

ISSUE BRIEF

HYDRO-HIGHWAY ROBBERY: REGUEMOS CHILE WOULD BENEFIT AGRIBUSINESSES AT THE EXPENSE OF THE ENVIRONMENT, SMALL FARMERS, AND INDIGENOUS PEOPLES

Climate change is wreaking havoc on the Chilean water supply. Rising temperatures and shifting precipitation patterns have led to an ongoing mega-drought.¹ The country is currently experiencing a serious water shortage that is impacting health, sanitation, food production, drinking water, and energy production.² In Chile, 42 percent of the rural population does not have a formal water supply, and more than a million people do not have reliable water sources.³ With the ongoing COVID-19 pandemic, this means that millions in Chile do not have access to potable water to wash hands as a means to avoid contagion, as recommended by the World Health Organization.⁴

This water crisis requires urgent solutions to ensure that there is sufficient and safe water for communities and ecosystems as well as for productive uses. Despite the need for immediate solutions, however, it is important to avoid projects that may cause more problems than they solve.

The Reguemos Chile project, a “*carretera hídrica*” or hydro-highway, is an example of such a damaging initiative. Its proponents plan to use a series of canals and aqueducts to transfer water from the south of the country to the central north. This transfer is designed to bolster large-scale agricultural initiatives by delivering water to the country’s most water-scarce regions. However, the project has advanced to the Ministry of Public Works (MOP) for consideration without the consent or consultation of local Indigenous communities, and it does not consider the environmental and social impacts to the regions from which water will be diverted and through which it will be transported.⁵ As it stands today, the hydro-highway would cause serious damage to the climate, biodiversity, ecosystems, and people living in the affected basins.



© Christian Andrés Pios Lira

The Maipo River Basin, one of many facing extreme drought in Chile.

Instead of the Reguemos Chile project, we recommend the development of local and regional water management solutions that focus on the reduction of water waste, the development and management of local supplies, and the restoration of highly overused aquifers. Such solutions would include expanding technical irrigation to enhance water efficiency; implementing water recycling systems; protecting, conserving, and restoring the basins' hydrological balance; and promoting practices to increase water retention capacities and soil health. Water management programs like these are needed to bring long-term, equitable relief to the many people, ecosystems, and industries suffering without reliable access to water in Chile.

THE WATER CRISIS IN CHILE

Chile is one of 44 countries that suffer “high water stress” due to a narrow gap between resource supply and demand, leaving it vulnerable to droughts and water scarcity.⁶ The year 2019 was Chile’s driest in six decades, causing the death of more than 10,000 animals and a high prevalence of fires in a 600-square-mile area.⁷ A study by the World Resources Institute (WRI) ranked Chile 24th among the 33 countries that will suffer “extreme water stress” by 2040.⁸ In Chile, 10 of the country’s 16 regions have been classified by WRI as “extremely water scarce.” These include the Metropolitan Region (containing the capital city of Santiago), as well as the central-north regions of Valparaiso, Coquimbo, and Atacama—all of which Reguemos proposes to reach.⁹ The Biobío region, where water would be sourced for this project, is ranked by the WRI as having “medium-high” water scarcity.¹⁰

Chile is the only country in the world where water is privatized. Its water code, written in 1981 during the Pinochet dictatorship, uses free market forces and water markets to reallocate water to high-value use.¹¹ Not surprisingly, a study from Fundación Chile reveals that nearly 60 percent of the water scarcity in Chile is caused by poor resource management, rising demand, and the over-granting of water use rights.¹²

PROJECT SUMMARY: A WATER HIGHWAY FROM THE SOUTH TO THE CENTRAL NORTH

Chile is in the midst of an ongoing mega-drought and pandemic, and Reguemos Chile argues that it will reduce water scarcity in the regions most heavily hit by drought. However, the real purpose of the Reguemos Chile project is to facilitate increased agricultural export opportunities. The project is not intended to address the existing crisis but rather to promote the growth of industries that are huge consumers of water.¹³

