng Lithium (46.7%) and JEMSE (8.5%).

<sup>24</sup> South American Salts is the national subsidiary of the Canadian company Advantage Lithium. With 34.7%, Orocobre is the largest shareholder of the parent company.

indirect sphere of influence: Olaroz Chico, Pastos Chicos, Catúa, Puesto Sey, Huancar, and Susques. There are pronounced differences between the contracts. The other four communities remain excluded.<sup>25</sup>

When the lithium mining companies arrived, the indigenous communities had achieved a high level of internal organization and were able to rely on new legal frameworks. However, in a relatively short time and without significant compensation, compared to the CPA-Albemarle contract, the companies were able to obtain the communities' approval. We can identify six fundamental factors that contributed to this situation.

First, the region is in the Atacama Puna. Throughout the region's history, it has changed jurisdiction. It was not integrated into the province of Jujuy until 1943, after the dissolution of the Andean National Territory. The region's history is characterized by the absence of rebellions and open conflicts. Unlike the neighboring communities of Salinas Grandes (for example, the 1875 Battle of Quera and the 1946 march *Malón de la Paz*, the communities of the department of Susques have historically been open to adaptation and negotiation (Dorn 2021b; Göbel 2003).

Secondly, because it is historically marginalized in the national context, the region has deficient infrastructure including a lack of secondary schools and health care, poor road conditions, and limited transport and communication options. The companies therefore focused on financing traditional festivals, buying equipment for local schools, and providing transportation and structural elements, for example a community hall. By meeting these basic needs, the lithium mining companies were able to quickly build a fundamental political consensus among the local population.

Third, the legal recognition of indigenous communities led to an organizational structure that parallels the administrative structure of the state. The communities do not have their own budget to promote activities or to strengthen their organization. The elected indigenous presidents and vice presidents serve without pay and have one- or two-year terms. Hence only people with another paid job are able to hold the position. This has an exclusionary effect and as a result, the interests of the working population tend to be over-represented. In many cases, this results in political patronage. A small group shifts the leadership positions from one side to the other (Interview with Vice-president of an indigenous community, Susques). In the face of new mining projects, these "construction flaws" (Göbel 2013: 144) in the organizational structure of the communities of Jujuy considerably reduce the potential for action and for claiming indigenous rights. By offering the community members direct or indirect employment, the mining companies take direct advantage of this situation. In 2019, the presidents of all relevant communities directly or indirectly made money from the mining companies (Interviews with former president indigenous community of Susques, and entrepreneur from Olaroz Chico).

Fourth, the state is the guarantor of the communities' rights according to the international and national framework of indigenous law. This includes prior consultation by the mining companies, equal access to information, independent legal advice, and the identification of alternative development opportunities. Several indigenous law experts have agreed that these participatory processes have not occurred in the Salar de Olaroz-Cauchari mining projects (Interview with lawyers of indigenous law).

There are no ties with regional, national, or international organizations or NGOs. In contrast, the resistance of the communities of Salinas Grandes are supported by several organizations such as the National Team for Indigenous Herding (ENDEPA), the Environment and Natural Resources Foundation (FARN), and Amnesty International.

Finally, the local population had already entered into dependency relationships with the globalized economic system before the lithium mines arrived. The closure of the borate mines forced many local residents, particularly men, to look for work outside the region. Additionally, people needed a residence in a village to receive social assistance during the Kirchner era. In many cases, this led to the abandonment of pastoral activities (Interview with student from Huancar). Hoping for new local jobs, communities quickly entered into bilateral negotiations. Workers emphasize the significantly improved working conditions in lithium mining compared to the exploitative conditions of the borate mines.

These factors have led mining companies to take a paternalistic welfare approach, instead of binding and transparent contracts. The main argument for collaboration is local employment. As a consequence of the bilateral agreements and the promotion of local contractors, that is, small companies that realize

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<sup>25</sup> Exar Mining affirms that, pending on the consent of the six communities, its local work program is open to the other four communities.

subcontracted services that mostly involve unskilled labor<sup>26</sup>, a new competitive relationship has developed between the communities. In the early years of the lithium boom, the community of Susques, individuals, and the collective La Apacheta fought together against lithium mining in their territory. However, opposition is the exception. There is a fear that other communities will accept the projects and their benefits, so the majority of voters favor the mines. Although uncertainty and local concerns have long turned into internal tensions and discontent, a quote from a local vice-president illustrates the prevailing mindset: "The projects are there, now we have to make the best of the situation" (Interview with the treasurer, indigenous community of Susques).

## 5. Discussion: comparing the social impacts of lithium mining

In this section, we discuss the impacts of salt flat mining from a political ecology perspective. In Chile, lithium is a strategic resource that cannot be licensed to private companies. Unlike copper mining, where the state-owned CODELCO is very active, the Chilean state does not participate in lithium exploitation. On the other hand, lithium extraction in Argentina can be licensed to private companies. Since subterranean resources belong to the provinces, there are national and provincial legal frameworks for administering lithium mining. This decentralized structure is an important difference from Chile's more centralized approach.