Founded in 2015, Reguemos Chile (“*reguemos*” meaning “let’s irrigate”) is a private corporation with the goal of transforming Chile into an “agrifood power” by expanding and diversifying irrigated areas and increasing overall food and agricultural export potential.¹⁴ To this end, Reguemos Chile has proposed a hydro-highway that moves water from watersheds in southern Chile (from the region of Biobío) to the arid central north (the region of Atacama). Specifically, the proposal involves extracting water from the Queuco and Biobío Rivers via five sections of channel cut into the Andean foothills over 3,900 kilometers (2,423 miles).¹⁵ According to a study on water



© Jessica Carey-Webb

View of Valle de la Luna, a protected area located in the Atacama region. The Reguemos project proposes to extend into the desert region.

availability done by Reguemos Chile, 85 percent of the water in southern rivers that would normally flow into the sea is an “exceedance”—a surplus that is ripe for the taking. Reguemos Chile proposes capturing 2,215 cubic hectometers (Hm³), or more than 2 trillion liters (585.1 billion gallons) of this “excess” water each year.¹⁶

Reguemos Chile intends to use this water to irrigate a million new hectares (more than 2.3 million acres), effectively doubling the irrigated area of the country. This would include:

- 360,000 hectares (889,580 acres) in the north zone,
- 270,000 hectares (667,185 acres) in the center zone, and
- 310,000 hectares (766,027 acres) in the south zone.¹⁷

It would prioritize irrigating areas that, according to the company, do not currently have an “ecological or productive value” and in the process generate “new ecosystems.”¹⁸ At the same time, Reguemos Chile would ignore struggling farmers and bypass city residents who desperately need access to more water.

Reguemos Chile is being promoted as a public–private initiative, and the company estimates that 25 percent of the project will be funded with taxpayer money.¹⁹ The first channel section alone, running more than 1,015 kilometers (about 631 miles), would cost US \$6 billion, US \$2 billion of which would be a state subsidy.²⁰ The first three sections of the proposed water highway could together require an infrastructure investment of US \$15 billion to \$18 billion, at least US \$3.75 billion of which would come from Chilean taxpayers.²¹ Reguemos Chile has said that the entire project will cost upwards of US \$20 billion, but that estimate is likely low.²² Still, it was one of the most expensive proposed projects in all of Latin America for 2019.²³ In addition to being expensive, it will take at least eight years, with most estimates putting completion closer to 10–15 years.²⁴ Even by the best estimates, the Reguemos Chile project will be lengthy and costly to taxpayers, whose money could be going to support more efficient and equitable water solutions.

FIGURE I: GENERAL OUTLINE OF THE HYDRO-HIGHWAY, WITH BLACK LINES REPRESENTING CANALS²⁵



FIGURE 2: CLOSE-UP OF THE FIRST TWO SECTIONS OF THE HYDRO-HIGHWAY



THE HARM DONE BY REGUEMOS CHILE FAR OUTWEIGHS ANY POTENTIAL BENEFITS OF THE PROJECT

“The water highway does not benefit us at all; quite the opposite. Despite all of the examples that exist in our history of genocide, cultural damage, relocation of populations, even so, Alto Biobío is still a territory that exists in the eyes of businessmen only as a sacrifice zone, meant to meet the needs not of the people, but of themselves; not for those who actually need water, but for mining, for their agricultural irrigation.”

—Fernanda Castro Purrán, spokesperson for the Red por los Ríos Libres and member of the Mapuche Callaqui community²⁶

Reguemos Chile has made sweeping and perhaps exaggerated claims about the benefits of the proposed project.²⁷ These include:

1. Doubled exports of agricultural products ranging from avocados to wine
2. 1,000,000 jobs generated
 - a. 1 new permanent employee for every 4 hectares (about 10 acres)
 - b. 2,200 seasonal workers per hectare (2.5 acres)²⁸
3. Estimated investments in infrastructure of US \$20 billion
4. Investment of US \$25 billion in agricultural plantations
5. Investments or contributions to the economy in logistics valued at US \$10 billion
6. Increase in tax revenues generated by agriculture and by the companies created

Reguemos argues that the tax revenues generated by the hydro-highway will increase Chile’s gross domestic product (GDP). In addition to delivering water for irrigation, the company claims it will produce “clean and sustainable” hydroelectric power and recharge depleted aquifers, improving the water supply for receiving cities.²⁹

However, members of the scientific community, civil society organizations, city mayors, and the Mapuche and Pehuenche Indigenous communities have publicly criticized the Reguemos project for ignoring the real harm the project would cause. According to Patricio González, an agroclimatologist at the University of Talca and an expert at the Center for Research in Irrigation and Agroclimatology (Citra), “You cannot do such a project without analyzing the consequences it will bring to the areas it crosses. It will certainly have an impact on the flora and fauna, and the solution could end up being worse than the current situation.”³⁰ In fact, the studies Reguemos Chile provides on its own website reveal that construction of the first section, a model of the next four sections to come, was found to pose a high-impact risk to the flora and fauna, natural hydrology, and local populations of the area.³¹

For example, Reguemos talks about the water it would capture from the rivers as an “exceedance,” a surplus of water not needed by local farms and cities. This is incorrect. Juan Armesto, a scientist at the Institute of Ecology and Biodiversity at the University of Chile, warns that the water that rivers take to the sea is a fundamental part of the ecosystem: “It is not a ‘surplus’ but rather contains biodiversity and nutrients derived from terrestrial ecosystems, which provide energy to the trophic chains of aquatic systems in rivers, lakes, and coasts.”³²

Additionally, in the Biobío region, residents have already suffered the socioeconomic and cultural impacts of two large hydroelectric dams on the Biobío River. At least 10,641 households currently do not have direct or safe access to water, and local communities have little or no access to irrigation.³³ The projected extraction at the headwaters of the Biobío River will make access to water even more difficult for the local population, increasing negative health and economic impacts for the region. Additionally, the project would further damage the Biobío River basin ecosystem, which has already been ravaged by fires and monocrop industrial logging plantations.³⁴ This may compromise the river’s critical role in moving sediments to the coastal areas, where they nurture one of the most productive fisheries in the southern Biobío region.³⁵

Reguemos Chile Would Negatively Impact the Climate

A project such as Reguemos Chile would produce massive amounts of greenhouse gas emissions that could adversely impact Chile’s ability to meet its climate goals of decarbonizing its electric sector and achieving carbon neutrality by 2050.³⁶ Using the Colorado River Aqueduct in the United States as a model, we were able to estimate the CO₂ emissions of just the cement used for the Reguemos Chile project. According to our projections, the cement alone in a basin transfer project such as Reguemos, which is 10 times longer than the Colorado River Aqueduct, could emit around 9,790 kilotons of CO₂, the equivalent of emissions from more than two billion passenger vehicles driven for one year.³⁷

Reguemos Chile Would Negatively Impact Communities

The hydro-highway would draw water from the Queuco River, along which the Indigenous Pehuenche communities live. In a press release from the Red por los Ríos Libres (“Free-Flowing River Network”), which is made up of activists, academics, and scientists, Fernanda Casto Purrán of the Mapuche Indigenous people, explained how the Queuco River is the lifeblood of four Indigenous communities: “For us, the river is life, it is the soul of this territory and we are going to defend it. We do not want the hydro-highway in our territory, and we are fighting, organizing, and studying as well, doing everything we can to keep this project out of our territory.”³⁸ The Red por los Ríos Libres has also described the project as unrealistic

and very dangerous due to its structural impacts on ecosystems and its various negative consequences for the neighboring communities.³⁹

The people of the Alto Biobío territory have already endured a similarly devastating disruption: a series of dams constructed without their consent, culminating in the installation of the Ralco Hydroelectric Power Plant in 2004. The project relocated and split up Pehuenche communities and flooded 4,000 square kilometers of forest including sacred sites and cemeteries, beginning in the early 1990s.⁴⁰ The consequences are still being felt by families that were moved from their ancestral homes to areas without water, creating a continued cycle of poverty.⁴¹