Since the 1990s, both countries have made progress in legislation and have ratified international conventions on environmental protection and legal protection for indigenous groups, for example, ILO 169. These measures aim to promote and defend indigenous claims and actions. However, their effective application and scope is another story. In the Argentine Puna, local organizations have not adapted to the new players in salt flat mining. There are only limited political and institutional resources as well as actors such as the state, regional indigenous movements, local governments, environmental activists, and experts. This contributes to the acceptance of the mining companies' paternalistic dominion. On the contrary, in the communities of Salar de Atacama, local and representative organizations are transitioning toward more complex forms of institutional design and management. Economic, political, and professional opportunities and resources have been present for the past two decades. This has fostered the development of new forms of organization, leadership, and representation of the Atacama people and empowered them in dealing with the mining companies. The profound contrast between the two areas illustrates the importance of organized indigenous communities, a framework of regional and national political opportunities, environmental institutions, regional political support, an active civil society, and media interest. The absence of these factors impedes mobilizing resources to achieve a fairer position with respect to the mining companies. In other words, the more pronounced opposition in Chile is primarily attributable to the greater availability of economic, organizational and political resources. In contrast, power asymmetries between communities and companies are more pronounced in Argentina, especially due to a lack of alternatives and financial resources.

Antofagasta is an economically important mining region that is even called "Chile's salary" (see Thodes Miranda 2016). In addition to copper, salt flat mining, and the development of the Salar de Atacama has had a significant local impact. While the national and regional impact of lithium and potassium mining is marginal, the impact is very visible locally, principally through direct and indirect employment for indigenous and non-indigenous workers south of the salt flat. The agreements with the mining companies ensure large flows of money for local development, education, direct and indirect payments to community members, and local organizations. The local tourism job market in San Pedro de Atacama and the regional mining market, especially around Calama, tend to make this impact less apparent. In the Argentine Puna, the lithium mining companies have more local and regional significance in the form of direct jobs and contracting services, where there are few economic alternatives. Although Argentina cannot historically be considered a mining nation, it is beginning to play a fundamental economic role in the provinces of Jujuy, Salta, and Catamarca. Local jobs are the key issue in all negotiations. At the same time, existing dependencies on the capitalist market are being substantially deepened.

Monetary loans, and the formation of small contracting companies that offer specific services to the mining companies, both foster further dependence. Based on the existence of an active regional mining labor market and an autonomous opposition from the indigenous communities, separated from individual

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<sup>26</sup> All these companies offer their services to only one or two companies in the same sector, e.g., a company in Olaroz Chico now competes with a company in Huancar. Only the community of Olaroz Chico has 16 contracting companies.

labor ties, the mining companies of the Salar de Atacama in Chile are unable to establish similar dependencies. Nonetheless, the funds of the indigenous communities, including the payment of leaders and direct and indirect payments to partners, come from shared value agreements with the neighboring salt and copper mining companies. The current Atacama organization, often referred to as "indigenous community 2.0," therefore maintains a substantial level of dependence on the mining companies. It might be less dependent than in Argentina, but it is still dependent.

Chile's national lithium policy aims to re-establish Chile as a global lithium player, obtain royalties, stimulate value-adding activities, conduct research and development, and develop local communities. This contrasts with the agenda of indigenous Atacama communities, who struggle to receive part of the mining profits, to take possession of lands on and around the salt flat by claiming ancestral occupation rights, and to have greater decision-making autonomy from mining companies and the state, for example, the guardianship in the CORFO-SQM agreement. We do not find comparable challenges for communities on the Argentine Puna, which have so far been subject to the paternalistic social assistance scheme imposed by the lithium mining companies.

The conflict between mining companies and indigenous communities is territorial, environmental, and economic. This process started with the definition of territorial demands and negotiations with the Chilean state at the end of the 1990s, and put into place in the early 2000s. It is territorial insofar as the areas of mineral and groundwater extraction are within communities' ancestral lands that they only partially own. Environmentalists believe that the extraction of brine and water, which had already begun when the territorial demands were made, has consequences for the salt flat's ecosystem and surroundings. The conflict is economic in terms of financial compensation for environmental intervention and for using the territory and its resources for transit, extraction, processing plants, and mining camps and operations. In 2016, the communities and their organizations accepted compensation from Albemarle. Compensation negotiated between SQM and CORFO are still rejected. All this is generally known in Olaroz-Cauchari and the Atacama communities of the Argentine Puna, but it does not translate into an open conflict. However, the growing competition between and within the indigenous communities of the Olaroz-Cauchari basin may lead to a future conflict.

Finally, in terms of salt flat ecology, the institutional framework, actors, labor, power relations, and conflicts make it possible to identify winners and losers of environmental change caused by lithium mining. In Chile, surface water for traditional use has not been affected, but groundwater is used as both drinking water and for industrial purposes on the southern and eastern edge of the basin. Local organizations continue to stress the risk of polluting surface waters. They also emphasize the damage to the salt flat's surface, lagoon areas, water tables, and brine composition as well impacts on ecosystem flora and fauna. There are similar concerns in Argentina, for example for pastoralism near the salt flat, but these communities have little opportunity to strengthen their position as those in Chile have done. These concerns highlight the local population's highly ambivalent relationship with lithium mining. Power asymmetries impede these concerns from leading to real change.