Since 2019 different social movements have come together to organize and protest against the Reguemos Chile project. The Malen Leubu, Weche Newen, Red Trab Mapu, Colectivo Una Sola Lucha (“A Single Fight Collective”) and Coordinator Pu Leubu have mobilized for the defense of the Queuco River. Mayors representing municipalities that would be affected by the hydro-highway have also mobilized to voice their disapproval on behalf of their constituents.⁴² Fredy Queupil, a leader of the Indigenous Weche Newen organization, says that so far Reguemos Chile has not consulted with the Pehuenche communities, nor has it given any information about the project to people who reside in Alto Biobío.⁴³

Queupil, who lives in Alto Biobío, also notes that the river does not have water to spare: “If there is a surplus, I don’t know what they [Reguemos] are talking about because during the winter it is common that the river rises a few days but then returns to its normal level. They would generate a decline in the banks of the Queuco River, and that would mean the death of some species of fish, macroinvertebrates, birds, and mainly the loss of some plants that communities use as *lawen* (Mapuche medicine).”⁴⁴

INTERNATIONAL COMPARISONS RAISE SERIOUS CONCERNS

As evidence in support of its project, Reguemos Chile highlights several international cases similar to the hydro-highway that have been “successful.”⁴⁵ However, many of these large-scale water infrastructure projects have raised serious environmental concerns and had negative impacts on local communities, casting real doubts on Reguemos Chile’s plans.

For example, the Olmos project in Peru has benefited large agribusiness while resulting in the loss of land for local farmers.⁴⁶ The project expelled peasant communities from their lands to build and install the infrastructure necessary for large-scale export agriculture.⁴⁷ This gave Odebrecht, the company behind the construction, control over 70 percent of the project’s lands.⁴⁸ Olmos was also far more costly than initially proposed, totaling US \$580 million instead of the initial \$220 million proposal.



An aerial view of the San Joaquin Valley in California. The irrigation project there is cited by Reguemos as a model, despite negatively affecting valley residents.

The Alqueva reservoir in Portugal, another example given by Reguemos Chile, has been highly criticized by Portuguese nongovernmental organizations. These groups cite environmental impacts that violate European environmental directives, insufficient mitigation and compensation measures, and marginal economic benefits for the local population.⁴⁹

Reguemos Chile also points to the San Joaquin Valley in California. However, this irrigation project too primarily benefited corporate agriculture, to the detriment of populations living in the San Joaquin River basin, who experience substantially high rates of poverty.⁵⁰ Also financed by taxpayers, the San Joaquin Valley system has required government subsidies for construction and operation. Additionally, in the current drought, farmers have turned to tapping into groundwater, causing experts to worry that the lack of regulation on the water system will lead to further over-pumping effectively drying up one of the world’s most productive farming areas.⁵¹

Reguemos Chile’s examples do not make it clear that its project will be a success; rather, they provide more evidence that the project will benefit agribusiness at the cost of local economies and ecosystems.

THERE ARE BETTER ALTERNATIVES

Fortunately, there are numerous other approaches to address the water crisis in Chile that are less expensive and faster to implement and come with fewer environmental and social impacts. For example, amplifying local and regional water management solutions can help reduce water waste and protect local supplies. Examples of these initiatives include expanding technical irrigation, improving water efficiency, implementing water recycling systems and practices that promote soil health, and increasing cropland resilience against droughts.⁵²

Replacing inefficient irrigation systems with micro-sprinkler or drip systems could increase the efficiency of water use in agriculture by at least 30 percent, according to a study published in *Sustainability*.⁵³ Soil moisture sensors, evapotranspiration measurements and remote sensors would allow farmers to determine exactly how much water is needed to irrigate their crops, significantly reducing water consumption.⁵⁴

Another way to alleviate the effects of water scarcity in areas with high water stress is to increase the use of treated wastewater in the agricultural sector. This produces a triple dividend, by increasing the availability of fresh water for the environment, for farming, and for human consumption.⁵⁵ Many regions and utility companies around the world are implementing successful large-scale wastewater recycling solutions, including Israel, Singapore, and parts of California. It is even being done at the International Space Station.⁵⁶

Chile should also work to better match agricultural products to the environment by growing crops that are better adapted to drought situations, low water availability, and climatic extremes. This is an internationally recommended measure to improve adaptation to climate change in areas experiencing high water stress.⁵⁷ Doing the opposite—growing tropical fruits such as avocado in semiarid areas—can generate high private profitability but also results in high environmental and social costs that are paid for by society as a whole.

Soil conservation or soil management would also help reduce water consumption in Chilean agriculture. Soil conservation refers to a series of agricultural techniques such as the incorporation of cover crops or the practice of direct sowing (zero tillage), which helps to accumulate carbon and organic matter in soils to prevent runoff, improve the infiltration of water, and recharge aquifers.⁵⁸

Water storage and harvesting systems, as well as micro-reservoirs on a farm scale, are low-cost and well-managed measures that expand the availability of irrigation and drinking water to thousands of small and medium-size farmers. They allow land conservation and do not require large investments, just a few benefits of implementing these systems in Chile.⁵⁹

CONCLUSION

The Reguemos Chile hydro-highway would be expensive and take years to build. It would only benefit big agriculture and would cause unknown and unprecedented social and environmental damage to the communities who live along its route, damage that would be exacerbated by the national water shortage and continued impacts of climate change. There are better solutions to help alleviate Chile's water scarcity problems. In the current context of climate change and water stress, it is worth investing in alternative projects that may avoid the harmful anticipated impacts of this hydro-highway.

Endnotes

- 1 Andrew Maddocks, Robert Samuel Young, and Paul Rieg, “Ranking the World’s Most Water-Stressed Countries in 2040,” World Resources Institute, August 26, 2015, <https://www.wri.org/blog/2015/08/ranking-world-s-most-water-stressed-countries-2040>.
- 2 World Bank Group, “Country Context: Chile,” <https://climateknowledgeportal.worldbank.org/country/chile#:~:text=Chile%20is%20highly%20vulnerable%20to,among%20the%20most%20vulnerable%20sectors> (accessed July 1, 2020). NASA Earth Observatory, “A Strained Water System in Chile,” NASA, <https://earthobservatory.nasa.gov/images/146577/a-strained-water-system-in-chile>, (accessed July 1, 2020).
- 3 Amulén: La Fundación del Agua, *Pobres del Agua: Radiografía del Agua Rural de Chile: Visualización de un Problema Oculto*, Centro UC, 2019, <https://drive.google.com/file/d/1Bv6BoTX2xrFbp8meGFPjigISTPPPZ-a/view>.
- 4 Deutsche Welle: Ciencia y Ecología, “Millones en América Latina Tienen Que Combatir el Coronavirus Sin Agua Potable,” Deutsche Welle, <https://www.dw.com/es/millones-en-am%C3%A9rica-latina-tienen-que-combatir-el-coronavirus-sin-agua-potable/a-52982337> (accessed July 12, 2020).
- 5 CPI: Consejo Político de Infraestructura, “Carretera Hídrica Ingresa Este Martes al MOP y Gestores Optan por Presentar Primer Tramo, Que Requiere US\$ 6 Mil Millones de Inversión,” *Infraestructura Pública*, September 2, 2019, <http://www.infraestructurapublica.cl/carretera-hidrica-ingresa-este-martes-al-mop-gestores-optan-presentar-primer-tramo-requiere-us-6-mil-millones-inversion>.