Until very recently, there was no independent expert knowledge on ecological dynamics, even in Chile, although the mining companies have done studies and hydrological modeling. The same is true of the Argentine salt flats. The lack of comprehensive external assessments underlines the companies' position of power in the continuity, expansion, and limitation of environmental commitments. Due to the technical language of the studies and reports produced for the companies, indigenous leaders often do not even understand the basics.<sup>27</sup> Since 2014, the position of the Chilean state has changed, put into place by CORFO and the Mining Ministry. There are new studies on the Salar de Atacama's ecosystem and the consequences of mining. For example, a study commissioned by the Committee on Lithium and Salt Flat Administration identified information distortions and inadequacies. The communities and the CPA maintain links with external consultants and hire professionals. They have managed to initiate joint monitoring with companies and Environmental Assessment Services (SEA) to make information more available and more transparent. On the Argentine side, communities are far from making similar progress.

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<sup>27</sup> When Rockwood Lithium presented its expansion project in the Salar de Atacama, the community of Toconao noted that it was impossible to understand the technical information without the help of independent advisors. They further remarked that 90% of the assembly understood little or nothing about the contents and methodology (comments to the Rockwood Lithium's environmental impact study by community of Toconao, 2011).

## 6. Concluding reflections

In this article, we have analyzed the relations between mining companies, the state, indigenous communities, and the socio-territorial implications of lithium mining in the Salar de Atacama and Olaroz-Cauchari basins. In both case studies, salt flat mining has caused profound socio-territorial transformations. Due to divergent institutional settings and power relations, these transformations have materialized differently in Chile and Argentina.

The power relations between the state, mining companies, and indigenous communities reveal major imbalances. The asymmetries are particularly evident with regard to the precarious local labor market. While the population around the Salar de Atacama has numerous employment alternatives such as the Chuquicamata copper mine and tourism, the communities of Olaroz-Cauchari are worried their villages will die out, due to young people emigrating and potential environmental damage. This illustrates not only the lack of possibilities for action by the local population, but also underlines the structural nature of the conflict. Furthermore, it underlines the superior negotiating position of the Chilean communities, and explains how they have been able to achieve, among other things, negotiated contracts with direct payments. The adverse effects of the Covid-19 pandemic on global and Chilean tourism remain to be seen.

Considering the limited life span of any mining project, the long-term creation of local value remains a big question. In the case of Argentina, it is particularly evident that the benefits of salt mining are unevenly distributed in favor of international companies. At the same time, the long-term social and ecological costs are distributed asymmetrically to the detriment of the local inhabitants. This imbalance is underlined by the general lack of independent ecological studies. There are significant differences between the communities of the Salar de Atacama and Olaroz-Cauchari. The Chilean communities are increasingly organized and aware of the long-term effects of salt flat mining. They have made several efforts toward local value creation: partnerships with mining companies to generate solar energy in the Atacama Desert, rural agricultural products with good market value, tourism infrastructure and services, and financial support from the mining companies. These are promising ideas that advance slowly and are sometimes hindered within the indigenous community itself, such as the preliminary project to build solar panels to bring power to the commune of San Pedro de Atacama and selling any surplus energy to mining projects. In Olaroz-Cauchari, such autonomous indigenous actors are still lacking. Indigenous organization, awareness of the future, and interest in exploring options for creating local value are still subsumed by the dominance of the mining companies. This is accompanied by the consent of provincial and national authorities in favor of mining.

The Chilean case has several paradoxes. On the one hand, Chile's neoliberal economic model favors private extraction. On the other hand, for historic reasons, lithium cannot be licensed and is subject to state intervention. As a consequence, the lithium state policy and salt flat governance is centrally organized. The policy involves high royalties and requires environmental and social commitments, including company-community ties under the notion of "shared value." The policy of ethnic recognition ensures enforceable indigenous rights in terms of territory, extraction, and the environment. Through independent negotiations and some led by the state, this is financially supported by the mining companies. In Argentina there is no comparable process. Lithium extraction is available through permits. Its export responds to the urgent need for foreign currency to finance the national debt. In this scenario, the political fallout from opposition, or company–community conflict, is more fragile. Moreover, the communities of the Argentine Puna face a persistent lack of employment opportunities with the decline of borate mining.

The lithium boom is clearly linked to the growing demand for energy storage in the context of global electro-mobility. Although electro-mobility is often considered to be part of a sustainable future market, our analysis shows that the development discourses underlying both electro-mobility and lithium extraction, such as the green economy and neo-extractivism, deepen existing Global North–South relationships, social inequalities, and power asymmetries. They therefore perpetuate an imperial mode of living (Brand and Wissen 2017). In this sense, the ambiguous and paradoxical character of lithium mining is revealed.

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