- 6 Rutger Willem Hofste et al., “17 Countries, Home to One-Quarter of the World’s Population, Face Extremely High Water Stress,” World Resources Institute, <https://www.wri.org/blog/2019/08/17-countries-home-one-quarter-world-population-face-extremely-high-water-stress>.
- 7 Dirección Meteorológica de Chile, “Anuario Meteorológico 2019,” Dirección General de Aeronáutica Civil, 2020, <https://climatologia.meteochile.gob.cl/application/publicaciones/anuario/2019>.
- 8 Maddocks, Young, and Rieg, “Ranking the World’s Most Water-Stressed Countries.”
- 9 Pablo Uchoa, “¿Cuán Probable Es Que Tu País Sufra Escasez de Agua?” BBC World Service, August 6, 2019, <https://www.bbc.com/mundo/noticias-49251961>.
- 10 World Resources Institute, “Aqueduct Country Ratings: Chile,” <https://wri.org/applications/aqueduct/country-rankings/?country=CHL> (accessed August 4, 2020). “El Doloroso Saldo de la Peor Sequía en Chile: 10 Mil Animales Han Muerto Entre Las Regiones de Coquimbo al Maule,” *El Mostrador*, September 1, 2019, <https://www.elmostrador.cl/dia/2019/09/01/el-doloroso-saldo-de-la-peor-sequia-en-chile-10-mil-animales-han-muerto-entre-las-regiones-de-coquimbo-al-maule>.
- 11 Roberto Burgos, “The Current Reform of the Chilean Water Code: An Attempt to Contest the Commoditised Treatment of Water,” *TLI Think! Paper* 82 (April 2017), <http://dx.doi.org/10.2139/ssrn.3049153>.
- 12 Fundación Chile, “Transición Hídrica: El Futuro del Agua en Chile,” June 2019, <https://fch.cl/wp-content/uploads/2019/07/transicion-hidrica-el-futuro-del-agua-en-chile.pdf>.
- 13 Corporación Reguemos Chile, “Los Cimientos de la Organización,” 2016, <http://reguemoschile.cl/noticias/corporacion-reguemos-chile.php>.
- 14 Corporación Reguemos Chile, “Carretera Hídrica: Conoce Nuestros Proyectos y Sus Beneficios,” 2016, <http://www.reguemoschile.cl/solucion.php>.
- 15 “Carretera Hídrica: ¿La Solución al Deficit de Agua en Chile?” *The Clinic*, September 21, 2019, <https://www.theclinic.cl/2019/09/21/carretera-hidrica-la-solucion-al-deficit-de-agua-en-chile/>.
- 16 Asociación Reguemos Chile, *Estudio de Disponibilidad Hídrica: Cuencas de las Regiones del BioBío y del Maule*, Hidrogestión, January 15, 2018, <http://reguemoschile.cl/pdf/hidrologico/HDG-1369-01-B.pdf>.
- 17 Reguemos Chile, “Presentación Corporación Reguemos Chile,” https://www.youtube.com/watch?time_continue=73&v=dmtv4o1sUNw, (accessed June 1, 2020).
- 18 Ibid.
- 19 Reguemos Chile, “Presentación Corporación Reguemos Chile,” https://www.youtube.com/watch?time_continue=73&v=dmtv4o1sUNw.
- 20 Reguemos Chile, *Memoria de Cálculos Ingeniera Preliminar Carretera Hídrica*, <http://www.reguemoschile.cl/pdf/memoria-carretera-hidrica.pdf> (accessed July 13, 2020).
- 21 Consuelo Rehbein, “Carretera Hídrica No Estará Lista Antes de 8 Años, Según Expertos,” *Publimetro*, September 24, 2019, <https://www.publimetro.cl/cl/noticias/2019/09/24/carretera-hidrica-expertos.html>.
- 22 Biobío Chile, “Chile: Buscan Crear Carretera Hídrica Que Extraiga Agua del Río Bio Extranigra al Resto del País,” *América Economía*, September 2, 2019, <https://www.americaeconomia.com/negocios-industrias/chile-buscan-crear-carretera-hidrica-que-extraiga-agua-del-rio-bio-al-resto>.
- 23 Ibid.
- 24 Rehbein, “Carretera Hídrica No Estará Lista Antes de 8 Años.”
- 25 Asociación Reguemos Chile, “Estudio de Disponibilidad Hídrica.”
- 26 Fernanda Castro Purrán, “Los Impactos de la Carretera Hídrica,” lecture, Sociedad Civil por la Acción Climática, Santiago, Chile, December 1, 2019.
- 27 Reguemos Chile, “Presentación Corporación.”
- 28 Reguemos Chile, *Memoria de Cálculos Ingeniera Preliminar*.
- 29 “Entrevista: Juan Sutil, Presidente de la Corporación Reguemos Chile,” *Hormigón al Día*, <http://hormigonaldia.ich.cl/entrevista/juan-sutil-presidente-de-la-corporacion-reguemos-chile/> (accessed August 28, 2020).
- 30 Marco Fajardo, “Injusticia Socioambiental el Duro Diagnostico de la Comunidad Científica,” *El Mostrador*, September 4, 2019, <https://www.elmostrador.cl/cultura/2019/09/04/injusticia-socioambiental-el-duro-diagnostico-de-la-comunidad-cientifica-al-%20road-water-project%20/>.
- 31 Reguemos Chile, *Estudio de Ingeniería de Perfil Para el Desarrollo del Proyecto de Carretera Hídrica*, May 2019, http://reguemoschile.cl/pdf/ambiental/1%20-%2005_INF_REG0001PB_PAMB_AMB_v0_TRAMOL.pdf.
- 32 Fajardo, “Injusticia Socioambiental.”
- 33 Environmental Justice Atlas, “Ralco HEP and Bio Projector Watershed Hydro Plans, Chile,” <https://ejatlas.org/conflict/bio-bio-watershed-targeted-by-ministry-of-energys-hydro-plans-chile> (accessed August 28, 2020).
- 34 Gobierno de Chile, Ministerio de Obras Públicas, *Cuenca del Río Bio Pública’s*, December 2004, <https://mma.gob.cl/wp-content/uploads/2017/12/BioBio.pdf>.
- 35 Fajardo, “Injusticia Socioambiental.”
- 36 Gobierno de Chile, *Contribución Determinada a Nivel Nacional (NDC) de Chile*, Update 2020, https://mma.gob.cl/wp-content/uploads/2020/04/NDC_Chile_2020-espan%CC%83ol-1.pdf.
- 37 Metropolitan Water District of Southern California, *History and First Annual Report*, 1939, http://www.mwdh2o.com/PDF_Who_We_Are/1.5.1_Inaugural_Annual_Report_1939.pdf. Historic American Engineering Record, *Colorado River Aqueduct Recording Project 1998*, 1998, <http://npshistory.com/publications/habs-haer-hals/haer-ca-226.pdf>. Industria del Cemento, “Hoja de Ruta Chile,” April 2019, <http://hojaderutaficem.ich.cl/>. U.S. Environmental Protection Agency, *Greenhouse Gas Equivalencies Calculator*, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (accessed August 3, 2020).
- 38 Red por los Ríos Libres, “Defensores de Ríos en Alerta por Carretera Hídrica,” press release from Ninth Summit of the Red por los Ríos Libres, Alto Biobío, March 2019.

- 39 Ibid.
- 40 Max Radwin, "Chile's Mapuche-Pehuenche: 10 Years After Relocation," *Al Jazeera*, January 31, 2016, <https://www.aljazeera.com/indepth/features/2016/01/chile-mapuche-pehuenche-10-years-relocation-160127111719637.html>.
- 41 Theodore Downing and Carmen Garcia-Downing, "Plan B: What Is Going to Happen to My People?" *Cultural Survival Quarterly*, September 2001, <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/plan-b-what-going-happen-my-people>.
- 42 Santa Barbara, Chile, "Su Preocupación Mostraron Los Alcaldes de la Región de Biobío por Proyecto de Carretera Hídrica," *Municipalidad*, September 27, 2019, <https://www.santabarbara.cl/noticias-de-la-comuna/municipalidad/item/1504-su-preocupacion-mostraron-los-alcaldes-de-la-region-del-bio-bio-por-proyecto-de-carretera-hidrica>.
- 43 Paula Huenchumil, "Las Desconocidas Críticas de la 'Carretera Hídrica' Que Busca Llevar Agua del Bío Levar al Norte," *Interferencia*, March 19, 2019, <https://interferencia.cl/articulos/las-desconocidas-criticas-la-carretera-hidrica-que-busca-llevar-agua-del-bio-bio-al-norte>.
- 44 Huenchumil, "Las Desconocidas Críticas."
- 45 Reguemos Chile, "Casos Internacionales," <http://www.reguemoschile.cl/casos.php> (accessed August 5, 2020).
- 46 Jean-Louis Chaléard and Anaïs Marshall, "Consequences of the Establishment of Agro-Industrial Enterprises on the Peruvian Piedmont Coast," *L'Espace Géographique* 44, no. 3 (2015), https://www.cairn-int.info/article-E_EG_443_0245--consequences-of-the-establishment-of.htm.
- 47 Ryan Dube, "Peru Irrigation Project Sows Dissent," *Wall Street Journal*, February 8, 2017, <https://www.wsj.com/articles/peru-irrigation-project-sows-dissent-1486549839>.
- 48 "Odebrecht: Proyecto Olmos Terminó Costando 580 Millones de Dólares," *América Noticias*, February 2, 2017, <https://www.americatv.com.pe/noticias/actualidad/odebrecht-proyecto-olmos-termino-costando-580-millones-dolares-n265994>.
- 49 Platform for Sustainable Alentejo, *The Alqueva Dam: How the EIB Helped to Finance Environmental Destruction in Portugal*, January 2005, https://bankwatch.org/documents/alqueva_dam_02_05.pdf.
- 50 Josh Harkinson, "Meet the California Couple Who Use More Water Than Every Home in Los Angeles Combined," *Mother Jones*, August 2016, <https://www.motherjones.com/environment/2016/08/lynda-stewart-resnick-california-water/>. *CRS Report for Congress: California's San Joaquin Valley—A Region in Transition*, December 2005, https://www.everycrsreport.com/files/20051212_RL33184_37b57a2e671c0d0d0d653ab619576d45f940a81b.pdf.
- 51 Tom Philpott, "Invasion of the Hedge Fund Almonds," *Mother Jones*, January 2015, <https://www.motherjones.com/environment/2015/01/california-drought-almonds-water-use/>.
- 52 Douglas Aitken et al., "Water Scarcity and the Impact of the Mining and Agricultural Sectors in Chile," *Sustainability* 8, no. 2 (February 2016), <https://www.mdpi.com/2071-1050/8/2/128/htm>.
- 53 Aitken et al., "Water Scarcity."
- 54 Andrea Becerra, *Drought and Rain Management in the Metropolitan Region of Santiago: Recommendations for a New Road*, NRDC, July 2019, <https://www.nrdc.org/sites/default/files/new-course-managing-drought-downpours-santiago-report-spanish.pdf>.
- 55 James Winpenny et al., *Water Reuse in Agriculture: Benefits for All?* Organization for Food and Agriculture, 2013, www.fao.org/docrep/017/i1629s/i1629s.pdf.
- 56 Erika Moyer, "Reciclar Más Agua: Resolución de Año Nuevo para América Latina," NRDC, January 2019, <https://www.nrdc.org/es/experts/erika-moyer/reciclar-agua-resolucion-ano-nuevo-america-latina>. NASA, "Water Recycling," October 13, 2014, <https://www.nasa.gov/content/water-recycling/>. Orange County Water District, "Water Reuse," <https://www.ocwd.com/what-we-do/water-reuse/> (accessed August 4, 2020).
- 57 Ali Raza et al., "Impact of Climate Change on Crops Adaptation and Strategies to Tackle Its Outcome: a Review," *Plants* 8, no. 2 (January 2019), 10.3390/plants8020034.
- 58 NRDC, "The Secret Weapon to Healthier Soil," January 26, 2018 <https://www.nrdc.org/stories/secret-weapon-healthier-soil>. "Soil Health and Cover Crop Facts: Ten Ways Cover Crops Enhance Soil Health," Soil Health Institute, December 2017, <https://soilhealthinstitute.org/>
- 59 "Canada's Prairie Drought: Back to a Dusty Future," *The Economist*, July 25, 2009, <https://www.economist.com/the-americas/2009/07/23/back-to-a-dusty-future>.